

**BRITISH COLUMBIA
MINISTRY OF FORESTS AND RANGE**

Robson Valley Timber Supply Area

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

Effective August 4, 2006

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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 Robson Valley timber supply area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the Robson Valley Timber Supply Area

The Robson Valley TSA, one of fifteen TSAs in the Southern Interior Forest Region of BC, is situated in east-central BC. The TSA covers a total area of approximately 1.46 million hectares, including parks and all ownerships, and is administered from the BC Forest Service (BCFS) Headwaters Forest District office in Clearwater, with a field office in McBride.

The TSA is bordered to the west by the Wells Gray and Bowron Lake provincial parks, and the Mitchell Lake-Niagara protected area which connects them, and by the Kakwa Recreation Area to the north. To the east are the Willmore Wilderness Area, Jasper National Park and Mount Robson and Mount Terry Fox Provincial Parks.

The terrain of the TSA is varied; the bottomlands of the Rocky Mountain trench are flat to rolling, while the adjacent snow-capped mountain ranges are rugged with steep forested lower slopes, and deeply cut side valleys. The diversity of the landscape is reflected in the mix of tree species which includes the dominant spruce and balsam (subalpine fir), as well as western redcedar, lodgepole pine, western hemlock and Douglas-fir, in forests dominated by mature and older types. The resultant mix of habitats supports a variety of wildlife species, including Mountain Caribou, Grizzly Bear and Mule Deer, as well as Wolverine, Cougar, Wolf and Lynx. Chinook Salmon are also present, and a number of species in the TSA are listed as endangered, threatened or vulnerable.

The largest communities in the TSA are McBride and Valemount, which are home to about 50 percent of the TSA's population of 3,963 people (2001 census). Smaller communities include Crescent Spur-Loos, Dunster, Tete Jaune Cache and Albreda.

No First Nations' communities are located in the Robson Valley TSA, but five First Nations have aboriginal interests in the TSA. The Lheidli T'enneh Band and the Simpcw First Nation claim traditional territories in much of the Robson Valley, and the Canim Lake Band, the Soda Creek Band, the Red Bluff Band all have asserted traditional territory in the TSA.

The economy in the TSA is generally diversified, with forestry, the public sector and tourism as the most important sectors. Public and commercial recreation are important to the TSA all year round. Winter activities include snowmobiling and cross-country-, heli- and backcountry skiing; and summer activities include hiking, heli-hiking, the use of all-terrain vehicles, camping, eco-touring, and hunting.

A total of 210 691 hectares of the TSA comprise the current timber harvesting land base, roughly 15 percent of the total area of the TSA (including parks).

Acknowledgement

For preparation of the information I have considered in this determination, I am indebted to MoFR staff in the Headwaters Forest District, the Southern Interior Forest Region, and the Forest Analysis and Inventory Branch, as well as to staff of the Ministry of Agriculture and Lands (MAL). I am also grateful to the Defined Forest Area Management group of licensees for the timber supply analysis and to the organizations and individuals who contributed significant insights during the review process, all of which I have considered in my determination.

History of the Robson Valley AAC

From 1981 to 1987, the AAC for the Robson Valley TSA was 500 000 cubic metres. In 1987, the AAC was raised to 560 000 cubic metres and a non-replaceable licence of 60 000 cubic metres per year was issued in January 1988, to harvest mature and over-mature cedar and hemlock stands. In 1988, volume was approved for an additional 140 000-cubic-metre licence to include health management harvesting in the Raush and Goat drainages, for an overall AAC of 700 000 cubic metres; however, no related harvesting occurred, and in 1990, the AAC was determined at 600 000 cubic metres.

In 1992, the non-replaceable 60 000-cubic-metre, cedar-hemlock licence was cancelled. In 1993, two non-replaceable licences of 50 000 cubic metres per year were awarded to permit development of a new access to the upper Morkill drainage. Access and harvesting took place and the licences were extended but have now expired without completion of harvesting in the drainage.

In 1996, the AAC was increased to 602 377 cubic metres, which included a partition of 6000 cubic metres attributable to deciduous-leading forest types, and a woodlot allocation of 3623 cubic metres per year was excluded from the AAC. In the 2001 determination, the AAC was maintained at 602 377 cubic metres, of which 6000 cubic metres remained attributable to deciduous-leading species. This AAC is apportioned by the Minister of Forests and Range (as of February 16, 2006) as follows:

Apportionment	Cubic metres per year	Percentage
Forest Licences (FL), replaceable	371,458	61.66
FL, non-replaceable	100,000	16.60
Timber Sale Licences (TSL) >10,000 m ³ , replaceable	11,372	1.89
TSL <=10,000 m ³ , replaceable	1,262	0.21
BCTimber Sales TSL / Licence to cut	54,908	9.12
Woodlot Licences (unallocated; see WL section below)	6,377	1.06
Community Forest Agreement (<i>separate admin</i>)	50,000	8.30
Forest Service Reserve	7,000	1.16
Total AAC	602,377	100

New AAC determination

Effective August 4, 2006, the new AAC for the Robson Valley TSA will be 536 000 cubic metres. This reduces the AAC by approximately 3 percent after accounting for the land base supporting the new McBride Community Forest area and woodlots. This AAC includes continuation of the 6000-cubic-metre partition specifying the harvest attributable to deciduous-leading species and includes an adjustment to account for harvested volumes of ‘dead potential’ timber (formerly known as grade 3 endemic and grade 5 logs) which commenced being charged to AACs in British Columbia on April 1, 2006. This AAC will remain in effect until a new AAC is determined, which must take place within five years of the present determination.

Information sources used in the AAC determination

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- BC Ministry of Water, Land and Air Protection 2003. *Order — Ungulate Winter Range # U-7-003*. Victoria: Province of British Columbia.
- BC Ministry of Forest and Range 2005. DFAM Interim Standards for Public and First Nations Review.
- BC Ministry of Forest and Range 2004 Modelling Options for Disturbance of Areas Outside of the Timber Harvesting Land Base Draft Working Paper.
- BC Ministry of Forest and Range 2003. Ministry of Forests Consultation Guidelines.
- Letter from the Minister of Forests to the chief forester, dated July 4, 2006, stating the Crown's economic and social objectives for the province (see Appendix 3).
- *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, MOFR and MELP.
- Technical review and evaluation of current and expected operating conditions through comprehensive discussions with staff of MOFR and MAL, including the AAC determination meeting held in the McBride Field Office of the Headwaters Forest District on March 28-29, 2006, and a helicopter review of major portions of the TSA on March 28 with district and branch staff.

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 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 Robson Valley 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 Practices Code—‘the Code’—which is now in transition to the Province's *Forest and Range Practices Act*.

In many areas of the province 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.

As BC progresses toward the completion of strategic land-use plans, in some cases the eventual timber supply impacts associated with land-use decisions resulting from various regional and sub-regional planning processes remain subject to some uncertainty before formal approval by government. It is my practice not to speculate on timber supply impacts that may eventually result from land-use decisions not yet finalized by government.

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 the establishment of resource management zones and resource management objectives and strategies for those zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. In such cases the legislated requirement for frequent AAC reviews will ensure that future determinations address ongoing plan-implementation decisions. Wherever specific protected 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 the Robson Valley TSA, land use management and development follow the general direction of the Robson Valley Crown Land Plan of 1985, and forest management practices are consistent with the goals and objectives of the 1999 Robson Valley Land and Resource Management Plan, a Cabinet-approved plan detailing 23 resource management zones with associated management strategies. Where applicable, I have referred in this rationale document to various aspects of these government plans.

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

Some 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 obligations 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 asserted rights and title in a manner proportional to the strength of their claimed interests and the degree to which the decision may affect these interests. In this regard, I will consider any information brought forward respecting First Nations' aboriginal interests, including operational plans that describe forest practices to

address First Nations' interests. As I am able, within the scope of my authority under section 8 of the *Forest Act*, I will address those interests. 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 Robson Valley 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 BC, of the mandate of the Ministry of Forests and Range as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the Code and under the *Forest and Range Practices Act*.

Because the new regulations of the *Forest and Range Practices Act* are designed to maintain the integrity of British Columbia's forest stewardship under responsible forest practices, it is not expected that the implementation of the legislative changes will significantly affect current timber supply projections made using the Code as a basis for the definition of current practice.

The role of the base case

In considering the factors required to be addressed in AAC determinations under Section 8 of the *Forest Act*, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and Tree Farm Licences (TFLs).

For each AAC determination for a TSA, 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 decline rates, starting harvest levels, 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, which 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 Robson Valley TSA

The timber supply analysis used as a basis for my considerations in this AAC determination for the Robson Valley TSA was prepared by Forest Ecosystems Solutions Ltd. (FES), of North Vancouver, BC, for the Robson Valley Defined Forest Area Management Group of licensees (the 'DFAM Group'), using the 'Forest Simulation and Optimization System' (FSOS), a proprietary forest estate model developed by FES. The FSOS model has been used on more than 24 forest management areas ranging in size from less than 15 000 hectares to over 4 million hectares, throughout BC, Alberta, Manitoba and Ontario; it has been reviewed by timber supply analysts in the Ministry of Forests and Range's (MoFR) Forest Analysis and Inventory Branch and has been accepted for use and applied in BC in timber supply analyses for five TFLs and five TSAs.

The land base used in the analysis reflects current land use and management, and the base case projection was selected based on the following harvest flow objectives: The current harvest level was projected to be sustained as long as possible until reductions became necessary to achieve long-term sustainability; the harvest level in the mid-term was prevented from declining below the sustainable long-term harvest level; where decreases in the harvest rate became necessary, no more than a 10-percent decrease by volume was permitted in any ten-year period; and the long-term harvest level was the maximum achievable even-flow harvest maintainable in combination with a stable growing stock.

The initial harvest rate chosen for the base case was 552 377 cubic metres per year, i.e. the current AAC reduced by the harvest attributable to the McBride Community Forest, which is administered separately from the TSA and was removed subsequent to the last AAC determination. This initial level was projected to be maintained for 20 years before declining by five percent every five years until reaching the long-term harvest level of 348 267 cubic metres, 55 years from now.

I have reviewed in detail the assumptions and methodology incorporated in the base case projection, and I have done so with reference to the public input provided. My considerations included projections provided in the timber supply analysis showing, for the next 400 years: the total and the merchantable growing stock in the TSA; the harvest contribution from unmanaged and managed stands; the average age of stands harvested over time; the mean harvest volume per hectare, the total area harvested annually; and the age-class distribution now and in 50, 150, and 400 years' time. Details of my assessment of particular aspects of the analysis and its projections in relation to specified uncertainties are provided in the following sections.

From my review of the timber supply analysis, including detailed discussions with the MOFR analysts who reviewed the analysis, I find no reason why this analysis and the base case forecast, whose inputs, assumptions and methodology have also been submitted to public review, should not provide a suitable basis of reference for use in my considerations in this determination. In addition to the base case forecast, I was provided with a number of sensitivity analyses carried out using the base case as a reference. Harvest flow scenarios, related to infestations by the Mountain Pine Beetle, were also provided. All of these analyses have been helpful in the considerations and reasoning, documented in the following sections, leading 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 timber harvest

- general comments

The overall area of the Robson Valley TSA is estimated from inventory data to be 1 458 548 hectares. This total includes both forested and non-forested lands of various ownerships that include parks, the McBride Community Forest, ecological and miscellaneous reserves, woodlot licence areas, and private and other lands. Some of these areas do not contribute to timber harvesting or to forest cover requirements for other objectives and are excluded from the timber supply analysis. Other areas—e.g. the community forest and woodlot licences—supply timber that is harvestable but that is administered and considered separately from the AAC for the TSA.

Some areas that do not supply harvestable timber directly, such as parks and riparian reserves, do provide habitats and forest cover that assist in meeting a variety of management objectives within the TSA, thereby indirectly contributing to the timber supply of the TSA. Areas which contribute directly to timber harvesting as well as to forest cover requirements are commonly referred to as 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 Robson Valley TSA, after excluding non-productive forest areas and existing roads, trails and landings, the total productive Crown forested land base is 562 727 hectares.

The THLB consists of those parts of the TSA 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 overall 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 Robson Valley TSA, these factors include some of the ownerships noted above, including parks, as well as: areas of unproductive forest and water bodies; areas considered unsuitable for operations for economic or physical reasons; environmentally sensitive areas, areas of high value for caribou habitat, riparian reserves, areas with a high value for recreation, forest stands that are of low volume per hectare or are unmerchantable, and 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, allowing for any portion that may have been deducted earlier in the series in respect of another, overlapping objective. Details of the net areas deducted are given in the 2005 timber supply analysis. The area of the current THLB so derived is 210 691 hectares, roughly 15 percent of the total area of the TSA. My considerations of the reasonableness of specific land base deductions as applied in the analysis are documented as follows.

- woodlot licences

The *Forest Act* requires that AACs determined for TSAs exclude the areas and timber volumes allocated to woodlot licences. In the analysis, a total of 1742 hectares were deducted from the productive land base in respect of woodlots. I am advised that the total area of allocated woodlot licences actually amounts to 3910 hectares. In this case, in the analysis, the required deduction from the productive forested area was underestimated by roughly 2168 hectares. Assuming the woodlot land base is predominantly in the THLB this would correspond to roughly one percent of the THLB, with the exact implication for timber supply depending on a detailed accounting of the areas associated with the various timber types in the licence allocations.

