

**BRITISH COLUMBIA
MINISTRY OF FORESTS AND RANGE**

Kamloops Timber Supply Area

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

Effective June 1, 2008

**Jim Snetsinger, RPF
Chief Forester**

Table of Contents

Objective of this Document.....	1
Acknowledgement.....	1
Description of the Kamloops Timber Supply Area.....	1
History of the AAC for the Kamloops TSA.....	2
New AAC determination.....	3
Information sources used in the AAC determination.....	4
Role and limitations of the technical information used.....	5
Statutory framework.....	5
Guiding principles for AAC determinations.....	5
The role of the base case.....	7
Base case for the Kamloops TSA.....	8
Consideration of Factors as Required by Section 8 of the <i>Forest Act</i>	10
Land base contributing to the timber harvest.....	10
- general comments.....	10
- areas of physical or economic inoperability.....	11
- environmentally sensitive areas.....	11
- low-productivity sites and unmerchantable forest types.....	12
- deciduous forest types and Pulpwood Agreement No.16.....	12
- cedar- and hemlock-leading stands.....	13
- timber licence reversions.....	15
- roads, trails and landings.....	15
- issued woodlot licences.....	15
- community forest agreements.....	15
Existing forest inventory.....	16
- status of the forest cover inventory.....	16
- volume estimates for existing, natural, unmanaged stands.....	17
- interior log grades.....	17
Expected rate of growth.....	18
- site productivity estimates.....	18
- volume estimates for regenerated, managed stands.....	19
- operational adjustment factors (OAFs):.....	19
- volume gains from select seed:.....	20
- minimum harvestable criteria.....	20
Regeneration delay.....	21
Not-satisfactorily-restocked areas.....	22
Silvicultural systems.....	22
Incremental silviculture.....	22
Mortality in young pine stands.....	23
Utilization standards.....	23
Decay, waste and breakage.....	24
Integrated resource management objectives.....	24
- forest cover requirements for cutblock adjacency and green-up.....	24
- hydrology and the MPB infestation.....	25
- visually sensitive areas.....	25
- recreation areas.....	26
- riparian management.....	26
- community watersheds.....	27
- First Nations' archaeological sites.....	27
- First Nations' cultural heritage resources.....	28
- wildlife habitat and identified wildlife.....	29

- ungulate winter range: deer and moose	29
- mountain caribou	30
- Identified Wildlife Management Strategy.....	32
- stand-level biodiversity and wildlife tree retention	32
- landscape-level biodiversity and old-forest retention	33
- impacts of MPB on forage supply	33
- ecosystem restoration	33
Other information	34
- strategic land use planning and objectives.....	34
- First Nations considerations	34
- participation in the forest sector.....	35
- consultation process for AAC determination.....	35
- areas with harvesting deferrals	39
- Arrowstone archaeological sites	39
- permanent sample plots.....	39
- woodlot expansion program.....	40
- alternative harvest flows.....	40
- community dependence on harvest level	42
- bio-energy considerations.....	42
Economic and Social Objectives	43
- Minister's letter.....	43
- local objectives	43
Non-recoverable losses	44
- Mountain Pine Beetle	44
- 'shelf-life' of MPB-attacked pine	45
- losses to forest health factors, wind, wildfire	47
Reasons for Decision	48
Determination	52
Implementation.....	52
Appendix 1: Section 8 of the <i>Forest Act</i>	54
Appendix 2: Section 4 of the Ministry of Forests and Range Act.....	56
Appendix 3: Minister of Forests and Range's letter of July 4, 2006.....	57
Appendix 4: List of written submissions received	59

Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia (BC) in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Kamloops 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 and Range (MFR) in the Kamloops and Headwaters Forest Districts, the Southern Interior Forest Region, and the ministry's Forest Analysis and Inventory Branch. I am also grateful to Timberline Natural Resource Group of Kelowna, BC, for the timber supply analysis, and to the First Nations, individuals and companies who contributed to the public input stage of the process.

Description of the Kamloops Timber Supply Area

The Kamloops TSA is located in south central BC and covers approximately 2.77 million hectares of the Southern Interior Forest Region. It ranges from Logan Lake in the south to Wells Gray Park in the north-west, including the Blue River area, and is bounded by the Columbia mountains to the east and the Cariboo Regional District to the west.

The forest and range resources of the TSA are administered by the MFR's Kamloops Forest District and the Headwaters Forest District. The topography of the Kamloops TSA is diverse, ranging from hot, dry grasslands in the valley bottoms in the south to wet rugged mountains in the north, and is bisected by the North Thompson River which joins the South Thompson River at Kamloops.

Forest lands in the TSA include extensive grasslands and forests that together provide timber and other forest products, forage for livestock and various wildlife species, fish, minerals, and opportunities for recreation and tourism. Ranching is very important to the local economy; the range program administered by the MFR in the TSA is the second largest in the province.

The area currently considered suitable and available for timber harvesting—the timber harvesting land base, or 'THLB'—covers roughly 45 percent of the TSA (excluding Wells Gray Park). Of the THLB area, forest stands predominated by Douglas-fir cover roughly 33 percent; lodgepole pine, 30 percent; spruce, 18 percent; and subalpine fir, 9 percent. Ponderosa pine, western red cedar, western hemlock and trembling aspen are also present.

Diverse landscapes in the TSA provide a variety of wildlife habitats, including the grasslands, lakes and wetlands, forested slopes, and alpine areas. Grizzly bear, black bear, mule deer, moose, bighorn sheep and many smaller furbearers, as well as many species of birds and amphibians, are common. The TSA includes portions of the range of three herds of mountain caribou. Twenty-six species are considered identified wildlife species within the Kamloops and Headwaters Forest Districts for which special management is required by provincial forest practices legislation. In the TSA, numerous rivers, lakes and streams support many species of fish including rainbow trout, kokanee, steelhead, brook trout and white fish. Significant demands are also placed on water resources to meet both domestic and agricultural needs.

Parks, recreation sites and trails, in addition to roaded and non-roaded areas, provide opportunities for numerous outdoor activities. Residents and tourists enjoy recreation activities including hiking, camping, hunting, fishing, wildlife viewing, boating, mountain-biking,

snowmobiling, downhill and cross country skiing, and ski touring. The TSA includes a number of parks and popular recreation areas.

The major population centres in the TSA are Kamloops, Clearwater, Logan Lake, Chase, Barriere, Cache Creek and Ashcroft. Smaller communities include Vavenby, Little Fort and Blue River. In addition, ten First Nations communities are located within the TSA. These include the Adams Lake Indian Band, Bonaparte Indian Band, Kamloops Indian Band, Simpcw First Nation, Neskonalith Indian Band, Skeetchestn Indian Band, Whispering Pines/Clinton Indian band, Little Shuswap Indian Band, Ashcroft Indian Band and Oregon Jack Indian Band. The 2006 Census data indicate a total population of 107,298 people residing in the TSA.

The economy of the Kamloops TSA is well diversified, and is dominated by an extensive local economy in the City of Kamloops which is based on trade, administration, services and manufacturing. The public sector, forestry and tourism are the major employment sectors, with agriculture, construction and mining also contributing to the local economy.

History of the AAC for the Kamloops TSA

In 1981, the AAC for the TSA was determined at 2 350 000 cubic metres. On January 1, 1989, the AAC was increased by 62 280 cubic metres to 2 412 280 cubic metres, to account for a transfer of harvesting rights and land base from 100 Mile TSA to the Kamloops TSA. In 1994, the AAC was increased by 4400 cubic metres to 2 416 680 cubic metres, accounting for a transfer of land from TFL 35 to the Kamloops TSA for the Small Business Forest Enterprise Program (SBFEP). In 1996, the AAC was determined at 2 679 180 cubic metres, including a partition of 200 000 cubic metres for cedar and hemlock stands and a partition of 86 000 cubic metres for Pulpwood Agreement (PA) 16.

In 2003, the AAC was determined at 2 682 770 cubic metres, with a new partition of 20 000 cubic metres for deciduous stands outside the current boundary of PA 16, with 14 870 cubic metres specified as attributable to innovative practices and activities within the Adams Lake Innovative Forest Practices Agreement Area, and with all woodlot licence volumes issued since the 1996 determination (31 280 cubic metres) now excluded, as required by the *Forest Act*.

In 2004, the AAC was determined at 4 352 770 cubic metres, with partitions specifying harvest volumes attributable as follows: to the salvage of fire-damaged timber, 670 000 cubic metres; to the salvage of timber damaged by the Mountain Pine Beetle (MPB), 1 000 000 cubic metres; to the harvest of cedar- or hemlock-leading stands, 200 000 cubic metres; to PA 16, 86 000 cubic metres; to stands predominated by deciduous species, 20 000 cubic metres; and, to conventional harvesting in the TSA, 2 376 770 cubic metres.

The AAC is currently apportioned as shown in Table 1, below.

	Annual volume cubic metres	%	Conventional	%	Deciduous- leading	%
Forest Licences Replaceable	1 570 637	36	1 570,637	66		
Forest Licences Non-Replaceable	1 600 288	37	138 288	6	20 000	100
BCTS Timber Sale Licence/Licence	864 476	20	548 476	23		
Pulpwood Agreement TSL	86 000	2				
Community Forest Agreement	60 000	1		3		
Woodlot Licence	33 570	1	33 570	1		
Forest Service Reserve	137 799	3	25 799	1		
Total	4 352 770	100	2 376 770	100	20 000	100

	Fire	%	Hemlock Cedar	%	MPB	%
Forest Licences Non-Replaceable	560 000	84	182 000	91	700 000	70
BCTS Timber Sale Licence	100 000	15	16 000	8	200 000	20
Forest Service Reserve	10 000	1	2 000	1	100 000	10
Total	670 000	100	200 000	100	1 000 000	100

Table 1: Current apportionment of the 4 352 770-cubic-metre AAC for the Kamloops TSA.

New AAC determination

Effective June 1, 2008, the new AAC for the Kamloops TSA will be 4.0 million cubic metres. This effectively reduces the former AAC by 8.1 percent. This new AAC includes partitions specifying allowable annual harvest volumes attributable to the following:

- for harvesting in stands predominated by Douglas-fir, spruce, or balsam, a maximum of 1 700 000 cubic metres (referred to in this document as the 'non-pine' partition);
- for harvesting of pine species, 1 994 000 cubic metres, with the possibility of an increase to the extent of any under-harvesting in the 'non-pine' partition;
- for harvesting in cedar- or hemlock-leading stands, 200 000 cubic metres;
- for harvesting in PA 16, 86 000 cubic metres; and
- for harvesting in deciduous-leading stands outside PA 16, within the Headwaters District, 20 000 cubic metres;

This determination, which excludes all woodlot licence volumes, will remain in effect until a new AAC is determined, which must take place within five years of the effective date of this determination.

Information sources used in the AAC determination

- Timberline Natural Resource Group, Forests for Tomorrow (FFT), Southern Interior Forest Region. *Kamloops TSA Mountain Pine Beetle Horizontal Initiatives Project*. March 2007.
- Timberline Natural Resource Group, *Timber Supply Analysis Information Package*. July 2007.
- Kamloops Land and Resource Management Plan, declared a higher level plan effective January 23, 1996.
- British Columbia Ministry of Forests, Forest Analysis and Inventory Branch. *Timber Supply Review for the Kamloops Timber Supply Area: Public Discussion Paper*. Victoria, BC Government of British Columbia, October 2007. 11 pp.
- B.C. Ministry of Water, Land and Air Protection. *Procedures for Managing Identified Wildlife* –V. 2004. Victoria, BC. <http://www.env.gov.bc.ca/wld/frpa/iwms/procedures.html>
- Ministry of Forests and Range. *Managing Identified Wildlife: Procedures and Measures. Volume 1*. February 1999.
- BC Ministry of Forests, Forest Analysis Branch. *Modeling Options for Disturbance outside the THLB* (Draft Working Paper). Victoria: Province of British Columbia. 2003.
- BC Ministry of Forests and Ministry of Environment, Lands and Parks. *Landscape Unit Planning Guide*. Forest Practices Code of British Columbia. Victoria: Province of British Columbia. 2000.
- BC Ministry of Forests. *Mapping and Assessing Terrain Stability Guidebook 2nd Edition*. Victoria: Province of British Columbia. 1999.
- BC Ministry of Forests. *Procedures for Factoring Visual Resources into Timber Supply Analyses*. Victoria: Province of British Columbia. 1998.
- BC Ministry of Forests. *Metric Diameter Class Decay, Waste and Breakage Factors*. Victoria: Province of British Columbia. 1976.
- BC Ministry of Forest and Range 2003. *Ministry of Forests Consultation Guidelines*.
- Letter from the Minister of Forests and Range to the chief forester stating the economic and social objectives of the Crown. July 4, 2006.
- *Forest and Range Practices Act*, 2002 and amendments;
- *Forest and Range Practices Regulations*, 2004 and amendments;
- *Forest Practices Code of British Columbia Act*, 1995, and amendments;
- *Forest Practices Code of British Columbia Act Regulations*, 1995, and amendments;
- *Forest Practices Code of British Columbia, Guidebooks, BCFS and MELP*;
- *Ministry of Forests and Range Act*, (consolidated to March 30, 2006).
- Technical review and evaluation of current and expected operating conditions through comprehensive discussions with MoFR staff, including the AAC determination meeting held in Kamloops on December 12-13, 2007.
- Input received from First Nations through the consultation process.
- Information received at a meeting in Kamloops Forest District Office on November 16, 2007, with representatives of First Nations bands and tribal councils.
- Information received at a meeting in Kamloops Forest District Office on November 16, 2007, with representatives of major licensees.
- Information received from the major licensees through the referral process.
- Information received at a meeting in Kamloops held in the Shuswap Nation Tribal council office on February 6, 2008, with representatives of First Nations bands and tribal councils.

- British Columbia Ministry of Forests and Ministry of Environment, Land and Parks. *Biodiversity Guidebook*. Government of British Columbia, Victoria, BC. 1995. 99 pp.
- British Columbia Ministry of Forests Forest Practices Branch. *Interior Watershed Assessment Procedure Guidebook (IWAP); Second Edition Version 2.1*. Government of British Columbia, Victoria, BC. 1999. 40 pp.
- British Columbia Ministry of Forests. *Kamloops Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination*. Government of British Columbia, Victoria, BC. 2003. 56 pp + app.
- British Columbia Ministry of Forests. *Kamloops Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination*. Government of British Columbia, Victoria, BC. 2004. 8 pp.
- British Columbia Ministry of Forests – Forest Analysis Branch. *Supplemental Guide for Preparing Timber Supply Analysis Data Packages*. Government of British Columbia, Victoria, BC. 2003. 61 pp.
- Information received at public meetings on February 19 and 22, 2007, with representatives of the major licensees, first nations and the public.

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 computerised analytical models currently used to assess timber supply purposely simplify the real world and unavoidably involve uncertainty in many of the inputs, due in part to variations in physical, biological and social conditions. While ongoing, science-based improvements in the understanding of ecological dynamics will help reduce some of these uncertainties, technical information and analytical methods alone cannot incorporate all of the social, cultural and economic factors relevant to forest management decisions, nor do they necessarily provide complete answers or solutions to the forest management problems addressed in AAC determinations. However, they do provide valuable insight into potential outcomes of different resource-use assumptions and actions—important components of the information that must be considered in AAC determinations.

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

Statutory framework

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

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—a principle that has been recognized in the legislated requirement to redetermine these AACs every five years. This principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, I attempt to reflect, as closely as possible, operability and 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 work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or with respect to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest and Range Practices Act*.

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

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

In some cases, even when government has made a formal land-use decision, it is not necessarily possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring for instance further detailed planning or legal designations such as those provided for under the *Land Act* and the *Forest and Range Practices Act* (FRPA). In cases where there is a clear government intent 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 frequent AAC reviews will ensure that future determinations address ongoing plan-implementation decisions.

In the Kamloops TSA, management of the forest and range is guided in part by two important planning processes, the Kamloops Land and Resource Management Plan (LRMP), and the Sustainable Forest Management (SFM) Plan. The Kamloops LRMP was originally designated a higher level plan on January 31, 1996, and provides legal land use direction to forest tenure holders within the Kamloops LRMP area of which the Kamloops TSA is a part. All major forest tenure holders are required to prepare Forest Stewardship plans that are legally binding and

reference its 26 objectives. Forest tenure holders who currently retain or are seeking environmental certification by the Canadian Standards Association (CSA) of their management practices, participate in the SFM plan.

Where appropriate, in determinations 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 not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

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

With respect to First Nations' issues, I am aware of the Crown's legal obligation resulting from decisions in recent years made by the Supreme Court of Canada. I am aware of the Crown's legal obligation to consult with First Nations regarding 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 TSR process for the Kamloops TSR, 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 those interests that will be impacted by my proposed decision. When aboriginal interests are raised that are outside my jurisdiction, I will endeavour to forward these interests for consideration by appropriate decision makers.

The AAC that I determine should not be construed as limiting the Crown's obligations under the Court's 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 Kamloops TSA. It is also independent of any decisions by the Minister of Forests and Range with respect to subsequent allocation of wood supply.

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

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 (TSR) program for TSAs and Tree Farm Licences (TFLs).

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

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

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

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

Such adjustments are made on the basis of informed judgement using current, available information about forest management that may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines or plans. Thus it is important to remember that while the timber supply analysis with which I am provided is integral to the considerations leading to the AAC determination, the AAC is not determined by calculation but by a synthesis of judgement and analysis in which numerous risks and uncertainties must be weighed. Depending upon the outcome of these considerations, the resulting AAC may or may not coincide with the base case forecast. Moreover, because some of the risks and uncertainties considered are qualitative in nature, once an AAC has been determined, further computer analysis of the combined considerations may not confirm or add precision to the AAC.

Base case for the Kamloops TSA

In view of the significant ongoing impacts of the Mountain Pine Beetle in the Kamloops TSA, the timber supply analysis used as a basis for my considerations in this determination consisted of refinements to work completed for the project ‘Kamloops TSA Mountain Pine Beetle Horizontal Initiatives Project’, which was funded by MFR’s ‘Forests for Tomorrow’ program in the ministry’s Southern Interior Forest Region. All related analysis was completed by the Timberline Natural Resource Group Ltd., under MFR direction, using Timberline’s CASH6 forest estate model.

To model the progression of the MPB epidemic in the TSA and the related useful ‘shelf-life’ of the damaged pine, the first decade of the timber supply forecast was projected in two five-year periods, from 2006 to 2010, and from 2011 to 2015. In each of these five-year periods, spatial adjacency and visual requirements were not enforced for any stand that was projected to experience greater than 50-percent mortality by the end of the five-year period. After 2015, the visual and adjacency requirements were returned to normal. (More aspects of the modeling for

MPB-related implications are considered below in ‘*Non-recoverable losses: Mountain Pine Beetle*’.)