In my determination I have therefore accounted for a one-percent overestimation of the timber supply in the base case, as discussed in **Reasons for Decision**.

- non-forested and non-productive sites

Non-forested and non-productive lands are not considered to contribute to the THLB or to non-timber objectives. In the 2005 analysis, a total of 806 061 hectares of non-forested and non-productive lands were excluded in deriving the THLB. Details of the areas and kinds of land excluded are provided in the analysis report.

Since the areal extent of each category of excluded land is identified in the current inventory, I consider the related individual and aggregate exclusions in the analysis to constitute the best available representation of these areas for modelling purposes. I am therefore satisfied that the base case adequately projects the timber supply in respect of these areas.

- parks, protected areas and ecological reserves

The province's Protected Areas Strategy has two goals: to protect viable representative examples of the natural diversity of the province, and to protect special natural, cultural heritage and recreational features of the province not captured under the first goal.

All protected areas as outlined in the 1999 Robson Valley LRMP have now been formally established by government. In the analysis, to account for parks, protected areas, ecological reserves, and miscellaneous reserve categories that include: Forest Service recreation reserve and corridor; watershed reserve; industrial reserve; islands reserve; map reserve; fish and wildlife management reserves; and interpretive forests; a net total of 104 117 hectares of productive Crown forested land were excluded from contributing to the timber harvest after accounting for overlaps.

Since the best available inventory information was used in defining the protected areas, since these areas were excluded from contributing to the timber supply, and since they were assumed to contribute to landscape-level biodiversity requirements, I am satisfied that the base case assumptions have adequately accounted for parks, protected areas and ecological reserves in defining the timber harvesting land base for the purposes of this determination.

- *Crown Land Plan and other development*

- (a) *The Robson Valley Crown Land Plan*: This plan was originally created in 1985, mostly for Crown land in the valley bottom, and includes detailed zonings within its boundaries for:
- Agriculture Development • Settlement Reserve • Recreation and Conservation Management
 - Wildlife Habitat Management • Sand and Gravel Reserve • Aggregate Management • Community Pasture Reserve • Natural Environment • Community Leases and Licences, and • Integrated Forest Management.
- While the Crown Land Plan itself has not been separately approved by government as a Higher Level Plan, it was accepted and referenced as a policy plan in the multi-stakeholder Robson Valley LRMP which was approved by government in April 1999. Portions of the Crown Land Plan are currently being considered for establishment as objectives under government's Land Use Objectives Regulation.

In the 2005 timber supply analysis, the Integrated Forest Management Area of the Crown Land Plan was included in the THLB, and lands within the Agriculture Development Area, the Aggregate Management Area and the Sand and Gravel Reserve were assumed to have a one-time initial harvest and then to make no further contribution to the timber supply. The remaining areas of the plan, listed in the timber supply analysis and totalling a net area of 3211 hectares, were excluded completely from the THLB.

To examine the effect on timber supply of *including* the excluded 3211 hectares in the THLB, a sensitivity analysis was performed. This showed no change to the base case harvest rate in the short term, but the harvest level did increase by 4450 cubic metres per year, or 1.3 percent, after 55 years.

- (b) *The Canoe Mountain Development Area*: Since this development is not yet near completion it was included in the THLB in the base case projection. A sensitivity analysis showed that removing this area and the Hotsprings Footprint from the THLB incurred no impact on the short-term timber supply, but reduced the projected long-term harvest rate by 1900 cubic metres per year.

Since the Crown Land Plan was referenced and accepted in the government-approved LRMP and now guides current management, I conclude that it was appropriate to model the land base exclusions as listed in the analysis, and I anticipate that the requirements set out in the land use plan will be established in a timely way as objectives set by government.

For the Canoe Mountain Development Area, I am advised that a master plan has been signed and approved, following a land use decision by the former agency of Land and Water BC, now known as the Integrated Land Management Bureau. Since government has a contractual agreement in place with the developer to provide the identified land, it is reasonable to expect that this development will proceed, in which case it is inappropriate to include the area in the THLB at this time. Sensitivity analysis showed that under the assumed harvest flow dynamics the impact on timber supply from its removal could be deferred to the longer term. However, since this land base is predominantly mature forest, I will assume that the THLB is effectively reduced immediately, and I have concluded that an associated reduction in timber supply of about 0.6 percent will occur across all time frames. I have accounted for this small overestimation in my decision as noted in **Reasons for Decision**.

As noted below, in **‘Implementation,’** I encourage all affected agencies to collaborate in obtaining the timely formal completion of all land use decisions related to this development and to the Crown Land Plan.

- non-commercial cover

The Crown forested land base in the TSA includes 34 hectares of non-commercial forest cover and 1486 hectares of non-commercial brush, in respect of which, after other reductions, a total net area of 641 hectares was excluded in deriving the THLB used in the analysis.

These figures are derived from the most recent inventory information, and as such I am satisfied they provide the best available representation of these areas for use in the timber supply analysis.

- roads, trails and landings

To estimate the area of productive forest required to be excluded from contributing to the timber supply to account for existing roads, Geographic Information System (GIS) data were used in conjunction with Terrain Resource Information Management (TRIM) mapping, forest development plans and the Forest Tenure Administration System (FTAS) to identify road lines, then percentage reductions were calculated and applied to each affected polygon in the inventory. The specific road types, lengths, widths, and areas so removed are given in the 2005 timber supply analysis, together with the deductions made for trails and landings. The average road widths were provided by the DFAM Group and then confirmed as representative by the MoFR’s district engineering/tenures technician. The total area of roads, trails and landings so identified amounted to 8355 hectares, with a net deduction of 4846 hectares to the THLB. I note that approximately 50 kilometres of road in harvested areas have been deactivated and reforested.

For future roads, trails and landings, the necessary land base reduction was estimated by

- (a) applying a ‘buffer’ to proposed roads to fully account for the width to be excluded;
- (b) conducting a modelling exercise to introduce roads to all areas that did not fall within 200 metres of an existing or proposed road; then
- (c) performing a mapping exercise in which it was estimated that two percent by area of each recent cutblock could be attributed to landings, whereby each landing was found to occupy approximately 0.2 hectares on average, excluding any associated road area; this figure was then applied to all future cutblocks.

This methodology showed a required total land base reduction of 9410 hectares to the THLB to account for future roads, trails and landings.

Additional partial harvesting could imply a need for more roads, but more heli-logging would imply fewer roads. Any necessary net adjustment would be impossible to predict at this time.

The total excluded area of 14 256 hectares for existing and anticipated roads, trails and landings amounts to between six and seven percent of the total THLB area. This figure is generally consistent with estimates in other management units with similar terrain. I am satisfied that conscientious effort and reasonable means were employed to define the required areas for exclusion, and that the results fall within a typically observed range. I therefore consider the deductions made in the analysis to account for roads, trails and landings to be acceptable for use in this determination. Nonetheless, in view of the potential effects of changes in harvesting practices, as I have noted in **‘Implementation,’** I recommend that district staff monitor the extent of the land base occupied by roads, trails and landings in practical operational experience, to ensure appropriate analytical methodology and to reduce uncertainty in future analyses and determinations.

- physically and economically inoperable areas

Those portions of a TSA which are not physically accessible for harvesting, or which are not feasible to harvest economically, are excluded in deriving a THLB. For the Robson Valley TSA, an operability map was produced by the MoFR's Northern Interior Forest Region. The criteria applied in this mapping to make exclusions for unstable or potentially unstable soils on steep slopes are the same as in the 2000 timber supply analysis:

- For cable logging areas: On lacustrine soils (formed from silt from former glacial lakes), areas with a slope greater than 30 percent were excluded, and on non lacustrine soils, slopes greater than 55 percent were excluded.
- For conventional logging areas, stands with volumes of less than 140 cubic metres per hectare were excluded.
- For areas with a mix of conventional and cable logging, stands with less than 200 cubic metres per hectare were excluded.
- For cable logging areas, stands with volumes of less than 250 cubic metres per hectare were excluded.

Based on this mapping, a net total of 55 262 hectares were excluded from the THLB to account for operability concerns. District staff confirm that these criteria represent current practice.

To examine the sensitivity of the timber supply to changes in the size of the THLB, two analyses were performed, in which the area of the THLB derived for the base case was first increased, then decreased, by 10 percent. With the increased THLB, the initial harvest rate could be maintained for one more decade and the long-term harvest rate was 9 percent higher, than in the base case. With the smaller THLB, the initial harvest rate could be maintained for only five years, and the long-term harvest rate was about 10 percent lower than projected in the base case. These analyses show that the timber supply in the TSA is sensitive to changes in the THLB area.

The DFAM Group and staff of MoFR's Headwaters Forest District identified specific geographic areas—the Upper Nevin or King Creek area in Planning cell B029, and the Baker or Holliday Creek area in Planning cell B031—that are considered physically inaccessible for harvesting. In the 2005 analysis, these areas were excluded from the THLB, resulting in a net area reduction of 1294 hectares. On my helicopter flight I viewed several convincingly impenetrable geographic features—rocky aprons and cliff faces—preventing access to the King and Baker Creek drainage areas. I am satisfied that removing these areas in the analysis reflects operational reality, and I recommend that such removals be incorporated in the next revision of operability mapping in the TSA.

Foster and Caribou landscape units

Headwaters Forest District staff expressed doubt about the appropriateness of the assumption in the 2005 timber supply analysis that two significant landscape units, the Foster and the Caribou, representing 6.8 percent of the THLB, would actually be able to contribute to the timber supply in the TSA when related physical and economic operability concerns were fully considered. This doubt was strongly reflected in the public input. In the previous AAC determination, uncertainty about the access into these two areas and about the suitability of their inclusion in the THLB for the 2000 timber supply analysis had prompted the former chief forester to suggest the undertaking of cost/benefit studies to examine the validity of their assumed contribution to the timber supply.

From a helicopter reconnaissance of major portions of the TSA, carried out in association with this determination, in which I was accompanied by the District Manager and the Engineering/Tenures Technician of the Headwaters Forest District, I have been able to make a reasonable first hand assessment of the conditions contributing to these concerns. I have made my assessment in

relation to operability in the TSA, both in general and in comparison with operability in other drainages—particularly the already partially-harvested Morkill—and I have discussed the situation in detail with district and regional staff. I have also considered a sensitivity analysis provided in the 2005 timber supply analysis, in which both the Foster and Caribou landscape units were removed from the THLB. This analysis showed that if the timber supply contribution from these two landscape units were excluded, the initial harvest rate projected in the base case could only be maintained for one decade, and the long-term harvest rate would be lowered by 32 000 cubic metres per year, or about 8 percent.

My observations, reasoning and conclusions on this are as follows.

I am advised that in the Foster drainage area, the transportation of logs from any harvesting that would take place would require expensive road building to overcome complex and uneven terrain, and the route must detour around an active, moving landslide that reaches down into Kinbasket Lake, while avoiding areas of high-value caribou habitat. Logs could be dumped into the lake and then dewatered on the other side of the slide, but this requires an adequate water depth which only occurs for a limited period each year during the maximum flood in July. The only other alternative is to construct a road through a protected area, for which an allowance has been provided, but which would still entail high-cost geotechnical engineering and construction.

From my own observation I understand that gaining access into the Caribou landscape unit entails establishing a transportation corridor on a difficult rock face over an elevated pass into the drainage. This would clearly involve complex, expensive engineering. Once inside the drainage, road development could proceed more readily for about four or five kilometres on fairly regular terrain. This would appear to be relatively straightforward—though by no means inexpensive—but several adverse factors would still need to be overcome. The district manager agrees that there is little or no adjacent timber for harvesting during the building of this section of road, and that even if this section of road were built, the overall forests in the entire area are not extensive, which would limit the eventual overall financial return from the area after investing in building a considerable length of road. Most of the harvesting in the drainage would involve operations on difficult terrain, and getting the logs out of the drainage would involve hauling up steep grades for considerable distances. Several avalanche areas would also need to be overcome.

To date, a lack of resources has prevented the gathering of more detailed information on the operability of these two landscape units as was requested in the previous AAC determination. Nonetheless, this determination requires a conclusion on whether or not it is appropriate to continue indefinitely to assume that the economic and physical operability of these areas is adequate to justify the respective contributions to timber supply attributed to them in the analysis. My conclusion is as follows.

Timber harvesting in most of the Robson Valley TSA, with the exception of the trench area, typically involves high operating costs associated with difficult logging and road-building. Unstable slopes and avalanche tracks necessitate multiple bridges, and meandering rivers can and do change course unexpectedly, leaving expensively built bridges without utility. The sometimes unpredictably high inherent development costs in the TSA render the overall extent of the operable area somewhat elastic and dependent on fluctuating commodity prices and market cycles. The consequences of this reality are evident in two ways, (a) in a licensee's abandonment of operations under a non-replaceable forest licence in the Morkill drainage for economic reasons after building extensive, expensive road into the area; and (b) by the ongoing shortfall between the AAC for the TSA and the actual overall harvest level. In my opinion, in the high-cost operating environment of this difficult terrain it is reasonable to assume that attempting to create and extend access into either of the Foster or Caribou drainages, in order to carry out and

complete economically justifiable timber harvesting, will prove even more problematic than for the now operationally inactive Morkill.

For these reasons, I consider it appropriate at this time to conclude that the incorporation in the base case analysis of the full contributions to the timber supply from these two areas has in fact resulted in a significant overestimation of the projected timber supply. The potential magnitude of the overestimation is indicated by the results of the sensitivity analysis noted above, in which both drainages were excluded from the THLB. I have taken this overestimation into account in my determination, as discussed further in **'Reasons for Decision.'** In the event of significant changes in market conditions or in technical or other factors, if and when appropriate, some or all of the respective contributions to timber supply from these two areas may be reintroduced into a timber supply projection and considered in a future AAC determination. In view of the considerable uncertainty in the contributions to timber supply from these areas, as I have noted in **'Implementation'**, an early assessment of the operability of these areas should be undertaken if their complete removal is to be avoided in the next determination.

- unmerchantable forest types

Unmerchantable forest types are not expected to be economically utilizable due to their low volume or poor quality of timber. In the 2005 timber supply analysis, mature coniferous stands that have not reached specified criteria for minimum height, volume and stocking class for particular operability codes were considered unavailable for timber harvesting and were excluded from the THLB. The criteria employed are described in the timber supply analysis report, and an analysis of the timber types actually harvested in the TSA over the seven-year period from 1997 to 2003 supported the assumptions in the analysis. The total net area removed from the THLB to account for these forest types was 19 969 hectares.

A sensitivity analysis was performed to examine the implications for timber supply of (a) increasing and (b) decreasing, by 50 cubic metres per hectare, the specified minimum volume required for a stand to be considered merchantable. Under (a), the THLB was further reduced by 16 964 hectares or 8 percent and, while harvest flow assumptions permitted no impact to the short-term timber supply, after 60 years the projected harvest rate was reduced by 20 000 cubic metres per year, 5.8 percent lower than in the base case. Under (b), the THLB increased by 8864 hectares or 4.2 percent, and the projected harvest rate after 55 years could be increased by 8000 cubic metres per year, or by 2 percent.

Since the utilization of cedar and hemlock stands in the TSA is sporadic in the wet Interior–Cedar-Hemlock (ICH) subzone at the north end of the TSA, as these stands are only harvested when product prices are high, there is some uncertainty as to the area of these stands that should be included in the THLB. In the base case, only those wet subzone cedar hemlock stands in the north end of the TSA in supply blocks A, B, I and J that could be logged using conventional ground-based logging equipment were included in the THLB. A sensitivity analysis was performed to examine the implications for timber supply if all the cedar-hemlock stands were assumed to be excluded or included. The results showed that if all the hemlock stands (on cable and mixed-operability ground in supply blocks A, B, I, and J) were included, the THLB would be increased by 3149 hectares or 1.5 percent from that used in the base case. The harvest level after 55 years would then be increased from the base case projection by 6300 cubic metres or 1.8 percent. Conversely, if all cedar and hemlock stands in the ICH zone in Supply Blocks A, B, I and J were excluded, the THLB would be decreased by 9236 hectares or 4.4 percent, and the harvest level after 60 years would be 20 500 cubic metres or 5.9 percent lower than in the base case.

I have considered this information as follows. With respect to the cedar-hemlock stands in the north in the wet sub-zone, only those stands in the specified supply blocks that could be logged with conventional ground based equipment were included in the THLB; cable-operating ground was excluded. In the rest of the TSA, notably on the more southern, warmer bench areas, cedar-hemlock stands for cable operations were included. District staff confirm that these assumptions are consistent with current practices on the ground, and I am therefore satisfied that the representation in the analysis of non-merchantable forest types is reasonable and neither excessively optimistic or pessimistic.

- sites with low productivity

Sites with timber of low productivity are typically not harvested, and must be excluded from contributing to the THLB. In the 2005 analysis, to identify immature stands with low productivity, a minimum required site index was used to reflect the fact that, to be considered harvestable, forest stands must be able to reach, by specified ages for particular species, a specified minimum volume, determined in dependence on the anticipated method of harvesting. A total of 31 396 hectares of low-productivity sites were identified, for a net reduction to the THLB of 10 761 hectares.

Details of the site-index criteria applied in the timber supply analysis, based on age and minimum volume, are specified in the analysis report. The minimum volumes for conventional, mixed, and cable operability codes were respectively 140, 200, and 250 cubic metres per hectare.

An analysis of stands harvested between 1997 and 2003 shows that the actual site indices of the harvested stands were generally above the site indices derived from the volume criteria. Only up to about one percent of the harvested areas showed site indices less than the minimum applied in the analysis, and any stand that did not appear to meet the criteria but which has been harvested or treated in the past was retained in the timber harvesting land base.

The information on the harvested stands indicates that the assumptions in the analysis are in quite close agreement with current performance in the field, and any discrepancies noted will be accounted for in future analyses. I therefore conclude that low-productivity sites are adequately accounted for in the base case projection.

- seed production stands

The Robson Valley TSA includes four seed-production stands, which are areas identified as sources of better-than-average spruce and Douglas-fir seed, where the management objective is to carry out natural stand seed collection. In the 2005 analysis, these areas were estimated to occupy a total area of 3368 hectares, on which timber harvesting would be deferred for 65 years, after which they would become available for harvest. However, timber harvesting has already occurred in two of the stands, such that the actual area to which to apply the deferral is now 2337 hectares. Nonetheless, since the areas were modelled as subject only to deferral, not exclusion, from harvest, including the affected area for the first 65 years will have little if any implication for timber supply.

Fir is undoubtedly a very desirable species for harvesting in this area at the present time, but it is also important to ensure the continuing production of good quality seed for future harvests. I am advised that a small amount of Douglas-fir A-class seed has started to come on-line for the Quesnel Lake seed planning unit, and that this seed can also be used in the Robson Valley TSA. However, current production levels are insufficient for use in Robson Valley TSA and projections of seed production indicate that adequate amounts of seed will likely not be available for this TSA until 2012. Some seed has been collected from one of the noted areas and is currently stored

at the provincial seed centre. However, this is the only storage location for this seed; if this source should become compromised for any reason, without the noted areas there would be no other suitable, economic collection source available. It is due only to the district's desire to maintain these areas for seed production that no further harvesting has occurred, and no plans are yet in place to protect these stands by formal means such as an objective under the Government Actions Regulation. Therefore, as I note in '**Implementation**' below, district staff should discuss this situation with MoFR's Tree Improvement Branch, and seek appropriate means to ensure the availability of seed from these areas for the future.

- environmentally sensitive areas

Environmentally sensitive areas (ESAs) are forested areas that are considered to be sensitive environmentally for a number of reasons and may be valuable for other resource values. Such areas were identified and delineated during the original forest inventory for the TSA in 1994.

To account for ESAs in the 2005 analysis, the same methodology was used as in the 2000 analysis. That is, areas mapped as having highly sensitive soils were 90-percent excluded from the timber harvesting land base, and moderately sensitive soils were 10-percent excluded; areas with regeneration problems were 90-percent excluded; avalanche areas were 90-percent excluded; and recreation areas were 100-percent excluded. The full list of reduction categories and areas excluded is given in the analysis report. After accounting for all overlaps and exclusions for other reasons, the total net area excluded for environmentally sensitive areas was 105 148 hectares.

The forest cover inventory maps from which these areas were derived are the most current and best information available from which to derive these land base exclusions. In the absence of more detailed terrain stability information, I accept these ESA deductions as appropriate for incorporation in the base case projection.

- riparian management

Riparian areas along streams, lakes and wetlands provide key habitat for fish and wildlife and help conserve water quality and biodiversity. To protect riparian habitats, the Forest Practices Code and the *Forest and Range Practices Act* (FRPA) provide for riparian reserve zones that *exclude* timber harvesting, and for riparian management zones that *guide* timber harvesting, in appropriate areas.

For the 2005 timber supply analysis, ground-based stream classification or riparian reserve information specific to the TSA was not available. To emulate expected timber supply impacts from riparian reserves under FRPA, the DFAM Group therefore applied assumptions for reserve and management zone widths based on the *Riparian Management Area Guidebook*, to stream information based on Terrain Resource Information Mapping (TRIM). The specific assumptions used, which I have examined, are identified in the analysis report. Riparian areas for the Fraser River were modelled with a 50-metre reserve zone and a 50-metre management zone.

Forest Service staff note that TRIM-based information is generally less reliable for smaller streams (S3 to S6) than for larger streams, and that smaller streams are less likely to be identified. While differing guidelines are assigned in the guidebook for each stream classification (e.g. S4 to S6 streams require no reserve), in the analysis the requirements for S3 to S6 streams were averaged—all were modelled with a 20-metre reserve zone, as applicable to S3 reserves, without management zones.

For the S3 to S6 streams, without more precise information on the lengths present in the TSA, it appears reasonable to assume that the application of a 20-metre reserve—which is more restrictive for the smaller streams, other than S3—adequately captures the timber supply impact

of management in these areas in a general way. However, I note that the rationale statement for the previous AAC determination for this TSA included an instruction to ‘strengthen the estimate for riparian deductions’ and that to date no activity has occurred to reduce the attached uncertainty. Therefore, while I am prepared accept the modelling used for riparian management in the 2005 analysis, which was based on the best currently available information, as adequate for use in this determination, in **‘Implementation’** below I have noted the need to improve on the quantification of the areas required for deduction in respect of riparian areas, to reduce associated uncertainty in the next determination.

- Grizzly Bear habitat

In the Robson Valley TSA, no wildlife habitat areas have been established for the Grizzly Bear under the Identified Wildlife Management Strategy, and although the Robson Valley LRMP identifies the need for a 100-metre reserve on each side of avalanche paths that are of importance to grizzlies, this requirement has not been made an objective of an approved higher level plan. In the absence of legally enforceable provisions for managing Grizzly Bear habitat, current management in the TSA includes reserving a buffer of approximately 50 metres on each side of important avalanche paths. In the 2005 analysis, to account for this management, a land base exclusion representing one percent of the THLB was applied, as in the previous analysis and determination. This resulted in a net deduction of 2132 hectares to the THLB.

In 2003, Boreas Environmental Services completed an inventory of grizzly bear habitat in the TSA. This inventory has not received any formal government approval. Analysis showed that if, instead of applying the one-percent reduction to the THLB, a 50-metre buffer were applied to this newly identified bear habitat area, the initial harvest rate would be maintained for 5 years less than in the base case, and the long-term harvest rate would be a net 3.8 percent lower than in the base case, reflecting approximately similar percentage changes in the THLB. Another analysis showed that doubling the buffers to 100 metres, as recommended by the LRMP, would result in a net loss to the THLB of approximately 8.6 percent, with a timber supply impact comparable to that in the analysis in which a 10-percent THLB reduction was examined, as noted above in *physically and economically inoperable areas*.

Staff of the Ministry of Environment confirmed recently that the current practice of 50-metre buffers does not reflect the 100-metre buffer recommended in the LRMP and that no mechanism will exist to invoke the new habitat inventory and recommendations until components of the LRMP become designated as a Higher Level Plan.

In public input it was expressed that since the LRMP was approved by Cabinet, since the District Manager has given direction to the licensees to adhere to the LRMP, and since each licensee has stated its intention to comply with the LRMP in its Forest Development Plans, it is reasonable to expect operational compliance with the LRMP. From this it was concluded that, even with uncertainty in the resolution of the Boreas mapping, at least the 50-metre reserve should have been used as a medium estimate in the timber supply analysis base case, which would have reduced the long-term harvest rate by nearly 5 percent.

In response, I note that while the LRMP specifies 100-metre buffers around important avalanche chutes, not all avalanche chutes are important to grizzlies and the LRMP does not identify which specific chutes need the provision. The base case was reasoned by MoFR staff to approximate the expected impacts of current licensee operations respecting current grizzly bear habitat management, given the current lack of direct legal obligation, by applying a one-percent THLB reduction as the default for identified wildlife species at risk. Attributing the one-percent provision entirely to grizzly habitat is reasonable since caribou have their own provisions, discussed below, and no other forest-dependent species are identified as at risk in the TSA.

That said, given the importance of the Grizzly Bear species in British Columbia and in this TSA, as confirmed by its reference in the LRMP, what is needed now is a correlation of the newly identified habitat with the intentions of the LRMP, and a determination of the best way to interpret the correlated information as objectives set by government.

Given the potentially significant uncertainties attached to related management issues, District staff should engage the other affected agencies in finding the most appropriate means of integrating the already existing LRMP policy direction with the new Boreas inventory information, to decide which of the avalanche chutes require the 100-metre buffer, and to establish the legal means for designating and enforcing the required management. In this way, the strategies and objectives for managing Grizzly Bear habitat can be fully taken into account in the next analysis and determination.

In the meantime, I recognize that the outcome of such a process is already indicated in a general way by the sensitivity analyses discussed above. That is, with the application of 50-metre buffers to the chutes identified by Boreas, the THLB could become subject to a reduction of nearly five percent, or by as much as up to nearly 10 percent, depending on the number of chutes to which the 100-metre requirement is found to apply. For this determination therefore, as discussed further under *identified wildlife* and in **Reasons for Decision**, I have accounted for a significant uncertainty in the form of a possible net overestimation in the THLB and in the short-term timber supply, ranging between 3.8 and 8.6 percent.