In the 2007 base case projection, the initial harvest level was set at 4 200 000 cubic metres per year, rather than at the previous AAC of 4 352 770 cubic metres per year determined for the TSA by the chief forester in January, 2004. This lower level was chosen in response to the following situation. The 2004 determination had included a temporary partition of 670 000 cubic metres per year, for three years, to salvage the timber damaged by wildfire in 2003. The timber which this partition was designed to help salvage has now largely been harvested, and by 2006, roughly 500 000 cubic metres per year of this partitioned volume had been redeployed into the salvaging of stands impacted by the MPB. This is a 50% increase in pine salvage relative to the harvest level specified in the 2004 determination. Partly consequential to this partial redeployment of volume, and partly due to softening markets in 2006, the annual harvest was roughly 4 200 000 cubic metres, the initial harvest level chosen for the base case.

In the 2007 base case, the initial harvest level was projected to be maintained for five years before declining by 40 percent to approximately 2.51 million cubic metres per year. This level was then maintained for the next five years before declining by a further 16 percent in 2016, to a mid-term harvest level of 1.83 million cubic metres per year. This mid-term level, which is 56 percent below the actual 2006 harvest level, is 23 percent below what was assumed in 2001 to be a sustainable mid-term level; the 23-percent difference is assessed by analysts to be in roughly progressive proportion to the total percentage loss of mature timber expected to occur by 2016 due to the MPB. In September 2007, MFR released the provincial-scale MPB analysis ‘*Timber Supply and the mountain pine beetle infestation in British Columbia, 2007 update*’, which portrayed a somewhat lower mid-term timber supply for the Kamloops base case. Although the models and the assumptions differed, both analyses suggested that the projected reduction in the mid-term timber supply will be roughly in proportion to the expected overall eventual loss of mature pine volume due to the MPB.

I have reviewed in detail and—with qualifications as accounted for in various sections of this document—concur with the assumptions and methodology incorporated in the base case projection, including assumptions about the sequencing of stands with various levels of MPB attack for harvest, and the assumption—derived from recent harvest billing statistics—of harvesting 1.4 million cubic metres per year from non-pine stands during the first two five-year periods. I have also reviewed projections over the entire forecast period for: the total growing stock both for the whole TSA and for the operable component; the harvest contributions from unmanaged and managed stands; the average volumes projected to be harvested per hectare and the average diameters at breast height; the average ages of forest stands harvested over time; and the total area harvested annually. I have also reviewed in detail the tree species composition in the TSA both inside and outside the timber harvesting land base. Details of my considerations of particular aspects of the analysis and its projections, in some cases in relation to uncertainties in associated assumptions, are provided in the following sections.

From my review of the timber supply analysis, including detailed discussions with BCFS analysts who have directed and reviewed the analysis in detail, I find that the analysis in general and the base case forecast in particular provide a workable basis of reference for my considerations in this determination. In addition to the base case forecast I was provided with a number of sensitivity and alternative analyses. All of these analyses have been helpful in the considerations and reasoning, documented in the following sections, which have led to my determination.

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

Section 8 (8)

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

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

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

Land base contributing to the timber harvest

- general comments

The overall area of the Kamloops TSA, as estimated from inventory data reported in the 2007 timber supply analysis, is 2.77 million hectares. This total land base differs from—and in consideration of the following factors cannot meaningfully be compared to—earlier reported land base assessments. The difference is attributable to differences in the treatment of parks.

The total land base includes both forested and non-forested lands of various ownerships that include parks, Indian and government reserves, woodlot licence areas, and private and other lands. Some of these areas do not contribute either to timber harvesting or to forest cover requirements for other objectives, and are therefore excluded from the timber supply analysis. Other areas, such as woodlot licences, supply timber that is harvestable but that is administered and considered separately from the AAC for the TSA. A third category, areas that do not directly supply harvestable timber, such as parks and riparian reserves, do nonetheless provide habitats and forest cover that assist in meeting a variety of management objectives in the TSA, thereby contributing indirectly to the timber supply of the TSA.

Areas in the TSA which contribute directly to timber harvesting as well as to forest cover requirements are considered part of the timber harvesting land base, or 'THLB.' Areas of productive forest that contribute to forest cover requirements, whether or not they contribute directly to the timber supply, are known as the Crown forested land base. For the Kamloops TSA, after excluding Wells Gray, all non-forested areas, and all areas of non-productive forest, the total productive Crown forested land base is 53 percent of the total TSA area, i.e. 1 479 005 hectares.

The THLB comprises those parts of the productive Crown forested land that are currently considered to be economically and environmentally suitable and available for timber harvesting. In deriving the area of the THLB for any TSA, a series of deductions must be made from the total TSA area in recognition of many factors that, for economic or ecological reasons, effectively reduce the extent of the productive forest area that is suitable and available for timber harvesting. In the analysis for the Kamloops TSA, some of the most significant deductions were for 'inoperable areas' considered unsuitable for operations for economic or physical reasons, as well as for OGMAs, non-merchantable forest stands, environmentally sensitive areas, areas of low timber productivity, basal area retention requirements in riparian management areas, as well as areas deducted for a number of other reasons detailed in the timber supply analysis.

In making these land base deductions, appropriate assumptions or projections must be made about many factors, prior to quantifying the associated net area to be deducted in each case, while allowing for any portion that may have been deducted earlier in the series in respect of another, overlapping objective. My considerations of the reasonableness of particular deductions are documented in the immediately following sections. Some land base exclusions from the THLB which are required to meet management objectives for specified resource values other than timber are considered, as required, under Section 8 (8)(a)(v) below, in 'Integrated resource

management objectives'. Those considerations include riparian reserve zones and management areas, as well as wildlife habitat and recreation areas.

- areas of physical or economic inoperability

Of the 1 479 005 hectares of the Kamloops TSA that are classified as productive crown forest land, in the 2007 analysis, in total 96 471 hectares were excluded in deriving the THLB, due to being either physically inaccessible or not economically viable for harvest. The areas excluded may nonetheless still contribute to meeting objectives for values other than timber. This land base exclusion was based on 'operability lines' that were initially developed in 1991 in consultation with major licensees and that were updated in 2002, again in consultation with licensees. Characteristics considered in defining the operability lines included steep slopes, broken topography, difficulty of road access, soil instability, high elevation, timber quality, combinations of these, and an inherent assessment of economic factors based on the experience of ministry and industry staff.

The updated operability line-work was not ready for incorporation in the analysis for the January 2003 AAC determination, nor was the operable land base re-defined for the January 2004 AAC determination, since this was an accelerated review focussed primarily on issues related to the MPB and wildfires. Staff of MFR have now reviewed the 2002 line-work, and report that it accounts appropriately for almost all of the harvesting that has occurred since the 2002 update, with only very minor changes anticipated. No public input has been received questioning the appropriateness of the operability lines.

I expect that the operability information will continue to be monitored and, if necessary, revised as new harvesting information becomes available and as inventories improve. For the current determination, I am satisfied that the updated line work provides the best available information, and that its incorporation in the timber supply analysis reflects a reasonable and adequate approximation to the operable areas in the TSA from which to project the timber supply.

- environmentally sensitive areas

Environmentally sensitive areas (ESAs) are forested areas that are considered to be sensitive for a variety of reasons or may be valuable for other resource values. In the analysis, a total of 140 000 hectares were identified as environmentally sensitive, of which, net of exclusions for other objectives, 66 656 hectares of productive Crown forest were excluded in deriving the THLB. Of this, 20 328 hectares were identified using recent terrain mapping as being unstable or having a high likelihood of landslide initiation following timber harvesting or road construction. Terrain stability mapping was not available for the entire TSA. Where it did not exist, older and coarser Environmentally Sensitive Area (ESA) mapping was used to assess terrain stability. This older ESA mapping was also used to assess environmental sensitivity for regeneration, recreation, and water. Due to the vintage of the information, if an ESA had been logged it was not excluded from the THLB. Those ESAs deemed highly sensitive and not already covered by more recent terrain stability mapping, an area totalling 46 328 hectares, were excluded.

I have reviewed with MFR staff the methodology and criteria applied in identifying the nature and extent of sensitive areas for exclusion, and I note that terrain stability mapping was incorporated in the analysis to the extent that it was available. I agree with MFR district staff that the assumptions incorporated in the base case include a reasonable accounting for concerns related to terrain stability and other sensitive areas. Other considerations related to environmental sensitivity, such as riparian areas, various wildlife habitats, and visually sensitive areas, are addressed elsewhere in this document.

- low-productivity sites and unmerchantable forest types

The Crown forest land in the Kamloops TSA includes an identified 109 573 hectares of forest stands that are physically operable but which are too problematic to harvest due to their low timber-growing potential or, if they do exceed the low-productivity site criteria, they are not currently utilized due to a low quality or volume of timber. These areas were removed from the THLB.

I have reviewed the characteristics of the stands and the criteria applied in excluding the areas that comprise this figure, and I concur with the need for removing these areas from contributing to the THLB. I am advised that the same information was presented to major licensees in the TSA, who have also agreed that this is the best information available. I conclude that these stands were properly excluded from the THLB and that the base case projection adequately accounts for current management in these areas.

- deciduous forest types and Pulpwood Agreement No.16

Deciduous forest types are those dominated by broad-leaved, deciduous species. In the July, 2001 timber supply analysis for the 2003 AAC determination, all stands dominated by deciduous species were excluded from the THLB, and any deciduous volumes in stands dominated by coniferous species were excluded from contributing to the timber supply. Nonetheless, in the 2003 AAC determination, in view of the extent of the deciduous harvesting taking place at that time in the TSA, and in view of what was seen as an emerging demand for additional deciduous volume, a new partition was established, specifying a volume of 20 000 cubic metres for harvesting attributable to deciduous species in the TSA in areas outside the boundary of Pulpwood Agreement No.16 ('PA 16'), discussed below.

In the 2007 timber supply analysis, deciduous-leading forest stands were included in deriving the THLB, but the deciduous volumes in coniferous-leading stands were deducted from the yield curves. Both of these procedures accord with current practice and licences in the TSA, as described to me in detail by MFR staff, although the current level of harvesting remains low.

District MFR staff advise that the demand for deciduous sawlogs in the TSA is limited, being mostly for birch stands. Current practice for major licensees in the TSA is to leave the deciduous stems in coniferous-leading stands as wildlife trees or coarse woody debris, in order to meet biodiversity objectives.

The partitioned 20 000 cubic metres specified for the harvest of deciduous timber outside the PA 16 area was only recently awarded in a Non-Replaceable Forest Licence and no related harvesting has yet occurred.

The 20 000-cubic-metre partition for deciduous implies a maximum harvest of 200 000 cubic metres over 10 years, and no related volumes have yet been harvested. The licence is for the harvesting of deciduous stands in the Headwaters District only, which contains roughly 560 000 cubic metres, or 28 years of harvesting at the maximum rate of 20 000 cubic metres per year. Given the fast growing rate of these species, and the indicated gross underestimation in deciduous volumes (see below, '*volume estimates for existing, natural, unmanaged stands*') the current partition is therefore certainly viable for at least the five-year effective period of this AAC determination, consistent with leaving large amounts of deciduous trees on the landscape to accommodate provisions for biodiversity for much longer durations.

The Pulpwood Agreement PA 16 was issued in April of 1990, for the purpose of supplying a portion of the fibre requirements of an Oriented Strand Board (OSB) Plant located in 100 Mile House. PA 16 is a non-replaceable forest tenure, with a 25-year term expiring in April of 2015. The 2003 and 2004 AAC determinations for the Kamloops TSA maintained the partitioned

annual harvest level of 86 000 cubic metres for PA 16. Included among the forest stands specified as available for harvest in PA 16 are small-volume coniferous stands and stands predominated by deciduous species. In recent years the PA 16 harvest has included more small-volume coniferous stands than deciduous-leading stands. Virtually all of these stands harvested under the PA 16 as part of the 86 000-cubic-metre-per-year partition have been pine leading, and must have a net piece size of 0.20 cubic metres or less. These stands are not considered economically operable for sawlog purposes and would generally not be harvested under a forest licence.

A potential utilization issue related to PA 16, but with negligible implication for timber supply, is noted below, in '*Utilization standards*'.

From my review of the assumptions in the analysis and of the conditions in the relevant licences as well as my consideration of current practice in the TSA, I am satisfied that both of the current partitions, that is, the 20 000-cubic-metre partition for the harvest of deciduous stands in the TSA, and the 86 000-cubic-metre partition for harvesting under PA 16, continue to provide both economic opportunity and administrative advantage in the TSA that is consistent with maintaining good forest stewardship now and over the long term. I am also satisfied that the procedures used in the analysis to account for deciduous volumes adequately reflect both current forest management and the level of interest in the harvesting of these species.

- cedar- and hemlock-leading stands

In 1996, the Chief Forester determined the need in the Kamloops TSA for a partition of 200 000 cubic metres per year for harvesting in stands predominated by cedar or hemlock that are over 140 years of age and are characterized by a site index greater than 8. The TSA includes 31 092 hectares of these stands, for which the average age is 275 years and the average site index is 14. The stands include a gross volume of almost 13 million cubic metres, of which 58 percent is cedar-leading and 42 percent hemlock-leading. Twenty-eight percent of these cedar- and hemlock-leading stands lie within the operating areas of British Columbia Timber Sales (BCTS), leaving about 9.2 million cubic metres of gross volume potentially available from these stands for other licensees.

The 200 000 cubic metres harvestable annually are currently apportioned with 182 000 available to Non-Renewable Forest Licences (NRFLs), 16 000 to BCTS, and 2000 to the Forest Service Reserve. Of the 182 000 cubic metres in NRFLs, the average annual volume harvested from 1999 to 2006 was 154 381 cubic metres (about 85 percent). Roughly 58 percent of the harvest volume was cedar, 18 percent hemlock, and 25 percent other species. Of the BCTS component of the partition, only about one-quarter has been harvested annually. None of the volume in the FS reserve has been harvested.

It is possible that the volume actually available for sawlog harvest under the partition may be somewhat overestimated; one NRFL licensee has estimated that its harvested volume under the partition recovers only 88 percent of the indicated cruise volume. Adjustments to cruise compilation procedures have been required, hemlock utilization appears to be lower than required, and poor pulp markets have necessitated less stringent harvest profile requirements for hemlock. However, the demand for species other than hemlock in the partition is continuing.

In the 2007 timber supply analysis base case, the 200 000-cubic-metre partition was assumed to be maintained for one more decade. After this, the remaining available unharvested cedar and hemlock stands were allowed to be harvested as part of the general profile in the TSA. This analysis showed that, upon removal of the limit imposed by the partition, the projected harvest of cedar and hemlock fluctuated very significantly, rising over the first decade to a high of 400 000 cubic metres, then falling to 75 000 cubic metres over the next decade, and varying

considerably thereafter with a low of 3200 cubic metres after five decades, followed by a similarly unsteady projection throughout the rest of the forecast period.

In a sensitivity analysis in which the cedar-hemlock partition was retained to achieve a target of 200 000 cubic metres annually for as long as possible, the overall harvestable timber volume in the TSA was increased by 10 000 cubic metres for the period from years 11 to year 90, and by 30 000 cubic metres thereafter. The analysis also showed that a harvest of 200 000 cubic metres per year could be maintained from the cedar hemlock partition for twenty years, followed by a modestly fluctuating harvest of between 181 000 and 192 000 cubic metres per year, from years 21 to 60, although significant fluctuations occurred thereafter.

One of the NRFLs in the partition has been cancelled and the volume may become available for re-disposition. The other two will expire on December 31, 2008 and may be re-advertised. The sensitivity analysis just described indicates that if new licences were to be issued, the standing cedar and hemlock volumes are sufficient for maintaining the 200 000-cubic-metre partition for two or possibly more decades, depending on the level of harvest. Given the continuation of current harvesting preferences, however, over time the quality of the wood in the partition will diminish, both in terms of the available volumes per hectare, and in the percentage of cedar in the harvest.

The provincial government's population recovery strategy for mountain caribou interacts with the extent of harvesting achievable under the cedar-hemlock partition. Some operational details of the strategy are not yet final, but draft mapped retention areas indicate a potential area reduction of 2672 hectares in the forest stands contributing to the partition, containing roughly 9 percent of the available volume. Without accounting for potential cover constraints beyond full retention, this approximates to six years of harvesting at the maximum allowed rate of 200 000 cubic metres per year.

From all of this I have reviewed and assessed the viability and utility of maintaining the cedar-hemlock partition as follows.

The possible overestimation in the volumes supporting the partition has been roughly estimated at about a maximum of 15 percent, and the additional reduction from caribou management at about 9 percent. From discussions with MFR district staff and with headquarters and regional timber supply analysts, I am satisfied that with a roughly 24 percent reduction in contributing volume, the cedar-hemlock stands contain sufficient volume to maintain the partition at the current level of 200 000 cubic metres for another ten years without incurring problems of sustainability and while facilitating mountain caribou population recovery.

With respect to the utility of the partition in context of the imminent expiry of the related current tenures, I note the established community dependence, primarily on the cedar profile, which provides economic stability in uncertain markets, and I also note the potential contributing role of continuing this harvest in accommodating First Nations requirements through Interim Agreements on Forest and Range Opportunities (FROs). The existing replaceable forest licences in the TSA are specifically excluded from harvesting the cedar-hemlock stands aged over 140 years, and I am advised that the discussions of all licensees at TSA Steering Committee meetings indicate support for maintaining the partition. One First Nation has indicated by letter its support for continuing the partition. Finally, analysis shows that harvesting these stands and converting them to productive managed stands also improves the overall long-term yield in the TSA.

I am therefore convinced both that the wood volumes supporting the cedar-hemlock partition are adequate for the partition to remain viable in its current form for at least another ten years, and that it is in the public interest to maintain the partition at its specified harvest volume of 200 000 cubic metres as a component of this determination.

- *timber licence reversions*

Timber Licences (TLs) are old tenure arrangements that give a licensee exclusive rights to harvest merchantable timber within the TL area. Until harvested, the volumes in TLs do not contribute to the AAC for the TSA. However, once a TL area has been harvested and regenerated to free growing status, all future harvesting rights from the licence area revert to MFR jurisdiction, and all associated harvests contribute to the timber supply and to the AAC for the TSA. The Kamloops TSA includes two TLs. In the 2007 timber supply analysis, the accounting for the associated reversion to the timber supply incurred a small error in the timing of the reversion of 921 hectares. As part of the reallocation process associated with Bill 28, these hectares reverted to the crown immediately. I have reviewed the implications of this inconsistency and I find them to be negligible in an overall assessment of the timber supply in the TSA.

- *roads, trails and landings*

In the timber supply analysis, 28 553 hectares of Crown productive forest were excluded in deriving the THLB to account for existing roads, trails and landings. This area was determined by applying 13- and 10-metre buffers respectively to all existing primary and secondary roads on the inventory file and directly removing this area from the productive forest land base. For future roads, trails and landings, land base reductions of 6.2 percent and 6.9 percent were applied to the THLB in the Headwaters and Kamloops forest districts, respectively, consistent with an extrapolation of average figures from 1995 to 1997.