- *cultural heritage resources*

Five First Nations' groups (the Lheidli T'enneh Band, the Simpcw or North Thompson Band, the Canim Lake Band, the Soda Creek Band and the Red Bluff Band) have aboriginal interests in the Robson Valley TSA although none are resident in the TSA. All First Nations with aboriginal interests in the TSA were provided with copies of the data package and analysis report, and asked to provide information on how their aboriginal interests could be affected by an AAC determination, but none provided any comment. Based on Archaeological Overview Assessment data from the (then) Ministry of Sustainable Resource Management, Archaeology and Registry Services Branch, a spatial analysis was conducted of all the archaeological and historic sites within the Robson Valley TSA. None were found to be located within the timber harvesting land base, and consequently no land base reductions were applied in the analysis for cultural heritage resources. The Simpcw and Lheidli T'enneh bands have conducted Traditional Use Studies which cover most of the TSA. As discussed further under *First Nations considerations*, the bands' interests in the Robson Valley TSA are often related to general use activities such as hunting, such that territorial claims are not specific to particular areas that could be excluded in deriving the THLB.

Since no specific requirements have been identified for managing cultural heritage resources on particular sites, I am satisfied that it was appropriate that no specific exclusions were made when defining the timber harvesting land base for the base case. I am also satisfied that should any new emerging occurrences of cultural heritage resources be found, they can be managed operationally, with the licensees' cooperation, with no or minimal impacts on the timber harvesting land base. If new information becomes available on cultural heritage resources, this can be incorporated into future AAC determinations.

Existing forest inventory

- current inventory

The Robson Valley TSA was re-inventoried in 1994-1995. An audit of this inventory in 1998 found no statistical differences between the inventory and the audit information. For the 2005 timber supply analysis all depletions for harvesting and or fires were officially updated to November 2002. No concerns have been expressed about the inventory data and I am satisfied that they provide the best, most current and most reliable information available for use as a basis in this analysis and in my AAC determination.

- age-class composition and species profile

The TSA is dominated by old stands, with about 50 percent of the THLB in stands greater than 140 years old. I have reviewed the projected changes in age classes, both on the timber harvesting land base and in the remainder of the Crown forest land base, in 50, 150, and 400 years' time, and I have discussed some of the assumptions made in the timber supply analysis in this regard under *landscape-level biodiversity*.

About half of the THLB supports stands of predominantly spruce, while balsam- and pine-leading stands each account for approximately 18 percent of the THLB area. Cedar, hemlock and Douglas-fir-leading stands account for approximately 15 percent of the THLB area.

In my determination I have been mindful of the species and of the distribution of the ages of the forest stands both inside and outside the THLB.

- volume estimates for existing unmanaged stands

In the timber supply analysis, estimates of the timber volumes in existing unmanaged immature and mature stands were projected using yield tables produced by the Variable Density Yield Prediction (VDYP) model batch version 6.6d. Staff of MoFR's Forest Analysis and Inventory Branch have indicated that the existing natural stand yield tables were appropriately generated.

Existing unmanaged stands were defined as all stands without a history of planting. The percentage of harvested stands without a planting history was determined in the previous timber supply review and these results, advanced 5 years for elapsed time, were used in the 2005 analysis. Consequently, all stands over 35 years of age were assumed not to have been planted, as were 17 percent of stands aged from 16 to 25 years and 5 percent of stands aged 16 to 25 years. All stands aged 15 years or less were assumed to have a planting history and were projected using TIPSU, the Table Interpolation Program for Stand Yields, as discussed below under *volume estimates for managed stands*. Deciduous volumes in predominantly coniferous stands were not included.

In a check of the current inventory volumes against the volumes identified in the aggregated yield tables (for both existing and managed stands) the yield table estimates were found to be only 0.9 percent higher, suggesting a good degree of correlation and reliability.

For analysis units with partial harvesting, in visually sensitive areas with established Visual Quality Objectives of 'partial retention' and 'retention,' in the roughly 12 000-hectare operating area of McBride Forest Industries Ltd, the volumes were adjusted to reflect multiple entries with specified volume removals (detailed on pp. 84, 85 of the analysis report). Because partial harvest regimes involve high uncertainties, in the timing of entries, in the volumes harvested, and in the

modelling of yields, a sensitivity analysis was conducted using the base yield tables under a clearcut harvest regime. In this case the projected harvest flow was not significantly changed, as noted below in *scenic areas*.

Another sensitivity analysis was performed to show the impact of increasing or decreasing the existing stand volumes by 10 percent. This showed that when the volumes for existing natural stands were increased by 10 percent, the base case initial harvest rate could be maintained for 4 decades, with no impact on the projected long-term timber supply. When the volumes of existing natural stands were decreased by 10 percent, the initial harvest rate was maintained for only 10 years, followed by 50 years of declining steps similar to those in the base case, to a mid-term level lower than in the base case by 20 300 cubic metres per year or 5 percent. This lower level persisted for 100 years before increasing to the long-term level in the base case.

Since much of the TSA remains in mature stands, increasing or decreasing the associated volumes by 10 percent has very large impacts. For this determination I accept the volumes as projected for existing unmanaged stands. However, I have noted the several potentially significant uncertainties associated with changing amounts of partial harvesting in the TSA and therefore, in **'Implementation'** below, I have recommended the ongoing assessment of several variables, including the stand volumes that may be expected to be achieved over time in response to various management regimes.

- *Interior log grades*

On April 1, 2006, new log grades were implemented for the BC Interior. Under the previous grade system, logs were assessed according to whether the trees they came from were alive or dead at the time of harvest. Logs formerly referred to as grade 3 endemic (a merchantable dead tree that was considered to result from the 'normal' mortality observed in a mature stand) and grade 5 (a dead tree 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, a log will be graded based on its size and quality at the time it is scaled or assessed, without regard to whether it was alive or dead at harvest. Moreover, volumes in logs that were previously considered grade 3 endemic or grade 5 will now be charged to the AAC, whether or not the logs are harvested and brought to scale. This more complete regulation of the timber volumes present in and harvested from the forest must now be accounted for in this determination; the estimates of timber volumes used in the base case did not account for the 'dead potential' volumes in dead logs that could potentially be used as sawlogs.

Possible sources of data for assessing the 'dead potential' in a TSA include inventory audit plots, VRI phase II ground samples, permanent sample plots, temporary sample plots, and cruise data. In the Robson Valley TSA, for inventory purposes the best of these is considered to be inventory audit data, which indicate that for this TSA the dead potential volume is about 11 percent of the green volume for the Crown forested land base over 60 years of age, and about 9 percent if only the operable land base is considered.

While these figures likely provide best estimates for the TSA as a whole and for the operable land base, they are not necessarily the most representative of the 'dead potential' volumes specific to the THLB itself, or to the locations of current and near-term operations on the THLB. In assessing the most appropriate figure to apply to these particular areas, several considerations present difficulties. Data for actual harvesting performance show that the 'dead potential' volume extracted from forest stands can vary significantly over time, depending on markets and other factors. The accounting is also complicated by the relationship between 'dead potential' volumes and the requirement to leave coarse woody debris on the ground for biodiversity objectives. Dead

potential volume that is identified within residue and waste audits is also accounted against the AAC.

Despite the uncertainties, these log grades must be accounted for in this AAC to the extent they are present in existing stands, whether use is made of them or not, and in this accounting it is my intention to apply the most reasonable and practically relevant figure. Data from the provincial harvest billing system provide what is perhaps the best reflection of the dead-potential volumes on the particular portions of the THLB where licensees have been, are currently, and will be operating over the period of this determination. These data show that for the period from 1995 to 2004, when taking dead logs to the mills was solely at the discretion of licences, the scaled volumes of grade 3 endemic and grade 5 logs totalled about 7.5 percent of the green volume. These data provide an actually experienced, ten-year average figure which has a magnitude comparable to the figure of 9 percent derived for the operable land base from the inventory audit. I have therefore decided to apply an approximate mid-range value of 8 percent as the adjustment to existing stand volumes needed in this TSA to account for the change in log-grades.

The timber supply analysis showed that when the volume estimates for existing natural stands were increased by ten percent, the current AAC could be maintained for two decades longer than in the base-case forecast. If the existing volumes are instead increased by the indicated 8 percent, this adjustment, considered separately, could also serve to extend the AAC, but over a somewhat shorter and uncertainly defined period. I have accounted for this adjustment as discussed in **'Reasons for Decision'**.

To reduce related uncertainties for future determinations, district staff should take steps to ensure that inventory projections appropriately reflect volume estimates that include the 'dead-potential' component, as I have noted below, in **'Implementation'**.

Expected rate of growth

- site productivity estimates

In British Columbia the productive potential of a forest stand to grow timber is expressed by a measure known as 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 MoFR's 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 in British Columbia, 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 improved productivity figures. However, no such studies have been conducted in the Robson Valley TSA. In this TSA, stands currently older than 140 years comprise 58 percent of the THLB. The use of standard forest cover inventory site indices likely results in underestimation in the volumes predicted by managed stand growth and yield models, and thus also in the long term timber supply.

The licensees' 2005 timber supply analysis included a sensitivity analysis in which site indices were increased in specific ways (see the analysis report for details) that resulted in an increase of 26 percent in the long-term harvest level. However, without information generated from locally based studies I have no reliable basis from which to assess the reasonableness of such an exercise in reflecting the degree of underestimation in the site indices or in the timber supply.

Therefore, while it is likely that site productivities in the TSA are in fact higher than quantified in the forest cover inventory site indices, at this time the estimates used in the base case remain the best available information. In view of the potential for increasing the projected long-term timber supply, which may be substantial, as suggested in the licensees' sensitivity analysis, it would appear advantageous to generate local site-index information for incorporation in the next timber supply analysis and AAC determination. This was done in TFL 18 in this Forest District, where a site index adjustment project verified increased site productivity. Much beneficial information can be gathered through differing methods such as valid site index adjustment sampling or, predictive or terrestrial ecosystem mapping and SIBEC correlation. In view of the apparently significant potential benefits, I have included a recommendation to this effect in **'Implementation,'** below.

- volume estimates for regenerated managed stands

In the 2005 timber supply analysis, the standard MOFR growth and yield model Table Interpolation Program for Stand Yields, TIPSYS (version 3.0h), was used to estimate the timber volumes for regenerated, managed stands. Stands were considered to be managed if they had a planting history, such that all stands aged 15 years or younger, 95 percent of stands aged 16 to 25 years, 83 percent of stands aged 26 to 35 years, and no stands over 35 years of age were considered to be managed. Major inputs to the TIPSYS model include species composition, regeneration delay, site index, operational adjustment factors and genetic worth of planting stock.

All TIPSYS projections 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 TIPSYS, to account for losses of timber volume resulting from these operational conditions. OAF 1 is designed to account for factors such as small stand openings that affect the yield curve across all ages. OAF 2 accounts for factors such as pests, disease, decay, waste and breakage, whose impacts tend to increase over time.

In the Robson Valley TSA timber supply analysis, the standard provincial reductions of 15 percent for OAF 1 and 5 percent for OAF 2 were applied to most areas, with refinements for analysis units likely to be impacted by the spruce leader weevil or armillaria. For areas subject to the weevil, OAF 1 was increased to 25 percent, and for areas subject to armillaria, OAF 2 was increased by 10 percent for moderate incidence, and by 20 percent for areas subject to severe incidence. These adjustments were also applied in the analysis for the previous determination.

Sensitivity analyses were conducted to show the impact on timber supply of changing the estimated volumes in regenerated stands. When the estimated volumes were increased by 10 percent, the long-term harvest rate after 100 years increased by 10 percent over the base case. When the volumes were instead decreased by 10 percent, the projected harvest rate after 70 years was 10 percent lower than in the base case.

Staff of MOFR's Research Branch confirmed that the managed stand yield tables for this TSA were generated appropriately. Recognizing the efforts to account for the potentially greater losses to weevils and armillaria, I am satisfied that the base case accounts adequately for expected rates of growth in the regenerating, managed stands in the TSA.

- gains from the use of 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 green-up height or the minimum harvestable age.

Between 2000 and 2005, approximately 85 percent of the spruce and 44 percent of the pine trees planted in the Robson Valley TSA were from Class A seed stock, which has improved growth characteristics. Class B seed was used in regenerating cedar, Douglas-fir, larch, and balsam over the same period. The expected gains from the use of select seed were modelled in the timber supply analysis using the genetic gain function in the TIPSY program. In the base case analysis, the average genetic gain by species was applied to current and future managed stands, but not to existing managed stands. The average genetic gain for spruce was 10 percent, and 1.3 percent for pine based on the observed genetic gain and the percentage of use of the improved stock to which it applies. In the future, the percentage use of genetically improved seed is expected to increase to 100 percent for spruce and Douglas-fir, and to 70 percent for pine. Associated forecast volume gains are 7 percent for pine, and up to 20 percent for spruce and 22 percent for Douglas-fir.

Analysis showed that if the expected levels of genetically improved seed are realised, then starting 55 years from now the timber supply would be higher than projected in the base case, by 28 000 cubic metres per year or 8 percent.

In public input, the assumption in the base case of growth increases due to genetic gain were characterised as optimistic and unproven, leading to an unsupported increase of 15 percent in the long-term sustainable harvest level over the results from the 2000 analysis.

My conclusion is that it is appropriate for the base case to reflect the predicted gains associated with already demonstrated levels of planting of Class A seed, which was done. The additional volume gains associated with increased levels of planting in the future depend upon realizing the expected planting levels; however, they are in any case not anticipated to begin affecting the projected timber supply for 55 years. In my determination I have therefore taken into account the possibility that the mid-to-long-term timber supply may be underestimated to an uncertain degree, as discussed further in 'Reasons for Decision.'

- minimum harvestable ages

In timber supply analysis, minimum harvestable ages are estimated as a measure of the earliest age at which a forest stand will have grown to a harvestable condition. Minimum harvestable ages 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, influence the actual minimum harvestable age.

For the Robson Valley analysis, minimum harvestable ages were determined as the ages at which yield curves showed that the growing trees in a forest stand would reach a specified minimum harvestable volume of timber per hectare. The minimum volumes considered harvestable were, for conventional harvesting, 140 cubic metres per hectare; for mixed conventional and cable operations, 200 cubic metres per hectare; and for cable systems, 250 cubic metres per hectare. Estimated minimum harvestable ages were typically reached before the age at which 95 percent of the maximum cumulative mean annual increment was attained. Details of the minimum harvestable ages, the ages at 95 percent of mean annual increment, and associated volumes per hectare, are given in the analysis report.

A sensitivity analysis was conducted to show the impact on timber supply if the minimum harvestable ages were increased or decreased by ten years. No impact on timber supply was detected if minimum harvestable ages were increased or decreased by ten years.

In public input, concern was expressed that it was unrealistic to assume harvesting at the relatively low ages indicated, when the Robson Valley is an important source of wood for musical instruments that require much older spruce and cedar with large minimum diameters, and for custom furniture made from high quality wood. In response, it must be remembered that the minimum harvestable ages are theoretical assumptions used in the model. In reality, many stands are harvested at ages much above the minimum harvestable age; the latter is a lower limit below which no stand is assumed to be harvestable in the analysis. Some stands are intentionally harvested in the model at higher ages, in order to meet other management objectives. Currently roughly 50 percent of the THLB supports stands of 140 years or older; much flexibility remains to maintain a mix of stand types and harvest ages. Nonetheless, in the long term, average estimated harvest ages in the model are projected to be lower, from 110 to 140 years.

Since there is considerable flexibility respecting the ages at which trees may be harvested in this TSA, and since the timber supply is not sensitive to changes in the assumed minimum harvestable ages, I conclude that these are adequately modelled in the base case projection.

- deciduous species

In 2005, in the Robson Valley TSA, roughly 11 000 cubic metres of deciduous species were harvested, under all types of licence, as minor components from stands of predominantly coniferous species ('coniferous-leading' stands). However, no timber sales have yet been awarded to harvest deciduous species under the current partition specifying 6000 cubic metres as attributable only to harvesting in deciduous-leading stands.

In the base case, deciduous volumes in coniferous-leading stands were not assumed to contribute to the timber supply. Deciduous-leading stands were included in the timber harvesting land base, with the model averaging a projected annual harvest of 6605 cubic metres over the 400-year planning horizon, varying from a low of 267 cubic metres per year in decade 27 to a high of 24 588 cubic metres per year in decade 8. In the first decade, about 600 cubic metres per year were assumed to be harvested in the base case.

Current management therefore differs somewhat from the modelling assumptions in that deciduous volumes in conifer-leading stands were assumed not to contribute to the timber supply and yet are being harvested, while deciduous-leading stands, which are assumed to be part of the THLB, are not being harvested. I have considered this situation as follows.

The volume of deciduous species harvested annually from coniferous-leading stands has varied over the past decade or so, from almost 25 000 cubic metres in 1995 to just over 2700 cubic metres in 2004. This ongoing harvest of deciduous species as a minor component indicates the potential utility of the species, and suggests that the absence of harvesting to date in deciduous-leading stands does not mean the opportunity represented by including these stands in the THLB no longer exists. On the other hand, it would be inappropriate for harvesting in deciduous-leading stands to be confused with or attributable to harvesting in the coniferous-leading stands. I therefore consider it appropriate to maintain the current partition of 6000 cubic metres per year for harvesting attributable to deciduous-leading stands, which closely approximates the modelling in the analysis.

Since in the model the minor deciduous components are essentially excluded from contributing to the timber supply, the ongoing use of this component suggests an underestimation of the actual volumes obtained from existing stands. I am advised that, at present, where licensees are potentially in conflict with cut-control requirements due to harvesting minor deciduous components from coniferous-leading stands, licensees currently receive relief from having this volume accounted against their licensed allowable annual cut, and thus the current exclusion of minor deciduous volumes in the analysis is appropriate. However, if the harvesting of minor deciduous components continues, I expect the associated volumes to be reflected in the timber supply analyses for incorporation in the next AAC determination, and the harvest to be charged against the AAC thereafter.

District staff advise that in their experience the current deciduous harvest level is not detrimental to the valuable contributions made by deciduous species in planning for biodiversity. Therefore, from all of the foregoing, for the current determination I see no reason to adjust the volumes of deciduous timber assumed to be harvested in the base case timber supply projection.

- (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. In the timber supply analysis, an effective average regeneration delay of 3 years was applied to all existing managed stands. No regeneration delay was applied to current and future managed stands, as one-year-old seedlings are now being planted within one year of harvesting on all sites.

From my discussions with district staff and from my observations on the helicopter flight I am satisfied that basic silvicultural obligations are being well taken care of in the TSA, and that the regeneration assumptions are suitably modelled in the base case analysis.

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. Since 1987 there has been a legal obligation to reforest harvested areas. Where a site was harvested prior to 1987 and a suitable stand has not yet been regenerated, a classification of 'backlog' NSR is applied.

In the Robson Valley TSA, the licensees have completed a survey of the wildfire areas and have found that most of the burned areas have become sufficiently restocked and in most cases are now in a free growing condition.

In the 2005 analysis, 2459 hectares were identified as current NSR from logging, 44 hectares on the THLB as current NSR from wildfire, 336 hectares as backlog NSR from logging, and 815 hectares as backlog NSR from burns. All stands identified as backlog NSR were assigned an age of zero with a regeneration delay of 15 years—that is, they were not assumed to reach an acceptable stocking level until 15 years from now. In the analysis it was also assumed that these stands will grow as untended natural stands until the next harvest.

Given the noted identification of the NSR areas in the TSA and the associated assumptions made in the analysis, I conclude that these areas have been appropriately represented and accounted for in the base case projection.

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

Silvicultural systems

In the Robson Valley TSA, the percentages of the timber volumes harvested by various logging methods in the past three years have been, respectively, conventional ground systems, 55.5 percent; cable systems, 42.5 percent; and helicopter logging, 2 percent. Historically, most of the harvesting in the TSA has been carried out using the clearcut system. Over the past few years, however, clearcuts with retention and partial harvesting systems have been increasing in visually sensitive areas and in zones of medium-value caribou habitat, to maintain habitat and visual quality. The DFAM Group agrees that further use of partial harvest systems in the TSA is likely, both within visually sensitive areas and in managing for other values outside the scenic areas.

For the analysis, a schedule was developed for partial-cutting harvest entries in existing stands, based on discussions between forest district staff and licensees, and the related modelling was based on generalized yield curves for leading species in analysis units in visually sensitive areas. The appropriate standard yield curve was then selected for each analysis unit within the visually sensitive zone and adjusted to represent the partial-cutting harvest entries. The initial volume for each yield curve was adjusted to reflect the volume harvested in the first entry. Allowance was made for uncertainty in the rate of growth in stands remaining after partial harvest, and losses to blow-down and breakage were accounted for. All sites were assumed to be planted following the final harvest. A total of 12 000 hectares were assumed to be partially-harvested, and for pine stands, for instance, the first entry was assumed to be in stands aged 80 years, when 70 percent of the volume was removed, with another, final entry 15 year later to cut all remaining timber in the stand.

In public input, comment was received that clearcut logging is not really the traditional means of harvesting in the TSA since clearcutting has only been practised for about thirty years, before which selective, diameter-based cutting was the rule, except where land was cleared for farming or other uses. I am advised that this may well be true for specific areas in the TSA, but that it does not reflect historic practice in the TSA as a whole. It was also suggested that, with partial cutting systems, soils are left less vulnerable to erosion, that spruce leader weevils present less of a problem, that the total volumes harvested are higher because smaller trees are released and allowed to grow, and that these factors should have been accounted for in the analysis.

These latter comments coincide with what is already an identified need among forest managers and timber supply analysts to gather particular kinds of information for incorporating into

analyses in order to better track the complex effects and interactions that follow partial harvesting treatments. From my discussions with district staff and from my personal observations during the helicopter flight, it is clear that, in this TSA, licensees have found innovative ways to harvest effectively in visually sensitive areas with partial-cutting systems that may simultaneously address Mountain Pine Beetle problems. From my initial observations, the results appear very positive in terms of meeting integrated objectives, and I commend licensees for their innovation. However, attempts to model the implications of this practice for timber supply are subject to uncertainties related to: potential changes in the productivity of the land base following partial harvest; the effectiveness of planting and the performance of new regeneration under the remaining stand; the validity of assuming the ability to re-enter the stand later to completely harvest the remaining volume; and subsequent implications for visual sensitivity. The longer-term implications of these uncertainties merit ongoing monitoring, which I have recommended in **‘Implementation’** below. For this determination, I recognize the integrity of the attempt to capture as fully as possible the implications of partial harvesting systems, given currently available information, and I am satisfied that these implications are therefore represented in the base case projection to the best possible degree.

Incremental silviculture

In general, incremental silviculture includes activities such as commercial thinning, juvenile spacing, pruning and fertilization, that are not part of the basic silviculture obligations required to establish a free-growing forest stand. In the 2005 timber supply analysis no incremental silvicultural activity was assumed, and MOFR district staff consider this to reasonably reflect current practice in this TSA which is dominated by older stands. The level of incremental silviculture undertaken in a TSA is very dependent on funding and is difficult to project into the future. If the amount of incremental silviculture actually practiced differs significantly in future from that assumed in the analysis, this can be reflected in future determinations. For the purposes of this determination, I am satisfied that the assumption in the analysis adequately reflects current practice.

- (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

Utilization standards define the species, dimensions and quality of trees that are harvested and removed from an area during harvesting operations. In the 2005 timber supply analysis, a 30-centimetre maximum stump height and a 10-centimetre minimum top diameter inside bark were assumed for all species. A 15-centimetre diameter at stump height was assumed for pine, and a 20-centimetre diameter at stump height was assumed for all other species.

District staff advise that in practice the minimum top diameter for both pine and cedar may be 15 centimetres instead of the assumed 10 centimetres. If licenses are choosing to cut to a bigger top, any material left behind should be assessed with respect to unavoidable waste, and accounted for in the cut control process. However, since the utilization specifications used in the analysis are consistent with cutting permit documents, this difference will have no implication for the projected timber supply.

Decay, waste and breakage

The VDYP model used in the timber supply analysis to project volumes for existing unmanaged stands incorporated estimates of the volumes of wood lost to decay, waste and breakage. These estimates of losses have been developed for various areas of the province based on field samples. As noted earlier, operational adjustment factors (OAFs) were used in the timber supply analysis to account for decay, waste and breakage in volume estimates for regenerated managed stands.

I am satisfied that appropriate procedures were followed in the analysis to account for decay, waste and breakage in unmanaged and managed stands, and that the base case projection incorporates the best available information on this account.

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

In the 2005 timber supply analysis, some IRM objectives were addressed through reductions in the timber harvesting land base, and I have accounted for these factors in 'Land base contributing to timber harvesting.' In the present section I account for IRM objectives where the affected portions of the land base continue to contribute to timber supply but are subject to various constraints with respect to forest cover and adjacency.

- cutblock adjacency, forest cover objectives 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 'green-up' height), and the more general objective, of requiring a minimum 'green-up' height 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.

In the 2005 timber supply analysis for the Robson Valley TSA, in order to represent the desired conditions necessary to meet the various objectives in different areas consistent with the LRMP, the timber harvesting land base was zoned for different values where various forest cover and other requirements apply. Specific resource management objectives for visual quality and caribou habitat apply to approximately 30 percent of the timber harvesting land base; these and the forest cover objectives for landscape-level biodiversity including wildlife corridors, as well as mule deer winter range and community watersheds, are discussed individually below.

To all of those parts of the THLB not subject to specific requirements for a particular resource value—the ‘IRM zone’—general forest cover requirements were applied to mimic adjacency requirements, as follows. Any harvested area in the IRM zone must be greened-up to at least 3 metres before harvest may occur in any adjacent stand, and at all times, 67 percent of the THLB in the IRM zone must be above the green-up height (i.e. no more than 33 percent below green-up height).

A sensitivity analysis was conducted to examine any extent to which reducing the maximum disturbance in the IRM zone from 33 percent to 25 percent—i.e. assuming a 4 pass harvest system rather than a 3 pass system—would reduce the timber supply. The results showed no impact on the harvest flow projection, indicating a good degree of flexibility for configuring operations on the land base.

In reviewing this information, I am satisfied that the timber supply analysis has accounted appropriately for green-up and cutblock adjacency requirements in the IRM zone, and that in this respect the base case is reliable for use in this determination.

- *visually sensitive areas*

The Code and FRPA enable scenic areas to be designated and visual quality objectives (VQOs) to be established so that the visible evidence of forest harvesting may be kept within acceptable limits. The management of visually sensitive areas is a significant objective for large areas in the Robson Valley TSA. On January 14, 1998, the District Manager established approximately 615 000 hectares (gross) of scenic areas and 220 381 hectares (gross) with VQOs. These established VQOs were incorporated and accounted for in the 2005 base case analysis.