I have reviewed in detail the information and procedures used in estimating the requirements for both existing and future roads, trails and landings, and I find that in each case the best available information was used and accepted methodologies were followed. I therefore consider that the base case harvest forecast accounts reliably for the respective land base deductions for these purposes.

- *issued woodlot licences*

The *Forest Act* requires AACs determined for TSAs to be exclusive of the areas and timber volumes allocated to woodlot licences. When woodlot licences are issued from a TSA, the required volumes are first allocated from an appropriate apportionment under the AAC for the TSA, then in the next AAC determination for the TSA, the TSA land base is reduced by the area of Crown land in all the woodlot licences issued since the previous determination, and the total volume in the issued woodlot licences is excluded from contributing to the AAC for the TSA.

Currently 50 woodlot licences are located in the Kamloops TSA, of which 48 were accounted for in the 2003 AAC determination. Three more 600-hectare woodlots are expected to be awarded in the Kamloops Forest District, through FROs for First Nations, within the next year.

In the 2007 base case analysis, all woodlot developments were properly accounted for except for one new issued woodlot, the land base and associated volume for which were not removed in deriving the THLB for the TSA. Thus the THLB has been overestimated by 1100 hectares, and the timber supply for the mid- and long-terms by 2500 cubic metres or 0.1 percent. I have accounted for this in my determination, as discussed in '**Reasons for Decision**'.

- *community forest agreements*

A total of 60 000 cubic metres was made available for allocation to three new Community Forest Agreements (CFAs) in the Kamloops TSA, under the provincial *Forestry Revitalization Act*, Bill 28. Timber volumes under these agreements are administered separately from the TSA and

must be removed as with woodlot licences. Currently, two CFAs, the Wells Grey and the North Thompson, have already been awarded.

The Wells Grey CFA, the only one that had been awarded at the time, was accounted for in the 2007 base case analysis. The two further agreements, the North Thompson, which is now awarded, and the Logan Lake, which was offered by the Minister on December 3, 2007, were not formalized at the time of the analysis and were not excluded from the THLB. These two pilot CFAs affect a combined total of about 16 000 hectares of the THLB to support their AACs of 20 000 cubic metres each. While the Logan Lake CFA has not yet been formally awarded, this formalization is considered to be imminent. Under the circumstances I consider this a reasonable expectation, and in my determination I have therefore accounted for the 40 000-cubic metre, or 1.6-percent, overestimation in the timber supply associated with the 16 000-hectare reduction to the THLB for both of the additional CFAs that were not accounted for in the analysis, as discussed in **'Reasons for Decision'**.

Existing forest inventory

- status of the forest cover inventory

In British Columbia, to improve forest cover inventory standards, the older forest cover inventory (FC1) mapping for TSAs and TFLs is being replaced over time by the Vegetation Resources Inventory (VRI) common database structures and a suite of tools to support file update and management. In the case of Kamloops, roughly 30 percent of the TSA has been re-inventoried to the new VRI inventory standard. The remaining 70 percent is the older FC1 mapping that has been transferred into the new VRI data structure as an interim measure to facilitate improved data management.

In the Kamloops TSA, the FC1 for the Kamloops Forest District is based on a 1996 re-inventory using 1995 aerial photography, and that for the Headwaters Forest District is based on 1992 re-inventory using 1990 photography. For the timber supply analysis, the forest stand attributes were projected to January 1, 2006. The inventory was updated for harvest depletions to summer 2006 using a combination of satellite change detection techniques and the MFR's 'Reporting Silviculture Updates and Land Status Tracking System' ('RESULTS'). Any previously harvested area was assumed to be harvestable again and was therefore included in the THLB.

One noted anomaly in the inventory is that 73 239 hectares of early seral stage forest in the crown productive forest land base were found to be without associated species information. It is the understanding of MFR staff that this occurred due to a contractor's oversight during GIS overlays in the depletion updating process. Default figures were therefore generated for 29 707 hectares using the Inventory Type Group for leading species and, for 43 533 hectares of records without a type group, the Biogeoclimatic Ecological Classification system (BEC) zones were used. From discussions with MFR staff, I am satisfied that this method of recovery has provided the best available approximation to the lost data.

To conclude, I believe all reasonable efforts have been made to update the inventory for recent harvesting and to remedy any other gross errors and omissions. I am therefore satisfied that the inventory has provided an adequate basis from which to analyse and project the timber supply in the current base case forecast. For future analysis, the stands identified in the inventory as currently lacking species information should be targeted for data capture through an inventory update, as I have noted below, in **'Implementation'**.

- volume estimates for existing, natural, unmanaged stands

Existing natural, unmanaged stands are stands that have not been logged, or are not subject to forest management by planting or density control. In the 2007 timber supply analysis for the Kamloops TSA, stands established prior to 1974 were assumed to be unmanaged. Their volumes were projected from inventory information using the Variable Density Yield Prediction (VDYP) model, version 6 and almost identical analysis units to those used in the July, 2001 timber supply analysis.

In 1995 an audit of the Kamloops Forest District inventory confirmed that mature stand volumes on the operable land base were reasonable. In 1997 a similar audit in the former Clearwater Forest District (now the portion of the Headwaters Forest District found in the Kamloops TSA) also confirmed the estimates of mature stand volumes. However, the results from a report released in January 2008, *'Kamloops TSA, Documentation of Analysis for Vegetation Resources Inventory Statistical Adjustment'*, Jahraus & Associates Consulting Inc and Churlish Consulting Ltd., indicate that VDYP6 volumes for mature stands, overall, are underestimated by 7 percent. This analysis combined 183 VRI Phase 2 ground samples from four different projects conducted throughout the TSA between 1998 and 2005. The 2008 reported adjustments were not available for incorporation in the 2007 base case projection for the Kamloops TSA.

The report's findings indicate that in the 2007 base case, the volumes in mature, deciduous stands were underestimated by 166 percent, and those in mature, cedar/hemlock stands and spruce stands were overestimated by 15 percent and two percent respectively. Further, volumes in existing, mature, Douglas-fir, pine and balsam stands were underestimated by four percent, nine percent and 33 percent, respectively.

The implications of this report and its recommended inventory adjustments for VDYP6 are discussed and accounted for in **'Reasons for Decision'**.

- interior log grades

On April 1, 2006, new log grades were implemented for the BC Interior. Under the previous grade system, a log was assessed according to whether the tree it came from was alive or dead at the time of the harvest. Prior to April 1, 2006, grade 3 endemic logs (with the 'normal' mortality observed in a mature stand) and grade 5 logs (dead trees with greater than 50-percent firmwood where the log has defects such as twists, knots and heart rot) were not charged to the AAC if harvested. Under the new system, grades are based on a log's size and quality at the time it is scaled or assessed, without regard to whether it was alive or dead at harvest. To better account for all harvested volumes in AAC cut-control, logs that were previously considered grade 3 endemic or grade 5 will now be charged to the AAC; this volume must therefore be accounted for in this AAC determination.

The VDYP model used in the 2007 timber supply analysis for the Kamloops TSA to estimate timber volumes in existing unmanaged stands does not account for the ongoing component of endemic dead trees that could potentially be used as sawlogs (known as 'dead-potential'), nor were dead wood volumes reported that could be derived from the 'TIPSY' growth and yield model used for managed stands.

Possible sources of data for 'dead-potential' volumes include inventory audit plots, VRI phase II ground samples, permanent sample plots, and temporary sample plots. For the Kamloops TSA at this time, the inventory audit is considered the best such source. Audit data indicate that the dead-potential volume is about 13.2 percent of the green volume for the forested land base over 60 years of age. Data from the harvest billing system for 1995 to 2004, when taking dead logs to the mills was solely at the discretion of licensees, showed that grade 3 endemic and grade 5 logs

totalled about 7.7 percent of the cut-accountable volume. (The MPB infestation in the TSA has resulted in the leaving on site of increased volumes of grade 4, unbilled timber; these volumes are epidemic rather than endemic losses and are considered below, in ‘decay, waste and breakage’.)

In determining an appropriate value to assign to the indicated underestimation in timber supply deriving from the need to account for ‘dead-potential’ wood, consistent with my determinations for a number of TSAs I have assumed a mid-range figure between that obtained from the audit data, in this case 13.2 percent, and that from the billing system, in this case 7.7 percent. This approximates to a 10-percent underestimation in the timber supply in all time periods, which I have accounted for as discussed in ‘**Reasons for Decision**’.

Expected rate of growth

- site productivity estimates

In British Columbia the productive potential of a forest stand for growing timber in a specific location is expressed by a measure termed the ‘site index.’ A site index is determined from the height and age of the largest trees in a stand, typically expressed as the height at age 50 years. Site productivity largely determines how quickly trees will grow; this in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, the age at which a stand will satisfy mature forest cover requirements, and the age at which it will reach a merchantable size.

The most accurate estimates of site productivity are usually for stands between 30 and 150 years of age. The growth history of stands younger than 30 years is often not long enough to give an accurate measurement of site productivity. Estimates derived from older stands tend to underestimate productivity, as these stands are often well past the age of maximum growth in height, and in their advanced age have often been affected by disease, insects and top damage.

Numerous studies in British Columbia, such as the Ministry of Forests Old-Growth Site Index (OGSI) project, have confirmed that site indices for stands older than 140 years and for those younger than 30 years (with a site index determined from the previous stand) are typically underestimated; when old stands are harvested and regenerated, the actual productivity realized in the new stands is generally higher than predicted in the inventory-based site index estimates. To accurately predict growth and yield in managed stands, site indices are needed that reflect the true potential of growing sites. In areas where local site-index studies have been carried out to obtain definitive data, adjustments can be made and the timber supply projected from the improved productivity figures.

One local study by Interfor on the area corresponding to its innovative forestry practices agreement (IFPA) demonstrated an overall increase in site index in the non-Engelmann Spruce – Subalpine Fir portion of the IFPA area. While the results of this site index adjustment project for this relatively small area were not included in the base case for the present AAC determination for the TSA as a whole, the information does indicate some potential flexibility for ameliorating the mid-to long-term timber supply when the current MPB infestation is over.

Under appropriate circumstances, site indices may be correlated with the provincial Biogeoclimatic Ecosystem Classification (BEC) system, to develop what are called ‘SIBEC’ site productivity estimates. However, site productivities derived from SIBEC information are not typically relied upon unless correlated with approved, local Predictive Ecosystem Mapping (PEM) or Terrestrial Ecosystem Mapping (TEM). The 2007 analysis for the Kamloops TSA incorporated the unadjusted site indices from the inventory file. A sensitivity analysis was undertaken to assess the potential underestimation in timber supply introduced by using these figures in comparison to site productivity that could be expected once harvesting and conversion

to managed stands has occurred. For this, a rough approximation to SIBEC figures was used, in which an average SIBEC site index was estimated for each BEC variant, and these estimates, acknowledged as rough approximations, were weighted within analysis units. In the absence of specific, locally-generated information, the standard provincial operational adjustment factors (OAFs) were applied, as defined and discussed in the next section below.

This very rough analysis showed that using inventory file site indices instead of those for managed stands may have led to an underestimation in the mid-term timber supply projected in the base case in the order of approximately 100 000 cubic metres per year, or roughly five percent, and considerably more—in the order of 20 percent—in the long term. While the increase in the mid term is moderated by known limitations in the growing stock in the TSA, the long-term underestimation is more consistent with analytical results for a number of other TSAs. I have remained mindful of this potential underestimation in my determination, as discussed in **‘Reasons for Decision’**.

The Kamloops TSA Licensees recently completed a site index adjustment project, documented in the report *Site index adjustment of the Kamloops Timber Supply Area*, by Timberline Natural Resource Group Ltd., March 31, 2008, which found that potential site index estimates were higher in lodgepole pine and Spruce-leading stands; however, timing obviously prevented consideration of the results in the base case. In order to obtain the most reliable projection of the timber supply for the mid and long terms, it is important for licensees and MFR staff to work cooperatively to include recent site productivity estimates, as appropriate, in the next analysis for consideration in the next AAC determination, and I have included an instruction to this effect, in **‘Implementation’**, below.

- volume estimates for regenerated, managed stands

In the Kamloops TSA, forest stands that have been harvested and planted since 1974 are considered to be managed stands. In the 2007 timber supply analysis, managed stand yields were used for stands that have already been harvested and planted as well as for those stands that will be harvested and planted in the future. The standard MFR growth and yield program, Table Interpolation Program for Stand Yields, ‘TIPSY’ (Batch Version 3.2) was used to estimate the timber volumes for all regenerated, managed stands except for dry-belt fir stands managed for selection harvesting. For the latter stands, VDYP was used, and it was assumed that selection harvest systems remove 40 percent of the existing volume on the first pass, with additional harvests beginning after 30 years, in which 30 percent of the original standing volume is removed, on an ongoing basis, every 30 years thereafter.

- operational adjustment factors (OAFs):

All TIPSY projections of volume yields for managed stands are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition. However, certain operational conditions, such as a less-than-ideal distribution of trees, the presence of small non-productive areas, endemic pests and diseases, or age-dependent factors such as decay, waste and breakage, may cause yields to be reduced over time. Two operational adjustment factors (OAFs) are therefore applied to yields generated using TIPSY, to account for losses of timber volume resulting from these operational conditions. OAF 1 is designed to account for factors affecting the yield curve across all ages, including small stand openings, uneven tree distribution, endemic pests and other factors. OAF 2 accounts for factors whose impacts tend to increase over time such as decay, and waste and breakage. Standard or ‘default’ provincial reductions of 15 percent for OAF 1 and five percent for OAF 2 are often applied in timber supply analysis but these may be adjusted, based on local conditions. In the

base case analysis for the Kamloops TSA, these standard OAF values were applied, as recommended by MFR's Research Branch.

- volume gains from select seed:

The use of select seed with improved genetic traits can increase the timber volumes in managed stands in the long term and shorten the time required for a forest stand to reach a green-up height or the minimum harvestable age. The quantity and quality of select seed available in the province have increased in the past decade, and are projected to increase further. Licensees are required to use select seed when available. Genetic gains were estimated for the Kamloops TSA using data from the provincial Seed Planning and Registry System (SPAR) in the form of sowing requests for 2004 to 2006 and genetic worth data.

The sowing requests indicate that, in the Kamloops TSA, genetically improved seed has been used only for fir, pine, larch and spruce. The request for fir was small and confined to 2006, because the seed has only recently become available. The figures for genetic worth were weighted for the proportions of 'Class A' and 'Class B' sowing requests, and the resulting genetic worth figures were applied to all newly regenerated stands containing the appropriate species.

From my considerations of this information I am satisfied that the volume estimates for regenerated, managed stands are adequately projected in the base case forecast, accounting appropriately for genetic volume gains and for OAFs, except for one concern related to OAFs in consideration of root disease, which I have addressed below in the section '*non-recoverable losses: forest health factors, wind, wildfire*'.

- minimum harvestable criteria

In timber supply analysis, minimum harvestable criteria are estimated as a measure of the earliest age at which a forest stand will have grown to a harvestable condition, often defined by achieving a minimum merchantable volume per hectare. Minimum harvestable criteria affect when second-growth stands will become available for harvest in the model, which in turn affects how quickly existing stands may be harvested while maintaining a stable flow of harvestable timber. In practice, economic considerations and constraints on harvesting that arise from managing for such values as visual quality, wildlife and water quality, may influence the actual minimum harvestable criteria. Minimum harvestable criteria are merely estimates of when immature or future managed stands will become available for harvest in the model; it is not expected that all stands will be harvested as soon as the criteria are met. Theoretically, however, it is assumed that harvesting may occur as soon as the criteria are met, in order to meet a harvest target for a relatively short period of time, or to avoid large and abrupt changes in harvest levels. Minimum harvest criteria are typically expressed by a minimum age or volume per hectare.

For the 2007 Kamloops TSA analysis, minimum harvestable criteria were defined from an essentially random sampling of 51 cutting permits in the TSA that had been submitted to the E-Commerce Appraisal System (ECAS) of MFR's Revenue Branch since the 2004 AAC determination. The sample showed that BCTS and licensees have been harvesting in stands on the THLB with a minimum of 164 cubic metres per hectare, a maximum of 549 cubic metres per hectare, and an average of 344.5 cubic metres per hectare. Licensees maintain that the minimum volume that is currently economical to harvest is 125 cubic metres per hectare.

For the analysis, the minimum harvestable volume was assumed to be 100 cubic metres per hectare. Although this figure is slightly lower than the licensees' figure, it was considered that licensees may be prepared to harvest such stands occasionally as the timber supply declines.

The model was programmed to harvest high-volume stands first, which corresponds to current practice. In the base case, from 2016 to the end of the planning horizon, only roughly 10 percent of the harvest was obtained from stands of less than 150 cubic metres per hectare. This number is somewhat misleading in that this portion of the forecasted cut was primarily in selection harvest. Since approximately 75 percent of the timber supply forecast is projected to come from stands with more than 200 cubic metres per hectare, then even with the minimum harvestable criteria set lower than current practice, the harvest of such stands only contributes a small portion of the harvest forecast, and any discrepancy in the projected timber supply would also be small.

I have reviewed the contributions of forest stands containing the full range of volumes per hectare assumed to be harvested under the base case projection. I have reviewed the basis for the assumptions related to minimum harvestable volumes as incorporated in the analysis, including the contributing volumes remaining in dry-belt fir stands after the first selection harvest. From this I find the assumptions to be adequate for use in the analysis supporting this determination.

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

Regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. Currently in the Kamloops TSA the time typically experienced for establishing plantations following harvesting, as determined by a review of data from the 'Reporting Silviculture Updates and Land Status Tracking System' ('RESULTS') is 1.7 years, using one-year-old seedlings. This assumption was modelled in the 2007 timber supply analysis base case. Most of the areas that are not planted but become reforested through natural regeneration are established within two years. A regeneration delay of 15 years was assumed for areas projected to be killed by the MPB and not harvested. Since this delay may be variable, depending on several factors including advanced regeneration, in '**Implementation**', below, I have requested that the actual regeneration delay on these areas be monitored, to verify or vary this figure for future analyses.

In general, the assumptions in the base case are an adequate approximation to current practice. However, in the 2003 wildfire season, a gross total area in the TSA of 66 000 hectares were burned, of which a maximum of 23 000 hectares are estimated to be in the THLB, and some of which were not salvage-harvested and therefore remain unmanaged. This creates two distinct implications that must be accounted for in assessing the timber supply; a) the unmanaged areas are still represented in the inventory as 'green' and potentially viable for harvest when in reality they are not, and b) these areas will not regenerate within the period assumed in the model, but should be assigned an extended regeneration delay. Roughly 12000 of the affected hectares have been surveyed, and field experience indicates that much of the area is already regenerating naturally.