For the balance of the scenic area—much of which is in side drainages away from the core valley area—VQOs have now been legally established upon the coming into force of Section 17 of the Government Actions Regulation. These VQOs were not modelled in the 2005 base case, but a sensitivity analysis conducted in the 2000 timber supply analysis showed no change in the projected timber supply from accounting for these additional VQO areas.

For the particular case of the McBride Forest Industries’ operating area within visually sensitive areas, which totals 12 000 hectares, it was assumed that VQOs would be met by partial harvesting, and no forest cover constraints per se were applied in the analysis to the identified operating area. A sensitivity analysis showed that changing the harvest regime from partial harvest to clearcutting in this area had negligible effect on the timber supply, since the area is relatively small and the available harvest would be limited by the cover constraints applicable to clearcutting.

In the analysis, maximum allowable disturbances for VQO categories were modified by visual absorption capabilities, and visually-effective green-up heights were calculated by slope class, consistent with standard procedures (i.e. *Procedures for Factoring Visual Resources into Timber Supply Analyses*). Sensitivity analyses showed that (a) increasing or (b) decreasing the maximum allowable disturbances to the tops or bottoms of their ranges had no effect on the short-term timber supply, but did respectively (a) increase the projected harvest level after 55 years to a stable level 6 percent above the base case long-term level, and (b) decrease the projected harvest level after 70 years to a level 9.2 percent below the base case mid-term level, with a projected long-term level 2.8 percent below that in the base case.

In reviewing this information in detail with MOFR staff, I am satisfied that the scenic areas and VQOs are consistent with the LRMP and that they have been accounted for appropriately in the base case timber supply projection. From my own aerial observation, it appears that positive results are being achieved in harvesting in these areas while maintaining visual quality objectives.

The nature of these results should be confirmed by local on-ground assessments, as I have noted in **‘Implementation.’**

- 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 landscape-level consideration. Old forest retention can be achieved through the location of old growth management areas (OGMAs).

In the Robson Valley TSA, biodiversity emphasis options (BEOs) have been established by provincial order for 21 landscape units. In the base case analysis, for all landscape units, a minimum percentage requirement was applied as an aspatial allowance for old forest retention.

Since the analysis was completed, legal objectives for spatially located OGMAs have been established on 13 landscape units and wildlife corridors in the Robson Valley TSA.

At the time of the timber supply analysis, in eight landscape units, draft spatial OGMAs totalling 16,398 hectares of the Crown forested land base were identified to show where old forest retention is needed. Since these were not formally established at the time of the analysis they were not accounted for spatially in the base case. A sensitivity analysis was conducted to show the effect of establishing and accounting for these draft OGMAs spatially instead of aspatially. In it a total of 5402 hectares of spatially explicit OGMAs were excluded from the THLB. The results showed no change in the short-term timber supply, but after 55 years the projected harvest rate increased by 0.6 percent. This indicates that, for these 8 landscape units, the placement of OGMAs has positive timber supply implications.

A set of wildlife movement corridors was also identified in the OGMA designation process. In the analysis (both in the base case and in the sensitivity analysis) two sets of cover constraints were applied to each corridor: 1) at all times, more than 20 percent of the Crown forest land base must be older than 140 years, and 2) at least 70 percent of the THLB must always be greened-up to at least 3 metres. The analysis report noted that the forest cover requirements applied to the wildlife corridors have a negligible impact on the harvest flow since the requirements are not highly constraining and the area affected is only one percent of the THLB.

Natural disturbances in the forest cover on the non-harvestable land base, from fires, insects etc., can affect the contribution made by this land toward the retained forest cover required to meet biodiversity objectives; this in turn can affect the projected timber supply. In the base case analysis, an attempt was made to represent these natural disturbances by assuming that all such stands, upon reaching their average expected age of natural disturbance, will revert to regenerating with an age of zero. In reality some of these stands will likely continue to grow beyond this average age. This could affect the timber supply to the extent that the requirements for retaining old-seral forest are met on or off the THLB. In landscape units with low BEO, where these requirements cannot be met immediately without constraining the timber supply, a ‘draw-down’ over three rotations is permitted, and this was modelled in the base case. However, sensitivity analysis showed that if the old-seral requirements were instead met immediately, the timber supply was unaffected, due to the large extent of old forest in the TSA.

In public input, concern was expressed over the dates of formal establishment of spatial OGMAs and wildlife corridors in comparison with the assumptions used in the analysis. In fact, all valid information current at the time of the analysis was included in the analysis, and as noted above, the conversion from aspatial to spatial OGMAs for a subset of the currently established OGMAs in the analysis did not affect the projected short-term timber supply. Concern was also expressed

about the validity of the assignments of BEOs. These are established through a provincial process, and my authority in determining AACs under Section 8 of the *Forest Act* does not extend to considering the basis for such assignments.

Comments were also received on the Interior Cedar-Hemlock (ICH) forest, advocating the location of OGMAs to accommodate its retention and comparing its treatment in the Prince George TSA with that in the Robson Valley TSA. A 'Sustainable Biodiversity Order' was cited, which I am advised forms the basis for the landscape units and wildlife corridors that were signed off for this TSA on January 30, this year. I also note that spatially defined OGMAs, which were located and adjusted on field trips with local public input and review, are now established with legal objectives in the Crescent Spur landscape unit, which is adjacent to the Prince George TSA and is the only high BEO landscape unit in the Robson Valley TSA. I note again that in the analysis the spatial definition of a subset of the OGMAs did not affect the short-term timber supply. Further protection for the ICH forest adjacent to the Prince George TSA is provided by parks identified through the LRMP process, and by the designation of much of the area as high-value caribou habitat. Finally, only those areas of the ICH where conventional logging would be feasible were included in the THLB for the analysis.

From all of this I conclude that the timber supply impacts of all legally established retention areas have been taken sufficiently into account, and that related concerns over the location of OGMAs in respect of the need for retention in the ICH are adequately accounted for in the base case timber supply projection.

- 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 Code and FRPA both provide for the retention of wildlife trees in harvested areas. In the 2005 timber supply analysis for the Robson Valley TSA, wildlife tree retention was modelled by considering existing mapped wildlife tree patches and current management. Existing spatially defined WTPs were identified from the DFAM licensees' FDPs and were excluded from the THLB in the base case. The remaining WTP requirements were based on procedures identified in the *Landscape Unit Planning Guide*. Coarse woody debris requirements were assumed to be met within current operations, and were not specifically accounted for in the analysis.

The procedures used in deriving the estimated requirements for wildlife tree patch areas are similar to those used in many timber supply reviews and I conclude that the base case projection is reasonable on this account.

- recreation features

In addition to the recreation areas identified in Environmentally Sensitive Areas, developed and undeveloped recreation areas are also identified in the Recreation Features Inventory through the labels for recreation management class and for recreation feature significance. Recreation features include a natural rock arch, waterfalls, canyons, glacier lilies, access trails to alpine lakes, and a special flying squirrel habitat feature identified in the LRMP.

The methodology for incorporating identified recreation areas in the 2005 analysis, which is consistent with that used in the 2000 analysis, resulted in a gross identified area of 40 071 hectares and a net exclusion of 2660 hectares from the THLB specifically for recreation. District staff note that no monitoring has occurred since the last determination and that the responsibility for the recreation program has been transferred to the Ministry of Tourism, Sport and the Arts.

Noting my concern that both the planning for recreation values in FSPs, and their actual maintenance on the ground, need to be carefully monitored, I accept that the identified recreation areas and features have been appropriately accounted for in the base case projection.

- *community and domestic watersheds*

Four community watersheds—the Dominion, Eland, Martinson, and Swift—have been designated within the Robson Valley TSA. These watersheds cover a total area of 14 699 hectares, including 1579 hectares in the THLB. In the timber supply analysis, a hydrological recovery green-up height of 3 metres was applied, and no more than 5 percent of the area in each watershed was allowed to be disturbed every 5 years, equivalent to harvesting no more than one percent of each of these watersheds per year.

The TSA also includes 323 officially licenced points of diversion, of which 316 represent domestic water licence source intake locations. Around each of these, no harvesting was assumed to take place within a circular buffer 200 metres in diameter.

I am advised that licensees are aware of these locations, and I am satisfied from the constraints applied that the modelling in the base case accounts appropriately for the expected rates of cut in community and domestic watersheds.

- *identified wildlife*

The province's Identified Wildlife Management Strategy (IWMS) addresses plant communities and species at risk, as well as regionally significant species. Identified wildlife are those wildlife species and plant communities that have been designated as requiring special management. Identified wildlife may be protected either through the establishment of wildlife habitat areas (WHAs) with objectives or with general wildlife measures. Such objectives or general wildlife measures may either preclude or constrain timber harvesting activity in certain areas, depending on the requirements of individual identified wildlife species or communities.

Government policy direction limits the timber supply impact of the IWMS to a generalized one percent. Operational policy direction has been to initially allocate the one percent impact equally to each forest district, acknowledging that this approach may be refined if warranted. Impacts greater than one percent may still be addressed by government if required to protect species at risk, by the use of other tools such as land use decisions.

Five identified wildlife species inhabit the Robson Valley TSA—the Wolverine, Lewis' Woodpecker, the Long-Billed Curlew, Northern and Mountain Caribou, and the Grizzly Bear.

A number of other endangered or threatened (red-listed) and vulnerable (blue-listed) species also exist in the TSA and could be included in the next version of the IWMS. The red listed species include the White Sturgeon, the Fisher, and the Southern Caribou. The blue list includes the Great Blue Heron, Short-eared Owl, American Bittern, Albert's Fritillary, Mead's Sulphur, Magdalena Alpine, Wolverine, Northern Long-eared Myotis, Long-billed Curlew, White-veined Arctic, Cutthroat Trout, Bighorn Sheep, Bull Trout, Quebec Emerald, and Grizzly Bear.

The timber supply implications of management provisions for approved or proposed identified wildlife and species at risk were not accounted for specifically in the base case analysis, with the exception of the Grizzly Bear, discussed earlier in *Grizzly Bear habitat*, and ungulate winter range for Mule Deer and Caribou, discussed below.

For the Grizzly Bear, I concluded that the one-percent deduction from the land base, as also applied in the 2000 analysis, was likely to prove inadequate to account for newly identified habitat and for expanded buffers that may need to be applied to particular avalanche tracks in

locations that remain to be identified and approved. Given the noted importance of the Grizzly Bear, in my determination I have accounted for a significant uncertainty in the timber supply, in the form of a possible overestimation in the timber harvesting land base ranging between 3.8 and 8.6 percent, as discussed earlier in *Grizzly Bear habitat*, and below, in **'Reasons for Decision'**.

With the one-percent IWMS budget already applied in the base case analysis to the management of habitat for Grizzly Bears, there is a potential for additional impacts to the timber supply if there are management needs for other identified wildlife species or if other proposed species become established as identified wildlife in future. However, in view of my accounting in this determination for the timber supply implications of Grizzly Bear habitat requirements, and the fact that most of the listed proposed species are not forest-dependent, I believe it is appropriate to assume that if WHAs do become established in the TSA, any additional associated timber supply implications may be considered and taken into account in a timely way in the next analysis and determination.

- Mule Deer winter range

The Robson Valley TSA falls within Mule Deer ungulate winter range order #U-7-010 (FPC, grand-parented April 6, 2006). Ungulate winter ranges within this order were modelled in the timber supply analysis base case.

To maintain high suitability snow interception cover and foraging opportunities in the UWR in the Robson Valley, the general management objective is that a minimum of 50 percent of the UWR area must be maintained in mature and old forest (i.e. stands of 141 years or older) with a minimum of 66-percent canopy closure, with some consideration for species. The order identifies other management objectives but these objectives were considered not to significantly affect timber supply of the timber supply area.

In the 2005 timber supply analysis, in the base case, a minimum of 50 percent of the ungulate winter range areas was required to be older than 140 years. This adequately represents the required constraint, and I am satisfied that the base case projection accounts appropriately for management objectives for Mule Deer winter range.

- Caribou habitat

The Ungulate Winter Range Order # U-7-003, signed on October 6, 2003, identifies Caribou habitat areas in the Robson Valley TSA and specifies their management. The Order designates corridor, high and medium suitability zones for Caribou winter range in the TSA.

In the 2005 timber supply analysis, the following constraints were applied to represent the requirements of the Order:

- All high-value winter range habitat as identified in the Order (totalling 102 574 hectares) was excluded from the THLB, except for Category A cutblocks and associated roads.
- In the Caribou corridor zone (total area 16 239 hectares, 4238 hectares of which are in the THLB), a minimum of 20 percent of the forest area in each corridor was maintained as 100 years of age or older, in a contiguous, wind-firm corridor where at least 80 percent of the area was always maintained above a 3-metre green-up height.
- In the Caribou medium zone (total area 29 124 hectares, 4733 hectares of which are in the THLB), partial cutting only was permitted, with less than 30 percent of the harvestable volume in a cutblock area removed every 80 years, and with a mean opening size of up to 0.5 hectares. To approximate the partial cutting, a reduction of 70 percent was applied to

each yield curve occurring in this zone, and harvesting was modelled as a clearcutting regime with a minimum rotation age of 80 years.

In public input, concern was expressed that the excluded area for high value Caribou habitat appeared much less than in the 2000 analysis. The reason for this is that the deduction for this habitat was made after other overlapping deductions were made earlier in the calculation of the timber harvesting land base. This left a smaller net reduction to be made specifically attributable to this high value habitat.