As noted below, in '*non-recoverable losses*', the total non-recoverable fire-related loss for 2003 amounts to almost four million cubic metres, and as noted in '**Implementation**' I have requested a full accounting, for the next timber supply analysis and AAC determination, of the total areas burned, salvaged, and regenerated. For the current determination, I have provisionally estimated that the need to apply the associated extended regeneration delay to affected areas has led to an overestimation in the range of up to one percent in the timber supply projected in the base case, which I have accounted for as discussed in '**Reasons for Decision**'. From my discussions with district staff, I am satisfied that there are no other impediments to prompt regeneration in the TSA requiring particular consideration in this determination.

Not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Areas where the standard regeneration delay has not yet elapsed since harvesting are considered ‘current’ NSR and fluctuate with the amount of disturbance—harvesting or fires—currently taking place. The reforestation of all harvested areas on Crown land in BC has been a legal obligation since 1987. Where a site was harvested prior to 1987 and a suitable stand has not yet been regenerated, a classification of ‘backlog’ NSR is applied.

I have reviewed in detail with MFR district staff the rehabilitation and essential elimination of backlog NSR land in the TSA. Concerns have been expressed regarding the consequences of small scale salvage operations that do not have a legal obligation for reforestation, and regarding the rehabilitation of the large extent of dead pine stands that may not be harvested.

For small scale salvage stands, I expect that the affected areas will eventually lie within larger harvested areas and will become incorporated in the inventory. From this I am satisfied that small scale salvage harvesting will become fully accounted for, and will not lead to an overestimation in the timber supply.

For pine, it is important for the next timber supply review to monitor and assemble information that will describe and quantify the effects on timber supply arising from the large extents of dead pine trees in the TSA, in terms of: the extents of the areas that will be harvested; the areas that will be rehabilitated; the amounts of dead wood that will be left on the landscape; how much will be used for bio-energy; and what areas will become naturally regenerated. I have noted the need to collect this information in ‘**Implementation**’, below.

(iii) silvicultural treatments to be applied to the area:

Silvicultural systems

The ‘RESULTS’ data shows that 98 percent of the 74 937 hectares logged in the past five years in the Kamloops TSA were harvested by clearcut or clearcut with reserves, with 1.2 percent by selection harvesting and 0.4 percent by patch cuts. On average over the past 5 years, roughly 177 hectares were harvested each year by selection harvesting, though not all of this was in the dry-belt-fir forest types. The current practice of salvaging MPB- and fire-killed timber results in reduced amounts of selection harvesting, as the salvage directs the harvest more into pine forest types. Selection systems are currently used primarily to meet silvicultural, visual and wildlife habitat objectives.

In the analysis, virtually no selection cutting occurs over the next 10 years, since higher-volume stands are assumed to be logged first. Over the longer term, selection cutting fluctuates from decade to decade with an average contribution to the timber supply forecast of roughly 10 percent. I am satisfied that the base case projection has adequately accounted for the silvicultural systems that are both currently and expected to be in operation in the TSA.

Incremental silviculture

In general, incremental silviculture includes commercial thinning, juvenile spacing, pruning and fertilization which are not part of the basic silviculture obligations required to establish a free-growing forest stand. In the Kamloops TSA, due to the impact of the MPB on young forest stands, little incremental silviculture work has been carried out in the past five years except for small amounts of spacing in dry-belt fir stands and small amounts of commercial thinning of Douglas-fir (273 hectares in the past two years). With the current harvesting focus on salvaging

MPB-damaged timber, little increase in this practice is expected in the near term. Some opportunities may exist to enhance future supply by fertilizing immature spruce and Douglas-fir; currently approximately 40 hectares per year are fertilized, mostly on rehabilitated roads and landings, with experimental work to alter palatability for deer.

In the 2007 analysis, no adjustments were incorporated for commercial thinning or fertilization, which adequately approximates current and contemplated practice.

Mortality in young pine stands

In the Kamloops TSA the majority of mature pine stands have now been killed by the MPB, and the beetle is attacking pine trees less than 60 years old, with diameters as small as 10 centimetres at breast height (DBH), in significant numbers. This mortality in young pine stands was not directly modelled in the 2007 base case, but a sensitivity analysis was performed based on 2006 data from field samples from other forest districts in the Cariboo and the Northern Interior Forest Region. This analysis projected 35-percent mortality in these stands by 2008. When this result was applied to the base case analysis by removing 35 percent of the growing stock from the yield curve for each stand and then 'growing' it to maturity, the projected harvest level was reduced by 90 000 cubic metres per year until approximately the year 2100. In early December, 2007, data became available on the impact of the MPB on 309 young stands (about 29 percent of such stands) in the Kamloops Forest District, showing that, on average, in fact 48 percent of these stands were being attacked, rather than the 35 percent modelled earlier.

From my related discussions with MFR staff, the following is clear. Silviculture treatments to rehabilitate some of the lost volume in the damaged stands could perhaps mitigate the timber supply impacts in the longer term to some extent, but results would not occur early enough to prevent an impact in the mid term. Moreover, studies have shown that even with 30 to 40 percent mortality in these young stands, sufficient volume will remain such that the cost of applying a silviculture treatment is not likely to be supported by an adequate differential in the eventual financial return. Thus an impact on the mid-term supply seems inevitable. Since the assumed 35-percent mortality resulted in a projected mid-term reduction of 90 000 cubic metres, the actual 48-percent mortality is likely to result in a further reduction in the mid-term harvest level, of roughly 120 000 cubic metres per year or about 7 percent below that projected in the base case. I have accounted for this impact in my determination, as discussed in '**Reasons for Decision**', and in '**Implementation**', I have instructed the ongoing monitoring of mortality and in-growth in these young pine stands, to provide for reliable assessment of related impacts in future analyses.

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

Utilization standards

Wood utilization standards define the species, dimensions and quality of trees that are harvested and removed during harvesting operations. I have reviewed the utilization standards as implemented in practice and as incorporated in the analysis, for the Kamloops TSA as a whole and for the PA 16 licence area. The latest management plan for PA 16 identifies the potential for utilizing wood to dimensions at small variances from the standards modelled, but the plan actually specifies standards identical to those of other forest licences, and the yield implications of the differences are negligible.

Public input was received to the effect that efficiencies have been developed in harvesting the small wood profile associated with young pine stands damaged by the MPB, and indicating interest in a new tenure focused on beetle-affected stands. However, in consistency with my

earlier stated Guiding Principles, until a tenure is awarded that incorporates different utilization standards, and until related performance is demonstrated, I cannot speculate on any associated implications for the timber supply.

From this I am satisfied that the utilization standards applied in the analysis adequately reflect current licence requirements and performance, and that the harvest levels in the base case are reliable in this regard. I have discussed a further, related issue under '*interior log grades*'.

Decay, waste and breakage

In projecting timber volumes for existing, natural, unmanaged stands, the VDYP model used in the timber supply analysis incorporates estimates of the volumes lost to decay, waste and breakage, which have been developed for various areas of the province based on field samples. For volume estimates in regenerated, managed stands, operational adjustment factors (OAFs) are used with the TIPSYP program to account for decay, waste and breakage.

The MPB epidemic has incurred additional losses due to dry, brittle wood and breakage. During the transition to full accounting for what might otherwise have been viewed as non-recoverable losses—due to waste formerly being left on site that now must be accounted for (see related considerations in '*interior log grades*', above)—some minor anomalies exist between what is accounted for in an AAC determination and what is accounted for under cut control regulations. However, given the flexibility in the short-term supply of pine, confirmed by the alternative harvest flow analysis showing the possibility of a 6.2-million-cubic-metre harvest level for the first five years (see below '*alternative harvest flows*'), these anomalies do not imply an overestimation in the short-term supply of pine for harvest. From this, while noting the 'log-grade' consideration referred to, I am satisfied that the timber supply analysis accounts adequately for losses to decay, waste and breakage.

- (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 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.

- forest cover requirements for cutblock adjacency and green-up

To manage for resources such as water, wildlife and scenic areas, and to avoid concentrating harvesting-related disturbance in particular areas, operational practices limit the size and shape of cutblocks as well as the maximum permissible disturbances (areas covered by stands of less than a specified height), and prescribe minimum 'green-up' heights required for regeneration on harvested areas before adjacent areas may be harvested. Green-up requirements help to achieve objectives for water quality, wildlife habitat, soil stability and aesthetics. Adjacency, green-up and forest cover objectives guide harvesting practices to provide for a distribution of harvested areas and retained forest cover in a variety of age classes across the landscape.

To account for forest cover requirements in the 2007 base case analysis for the Kamloops TSA, specific constraints were applied consistently with any requirements specified for particular resource management zones (RMZs) in the Kamloops LRMP (KLRMP). For other areas not subject to any specific, more stringent forest cover constraint under an RMZ, a general adjacency provision was applied, requiring the forest cover on a minimum of 67 percent of any landscape-unit (LU)-BEC-zone to be at least three metres in height. To mimic current practice, for stands with very severe (greater than 50 percent) MPB attack, this requirement was relaxed for the first two five-year modelling periods, then reapplied in 2016 on the assumption of effective completion of the beetle attack by that date.

Since the analysis included representation of all cover constraints specified by the KLRMP as well as appropriate default adjacency requirements for other areas, which were only temporarily relaxed to permit the achievement of requisite salvage objectives, and since MFR staff and licensees agree that the modelling reflects current practice, I am satisfied that the analysis has adequately accounted for forest cover requirements.

- hydrology and the MPB infestation

Natural hydrologic processes, important to many aspects of forest health and growth, are affected by a number of factors related to the current MPB infestation. These factors include high levels of mortality in forest stands, increased logging and road construction, changes in understory light levels, changes in competition for nutrients, increased water volumes in springs and streams, earlier spring snowmelt, faster stream flow during storms, and much more. The Skeetchestn First Nation has expressed related concerns, and research ecologists from the MFR are already engaged in studying a wide range of hydrological effects associated with the MPB infestation.

In general, objectives for retaining a distribution of forest cover on the landscape will help to lessen hydrologic impacts, and I have considered a number of related factors, in the previous section on adjacency and in other sections on visual quality, landscape-level biodiversity and wildlife habitat. Also, the MFR provides planning guidance for addressing hydrological concerns, for reducing erosion and sedimentation, and for the retention of forest structure at the stand and landscape levels in salvage operations. At present, studies do not show significant changes in risks to watersheds, and I am advised by MFR district and analysis staff that at the TSA level there are no identifiable, specific, management considerations related to hydrologic concerns arising from the MPB infestation that are known to affect the projection of timber supply.

- visually sensitive areas

The *Forest Practices Code* (the *Code*) and the FRPA enable scenic areas to be designated and visual quality objectives (VQOs) to be established so that the visible evidence of forest harvesting can be kept within acceptable limits. Scenic areas recognized under the *Code* have been carried forward for the purposes of FRPA and must be managed consistent with the requirements of the *Forest Planning and Practices Regulation* (FPPR).

In the 2007 analysis for the Kamloops TSA, 635 284 hectares of the Crown forested land base and 447 622 hectares of the THLB were assumed to be visually sensitive. Roughly one third of these hectares were located in the Headwaters Forest District, the other two thirds in the Kamloops Forest District. The harvesting in these areas is moderately to severely constrained depending on the degree of visual sensitivity. For areas with pine harvest in stands with greater than 50-percent MPB attack, visual management constraints were not applied for the first ten years (modelling years 2006 – 2015), but appropriate constraints were applied if the level of attack was less than 50 percent.

In the Kamloops Forest District, this modelling reflects current performance by licensees. In the Headwaters Forest District, VQOs are not yet established by the District Manager, and known scenic areas, previously designated under the Code, are continued under Section 180 of the FRPA. Legal visual objectives in the Headwaters Forest District are as defined under Section 9.2 of the Forest Planning and Practices regulation and the Kamloops LRMP. For the Headwaters District, the base case modelled VQOs associated with the inventory that defines the known scenic area.

In this situation, there is a possibility of a small discrepancy in the projected timber supply. Where a VQO has been established in the TSA, in current practice it is simply followed as required. However, where the visual inventory identifies a recommended Visual Quality Class (VQC) that is not yet established, in reliance on the associated visual sensitivity class, using the options presented by FPPR 9.2, licensees may choose to follow one of the two objectives where the second possible objective is generally one class lower. Nonetheless, since current practice is also guided by professional reliance, management is not expected to change significantly, but to remain within the range bounded by the assumptions modelled and what is legally permissible. At some point the recommended VQCs will be formalized as VQOs under the Government Actions Regulation.

From this I conclude that while visual sensitivity as modelled in the analysis closely reflects current practice, some uncertainty remains as to the actual management choices to be adopted by licensees. This could potentially lead to a slight underestimation in the timber supply if most licensees were to choose management to the lesser of the two objectives identified in the regulation. Whether this will happen will become evident through the preparation of Forest Stewardship Plans (FSPs), and the related uncertainty will thus be reduced for the next analysis, when VQOs will also likely be established. In the meantime, for the current AAC determination, I consider any potential related underestimation in the timber supply to be small and speculative, and I therefore accept the modelling of visually sensitive areas as an adequate reflection of current practice.

- recreation areas

In the Kamloops TSA, objectives have been established under Section 180 of the FRPA for 203 recreation sites, trails and interpretive sites in areas where timber harvesting is not prohibited but where the objectives are not anticipated to constrain the timber supply. Objectives have also been established for a number of other recreation areas, including Heritage Trails declared under the *Heritage Conservation Act*, and Controlled Recreation Areas, which include areas formally excluded from harvesting, under Section 180 of the FRPA. On a total area of 8759 hectares with recreation objectives identified in the TSA, harvesting has been deferred on 4226 hectares, and 4533 hectares remain accessible for harvesting.

I have reviewed the assumptions applied in the analysis to account for the trail buffers and other excluded areas, and from this I am satisfied that all timber supply implications associated with recreation areas are accounted for in the base case. The one exception is the forthcoming establishment of Harper Mountain as a Controlled Recreation Area, for which the affected area of 284 hectares is too small to incur any noticeable implication for the projected timber supply.

- riparian management

Riparian management areas (RMAs) along lakes, wetlands, streams and rivers provide key habitat for fish and wildlife and help conserve water quality and biodiversity. The FRPA provides for RMAs which include both riparian reserve zones that exclude timber harvesting and riparian management zones where constraints are placed on timber harvesting.

The 2007 timber supply analysis used the same buffer widths for streams, lakes and wetlands as were specified in the 2001 analysis. However, the corporate riparian GIS layers for the Kamloops TSA have become more comprehensive than those available at the time of the 2001 analysis. New riparian reserve and management zone buffers were therefore created using the new enhanced spatial information applying the 2001 criteria.

In the analysis, from a total identified area of 61 307 hectares of riparian reserve zones and management areas, of which 31 176 hectares were located in the Crown forested land base, a total reduction of 21 527 hectares was made to the THLB, net of overlaps for other objectives, to account for riparian management. I have reviewed in detail the estimates applied to each class of stream, lake and wetland, and I am satisfied that the analysis has accounted appropriately for timber supply implications of current practices in riparian management. I am advised that little, if any, relaxation of the specified requirements has occurred, or is likely to occur, as a consequence of mortality from MPB damage, in the interest of maintaining appropriate levels of protection for waterside areas. I appreciate and encourage continuation of this approach to maintaining riparian objectives to the extent possible during the beetle epidemic. A First Nation concern for riparian management is addressed below, in *'First Nations cultural heritage resources'*.

- community watersheds

The Kamloops TSA includes 15 formally designated community watersheds as well as the East Blackpool Watershed, which, while not formally designated as a community watershed, is managed within the Headwaters Forest District as a community watershed. The total area of productive forest in community watersheds in the TSA is 79 562 hectares, of which 54 308 hectares are in the THLB.

Management in community watersheds includes restricting disturbance to an equivalent clear-cut area of 20 percent of the gross land base in the upper 60 percent of each watershed. This upper 60 percent, which comprises the snow pack area, is considered hydrologically recovered when the forest cover reaches 9 metres in height. The lower 40 percent of the watershed is subject to standard management, but overall, in each community watershed, on average no more than 25.2 percent of the gross area may be less than 6.6 metres in height, consistent with the interior watershed assessment procedures for those watersheds assessed in the Kamloops TSA.

I am satisfied that adequate provision for the maintenance of water quality in community watersheds was incorporated in the base case timber supply projection.

- First Nations' archaeological sites

Provincial legislation requires that BC's forests be managed in a sustainable manner that includes balancing the social and cultural needs of First Nations. Archaeological Overview Assessment (AOA) models are used as risk measurement tools to assess the potential for finding archaeological evidence, and to suggest sites that may require more detailed field assessments.

The AOAs are intended to involve First Nations communities directly in the assessments through the Kamloops AOA process and to facilitate partnering with licensees in conducting the detailed field assessments. Communication is meant to occur between a licensee and the affected First Nation whenever there is a proposed forest development. The Kamloops AOA model is designed to predict the potential for archaeological site locations through a combination of known archaeological site data, environmental, ecological and physical site conditions and cultural information.

To the present date, approximately 1865 archaeological sites have been identified within the Kamloops TSA, of which 1780 are located in the Kamloops Forest District and 85 are located in the Headwaters Forest District. Current practice is to leave each site within a surrounding forest

buffer of 50 metres' radius. Applying such a buffer to all known sites in the TSA would affect a gross area of 1469 hectares. For the approximately 189 sites known to be located in the THLB, this would remove the availability for timber harvest of roughly 150 hectares. In view of the small size of this area, no related accounting was included in the 2007 analysis.

All of the known archaeological sites are located on maps and are used in the planning of forest development activities. The archaeological assessments provide specific knowledge of areas where First Nations have requested either special management practices or no harvesting. Although these individual areas do affect the local harvest in this way, the accumulated impact is not sufficient to affect the projected timber supply for the whole TSA, which I am therefore satisfied has been adequately modelled in this regard. One exception is the Arrowstone operating area which includes a significant number of archaeological sites of concern to First Nations and which I have addressed below in '*areas with harvesting deferrals*'.

- First Nations' cultural heritage resources

In addressing cultural heritage resources in forest development planning and in accounting for the associated impacts on timber supply, current and reliable local information is indispensable.

Thirteen First Nations' bands have completed Traditional Use Studies (TUS) covering roughly 80 percent of the Kamloops TSA, but most of the detailed information remains in the First Nations' communities. The MFR does receive basic maps and reports for use in planning purposes, under strict information-sharing agreements, and relies on direct consultation with the bands for identification of more specific interests within the TSA. While the TUS process has generated improved knowledge, First Nations have advised me that generally they do not have the resources or the staff to deal with multiple forestry-related referrals. I have discussed this further, below, under '*First Nations considerations: consultation process for AAC determination*'.

The Skeetchestn Indian Band has developed a Cultural Resource Management Zone (CRMZ) strategy for riparian areas within its asserted traditional territory. The strategy covers approximately 19 percent of the THLB within the territory and calls for 100-metre buffers on all water sources in the area. The CRMZ strategy has not been implemented as current practice by licensees operating within the Skeetchestn's asserted traditional territory. Analysis shows that, due to the very large number of affected streams, if fully implemented, this strategy would reduce the THLB within the asserted traditional territory by 74 percent and the projected mid-term timber supply in the TSA by an estimated 14 percent.

In assessing the current implications of the CRMZ strategy for the projected timber supply, I have reasoned as follows. I appreciate the work done by the Skeetchestn Indian Band in considering how their asserted traditional territory should be managed and in developing a related strategy. At the present time, as discussed earlier under '*riparian management*', riparian areas throughout the TSA are managed in accordance with the legislated requirements of the *Forest and Range Practices Act*. In my judgment, this legislation generally provides for a reasonable balance between the maintenance of undisturbed natural values and habitats and the ability of these areas to contribute in some measure to the social value represented by their inclusion in the assessment of the timber supply.

While I recognize and have carefully considered the CRMZ strategy and its implications, the degree to which this strategy may become fully implemented and eventually come to represent 'current practice' within this particular asserted traditional territory, remains uncertain at this time. In the present determination therefore, and particularly while continuation of the elevated harvest level necessitated by the MPB infestation remains a high management priority, it would be impossible to speculate on future influences on the future timber supply related to the CRMZ

strategy. At an appropriate future time, when information on the implementation of the strategy has become more clear, its implications can be incorporated in timber supply analysis and accounted for in an AAC determination.

On November 16, 2007, I met with representatives of nine First Nations and two Tribal Councils, at the Kamloops Forest District conference room. At the meeting, the Adams Lake Indian Band stated that in its TUS it has identified sacred areas for which it requested that no harvest take place, except for beetle salvage. I greatly appreciate the time taken by First Nations representatives to meet with me and to express their views, and I value their input. I am advised that through ongoing negotiations with licensees the Adams Lake Band has allowed some harvesting in the area concerned, known as the Cahilty, and that more blocks have been proposed. I understand also that related discussions will be taking place between the First Nations and the licensees as planning continues for the area in question, and that these discussions may result in the application of particular constraints on the timber supply that will require an accounting in a future AAC determination.

Issues raised at this meeting which do not relate directly to cultural heritage resources, are discussed below, in *'First Nations considerations - consultation process'*.

On February 6, 2008, I met with nine chiefs of the Shuswap Nation Tribal Council (SNTC), including the co-chairmen, and SNTC representatives and staff, together with MFR region, district and headquarters staff, in the SNTC office in Kamloops. The concerns raised in those discussions related primarily to issues other than cultural heritage resources; again, I have addressed these below, in the section *'First Nations considerations - consultation process'*.

From all of the above considerations, I have concluded that for this current determination, identified cultural heritage resources can be managed by appropriate planning within the available operational flexibility. Any additional, emerging information brought to the MFR can be included in timber supply analyses for accounting in future AAC determinations.

- wildlife habitat and identified wildlife

- ungulate winter range: deer and moose

Many ungulate management objectives are met through normal practices in the KLRMP area, for example, through selective harvesting in the dry Interior Douglas-fir zones. However, certain critical habitat areas have been identified where particular habitat values must be maintained. The KLRMP identifies five wildlife habitat zones: for caribou—considered separately below—early winter habitat, late winter habitat, and travel corridors; for deer, critical winter range; and for moose, critical winter range.

In the 2007 timber supply analysis, consistent with the previous two timber supply analyses for the TSA, provisions for critical moose winter range were assumed to be met without incurring implications for timber supply.

For deer, a total of 31 critical winter range zones are identified in the TSA, covering 59 173 hectares of the THLB, where the management objective is to maintain or enhance forage production and habitat requirements. In critical deer winter range, at all times the forest cover on at least 25 percent of the gross forested area must be over 20 metres tall (typically achieved by trees aged 75 years), and no more than 20 percent of the gross forested land base may be less than 3 metres in height. These requirements were applied in the 2007 base case analysis.

Associated management strategies for deer in the KLRMP include dispersing timber harvests throughout the winter range and spreading them evenly through the rotation age of the forest; maintaining at least 25 percent of the forested area in thermal cover; linking thermal cover units

with suitable travel corridors, especially with mature Douglas-fir trees on ridges; practicing uneven-aged management wherever possible; applying clearcuts smaller than 5 hectares where uneven aged management cannot be practiced; ensuring maintenance of browse species such as *Ceanothus*, wild rose and Saskatoon berries throughout range management practices; pursuing mixed forest management with similar species distribution to natural stands including deciduous species; establishing access management guidelines; and incorporating management objectives for Critical Deer Habitat into local level planning for the area. All of these management strategies are expected to be accomplished within the constraints identified above.

The forest cover constraints required for critical deer winter range as well other integrated resource management strategies were appropriately applied in the analysis, and I am satisfied that the associated timber supply implications are therefore adequately incorporated in the base case projection.

The MOE is currently updating the Kamloops LRMP mule deer winter range mapping and management. When this update is finalized, the new information will be included in analysis for consideration in a subsequent determination.

- *mountain caribou*

Mountain caribou are an ecotype of British Columbia's woodland caribou population and are a globally unique population as the world's southernmost caribou population and as the only remaining caribou that live in rugged, mountainous terrain and feed on arboreal lichens in winter. The population has drastically declined over this century, with a sharp decline from about 2500 animals in 1995 to about 1900 in 12 herds today.

Requirements for managing mountain caribou, one of the key components of the KLRMP, have been under government review for several years. Consequent revisions to the management guidelines in Appendix 10 of the KLRMP have been carried out under its due amendment process, but are not formally complete. The process may now become subject to potential changes in land use planning, under the December 2006 strategic land use planning program 'New Direction' of the provincial Integrated Land Management Bureau (ILMB). New management provisions will also arise from the initiative of the Species at Risk Coordination Office (SaRCO), endorsed by the provincial government on October 15, 2007, to achieve recovery of the mountain caribou population.

Reflecting the changing situation, in recent months the MFR has been approving licensees' FSPs with caribou management strategies that are consistent with guidelines in either the original, or the revised, version of Appendix 10. However, the requirements incorporated in the 2007 base case were defined from the original Appendix 10 only, which has been the approved strategy predominantly employed by licensees that have operations planned in identified caribou habitat.

The types of caribou habitat identified in the KLRMP and modelled in the base case are 'early winter' (or 'transitional'), 'late winter', and travel 'corridor'. The identified areas and provisions incorporated in the base case with respect to each of these are as follows.

'Early winter' caribou habitat covers a total of 96 874 hectares of productive Crown forest land, of which 69 328 hectares lie in the THLB. At least twenty percent of the affected forest cover must be at least 140 years old.

'Late winter' caribou habitat covers a total of 61 660 hectares of productive Crown forest land, of which 24 959 hectares lie in the THLB. At least 33 percent of the affected forest cover must be at least 140 years old.

‘Caribou corridors’ cover a total of 6531 hectares of productive Crown forest land, of which 4471 hectares lie in the THLB. At least 30 percent of the affected forest cover must be at least 20 metres in height, and no more than 20 percent may be less than 3 metres in height.

The SaRCO recovery initiative includes a draft strategy to exclude from timber harvesting all moderately and highly capable habitat within defined core winter and core all-season habitat cells, as well as all corridor habitat. For the most part, licensees operating in these areas have already voluntarily deferred harvest until the strategy can be finalized and implemented. The potential maximum effect of this draft strategy on timber supply relative to the base case was examined in a sensitivity analysis in which all of the affected area, almost 99 000 hectares, was removed from the THLB. The projected mid-term harvest forecast, from year 10 to year 90, was reduced by 13 percent or 240 000 cubic metres per year, and the projected long-term harvest forecast, from year 90 onward, was reduced by 10 percent, or 210 000 cubic metres per year.

The SaRCO strategy is currently incomplete, and the analysis results described above provide an outside indication of its maximum potential impact, since the strategy is intended both to identify areas for exclusion from harvest as well as to define constraints applicable to habitat outside core no-harvest areas.

In March of 2007, the Kamloops TSA licensees responded to the November, 2006 SaRCO draft proposal with another proposal for a recovery plan which also identified additional no-harvest areas and was given general acceptance by government. Further land base adjustments have since been proposed, and I have reviewed in detail the related extents of the THLB identified for no-harvest or deferral. The net associated areal impact on the THLB, including a 20-year deferral on about 1600 hectares, is somewhat in flux as considerations progress, but is in the order of the proposal’s original figure of approximately 39 000 hectares (roughly 40 percent of that in the November, 2006 SaRCO draft proposal) plus an additional 6000 hectares which government has provisionally approved as a likely maximum additional requirement for habitat under the proposed plan.

From all of this, it is clear that the modelling of mountain caribou habitat in the base case, which reflected only the original version of the KLRMP Appendix 10, does not now adequately reflect the imminent areal requirements for this habitat. Although at this time final resolution has not been reached regarding the additional areas that will be approved for exclusion and deferral, discussions are active. Given the high priority of this recovery plan it appears almost inevitable that some good part of the additional identified areas will become either formally excluded, or subject to deferral, from timber harvesting. In the urgent context of this recovery plan I have therefore considered it reasonable to depart from my Guiding Principle of not accounting for land base changes until formal approval by government, and in my AAC determination I have accounted for a related overestimation in the projected timber supply, as follows.

Current indications are that the overestimation will lie in rough approximation to 40 percent of the maximum impact indicated in the noted sensitivity analysis, that is, close to 5 percent of the annual volume available in the mid term, and 4 percent in the long term. In my determination I have taken these mid- and long-term overestimations into account as discussed in **‘Reasons for Decision’**. In the short term, the allowable harvest is already increased by an amount significantly in excess of these figures, in response to the still ongoing need for salvage related to damage from the MPB epidemic. The expected additional measures for mountain caribou habitat will not detract from the need to pursue this salvage, the accelerated operations for which generally do not overlap significantly with the additional proposed habitat areas. Any short-term implications for timber supply from additional provisions for caribou habitat will therefore be taken into account when the AAC uplift for MPB-related salvage is no longer needed.

- Identified Wildlife Management Strategy

‘Identified wildlife’ refers to two categories of wildlife designated by the Minister of Environment under FRPA. These categories are: (1) species at risk (i.e., species that are endangered, threatened, or vulnerable); and (2) regionally important species that rely on habitat that may be adversely impacted by forest or range practices on Crown land and that may not be adequately protected by other management strategies, such as those for biodiversity or riparian management. The establishment of these categories of species enables a number of provisions under FRPA to be used to manage habitat for identified wildlife; including Wildlife Habitat Areas (WHAs) and objectives, and General Wildlife Measures and objectives.

The provincial government announced its Identified Wildlife Management Strategy (IWMS) Volume I in February 1999. The IWMS Version 2004 contains an updated list of identified wildlife, updated species accounts, and updated procedures for implementing the IWMS. Government has limited the impact of management for identified wildlife to a maximum of one percent of the short-term harvest level for the province.

The KLRMP includes government-approved Special Resource Management Zones for Habitat and Wildlife Management Areas which have been established where there is regionally or provincially significant wildlife habitat. Management in these zones is intended to ensure the long-term viability of identified wildlife habitat through a wide variety of management tools and activities. Seventeen Wildlife Habitat Areas (WHAs) totalling 1567 hectares are spatially located on the landscape in the Kamloops TSA, five for Rattlesnake, three for Western Screech Owl, and nine for Lewis’ Woodpecker. These WHAs cover 1567 hectares, 82 hectares of which are in the THLB. On the THLB, the forest cover on 66 hectares is older than 80 years. A further 4 WHAs have been identified in draft and it is anticipated that the provincial Ministry of Environment (MOE) will establish more WHAs in 2008.

The establishment of WHAs is an integral component of wildlife management and in most areas of the province the one-percent impact that is permitted for the special management of Identified Wildlife provides for an important contribution toward achieving associated objectives. In this TSA, so far, much of the land for WHAs has been located in non-THLB areas or in poorer quality stands, but I cannot be certain that this will be so in the case of each and all of the WHAs anticipated to be established in the future. To accommodate this uncertainty, I have accounted in my determination for up to a one-percent impact on the timber supply in the mid and long terms for the management of Identified Wildlife, as discussed in ‘**Reasons for Decision**’.

- stand-level biodiversity and wildlife tree retention

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

In the 2007 timber supply analysis for the Kamloops TSA, the retention of WTPs was modelled by applying a percentage reduction to the volume yield of each stand at the time of its projected harvest. This modelling approach means that WTPs are not assumed to make any contribution toward biodiversity requirements at the landscape level, although in reality some WTPs may contribute to some extent to landscape-level forest structure and old-growth habitat. Based on information provided by licensees, under current practice, on average about 1.9 percent of the THLB area in each cutblock is being retained for WTPs and this was modelled in the analysis. Since this percentage reduction in conjunction with retention outside of the cutblock is consistent with management objectives in the KLRMP and was also modelled in the analysis, I am satisfied that the base case projection adequately accounts for management requirements to meet biodiversity objectives at the forest stand level.

- landscape-level biodiversity and old-forest retention

Conserving landscape-level biodiversity involves maintaining forests with a variety of patch sizes, seral stages, and forest-stand attributes and structures, across a variety of ecosystems and landscapes. Together with other forest management provisions that provide for a diversity of forest stand conditions, the retention of old forest is a key consideration in managing for landscape-level biodiversity objectives. Old forest retention can be achieved through the location of old-growth management areas (OGMAs).

In the Kamloops TSA, OGMAs totalling 227 958 hectares have been spatially located (as of March 2006), in respect of which 92 177 hectares of Crown productive forest have been excluded in deriving the THLB. In response to consultation with First Nations the Simpcw First Nation recommended that OGMAs not be excluded in the base case projection, since they can be managed and transferred to other areas outside the THLB. However, it is the current practice by the major licensees to manage these March 2006 spatial OGMAs and they have incorporated processes for this management into their landscape-level plans.

I therefore conclude that the land base exclusion for OGMAs appropriately reflects current practice in the TSA and its incorporation in the base case projection adequately accounts for this aspect of the timber supply implications of meeting biodiversity objectives at the landscape level. If management for old forest changes in the future, such changes will be captured in future AAC determinations.

- impacts of MPB on forage supply

In the Kamloops TSA, much of the summer range for livestock derives from forest stands predominated by lodgepole pine where sequential harvesting has provided an ongoing supply of either native forage or areas for the seeding of domestic forages. Such areas are most appropriate for this purpose during the first 15 to 20 years after harvest. The extensive harvesting related to the MPB infestation will create a sharp increase in forage supply in the near term, creating increased grazing opportunities in some areas, depending on accessibility or the presence of a remaining understory. In about 20 years or so, however, as these vast areas of forest regenerate further and canopy closure begins, their reduced ability to provide summer forage may place pressure on other more sensitive range areas, such as riparian areas, to provide forage.

In view of the high value of range management in the TSA, to avoid this future pressure on sensitive areas without reducing or displacing livestock, a number of potential remedies may be applied. These include: deferred planting or reduced rates of stocking in some areas to increase and lengthen the availability of the forage supply; rehabilitation of some of the unsalvaged areas for pasture; and ecosystem restoration in adjacent dry forest areas to increase the forage supply.

Lengthening the regeneration delay or converting some areas to permanent or transitional pasture would have as yet unpredictable implications for timber supply that will need to be accounted for in future determinations as information becomes available. The MFR is already working with the MAL toward strategies for 'agroforestry silvopasture' that will include reviewing the efficacy of relative emphases that may be placed on forest stocking standards and the provision of pasture. For the current AAC determination, I have remained mindful of the potential for a related future constraint on the timber supply, but I have no basis from which to assume any particular overestimation in the current base case projection.

- ecosystem restoration

Recognizing that grassland ecosystems are rare in BC, the KLRMP includes an objective to maintain natural grassland ecosystem processes, including all grassland-dependent species. Treatments will therefore likely be necessary to reduce the current rates of encroachment of

Douglas-fir and Ponderosa pine forests onto grassland ecosystems. The Kamloops Forest District is developing an ecosystem restoration plan that will zone dry forests and grasslands and prioritize harvesting or prescribed burning in selected stands for subsequent management as grassland or open forest. Most of the areas proposed for ecosystem restoration in the TSA have either already been excluded in deriving the THLB, or are areas of low site productivity. The implications for the timber supply in the TSA from ecosystem restoration are therefore minimal in relation to the base case, and I am satisfied that no further adjustment to the projected timber supply is required on this account.

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

Other information

- strategic land use planning and objectives

Forest management in the Kamloops TSA must be consistent with legislative direction and objectives specified in the Kamloops Land and Resource Management Plan (KLRMP), originally designated a higher level plan on January 23, 1996. This plan provides legal land use direction to the Kamloops TSA. All major forest tenure holders are required to prepare legally binding Forest Stewardship Plans that reference the 26 objectives of the KLRMP. A 2006 Monitoring Report indicates that the goals and objectives of the KLRMP are generally being met, and the KLRMP Monitoring Table has been meeting annually to provide ongoing public involvement in the implementation of the plan.

Management of the forest and range within the Kamloops TSA is also guided by the Sustainable Forestry Management (SFM) Plan which is participated in by forest tenure holders who retain or seek environmental certification of their management practices by the Canadian Standards Association (CSA). The SFM plan sets performance values, objectives, indicators and targets addressing environmental, social and economic aspects of forest management in the TSA. The SFM plan is monitored by the SFM advisory group which is made up of a cross-section of local interest groups. Participants in the plan report annually to the public.

The timber supply review process reflects land use planning decisions that affect forest practices, and my considerations of the modeling of specific requirements of the KLRMP in the base case analysis are discussed in various sections of this document.

Some First Nations have stated that they do not accept the KLRMP as a higher level plan on the basis of their lack of involvement in the process. I understand that the plan may not represent or address all of First Nations' interests or concerns, but the plan is designed to, and does, provide strategic direction for integrating environmental and socioeconomic interests, including many, such as provisions for wildlife habitat and riparian areas, that overlap with concerns expressed by First Nations. Under current law, in all AAC determinations I must respect the provisions of the approved land use plans in place for many areas of the province, and I must assess the implications of current forest practices according to their consistency with such plans. I must also consider information from First Nations respecting aboriginal interests and treaty rights that may be affected by AAC determinations, as I have done in the following section and as noted in other sections in this document.

- First Nations considerations

As chief forester of British Columbia, I must 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 relevant internal information available to the ministry

A total of 28 First Nations were consulted as part of the Timber Supply Review for the Kamloops TSA. Five First Nation associations have members with asserted traditional territories within the TSA. These are the Shuswap Nation Tribal Council, Nlaka'pamux Nation Tribal Council, Nicola Tribal Association, St'at'imc Chiefs Council and Lillooet Tribal Council. Ten First Nations reside in communities located within the TSA, with a total population of about 5000 people. These include the Adams Lake Indian Band, Bonaparte Indian Band, Kamloops Indian Band, Simpcw First Nation, Neskonlith Indian Band, Skeetchestn Indian Band, Whispering Pines/Clinton Indian band, Little Shuswap Indian Band, Ashcroft Indian Band and Oregon Jack Indian Band. Nine First Nations communities have traditional interests within the Kamloops TSA, but reside outside the TSA. These communities include: High Bar, Splots'in (Spallumcheen), Lower Nicola, Upper Nicola, Xaxl'ip (Fountain), Ts'kw'aylaxw (Pavilion), Cook's Ferry, Lheidli T'enneh and Canim Lake.