For this determination, I am satisfied that the constraints applied in the analysis adequately represent the requirements of Order # U7 003 identified as necessary to maintain favourable conditions for caribou winter range. If any government decisions are made following further evaluations related to this species at risk, any related timber supply implications can be incorporated in the next timber supply analysis and accounted for in the next AAC determination.

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

Other information

- First Nations considerations

No First Nations' communities are located in the Robson Valley TSA, but five First Nations have aboriginal interests in the TSA. The Lheidli T'enneh Band and the Simpcw First Nation claim traditional territories in much of the Robson Valley, and the Canim Lake Band, Soda Creek Band, and the Red Bluff Band all have asserted traditional territories in the TSA.

The Red Bluff Band has signed an Interim Accommodation Agreement with the provincial government. The purposes of this agreement include an increase in the opportunity for the band to participate in the forest sector, and provision of economic benefits to the band through a forest tenure opportunity and the sharing of forest and range revenues. The consultation provisions of the agreement outline a commitment by the provincial government to involve the Red Bluff Band in public processes related to the Robson Valley TSA timber supply review. As indicated below, the band was provided information on the TSR process and asked for information on its aboriginal interests.

The Lheidli T'enneh Band has completed Stage 4 of the BC Treaty process, and has signed an agreement-in-principle with the governments of British Columbia and Canada. On March 16, 2005, a designated area was established under Part 13 of the *Forest Act* covering proposed treaty settlement lands, all of which fall within the Prince George Forest District. Currently no legal aboriginal title has been established for areas within the Robson Valley TSA. Negotiations are underway on a final agreement under the treaty process. Discussions are also ongoing between the Lheidli T'enneh and the MoFR on forest and range opportunities, and an interim agreement should be signed in the near future.

The public and First Nations were advised by e-mail of the completion of the timber supply analysis data package and encouraged to review and comment between January 31 and March 31, 2004. On November 10, 2005, the DFAM Group wrote to each of the five First Nations, referring the timber supply analysis report for comment. On December 20, 2005, MoFR wrote to each of the First Nations, inviting comments and information on how their aboriginal interests could be affected by an AAC determination. On January 19, 2006, MoFR wrote a follow-up letter to each First Nation, again inviting comments and information on aboriginal interests. One

e-mail was received in response from the Simpcw, requesting more time for review, and requesting more information on Simpcw fishing and hunting in the Robson Valley. At a subsequent meeting on February 3, 2006, between MoFR staff and Simpcw representatives, no comments or concerns were raised regarding the timber supply analysis. As a matter of course, during the review and approval process for forest development activities, the MoFR seeks to identify issues potentially affecting First Nations' aboriginal interests in the TSA, and licensees seek to identify cultural heritage interests, by referring all forest development plans to First Nations for review and comment.

Traditional Use Studies have been completed by the Simpcw and Lheidli T'enneh First Nations; these studies cover most of the TSA and are used by licensees in development planning. As discussed under *cultural heritage resources* above, these studies identify interests in the Robson Valley TSA that mostly occur over general areas. Management practices and exclusions from the timber harvesting land base for protection of biodiversity, wildlife habitat and riparian areas can likely address aboriginal interests associated with fish and wildlife to some extent. Given a lack of more specific information that might suggest the need for land base exclusions or specific modifications to forest practices, it seems reasonable to believe that the management and land base provisions reflected in the base case, as well as adjustments in the design and timing of operations with little or no impact on timber supply, can address aboriginal interests in the TSA.

From my discussions with MoFR district staff and from the information they have provided to me, I am satisfied that reasonable effort was made to consult with First Nations on how aboriginal interests could be affected by my AAC determination. As noted in '**Guiding Principles**', my AAC determination does not imply any particular pattern of activity on the ground, and I understand that licensees are accounting for information from the traditional use studies in their operations. Any new information suggesting that specific exclusions from the timber harvesting land base are necessary to protect aboriginal interests should be made available for incorporation into future AAC determinations. On this basis, at this time I find no reason to believe that the timber supply projected in the base case is overestimated with respect to First Nations' interests. If new information related to First Nations' interests becomes available, this can be considered in future AAC determinations.

- harvest sequencing

In timber supply analysis, the order in which eligible stands are assumed to be harvested can affect the projected timber supply in a number of ways. Any difference between the modelling assumptions made and the order in which stands are or will be harvested in operational practice must be examined and accounted for.

In the 2005 analysis base case projection, the initial harvest scheduling priorities were directed by the licensees' forest development plans. A further priority was assigned to those areas eligible for salvage, in response to the growing concern over the Mountain Pine Beetle and, to a lesser degree, the Hemlock Looper and losses to fires. Following these priorities, the 'relative oldest first' rule was applied, whereby stands with the greatest number of years above their minimum harvestable age were assumed to be harvested first.

Sensitivity analysis was conducted to show the impact on timber supply if 'random harvest' rules were applied—i.e. the random harvest of any stand above the minimum harvestable age—instead of the relative oldest first. This resulted in the projected timber supply after 60 years being 2.6 percent lower than in the base case.

Given the short-term insensitivity to changes between the 'relative oldest first' option used in the base case and the 'random' option which could potentially be applicable to operational practice

during beetle management, I am satisfied that the harvest scheduling assumption used in the base case is an appropriate reflection of average operational practice over time.

- actual harvest level

The full AAC for the Robson Valley TSA has not been harvested in any year between 1995 and 2005. Harvests (of sawlogs and grade 3 logs, including minor deciduous components of coniferous-leading stands, with no harvest from stands in the deciduous-leading partition) have ranged from 543 337 cubic metres or 90 percent of the AAC in 1996, to 251 639 cubic metres or 42 percent in 2003. In 2005, the total harvest in the TSA was 441 987 cubic metres. Given current and foreseeable economic conditions, it is reasonable to expect that the harvest levels in the TSA in the near term will not exceed those experienced in recent history and are therefore likely to continue to be below the level of the current AAC. I have taken this ongoing situation into consideration 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 addition to the base case harvest projection for the Robson Valley TSA, described earlier, two alternative harvest flows were provided that also resulted in a stable long-term harvest level.

In the first alternative flow, the initial harvest level was maintained for three decades, but this required the harvest rate to drop by 10 percent below the long-term harvest level in the mid-term transition period.

In the second alternative, the initial harvest level was set at the level of maximum, non-declining, even flow. This maximum even-flow harvest level was 359 267 cubic metres per year, which is just 11 000 cubic metres per year or 3 percent higher than the long-term harvest rate in the base case. However, this alternative caused a very significant immediate drop in the harvest rate of about 20 percent from the current harvest level, or 35 percent from the current AAC, which would incur significant social and economic adjustment in the TSA. Moreover, the average volume harvested annually over the whole forecast horizon was 7400 cubic metres or 2 percent lower than in the base case.

In making my AAC determination I have considered both of these alternative forecasts, in addition to the base case forecast and the many sensitivity analyses provided in the analysis report, as well as the recent and current actual harvest levels in the TSA.

- (c) **the nature, production capabilities and timber requirements of established and proposed timber processing facilities;**

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

- (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;**

Minister's letter

The Minister of Forests and Range has expressed the economic and social objectives of the Crown for the Province, to be considered in allowable annual cut determinations by the chief forester, in a letter dated July 4, 2006 (attached as Appendix 3). This letter replaces the former expression of economic and social objectives which consisted of two documents—a letter to the chief forester dated July 28, 1994 and a memorandum dated February 26, 1996.

In the July 4, 2006 letter, the Minister asks the chief forester to consider the importance of a stable timber supply in maintaining a competitive forest industry, while being mindful of other forest values. As I have noted in 'Base Case for the Robson Valley TSA,' and 'Alternative Harvest Flows,' the principles of stability are incorporated in the harvest flow objectives assumed in the base case projection which I have considered extensively in this determination and, as I have noted in 'Reasons for Decision,' the AAC I have determined both takes into account the need for stability in the long-term timber supply, and accommodates objectives for all forest resources.

The Minister's letter also highlights the severity of the current mountain pine beetle infestation and makes reference to government's related objectives as contained in B.C.'s Mountain Pine Beetle Action Plan, noting in particular the objectives of:

- encouraging long-term stability for affected communities;
- recovering the greatest value from dead timber while respecting other forest values;
and
- conserving the long-term forest values identified in land-use plans.

The letter also asks the chief forester to examine factors that affect demand for beetle-killed timber and products manufactured from it, the time period over which it is utilized, and ways to maintain or enhance the mid term timber supply.

In respect of these considerations, I have noted in 'Mountain pine beetle epidemic' that the MPB is now epidemic in the lodgepole pine stands which make up 18 percent of the THLB in this TSA, and that the management strategy is to attempt to hold it at current levels by partial cutting, clear-cutting and small scale salvage. I have noted that continuation of the management of the MPB is very important to the continuing health of the forests in the TSA and to the integrity of the projected timber supply—particularly in the mid term. In recognition of this I have encouraged the continuing direction of appropriate harvest volumes under the new AAC toward the management of stands infested by the MPB. In '**Reasons for Decision**' I have also noted that the AAC I have determined will not displace any existing forest industry-related socio-economic activity.

With respect to the conservation of long-term forest values identified in land-use plans, this is addressed in respect of the Robson Valley LRMP in many of the considerations documented in this rationale document.

The Minister's letter also addresses change and transition in the coastal forest industry and requests consideration of the nature of the timber supply that can contribute to a sustainable forest industry while reflecting decisions in land and resource management plans. These objectives are not directly applicable to this TSA, which lies in the Southern Interior Forest Region.

The letter also refers to local objectives as expressed by the public, and I have considered these in the following section.

Local objectives

The minister's letter of July 4, 2006 suggests that the chief forester should consider important local social and economic objectives expressed by the public during the timber supply review process, where these are consistent with government's broader objectives, as well as any information received from First Nations.

The Robson Valley LRMP, to which I have referred in many of my documented considerations in this determination, has largely captured local objectives for land and resource use in the Robson Valley TSA. Other considerations I have made are as follows.

To invite public input to the current AAC determination process, in addition to the letters noted earlier as sent on November 10, 2005 to five First Nations with interests in the Robson Valley TSA, which announced the approval of the analysis report by the Timber Supply and Inventory Branch for public review, a link was provided to the analysis report on the DFAM Group website. Contact information was provided for hard copies and for sending comments, and notice was given of a public open house. Letters giving notice of the completion of the analysis report and providing an opportunity to provide comments were also distributed on the same date to other stakeholders in the Robson Valley TSA, including trappers, backcountry tourism operators, ski clubs, and others.

In January 2006, letters were faxed to the First Nations extending the period for review and comment to January 31, 2006 and giving notice of an open house on January 26, 2006 in Valemount. Advertisements were placed in the Robson Valley Times on November 15 and 22, 2005, and in The Valley Sentinel on November 16 and 23, 2005, giving public notice that the analysis report was available for review and comment. Advertisements were also placed in the Robson Valley Times on January 17 and 24, 2006, and in The Valley Sentinel on January 18 and 25, 2006, giving notice of the extension for review and of the January 26 open house in Valemount.

No comments were received from First Nations, but a good number of comments were received from the general public. Wherever possible, and where comments were germane to the considerations required under Section 8 of the *Forest Act*, I have attempted in this rationale to respond briefly to the views expressed in the submissions received, and consideration of this input has been helpful in my determination. I will respond briefly below to a number of comments not directed toward specific factors already addressed elsewhere in this document.

Concern was expressed that the socio-economic analysis was 'rudimentary.' While we would always like to add resources to carry out any aspect of this comprehensive timber supply review process, the current socio-economic analysis is adequate to provide an overall picture of the sector trends in the TSA, which I have considered in making my determination. On the other hand, the timber supply analysis report itself was criticised for being too technical. I agree that informed public input is a very important part of the process; consequently, all reasonable attempts are made to explain essential points and, by this rationale, I will pass on this comment to timber supply analysts in DFAM Groups and elsewhere. Unfortunately, in a field of investigation as complex as the projection of timber supply into the long term in conjunction with assessments

of current forest management planning and practice, it would not be possible to explain everything in full to all persons without producing excessive volumes of material and incurring delay beyond already restrictive timelines. Judging from the fine points expressed in the public input in this TSA, I find that the level of public knowledge in this area is in any case already rewarding. It was requested that the level of public advertisement be increased. This is primarily a matter for consideration by district staff, but from the information noted above I would estimate that adequate efforts were made to ensure public notice was given. Opinion was expressed advocating reducing the AAC immediately to avoid environmental damage and reflect socio-economic trends in the TSA. I have noted these opinions as such and in response I refer the commentator to my '**Guiding Principles**', above. The issue of climate change was raised, and while MoFR staff are carefully examining directly related issues such as how to manage beetle infestations, it appears that the implications for timber supply projection at this time remain speculative and uncertain. I refer interested persons to the May 18, 2006 MoFR publication *Preparing for Climate Change: Adapting to Impacts on British Columbia's Forest and Range Resources*. Further related information may be obtained from the MoFR's Future Forest Ecosystem Initiative (FFEI) website, http://www.for.gov.bc.ca/hts/Future_Forests/. As new information becomes available it can be taken into account as appropriate in future timber supply analyses and AAC determinations.

Questions about local data on stumpage are not within the considerations required of the chief forester by Section 8 of the *Forest Act*, and I suggest these be addressed to the district manager.