The majority of the bands in the Kamloops TSA are not involved in the Treaty process; instead, MFR staff work mainly with protocol agreements, work groups, monthly meetings, and other non-Treaty processes. Exceptions are the Lheidli-T'enneh Band, which reached the final stages of a treaty that was not signed, as the community did not ratify the agreement, and the Canim Lake Band, which at Stage 4 of the Treaty process continues to work on an agreement-in-principle through the Northern Secwepemc Tribal Council.

- participation in the forest sector

Fourteen of the 19 bands within the Kamloops TSA have signed agreements with MFR. These agreements are all for five-year periods and are due to expire between 2009 and 2012. The agreements allow for Non-Replaceable Forest Licences (NRFLs) and, in some cases, area-based tenures such as in a woodlot or community forest. Five of the agreements include a woodlot tenure. Twelve agreements include a provision for a range tenure. Two First Nations are currently requesting a community forest under their Interim Agreements on Forest and Range Opportunities (FROs). All of the FROs and the Forest and Range Agreements (FRAs) include a requirement for consultation on administrative and operational decisions related to forest and range management. The individual consultative process described within each of these agreements for AAC determinations has been followed and completed.

Eleven bands have a NRFL outside an FRA or FRO agreement. These licences resulted from the May 2002 amendment to the *Forest Act* that allowed First Nations to apply to the Minister of Forests and Range for forest licences without competition. The timber volume for these licences came in the most part from timber killed by the MPB or damaged by fire in 2003. Three bands have more than one NRFL, and eight bands hold a woodlot separate from the FRAs and FROs.

- consultation process for AAC determination

The chronology of the process followed for engaging First Nations in consultation for this determination is as follows.

On January 29, 2007, MFR staff sent an advisory letter to all 28 First Nations and Tribal Councils within the Kamloops TSA, informing recipients of the Timber Supply Review process and inviting comments. The 28 recipients were: Adams Lake Indian Band; Ashcroft Indian Band; Bonaparte Indian Band; Canim Lake Indian Band; Cook's Ferry Indian Band; High Bar Indian Band; Kamloops Indian Band; Lillooet Tribal Council; Little Shuswap Indian Band; Lower Nicola Indian Band; Neskonlith Indian Band; Nicola Tribal Association; Nicomen Indian Band; Nlaka'pamux Nation Tribal Council; Nooaitch Indian Band; Oregon Jack Creek Indian Band; Shackan Indian Band; Shuswap Nation Tribal Council; Simpcw First Nation; Skeetchestn Indian

Band; Splots'in First Nation; Ts'kw'aylaxw First Nation; Upper Nicola Indian Band; Whispering Pines/Clinton Indian Band; Xaxli'p First Nation; Lheidli-T'enneh Band; Shuswap Indian Band; and the St'at'imc Chiefs Council. A follow-up phone call was made to each recipient. In response, three comments were received.

On October 19, 2007, a formal consultation letter was sent to chief and council for each of the same 28 First Nations groups, with the Public Discussion Paper (PDP) attached, and with notification of December 31, 2007 as the concluding date for consultation. This was followed three days later by an e-mail to respective First Nation forestry representatives with the PDP and TSR backgrounder attached. All 28 recipients were invited to a technical session at the Kamloops Forest District Office on November 6, 2007, to discuss the PDPs and to provide input. A PowerPoint presentation on the TSR process was provided by MFR staff, and discussion included the base case projection, the nature of AAC uplifts and other relevant topics. However only one First Nation representative attended. All 28 recipients were then contacted again, provided with the PDP and backgrounder, and invited to meet with me as chief forester on November 16, 2007, to discuss the PDP and provide input for my consideration in this determination.

Fourteen First Nations representatives attended the November 16 meeting, and many issues of concern were raised, as noted in the bulleted paragraphs below.

On December 6, 2007, a further letter was sent to all 28 First Nations groups requesting any additional input, with a reminder of the closing date, and this was followed up by reminder phone calls to all recipients. Following the initially planned conclusion of consultation on December 31, 2007, a further letter was sent and a phone call made to each of the 28 First Nations groups, with additional requests for input.

On February 6, 2008, I met with nine chiefs of the Shuswap Nation Tribal Council (SNTC), including the co-chairmen, and SNTC representatives and staff, together with MFR region, district and headquarters staff, in the SNTC office in Kamloops. The period for consultation and input eventually concluded following the receipt by my office of a letter dated February 21, 2008, from the SNTC, which I have considered and to which I have also responded under separate cover, dated May 23, 2008.

First Nations representatives should know that their input to this determination and its potential influence on the assessment of the timber supply are valued and considered in all respects, right up to the time when the rationale documenting my determination is signed.

From my review of, and from my personal participation in, the process of consultation for this determination, I consider that the MFR has made substantial efforts to engage First Nations in consultation respecting interactions between their aboriginal interests and this AAC determination. In particular I note that efforts were made to engage all of the bands directly, not just through the Tribal Councils, which is consistent with the preference I have heard from First Nations.

Of the many issues raised in the consultation process, some lie directly within my statutory mandate for consideration under Section 8 of the *Forest Act*, and some are properly matters for consideration by other statutory decision makers and will be forwarded to these decision makers for consideration when making future decisions. Issues in the former category are addressed in the appropriate sections of this rationale document, notably in '*First Nations cultural heritage resources*' and '*First Nations archaeological sites*' or in other sections, as for example the concern expressed at the November 16, 2008 meeting over hydrological impacts, which is addressed in '*hydrology and the MPB infestation*'.

At the November 16, 2007 meeting, the potential for implications arising from the ‘Sappier-Gray’ decision was raised. This decision from December 7, 2006 in the Supreme Court of Canada confirmed an aboriginal right to harvest wood for domestic purposes on Crown land traditionally used for those purposes by specified First Nations. Before any related implications for timber supply can be analysed, options for sustaining domestic timber requirements must be identified. For the current determination, with input from the district managers, I have concluded that it is reasonable to expect that timber requirements for domestic use can be met through operational allocation decisions without significant impacts on forest sustainability and stewardship. As specific information becomes available, it can be incorporated into future timber supply analyses.

Other issues raised at this meeting which are not within my mandate for consideration in an AAC determination under Section 8 included: the impacts of the Caribou Recovery Plan on the viability of First Nations’ harvesting operations; the quality of wood in First Nations’ tenures; the possibility of establishing area-based tenures; problems with stumpage rates; the need to include range opportunities in FROs; the need for renewable tenures; access and road-deactivation issues; and other concerns. A number of these concerns were also included in a November 16, 2007 letter from Chief Don Moses of the Lower Nicola Indian Band, and a December 7 letter from Chief Keith Matthew, which I have referred to and discussed with the Assistant Deputy Minister of MFR’s Revenue and Tenures Division for his consideration. As I have noted again below, I will forward all First Nations’ concerns that do not fall within my mandate under Section 8 of the *Forest Act* to the appropriate member of the Ministry of Forests and Range executive, or statutory decision maker, as required.

At the February 6, 2008 meeting with the SNTC, a large number of issues, comments and concerns were presented. These included:

- statements related to aboriginal title, including reference to the September 2007 United Nations Declaration on Rights Of Indigenous Peoples, and in particular that: while SNTC member nations are interested in coexisting and sharing resources with the later arrivals, they have not given up title to their lands; that recent court decisions affirm the non-extinguishment of aboriginal title; that this is reflected in the case of Wilson/Jules (Harper Lake); that the provincial *Forest Act* does not apply to lands with unextinguished aboriginal title; that concerns comparable to those now expressed were conveyed to Sir Wilfred Laurier in a ‘Memorial’ document on August 25, 1910 in Kamloops, almost 100 years ago, which document indicated a willingness to share half of the territories’ resources with post-contact arrivals, while only two or three percent of the timber harvested on traditional territory is now harvested by First Nations; that co-management is desirable but that it could potentially prejudice claims to title and rights; that in the ‘New Relationship’ there is an immediate need for dialogue and for the courage to find creative solutions; that negotiation is preferred over litigation, but that direct action may be needed to see recognition of First Nations rights and title;
- comments related to accommodation for infringement of interests, noting that SNTC members do not consider FROs accommodation, being only an interim measure, and being subject to the further criticisms in the following paragraph;
- concerns related to economics: that First Nations continue to provide ongoing employment to their band members despite high operating costs and related losses; that restrictions are placed on First Nations and not on major licensees, which create inequities (in particular respecting FROs which some First Nations view as marginal operations that neither meet the differing needs of all First Nations nor represent an adequate economic opportunity, since they are heavy to pine, and are restricted to 54 cubic metres per capita); that while development takes place on First Nations’ land, the

First Nations people continue to live in poverty, resulting in hopelessness for youth that leads to drugs, suicide and gang activity; that access to green wood is needed; that in lieu of access to timber, they would settle for financial accommodation; that First Nations should not pay stumpage to the Province to harvest timber on First Nations' land but rather the companies should pay stumpage to First Nations;

- concern that 'clearcut destruction' is very disturbing in relation to First Nations title; and that there is a need for long-term strategies for sustainable land and water resource management that incorporate traditional practices and technologies;
- concerns related to the socio-economic implications of the loss of Weyerhaeuser from the area and a lack of consultation on the matter;
- comment that the First Nations Forestry Council is an organization, not a government, and that the provincial government needs to consult with individual Chiefs, not with the First Nation Forestry Council;
- concern that Timber Supply Review data packages should include information on matters of concern to First Nations, and that additional capacity is needed for these concerns to be addressed by First Nations in the consultation process;

Discussion at the meeting was far-ranging, including a description of pre- and post-contact First Nations tax systems, a recommendation by the First Nation Forestry Council to waive administrative costs and subsidize First Nation operations, and a number of further issues related to timber allocation, the potential for licence amendment, land use management, co-management, and revenue sharing. The Bonaparte First Nation noted that its own representatives, and not the SNTC, were representing its interests.

In the discussion, MFR staff and I provided answers to some of the questions directly. I also acknowledged, based on what I had heard, that First Nations do not consider the consultation process to meet their needs. At the meeting I committed to responding to outstanding questions from the SNTC by letter, which I have done.

One issue that was raised at both the November 16, 2007 and February 6, 2008 meetings and that remains difficult to address is the continuing concern among First Nations over what is seen as the inadequacy of their resources for participating more fully, in what they describe as a 'meaningful' way, in the TSR process. This is identified as an issue in respect of the information they can provide for the data package, and in the effectiveness of their technical ability to review the timber supply analysis and the PDP. Moreover, some First Nations do not consider a 'review and comment exercise' to constitute meaningful consultation.

In acknowledging these concerns, I note that the process of consultation is not fixed and that it could include changes in the ways First Nations become involved in earlier stages of the information gathering process for AAC determinations. I am aware that government is already working on developing consultation protocols with First Nations in a number of aspects related to forest management through signed FRAs and FROs. I am also aware that under the leadership of the Integrated Land Management Bureau the provincial government is undertaking a new initiative to improve the effectiveness of provincial engagements with First Nations and to provide greater efficiencies and improved working relationships between provincial agencies and First Nations.

For the present, I encourage communication and information sharing between First Nations and MFR staff that will contribute to overcoming the stated concerns, including making available early and to the extent possible the detailed findings of TUSs for inclusion in data packages and analyses. However, since I have no direct mandate in AAC determinations to consider matters beyond those provided for under Section 8 of the *Forest Act*, I will undertake to convey such

concerns of First Nations to MFR Executive members or the appropriate statutory decision maker. Many of the comments, concerns and issues noted above arising from the consultation process relate to licensing, apportionment and allocation of harvesting rights in types of timber and among licensees, and the disposition of economic benefits from the resource. As noted, First Nations assert their historic entitlement, from the 'Memorial' document, to the allocation of half of all natural resources, including the volume of whatever AAC I determine. Again, issues of this nature are beyond my authority for consideration, and should be addressed to the appropriate statutory decision maker. My role in AAC determinations is to identify the total volumes of timber that may be made available in TSAs for utilization in harvesting opportunities that will be distributed among licensees as decided by the Minister of Forests and Range through the apportionment process.

As I noted at the meeting between SNTC and MFR representatives on February 6, 2008, in AAC determinations I can consider timber supply implications related to First Nations title when title is explicitly articulated in law or through a Treaty negotiation.

With respect to the B.C. Supreme Court (BCSC) decision on the William or *Tsilhqot'in* case of November 20, 2007, this is a significant but complex legal decision with an array of potential implications which government staff are working diligently to understand. My understanding at this point is that the aboriginal title aspects of the decision represent the judge's opinion and are not binding, and further that this particular opinion is specific to the *Tsilhqot'in* Nation. In all cases it should be remembered that in all AAC determinations I already consider and account for many wildlife management issues associated with potential implications for timber supply, for instance by ensuring appropriate provisions for riparian areas, for ungulate winter range, for biodiversity, for OGMAs, for caribou, for wildlife tree patches, and other such objectives, all of which are routinely assessed and accounted for. In situations where fishing, hunting, trapping, or other wildlife related interests are raised by a First Nation, I can then determine whether these considerations are appropriate to address the interests raised or whether further steps may be necessary to adequately address the particular interest and the impact my decision may have on that interest.

In conclusion, I would like to thank the First Nations for a productive and mutually respectful exchange of information and ideas during this consultation process, and I reiterate that my considerations with respect to specific aboriginal interests relevant to my decision are discussed in the appropriate sections of this document as noted above.

- areas with harvesting deferrals

- Arrowstone archaeological sites

The Arrowstone operating area near Cache Creek has a high incidence of First Nations' archaeological sites. I therefore consider it appropriate to exclude from the THLB the 500 hectares identified as associated with these sites.

- permanent sample plots

Information from the Southern Interior Forest Region's Forest Sciences program indicates that 650 hectares of Permanent Sample Plots (PSPs) are installed in the Kamloops TSA. A permanent sample plot is a location within a forest where researchers collect detailed measurements and data relating to trees and vegetation. The plots provide information that allows the evaluation and prediction of forest growth, and the monitoring of changes in the forest. In the Kamloops TSA, these sample plots include uncut forests, partial-cut areas, and regenerating areas. No accounting for these areas was included in the analysis for the base case projection. However, the PSPs, which are geographically referenced and appear on a mapping layer during the forest

development planning process, have certainly been subject to deferral from harvesting. Given the current practice of deferral, I consider it appropriate to remove the affected 650 hectares from the THLB.

- woodlot expansion program

A total of 30 000 cubic metres of timber taken back from major licensees under Bill 28 was allocated to expanding the woodlot program in the Kamloops TSA. To date, no new woodlots have been offered from this allocated volume. Woodlot expansion is expected to proceed following negotiations with First Nations to award volume under FROs. Six new Woodlots totalling 7016 hectares and supporting 14 097 cubic metres per year in the Kamloops Forest District await government approval for advertising, and meanwhile major licensees are not allowed in the affected areas. The timber volumes required for these woodlots remain in the AAC for the TSA until the apportionment is made and the licenses issued, following which a corresponding AAC adjustment will be made in the next determination to reflect the separate management of these areas. Forest health concerns will nonetheless continue to be addressed as necessary in these areas. Recognizing the forthcoming adjustment to be made in the next determination, for the current determination I will leave the affected land base in the THLB, and make no related adjustment in the projected timber supply.

To conclude this section, my considerations have identified overestimations in the base case projection in respect of archaeological areas in the Arrowstone area and of the installed PSPs, in the total amount of 1150 hectares, or roughly 0.1 percent of the mid-to-long-term timber supply, and I have accounted for this in my determination as discussed in ‘**Reasons for Decision**’.

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

- alternative harvest flows

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that short-term harvest levels are compatible with a smooth transition to medium and long-term levels. Timber supplies need to remain sufficiently stable so that there are no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

In some situations in some areas of the province—but not all—during the current extensive MPB infestation, a significant increase in harvest level may be required for a period whose duration will depend on a number of factors evolving over time. This is currently the case in the Kamloops TSA, for which the former chief forester determined, effective January 1, 2004, an AAC increase of one million cubic metres per year to reduce the spread of, as well as the expected losses from, the MPB.

To provide additional information to help me in considering the implications of alternative rates of harvest in this AAC determination, in addition to the base case harvest projection, the 2007 timber supply analysis included three alternative harvest flow projections that also resulted in a stable long-term harvest level. Two alternative forecasts described in the Public Discussion Paper examined the effects of (a) maximizing the salvage of MPB-damaged pine timber and (b) abandoning MPB pine salvage operations. A third analysis (c) examined the potential for a very significant increase in short-term MPB salvage.

In analysis (a), the existing partitions for cedar and hemlock and for deciduous and pulpwood stands were maintained during a salvage period which extended over the first ten years of the projection, while all of the rest of the harvest was deployed into forest stands showing 50 percent or greater 'red' or 'grey' attack by the MPB.

In analysis (b), the same partitions were again maintained, but all stands with 50 percent or greater 'red' or 'grey' attack were avoided completely. No attempt was made to limit the harvest of non-pine stands to 1.4 million cubic metres per year, the base-case level derived from recent harvest billing statistics, noted earlier in *'Base case for the Kamloops TSA'*. In reality, however, the volume of harvest from non-pine stands is a matter of significant concern, as noted below in this section and as accounted for in **'Reasons for Decision'**.

In both of these alternative scenarios, as in the base case, within each targeted group of forest stands, those with the highest volumes were assumed to be harvested first. As in the base case, the initial harvest level for both alternate salvage scenarios was 4.2 million cubic metres per year. The differences (shown graphed in the analysis and in figure 4 of the PDP) were that in (a), the relatively stable mid-term harvest level of 2.05 million cubic metres per year was 12 percent above the base-case mid-term level of 1.83 million cubic metres per year, while in (b) the mid-term level of 1.46 million cubic metres per year was 20 percent below the base-case mid-term. In the long-term, the situation was reversed, with the harvest level in (a) slightly below, and that in (b) slightly above, the base-case level of 1.83 million cubic metres per year.

Under the 'maximum-salvage' scenario, during the first five years, 81 percent of the harvest was obtained from stands of at least 70 percent pine. In the 'abandon-salvage' scenario, in the first five years 94 percent of the harvest was from stands with less than 50 percent pine. Since roughly 72 percent of the mature pine in the TSA is projected to die in the next 5 years, it is clear that targeting stands with high pine content at this time, as in the 'maximum salvage' scenario, preserves as much non-pine growing stock as possible for subsequent harvest in the mid-term. If the harvest of pine-leading stands were to cease today, as in the 'abandon-salvage' scenario, future generations would be penalised not only by the loss of regenerating new pine forests but also by the earlier harvest of much more of the mature, non-pine forest.

From these two scenarios it is clear that choices in the deployment of the harvest in the short term have very significant mid-term consequences. While economic factors deriving from adverse market conditions may prevent the achievement of the 'maximum-salvage' scenario, the early targeting of heavily impacted pine stands, to the extent feasible without compromising the mid-term supply of non-pine species, will have a far more beneficial effect on the mid-term timber supply than would the complete avoidance of harvesting in pine stands. I have taken these considerations into account in my determination, as noted in **'Reasons for Decision'**.

Also significant as an indication of the flexibility in the short-term timber supply is the conclusion from (c) the third alternative analysis which showed that the initial harvest level in the base case was not limited by the amount of pine that can be salvaged in the first and second five-year periods. At least an additional 2 million cubic metres of pine could be salvaged in the first five-year period, at a rate of 6.2 million cubic metres per year, with a harvest level of 2.51 million cubic metres per year in the second five-year period, and only a very small change (300 000 cubic metres per year less) in the mid-term harvest level projected in the base case. Notably, in this scenario the non-pine harvest was limited to 1.4 million cubic metres per year. As evidenced by scenario (b), if the non-pine harvest were not limited in scenario (c) the mid-term would likely be more than 20-percent lower than in the base case. In my determination I have remained mindful of this short-term flexibility in the timber supply.

In making my AAC determination I have considered the implications of all of the alternative forecasts provided, as well as those of the base case forecast. As noted earlier, in *'Base case for*

the Kamloops TSA', I am satisfied that the base case projection forms a satisfactory basis of reference for my considerations in this determination.

- community dependence on harvest level

Estimates by MFR staff show the following employment derived from harvest billing data to the end of 2006 and in subsequent years projected from base-case harvest levels.

		Person-Years in Kamloops TSA			Person-Years in Province		
Year	Harvest (cub. m.)	Direct	Indirect/ induced	Total	Direct	Indirect/ induced	Total
2006	4,200,000	3,570	2,352	5,922	3,948	4,158	8,106
2011	2,513,000	2,136	1,407	3,543	2,362	2,488	4,850
2016	1,828,128	1,554	1,024	2,578	1,718	1,810	3,528
2026	1,828,100	1,554	1,024	2,578	1,718	1,810	3,528

Table 2. TSA and provincial person-years supported by projected Kamloops TSA timber supply.

By the year 2016, the projected reductions in timber supply in the Kamloops TSA will support less than half the total person-years supported in 2006, a level of employment over 20 percent lower than was projected in the 2001 analysis. Some of this reduced employment has already been incurred by recent lower actual harvest levels experienced in relation to soft markets; future employment conditions are dependent on many additional factors including the relative value of the Canadian dollar, and thus are difficult to predict with confidence. In a regional context, from 2004 to 2006 the Kamloops TSA harvest was approximately 4.1 million cubic metres per year. In 2007, the annual harvest had declined to between 2.8 and 2.9 million cubic metres, partly due to AAC uplifts in the 100-Mile, Okanagan and Merritt TSAs which have contributed over the past few years to a much closer balance between regional supply and demand. The general market and economic conditions have undoubtedly contributed to Weyerhaeuser's closure of its Kamloops mill in May 2008. The associated local employment opportunity will likely be transferred elsewhere.

First Nations have stressed a need for forest policy and legislation to develop a sustainable forest industry in the TSA, the associated opportunities and benefits of which they suggest should remain in the local area. However, as I have noted earlier, the disposition of benefits from harvesting is beyond my mandate for consideration in determining this AAC.

- bio-energy considerations

The Kamloops Forest District participated in the provincial bio-energy project designed to identify the potential for bio-energy production from MPB-killed timber and roadside waste. The project showed that roughly 200 000 cubic metres of fibre per year could be available for the next 20 years for bio-energy purposes. Any stand cut for bio-energy purposes would be promptly reforested to district standards, the future volumes in which would be projected from yield curves for managed, instead of unmanaged stands. While this could add slightly to the projected timber supply, no public input has been received on this subject, and the bio-energy potential is not anticipated to be realized in harvesting in an active tenure for at least another three years, if at all. Therefore it is appropriate to defer consideration of any related implications until the next timber supply review, and I have made no adjustment on this account in this determination.

- (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 has expressed the economic and social objectives of the Crown for the province in a letter to the chief forester, dated July 4, 2006 (attached as Appendix 3).

The letter stresses the importance of a stable timber supply to maintain a competitive and sustainable forest industry while being mindful of other forest values. In respect of this, in the base case projection and in all of the alternative harvest flow projections with which I have been provided for reference in this determination, a primary objective in the harvest flow has been to attain a stable, long-term harvest level where the growing stock becomes stable, neither increasing nor decreasing over time. Another objective in my determination has been to make available for harvest as much of the damaged pine as is feasible and environmentally appropriate in order to avoid unrecoverable losses and to minimize negative impacts on the mid-term timber supply and on associated socio-economic activity. In my determination, I have been mindful of the need for the allowable harvest in the short term to remain consistent with maintaining the integrity of the timber supply projection throughout the planning horizon. I have also 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. I am therefore satisfied that this determination accords with the objectives of government as expressed by the Minister.

- local objectives

The Minister's letter of July 4, 2006 suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. To this end, and to ensure appropriate consultation with First Nations, a public review period of 60 days was provided, commencing with the October 10, 2007 release of the Public Discussion Paper. The official period for receiving comments was extended from December 10, 2007 to February 6, 2008, and further input, by letter from the Shuswap Nations Tribal Council, dated February 21, 2008, was also considered. I have discussed the specifics of the communications and consultation process with First Nations inviting their input, and the input submitted by First Nations, earlier, in *'First Nations' Considerations*, and where appropriate I have recorded how I have addressed the issues raised, in appropriate sections of this rationale.

Opportunities for input included a meeting on December 20, 2006, with licensees and First Nations representatives, to discuss particular aspects of forest management; input on several factors from this meeting was incorporated in the base case and sensitivity analyses as appropriate. Further input was solicited from a follow-up meeting with licensees on March 8, 2007, with no consequent implications for the validity of the timber supply as projected. The formal period for public review, October 10, 2007 to December 10, 2007, was advertised in all of the local papers that have circulation to all of the communities in the Kamloops TSA.

A number of technical and other questions related to the timber supply review were posed by media representatives and were responded to directly by district staff. One licensee stated its agreement with salvaging and replanting, in an environmentally appropriate fashion, the maximum amount of land possible before the MPB-affected timber becomes unusable. I have addressed this objective in several places in this document, including *'shelf-life of MPB-attacked pine'* and in **'Reasons for Decision'**.

A representative of Natural Resources Canada suggested examining a short-term, 'pine-only' harvest scenario. A similar scenario was investigated in the 'maximum salvage' alternative analysis discussed in '*alternative harvest flows*'. However, eliminating the non-pine harvest altogether would seriously impact the viability of current operations.

In respect of overall statements about local objectives for the use of land and resources in the Kamloops TSA, these are provided by the KLRMP as noted earlier in '*strategic land use planning and objectives*'. To the extent of my knowledge, the current forest management planning and practices in the TSA, the assumptions in the data package, the methodologies applied in the analysis, and my considerations and reasoning in this determination, are all consistent with the objectives and requirements of these plans, with only specific qualifications as necessitated by MPB management as noted in this document, for instance regarding the temporary relaxation of adjacency constraints during MPB salvage harvesting.

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

Non-recoverable losses

Non-recoverable losses (NRLs) are timber volumes that are destroyed or damaged by such agents as fire or disease and are not recovered through salvage operations. Estimates for unsalvaged losses account for epidemic (abnormal) infestations and for factors that result in losses that are not recovered through salvage harvest programs and are not recognized in yield estimates. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or through other methods. That is, the volumes of the yield tables used in the modelling included a reduction for these endemic losses. Endemic losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted in that section under '*volume estimates for managed stands*'.

- Mountain Pine Beetle

The strategy for managing the salvage harvesting necessitated by the MPB infestation in the Kamloops TSA was developed in 2006 by Kamloops TSA major licensees, BCTS and the MFR. The MOE and MAL (through ILMB) as well as the Fisheries and Oceans Canada reviewed and contributed to the strategy without officially endorsing it. The active members of the Kamloops TSA Committee endorsed the strategy, the 2006-07 update of which involved licensees and government staff. The Strategy forms Appendix 1 of the Kamloops TSA Forest Health Strategy, and maintains a focus on maximizing the salvage harvest of the highest-priority stands through two main focuses: (a) carrying out as much salvage harvesting as early as possible, to minimize impacts to the timber supply in the short and mid terms; and (b) prioritizing damaged stands to maximize the available timber supply benefits in view of the limited capacity for harvesting, milling and marketing, of the attacked timber. Economically recoverable stands are prioritized for harvest in order from very severe, severe, and moderate, as classified in an overview flight.

To December, 2008, a total of 15.6 million cubic metres had been identified in stands of high priority, of which 7.8 million were assumed to be commercially available. A total of 21.2 million cubic metres in low salvage priority stands have not yet been included in salvage harvesting strategies, pending assessment for opportunities for salvage, capital investment, and environmental benefit.

To represent salvage harvesting in the base case analysis, forecast data were used from the 'BCMPBv3' computer model developed by MFR scientists in conjunction with consultants and the Canadian Forest Service. The data used in the BCMPBv3 model were from actual infestation

figures for 1999 to 2005, with projections from this data for 2006, as later data were not then available. The 'v3' model projected the MPB outbreak to peak in 2007, while actual observations show that it appears to have peaked in 2006, with a very high level of attack, one year earlier than assumed in the analysis. The projection showed that by 2014, the infestation will be effectively over.

In the base case projection, for the salvage period 2006-2015, 1.4 million cubic metres, or one third of the total harvest, was scheduled to come from stands predominated by species other than pine. This is consistent with harvest billing data showing that of the volume scaled in the TSA in 2006, approximately 40 percent was from non-pine species. Conversely, the harvest billing data showed that roughly 60 percent of the scaled harvest was pine.

I have reviewed with MFR staff the modelling assumptions applied to represent the harvesting of stands with various levels of attack, and the harvest of pine- and non-pine-leading stands in the TSA. From this I have concluded that, when the licensees' approach of targeting 'green-attack' stands in order to maximize the salvage value is accounted for, and when the significant volumes of non-pine species that were salvaged-harvested following the 2003 fires are also accounted for, the representation of salvage-harvesting in the base case projection adequately reflects current practice in the TSA with respect to salvaging potential losses to the MPB. Nonetheless, in view of the importance of non-pine species in supporting the stability of the mid-term timber supply, the need to limit the harvest of non-pine species to a sustainable level remains an objective of high priority in forest management during the MPB epidemic. Consequently, in my determination I have addressed this requirement by specifying a maximum allowable volume attributable to the harvest of particular non-pine species, as discussed in '**Reasons for Decision**'.

I am also concerned about our understanding of the secondary or understory stand structure remaining in pine-leading stands that are not salvaged following beetle infestation. This concern has two aspects with respect to: (a) the secondary structure's potential under appropriate short-term management for contributing some volume to ameliorate the mid-term timber supply, and (b) the forecasting of regenerating volumes that will contribute to long-term timber supply and will have implications for the mid-term timber supply. In preparing harvesting plans therefore, licensees should remain cognizant of the understory structure and of its potential to contribute to future timber supply, and of the areal extent of such stands. The ministry and licensees should work together in determining appropriate management strategies on areas that are not to be harvested (for example, leaving 'as is', or planting under the 'Forest for Tomorrow' program). In my '**Implementation**' section, below, I have therefore included a specific two-part instruction reflecting these concerns.

- '*shelf-life*' of MPB-attacked pine

The duration for which a pine tree that has been damaged or killed by the MPB will retain a merchantable value is assessed in the Kamloops TSA in terms of its value as a sawlog and is known as its 'shelf-life'. Shelf-life may vary considerably, being dependent on many factors including the climate and moisture regime at the harvest site, stumpage rates, lumber prices, milling technology, and the Canadian dollar exchange rate. In timber supply analysis, it is typically assumed that once the shelf-life is exceeded, the dead pine reverts to a non-recoverable loss (NRL), although in practice in some circumstances the wood may still be useable for chips or other non-sawlog purposes.

In timber supply analyses for my recent AAC determinations for the 100 Mile House TSA, the Williams Lake TSA and the Morice TSA, shelf-life was incorporated in conjunction with the projected spread of the MPB, with the assumed shelf life and associated salvage harvesting being modelled at the forest-stand level on an annual basis. In the 2007 analysis for the Kamloops TSA, due to limitations in the CASH model used, pine forest stands were categorized according to their

projected mortality in a more basic way related to two five-year periods over the expected 10-year duration of the MPB attack. It was assumed that, once dead, a pine tree would be useful as a sawlog for two years only, a number based on discussions in 2006 with licensees in the TSA. With more experience in, and improved knowledge of, processing the dead timber, licensees now suggest that, in part because the shelf-life of dead pine is highly dependent on milling technology, their initial two-year assumption may have underestimated the true shelf life.

I have reviewed in detail the assumptions made in the analysis about the periods during which the harvesting of dead pine would remain viable, and I concur with MFR analysts that this method of analysis introduces more uncertainty in the short-term timber supply projection than does the method of annual projection. I have also examined the projected mortalities over time from MPB attack and the associated percentage losses projected to be experienced in the pine resource. Entomologists' best informed estimates suggest the MPB will destroy roughly 80 percent of the entire mature pine resource, with 20 percent remaining dispersed on the landscape. Depending on location, accessibility, markets and other factors, this 20 percent may or may not include recoverable timber. Assuming 80-percent mortality, in the base case scenario, with a two-year shelf-life, by the end of 2008, roughly 54 percent of the mature pine would be killed, and by 2012, 71 percent. This would mean that by 2010, without salvage, 28 million cubic metres of mature pine would have become unusable for sawlogs, leaving a residual mature pine inventory of approximately 23 million cubic metres.

In the base case projection, by this date, the model had harvested approximately 14 million cubic metres of pine, of which six million cubic metres were from pine trees that would remain useful beyond 2010. This means that in the base case, of the residual 23 million cubic metres of pine, approximately 17 million cubic metres would persist beyond 2010. In the base case, only 5.5 million cubic metres of pine were harvested in the second five-year period (2010-2015), while 17 million cubic metres were potentially available. Thus the base case forecast for this period appears too pessimistic, unless the harvesting of the 17 million cubic metres is constrained by the model to meet objectives for other values such as for visually sensitive areas for example, or unless the volume resides in stands containing less than 100 cubic metres per hectare. From this it would seem likely that the initial pine harvest level in the base case, of 2.8 million cubic metres per year, could be extended beyond 2010 and, if the shelf life were extended to four years, this harvest level may potentially be extended to the end of the second period, i.e. to 2015.

From detailed discussions with MFR staff, my conclusions are that the base case forecast is likely too pessimistic for the period 2010-2015, due to the modelling methodology employed, as also is the assumption of a two-year shelf-life itself, as was also suggested by licensees. Moreover, while the ultimate extent of the pine mortality is presently uncertain and can only become known over time, from my personal observations in other areas, including the Quesnel and Lakes TSAs and the Vanderhoof area, some fraction of undisturbed pine often does remain in stands with high mortality, some of which could retain normal merchantable value. From all of this, I believe that the precipitous decline forecast in the base case to occur between 2010 and 2011 likely overstates the unavailability of attacked pine stands, at least some of which will by then still be within their shelf-life period. This suggests that the pine resource can contribute to the timber supply for a period exceeding that which was implied in the base case, possibly for one-and-one-half to two five-year periods, although the true duration of this additional extent remains uncertain. In my determination I have remained mindful of, but have not directly accounted for, a potential underestimation in the duration of the availability of mature pine in the TSA.

- losses to forest health factors, wind, wildfire

Using procedures from 'Methods to Estimate Unsalvaged Losses for Timber Supply Review', developed by the MFR Forest Practices Branch, the total NRLs caused by factors other than the MPB were estimated in the TSA as 139 402 cubic metres per year. Contributing damage agents included Douglas-fir beetle, spruce beetle, western hemlock looper, wildfire, and root disease in managed stands.

I have reviewed in detail with district and analysis staff the assumptions incorporated in this estimate, and I am in agreement that some of the losses appear underestimated in the following ways. Spruce bark beetle populations are rising, and up to a 25-percent error may be present in identifications in over-flights. It is also believed that VDYP underestimates losses to the balsam bark beetle as well as the affects of drought and stress related to climate changes which will result in the harvest yield from these stands being lower than expected. Catastrophic wind events similar to those in 2004, as well as increased levels of damage from wildfires over historic levels, will also likely increase losses anticipated to occur from climate change. Finally, the 2003 fires were treated as an anomaly and were omitted from the calculation of average losses due to wildfire. This treatment of the 2003 fires potentially leads to an underestimation of the fire losses.

At the time of the 2007 analysis, updated NRLs were not available. In the 2007 base case, only 62 590 cubic metres of NRLs were accounted for (based on July 2001 estimates), and MFR expert staff have calculated the total underestimation in the NRLs due to anticipated but unaccounted future damage from bark beetles, root disease, fire and wind to be at least 76 812 cubic metres, which in terms of the projected timber supply amounts to a 4-percent overestimation in the level projected in the base case to be sustainable in the mid term. In my determination I have accounted for this overestimation as discussed in '**Reasons for Decision**'.

In considering the NRLs in the TSA in this way, I have identified an ongoing concern that should be addressed before the next timber supply review. This relates to the salvage harvesting of approximately 1.19 million cubic metres of timber from the almost 5 million cubic metres that were damaged by fire in 2003. I am concerned that the inventory updates should fully account for all of the related depletion, such that any remaining damaged and unmarketable timber on the landscape will not be assumed to contribute to future timber supply projections unless they are suitably regenerated. I have included an instruction to this effect in '**Implementation**', below.

Reasons for Decision

In reaching my AAC determination for the Kamloops TSA, I have made, reviewed and confirmed all of the considerations documented above, and have reasoned from them as follows.

The current AAC of 4 352 770 cubic metres for the TSA, determined in 2004, consists of a ‘base’ AAC of 2 682 770 cubic metres, plus temporary uplifts of 1 000 000 cubic metres for MPB-related harvesting and 670 000 cubic metres for the salvage of fire-damaged timber. The base AAC consists of 2 376 770 cubic metres for conventional harvesting, plus 200 000 cubic metres for harvesting in cedar- or hemlock-leading stands, 20 000 cubic metres for harvesting in deciduous-leading stands, and 86 000 cubic metres for harvesting pulpwood within PA 16.

As I noted in ‘**Base Case for the Kamloops TSA**’, in the 2007 timber supply analysis, the initial harvest level in the base case projection was set at 4 200 000 cubic metres per year rather than at the current AAC of 4 352 770 cubic metres. This reflected the reduced actual harvest level in 2006, and the fact that by 2006 much of the allowable harvest for fire salvage had been completed and the harvest redirected to MPB salvage. In the base case, this initial harvest level of 4 200 000 cubic metres per year was maintained for five years before declining by 40 percent to approximately 2.51 million cubic metres per year. This level was then maintained for the next five years before declining by a further 16 percent in 2016, to a mid-term harvest level of approximately 1.83 million cubic metres per year.

In determining AACs, my considerations typically identify factors that, considered separately, indicate reasons why the timber supply may be either overestimated or underestimated in the harvest levels projected for various periods in the base case. Some of these factors can be quantified and their implications assessed with reliability. Others may influence the assessment of the timber supply by introducing an element of risk or uncertainty, but cannot be quantified reliably at the time of the determination and must be accounted for in more general terms.

I have identified a number of such factors in my considerations for this determination, but before reviewing them in detail I will outline the general context in which this determination is being made.

First, although it appears that the MPB infestation may have peaked in 2006, the attack continues apace, with unresolved uncertainty as to the ‘shelf-life’ of the damaged wood. From much expert discussion it seems likely that the actual shelf-life will be somewhat longer—at least in some areas—than the two-year sawlog assumption applied in the base case, that some undamaged pine may remain on the landscape, and that the duration of the availability of mature pine for harvest in the TSA may therefore have been somewhat underestimated. Contrary to the modelling in the base case, considerable quantities of pine may be available for salvage until 2015.

Second, First Nations, which have received 40 percent of the AAC uplift for MPB salvage, as well as volumes from the uplift for the now diminished fire-related salvage, are seeking and will continue to seek access to harvestable volume to replace the reduced fire-salvage volume, particularly when so much of the harvest is still directed toward MPB salvage.

Third, reviewing the demand for timber from the Kamloops TSA in a regional context, from 2004 to 2006 the Kamloops TSA harvest was approximately 4.1 million cubic metres per year. In 2007, the actual annual harvest had declined to between 2.8 and 2.9 million cubic metres, partly due to AAC uplifts in the 100-Mile, Okanagan and Merritt TSAs which have contributed over the past few years to a much closer balance between regional supply and demand.

Fourth, while timber markets for pine remain unencouraging and are not expected by economists to recover significantly before 2009, the markets for non-pine species have remained relatively stable throughout the recent period, maintaining mill viability and lumber recovery factors.

Fifth, as noted earlier in appropriate sections in this document, the partitions for cedar-hemlock and for deciduous species, as well as for PA16, continue to provide both economic opportunity and administrative advantage in the TSA that is consistent with maintaining good forest stewardship now and over the long term. These partitions will help to ensure appropriate performance in the respective components of the harvestable profile, and in each case sufficient flexibility remains in the respective stands to continue implementation of the partition.

With these observations as a general context, in my considerations I have identified the following specific factors as reasons why the actual timber supply in the Kamloops TSA may have been overestimated in the 2007 base case projection, to degrees that can be quantified with reasonable reliability.

- **Woodlots:** The need to account for one new issued woodlot has resulted in overestimations in the THLB of 1100 hectares and in the timber supply projected for the mid and long terms of 2500 cubic metres or 0.1 percent.
- **Community Forest Agreements:** The need to account for two agreements, the North Thompson, which is now awarded, and the Logan Lake, which has been offered by the Minister, necessitates a 16 000-hectare reduction to the THLB that indicates a 40 000-cubic metre or 1.6-percent overestimation in the projected mid- and long-term timber supply.
- **Regeneration delay:** I have provisionally estimated that the need to apply extended regeneration delays to certain areas has led to an overestimation of up to one percent in the projected mid-term timber supply.
- **Mortality in young pine stands:** The actual 48-percent mortality, against the 35-percent figure assumed in the analysis, results in an overestimation of roughly 120 000 cubic metres per year, or about 7 percent, in the projected mid-term timber supply.
- **Mountain Caribou:** Current indications are that ongoing reassessments of the requirements for Mountain Caribou Habitat result in overestimations of about 5 percent of the annual timber supply available in the mid term, and 4 percent in the long term. Any short-term implications for timber supply from additional provisions for caribou habitat will be assessed and accounted for when the AAC uplift for MPB-related salvage is no longer needed.
- **Identified Wildlife:** The need to establish additional WHAs in managing for Identified Wildlife indicates a one-percent overestimation in the projected mid- and long-term timber supply.
- **Harvesting deferrals for archaeological areas and Permanent Sample Plots:** Harvesting deferrals now being applied in respect of archaeological areas in the Arrowstone area and for installed PSPs in the TSA indicate a combined overestimation of 1150 hectares in the THLB, or roughly 0.1 percent of the projected mid- and long-term timber supply.
- **Non-recoverable losses other than MPB:** The NRLs for forest health factors, particularly for spruce and balsam bark beetles and for root disease, were under-represented in the base case by 76 812 cubic metres, resulting in a 4-percent overestimation in the timber supply projected for the mid term.

Offsetting the above overestimations, I have identified the following factor in my considerations as a reason why the actual timber supply may have been underestimated in the base case projection, to a degree that can be quantified with reasonable reliability.

- **Log grades:** The need to account for available volumes of 'dead-potential' wood indicates an underestimation of approximately 10 percent in the timber supply projected for all time periods.

- **Volume estimates for existing, natural, unmanaged stands:** The 2008 statistical adjustment report indicates a potential overall underestimation of approximately 7 percent in the growing stock that will be available to support the harvest level at the beginning of the mid term.

From reviewing all of the above-listed over- and underestimations in the projected timber supply, the combined result is an approximately 3.5-percent net overestimation, or approximately 60 000 cubic metres. This overestimation is of most significance in considering the sustainability of the 'post-MPB-epidemic' timber supply projected in the base case for the mid term. In the base case, this mid-term level was forecast at 1.83 million cubic metres per year. Accounting for the overestimation reduces the projected mid-term level to approximately 1.77 million cubic metres per year. This mid-term harvest is comprised of the very minor components of pine predicted to survive the MPB epidemic, together with cedar/hemlock-leading stands, deciduous-leading stands, and stands predominated by Douglas-fir, spruce, and balsam.,

The forecast mid-term decline in timber supply may be moderated to some extent by the likely underestimation in site productivity from the use of inventory file site indices instead of those for managed stands. In the interest of prudent stewardship, I have decided not to factor in possible mitigating affects of underestimated site productivity, primarily as a precautionary step to address my uncertainty concerning the actual timber supply implications of the earlier noted recent study and other factors affecting the realization of the potential productivity. These include, for example, the distribution of unharvested pine sites, expected insect predation in young pine stands, and the activity of other insects on other commercial tree species. I expect that in the next timber supply review, the results of recent and further studies on site productivity and its realization will be accounted for in the timber supply analysis.

The noted mid-term level is of significant importance in assessing the appropriate contributions to be made by pine and non-pine species to the composite AAC now under determination. It was made clear by analysis discussed earlier in '*Alternative harvest flows*' that the ongoing early targeting of heavily impacted pine stands, to the extent feasible under the given ecological and economic considerations, will have a far more beneficial effect on the mid-term timber supply than would the avoidance of harvesting in pine stands. Moreover, it was demonstrated that sufficient flexibility exists in the timber supply for continuation of an elevated harvest in pine stands. In establishing an appropriate level for the pine salvage harvest, I have considered the continuation of the one-million-cubic-metre uplift as an advantageous management option. I have also considered transferring to the pine harvest a component of the salvage harvest of fire-damaged stands, the requirement for which has more recently become reduced. In assessing such a transfer, I have been mindful of the inevitably higher 'by-catch' of non-pine species associated with an elevated harvest level, and of the related implications for optimising the mid-term timber supply, which will depend primarily on non-pine species. To avoid excessive 'by-catch' I have decided to reduce by approximately one-half, the 670 000 cubic-metre-per-year harvest formerly attributable to the salvage of fire-damaged timber. All else remaining equal, this can be effectively accomplished by reducing the overall AAC from its current level of 4 352 770 cubic metres to 4.0 million cubic metres, with the remaining component of the fire-salvage harvest now transferred to the salvage of MPB-damaged pine.

With respect to the existing partitions, the 2007 timber supply analysis showed at the start date of the forecast approximately 12.9 million cubic metres of cedar- or hemlock-leading stands across the THLB, and about 1.4 million cubic metres in stands composed of 70 percent or more deciduous volume, of which 560 000 cubic metres are located in the Headwaters District for harvest under the deciduous partition. Ignoring for the moment any constraints or scheduling problems, and assuming the current NRFL licence harvest levels for these stand types, these figures equate to harvests of approximately 64 years' duration for cedar-hemlock in the TSA, and

28 years for deciduous in the Headwaters District. Given that both licences are NRFLs, then although the cedar/hemlock volumes are overestimated by 15 percent, it is reasonable to assume the feasibility of continuing the current AACs for both partitions at their existing levels, i.e. 200 000 cubic metres for the cedar and hemlock partition, and 20 000 cubic metres for the deciduous partition outside the PA16 boundary, for the next 5 years, particularly since the reason for establishing these partitions was to encourage the use of these stand types. Nonetheless, it should be noted that a cedar/hemlock harvest cannot be sustained indefinitely at a level of 200 000 cubic metres. If the cedar/hemlock partition were to become a replaceable forest licence, the harvest level would need to be reduced over time to a long-term sustainable level of approximately 100 000 cubic metres per year. On the other hand, the indicated gross underestimation of deciduous volumes in the inventory emphasizes the ongoing sustainability of the deciduous partition at the current level.

Assuming the majority of the pulpwood harvested in the PA 16 will be pine, it is also reasonable to maintain the pulpwood partition of 86 000 cubic metres per year within the PA 16 boundary.

Together, these three partitions comprise a total allowable annual harvest of 306 000 cubic metres, residing within the total AAC of 4.0 million cubic metres I have determined for the TSA as a whole.

As noted earlier, the 1.77-million-cubic-metre mid-term forecast is comprised not only of stands predominated by Douglas-fir, spruce and balsam, but also of cedar/hemlock and deciduous-leading stands. It follows that a sustainable harvest from the Douglas-fir-, spruce- and balsam-leading stands would be somewhat less than 1.77 million cubic metres, throughout the mid term. In consideration of this, and also recognizing the need to maintain mill viability in the current difficult economic period, I have decided to establish a partition for harvesting attributable to Douglas-fir-, spruce- and balsam-leading stands—which I will define as the ‘non-pine’ partition, set for the period of this determination at 1.7 million cubic metres. This is intended as a step in a transition to the lower mid-term harvest level for these species that will become more accurately forecast in successive timber supply analyses.

Under the determined AAC of 4.0 million cubic metres, the residual from the four partitions discussed above is 1 994 000 cubic metres annually for dedication to pine as market conditions permit. In the event of an under-harvest in the partition for Douglas-fir, spruce and balsam, the difference, up to the maximum volume permitted under the partition for Douglas-fir, spruce and balsam, may be harvested instead in pine.

The specified volumes attributable to harvesting in the pine and in the ‘non-pine’ partitions are by species, not by leading components of forest stands, in order to ensure a minimum of ‘by-catch’ of fir, spruce and balsam that might otherwise result from harvesting in pine-leading stands. This is intended to retain the integrity of the fir, spruce and balsam stand structure, while removing the pine before it loses its economic value. I anticipate that this will require monitoring of scaled volumes by species on an annual basis, with a performance requirement over the five-year effective period of the determination, to allow licensees some flexibility to sustain economic viability in the short term. I understand that administration of the pine and the ‘non-pine’ partitions will be challenging in this TSA, due to the diversity of species and topography and with the administration also being shared between two forest districts over multiple operating areas. I therefore recommend that MFR region and district staff collaborate with licensees in resolving the

details of establishing the most fair, equitable and operationally effective means of administering these partitions.

In conclusion, I will reiterate that the primary purpose of the 'non-pine' partition is to maintain options to support the currently projected mid-term harvest level. In the short term, the implementation of this capped partition should allow for licensees to harvest in and sustain operations from Douglas-fir-, spruce- and balsam-leading stands during times when pine may not be economically viable, with the proviso that at the end of the five-year period the total amount of five times 1.7 million = 8.5 million cubic metres of harvested, Douglas-fir, spruce and balsam is not exceeded; this provides for continuation of the harvest at close to recent levels. To any extent that this were to be exceeded, the mid-term level would be compromised. Therefore, if ongoing monitoring shows a consistent trend toward over-reaching this limit, I may revisit this determination earlier than required by statute, to specify a new level of harvest in the 'non-pine' partition, consistent with achieving the mid-term level.

The partitions should also ensure that the AAC I have determined will not become a limiting factor on the priority for aggressive harvesting in the MPB-damaged pine stands.

Determination

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

A timber harvest level that accommodates as far as possible the objectives for all forest resources during the next five years, including the increased harvesting necessitated by the Mountain Pine Beetle infestation, that reflects current management practices as well as the socio- economic objectives of the Crown, and that includes the required adjustment in respect of the change in accounting for interior log grades, can be best achieved in the TSA by establishing an AAC of 4.0 million cubic metres, effectively a net reduction from the former AAC of 8.1 percent.

This new AAC includes partitions specifying allowable annual harvest volumes attributable to the following:

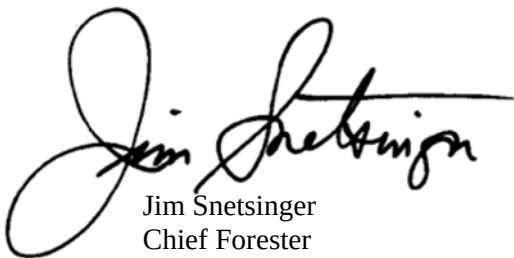
- for harvesting in stands predominated by Douglas-fir, spruce, or balsam, a maximum of 1 700 000 cubic metres (referred to in this document as the 'non-pine' partition);
- for harvesting of pine species, 1 994 000 cubic metres, with the possibility of an increase to the extent of any under-harvesting in the 'non-pine' partition;
- for harvesting in cedar- or hemlock- leading stands, 200 000 cubic metres;
- for harvesting in PA 16, 86 000 cubic metres; and
- for harvesting in deciduous-leading stands outside PA 16, within the Headwaters District, 20 000 cubic metres;

This determination, which excludes all woodlot licence volumes, becomes effective on June 1, 2008, and will remain in effect until a new AAC is determined, which must take place within five years of the effective date of this determination.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff and licensees to undertake the tasks and studies noted below, the particular benefits of which are described in appropriate sections of this rationale document. I recognize that the ability of staff and licensees to undertake these projects is dependent on available resources including funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Kamloops TSA.

1. In order to obtain a more reliable projection of the timber supply for the mid and long terms, it is important for licensees and MFR staff to work cooperatively to reduce the uncertainty in site productivity estimates and to incorporate recent studies as appropriate in the next analysis for consideration in the next AAC determination.
2. A full accounting should be made, for the next timber supply analysis and AAC determination, of the total areas on the THLB that have been burned, salvaged, and regenerated.
3. A regeneration delay of 15 years was assumed for areas projected to be killed by the MPB and not harvested. The actual regeneration delay on these areas should be monitored to verify or vary this figure for future analyses.
4. For the next timber supply review it is important to monitor and assemble information that will describe and quantify the effects on timber supply arising from the large extents of dead pine trees in the TSA, in terms of: the extents of the areas that will be harvested; the areas that will be rehabilitated; the amounts of dead wood that will be left on the landscape; how much will be used for bio-energy; and what areas will become naturally regenerated.
5. Ongoing monitoring of mortality and in-growth in young pine stands should be carried out, to provide for reliable assessment of related impacts in future analyses.
6. MFR staff should ensure that forest inventory updates fully account for all necessary depletion related to unmarketable timber remaining on the landscape following damage by the 2003 wildfires. In addition, I recommend that the stands identified in the inventory as currently lacking species information be targeted for data capture through an inventory update.
7. In order to improve the quality of the SIBEC values and in view of the desirability of having an ecosystem (site series) mapping of the TSA that may have multiple uses including habitat mapping and traditional use studies, I recommend that a Predictive Ecosystem Mapping (PEM) exercise be undertaken for the TSA.
8. For the next timber supply review, district staff should work cooperatively with licensees to (a) quantify the amount of stands containing adequate secondary stand structure that would support the mid-term timber supply, and (b) to identify the expected management, future yields, and extent of pine stands that will not be salvaged.
9. Ensure that the next analysis includes a full accounting for all areas deleted from the land base in association with the mountain caribou recovery strategy.



Jim Snetsinger
Chief Forester

May 28, 2008



Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157 Consolidated to October 21, 2004, reads as follows:

Allowable annual cut

- 8** (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for
- (a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and
 - (b) each tree farm licence area.
- (2) If the minister
- (a) makes an order under section 7 (b) respecting a timber supply area, or
 - (b) amends or enters into a tree farm licence to accomplish the 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 5 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 5 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 5 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 10 years after the date of the relevant last determination, and
 - (b) must give written reasons for the postponement.
- (3.2) If the chief forester, having made an order under subsection (3.1), considers that because of changed circumstances the allowable annual cut that was determined under subsection (1) for a timber supply area or tree farm licence area is likely to be changed significantly with a new determination, he or she
- (a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and
 - (b) must give written reasons for setting the earlier date.

- (4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).
- (5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to
 - (a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and
 - (b) different types of timber and terrain in different parts of private land within a tree farm licence area,
 - (c) [Repealed 1999-10-1.]
- (6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.
- (7) The regional manager or the regional manager's designate must determine a an allowable annual cut for each community forest agreement area, in accordance with
 - (a) the community forest agreement, and
 - (b) any directions of the chief forester.
- (8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider
 - (a) the rate of timber production that may be sustained on the area, taking into account
 - (i) the composition of the forest and its expected rate of growth on the area,
 - (ii) the expected time that it will take the forest to become re-established on the area following denudation,
 - (iii) silviculture treatments to be applied to the area,
 - (iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
 - (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
 - (vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,
 - (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,
 - (c) Repealed [2003-31-02]
 - (d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and
 - (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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

Section 4 of the *Ministry of Forests and Range Act* (consolidated to March 30, 2006) reads as follows:

Purposes and functions of ministry

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

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

Documents Attached

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

Appendix 4: List of written submissions received

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



JUL 04 2006

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

Dear Jim:

Re: Economic and Social Objectives of the Crown

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

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

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

Page 1 of 2

Minister of
Forests and Range
and Minister Responsible
for Housing

Office of the
Minister

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

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



Jim Snetsinger

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

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

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

Sincerely yours,

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

Rich Coleman
Minister

Appendix 4: List of written submissions received

First Nations

Bonaparte Indian Band.

Lower Nicola Indian Band

Simpcw First Nation

Canim Lake Band

Shuswap Nations Tribal Council

Industry

Tolko Industries Ltd.

Sk7ain Ventures Ltd.

Individuals

1 submission