I thank all those who have taken the time and trouble to convey their views and concerns.

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

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed or damaged, by such agents as fire or disease, that 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. Endemic losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted under *volume estimates for regenerated managed stands*.

In the Robson Valley TSA, except for unsalvaged losses associated with bark beetles, no new studies have been undertaken since those used for the 2001 AAC determination; the same figures were therefore incorporated in the 2005 analysis with consideration for the removal of the community forest..

For beetles alone, from an average of the figures for 1992-1997 as used in the 2000 analysis, and of the figures from licensees for 2000-2003, a total of 15 948 cubic metres per year were accounted for in the 2005 analysis as unsalvaged losses. Losses specific to the Mountain Pine Beetle are discussed in that section below.

Altogether, with other losses to the Hemlock Looper and to fire and wind, the total unsalvaged losses accounted for in the base case projection were 55 733 cubic metres per year. Losses to disease were accounted for by OAF 2 with an increase for Armillaria as noted in the discussion above, in - *volume estimates for regenerated managed stands*.

I note that the figures used are not just a reflection of acute problems in the past few years, but an average over a 10-year period. As such, in the absence of more recently gathered information, and noting the additional discussion of the Mountain Pine Beetle below, I consider them adequate for use in this determination. However, in view of the need to maintain a current perspective on forest health in relation to these losses, I have included in **‘Implementation’** a recommendation that staff of MoFR work with licensees to obtain updated information on unsalvaged losses for incorporation in the next analysis and AAC determination.

Mountain pine beetle epidemic

Mountain pine beetles (MPB) are part of the natural process in lodgepole pine ecosystems. However, the current provincial outbreak has reached an unprecedented level in BC’s history of recording such events. The current MPB epidemic has killed approximately 420 million cubic metres of timber, affecting an area of over 8 million hectares in the central and southern interior of British Columbia.

In the Robson Valley TSA, the MPB is now epidemic in the lodgepole pine stands which make up 18 percent of the THLB. Infestations are located primarily in the scenic Rocky Mountain trench and are visible from highways 5 and 16, and from the main population centres. Because the beetle population in the TSA is too large to suppress, the management strategy is to attempt to hold it at current levels using partial- and clear-cutting and small scale salvage. In three special management units near the provincial border with Alberta, suppression activities are in progress to attempt to limit the movement of beetles into Alberta.

In the base case analysis, the MPB attack was simulated by incorporating an annual unsalvaged loss of 7058 cubic metres to the harvest forecast. (This was included in, not additional to, the 15 948-cubic-metre annual loss attributed to all beetles in Unsalvaged losses, above.)

Two other scenarios were also modelled:

- A ‘Best Case’ scenario, in which all pine-leading stands over 60 years of age are successfully salvaged in the next 20 years, such that no unsalvaged losses result from MPB beetle damage and all affected stands are converted to managed stands; and
- A ‘Worst Case’ scenario, in which all pine-leading stands over 60 years of age are immediately lost to the MPB infestation with no salvaged volume. In this scenario, affected stands were assumed to regenerate naturally in 10 years as unmanaged stands.

Results for the Best Case scenario showed the same projected timber supply as in the base case for the first 100 years, after which the harvest rate was two percent higher than in the base case, because the future unsalvaged losses were assumed to be smaller.

Results for the Worst Case scenario showed that the initial harvest rate in the base case could only be maintained for 10 years, and the mid-term harvest rate would drop below the stable long-term level by 6 to 11 percent. In this projection, after 120 years, the harvest rate increased to a long-term level two percent higher than in the base case, again because no further unsalvaged losses were attributed to the MPB and future unsalvaged losses were thus assumed to be smaller.

In considering the implications of the MPB for timber supply, I am grateful for the guidance provided by these two scenarios which indicate the likely upper and lower bounds of reasonably expectable outcomes. I note that in each case losses to the beetles were not assumed to recur and MPB-related damage was not included in ongoing future unsalvaged losses. This seems improbable as the beetle is so well established and, given its history, it is unlikely that it will never create another outbreak. However, the discrepancy between these scenarios and the base case, which did include ongoing unsalvaged losses to the MPB, is only two percentage points; it

is not projected to occur until many decades from now, and it will not affect the current AAC determination.

In public input, concern was again raised over the implications of climate change related to the beetles, together with associated uncertainties for growth and yield, and a request for MoFR to provide some guidelines for estimating overall effects. As noted earlier, Ministry staff are investigating related issues, but no such guidelines currently exist and any implications for timber supply projection remain speculative.

Public input also included a submission by one licensee that an AAC uplift be considered in the TSA to ensure adequate management of the MPB. This is a valid management response in some areas of the province where a preponderance of pine stands are infested with the MPB epidemic and increasing the AAC becomes necessary to allow licensees to harvest enough of the damaged timber before large volumes become unsalvageable over extensive areas. In the Robson Valley TSA, however, where pine-leading stands account for only roughly 18 percent of the THLB area, conscientious licensees have so far been able to slow the outbreak in local areas by aggressive, well targeted harvesting. As noted earlier, all harvesting in the TSA is proceeding well below the level of the current allowable annual cut. Therefore, while I greatly appreciate the pro-active role of licensees in the timely removal of stands damaged by the MPB, and while I encourage continuation of this effective approach, in context of the general trend of the timber supply projection in the TSA, which is toward a mid-term decline, at this time I see no advantage in increasing an already adequate harvest level in consideration of foreseeable requirements for managing the MPB in this TSA. However, the submitted information and the 'Best Case' scenario of harvesting all pine older than 60 years in the next 20 years do suggest it would be advantageous for more of the currently underutilized harvest to be usefully targeted toward capturing losses from damaged pine.

For the purposes of this determination, I am satisfied that the level of accounting in the base case projection for losses to MPB damage provides an adequate representation of the timber supply implications of current management of the MPB. However, I remain mindful that continuing the present management of the MPB is very important to the continuing health of the forests in the TSA, and to the integrity of the projected timber supply—particularly in the mid term. I therefore encourage the continuing direction of appropriate harvest volumes under the new AAC toward the management of stands infested by the MPB.

Reasons for Decision

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

In the DFAM Group's 2005 timber supply analysis, the projected initial harvest rate of 552 377 cubic metres per year could be maintained for 20 years before declining by five percent every five years until reaching a long-term harvest level of 348 267 cubic metres 55 years from now.

In determining AACs, my considerations typically identify factors which, considered separately, indicate reasons why the timber supply may be either greater or less than 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.

In my considerations, the following factors have been identified as reasons why the actual timber supply may have been overestimated in the base case:

- *Woodlots*: Due to incomplete accounting for the allocation of woodlot licences, the THLB has been overestimated by roughly 2168 hectares, or roughly one percent.
- *Canoe Mountain Development Area*: Since government has a contractual agreement in place with the developer to provide the land, and a master plan has been signed and approved following a land use decision by the former agency Land and Water BC (now the Integrated Land Management Bureau) the THLB is effectively reduced immediately such that the projected timber supply is overestimated by about 0.6 percent across all time frames.
- *Foster and Caribou drainages*: Physical and economic operability considerations indicate that neither of these drainages is likely to contribute to the timber supply to the extent assumed in the base case base projection. Without any contribution from either area, under the harvest flow assumptions in the base case, the initial harvest rate could only be maintained for one decade, and the sustainable long-term harvest rate would be lower than that projected in the base case by 32 000 cubic metres per year, or about 8 percent.
- *Grizzly bear habitat*: The potential need for additional habitat and for the doubling the widths of some buffers to levels recommended in the LRMP introduces a significant uncertainty in the projected timber supply, amounting to a probable overestimation in the THLB ranging between 3.8 percent and 8.6 percent.

The following factors have been identified as reasons why the actual timber supply may be underestimated in the base case projection:

- *Interior log grades*: To the extent that dead-potential log grades are present in existing stands, they must now be accounted for in AACs, whether use is made of them or not. For this determination I am assuming the wood volumes available in the near term have been underestimated in the base case by roughly 8 percent.
- *Class A seed*: The additional volume gains associated with increased levels of planting Class A seed in the future indicate that the mid-to-long-term timber supply may be underestimated to an uncertain degree in the base case, although the implications will not materialize for roughly 55 years.

Having reviewed and confirmed these considerations, I have reasoned from them as follows.

The Foster and Caribou drainages contain significant amounts of mature fibre that cannot be expected to be fully accessed under currently foreseeable economic conditions. Concerns were raised in the AAC determination five years ago about the reasonableness of continuing to include these drainages in the THLB, and no indication has been forthcoming of any intention to attempt to access these areas in the face of the problems discussed earlier in *physical and economic operability*. Much timber in the already accessed Morkill drainage remains unharvested due to comparable concerns related to operability. If the Caribou and Foster continue to be assumed to contribute fully to a projected timber supply that, in reality, will need to be found in other parts of the TSA, then in the context of the overall declining timber supply forecast in the TSA, at some point the sustainability of meeting the full range of management objectives throughout the TSA will be brought into question.

Without further assessment it is impossible to define which portions, if any, of these drainages are in fact operable. As noted, the implication for timber supply of *entirely* removing the two areas would be a land base exclusion resulting in roughly an 8-percent overestimation in the long-term productivity of the TSA, which would begin to take effect at the time of the assumed removal. Some or all of this overestimation must be combined with the uncertainty associated with the increased cover requirements for managing Grizzly Bear habitat, which (accounting for overlapping habitat in the Foster and Caribou) could by itself range from a

potential 3.5- to an 8.0-percent overestimation. Addressing also the 1.6-percent real deduction for the Canoe Mountain development and the allocated woodlots, the total potential overestimation in the THLB and in the short-term timber supply could amount to as much as up to almost 18 percent, or certainly in the range of 10-to-15 percent. The questionable economic operability of the Morkill could add roughly two percent more to the potential overestimation in the short-term timber supply.

At this time, without conducting further operability assessment work, I believe it would be premature to assume the complete and permanent removal of the entire timber supply contribution from both the Foster and the Caribou drainages. Nonetheless, in view of the overall declining timber supply projection, some significant adjustment must now be made to reflect the now very questionable operability of these two areas. Assuming roughly half the maximum impact of their complete exclusion (4 percent), in combination with a lower-end value of the indicated range of the impact of Grizzly Bear management (roughly 5 percent), still suggests a combined overestimation, from these two factors, of roughly 9 percent. Adding to this the nearly two-percent land-base adjustment required for woodlots and for the contracted land development, indicates a combined overestimation of about 11 percent in the short-term timber supply, without any accounting for the questionable condition of the Morkill drainage.

This combined overestimation is partially offset by the 8-percent underestimation attributable to the change in interior log grades, which reduces the net overestimation to a figure in the range of 3 percent, applicable to the coniferous component of the harvest.

From this reasoning, in order to reflect the very considerable uncertainty represented by the combined possible overestimations and the consequent potential difficulty of meeting sustainability requirements in the TSA as a whole under continuation of the current AAC, I have determined that, in the absence of more exacting operability information upon which to base a judgement, it is appropriate at this time to apply a roughly three-percent reduction to the AAC for coniferous species, independent of the deciduous harvest. This will reduce the allowable annual harvest of 546 377 cubic metres for coniferous species in the TSA to 530 000 cubic metres.

The current level of harvest in the TSA under the present AAC of 552 377 cubic metres is 440 000 cubic metres. Thus, applying a reduction of roughly 16 000 cubic metres at this time will account for at least part of the significant identified uncertainties without displacing any existing forest-industry-related socio-economic activity. If it becomes apparent over the coming years that economic conditions have resulted in viable plans to operate in parts or all of the Foster or Caribou drainages, it may become appropriate to re-evaluate and possibly reinstate commensurate portions of their respective contributions to the timber supply. On the other hand, if no such indications have materialized before the next analysis and AAC determination, it may be appropriate at that time to permanently remove all of the projected contribution to the timber supply from both of these drainages. I therefore strongly recommend an early assessment of the operability of these areas.

Notwithstanding the climate of uncertainty in the short term, if local information can be generated to provide reliable, improved, site-productivity estimates, and if the percentages of reforestation using Class A seed continue to increase as projected, eventual increases in harvestable volumes may well produce a considerably brighter longer-term future than currently forecast, with potential increases in the projected long-term harvest level of a magnitude depending on the local findings.

With respect to the deciduous harvest, given the ongoing interest in these species shown by the current utilization of minor deciduous components in predominantly coniferous stands, I consider it appropriate to maintain the current partition to provide for the economic

opportunity associated with the harvesting of up to 6000 cubic metres per year attributable to stands of predominantly deciduous species.

As I have noted in Mountain Pine Beetle Epidemic, continuing the present management of the Mountain Pine Beetle is important to the continuing health of the forests in the TSA and to the integrity of the projected timber supply—particularly in the mid term, and I therefore strongly encourage the continuing direction of appropriate harvest volumes under the new AAC toward the management of stands infested by the MPB.

In conclusion, I would like to acknowledge the work of the Robson Valley DFAM Group in producing the timber supply analysis used in support of this determination. The base case and alternative flow projections, as well as the sensitivity analyses, provided much helpful information for assessing the potential implications of uncertainties.

I also greatly appreciate the assistance given by the Headwaters Forest District, Southern Interior Forest Region, the Forest Analysis and Inventory Branch and other MOFR and other agency staff for their very considerable efforts in support of this determination.

The well-informed public input was also most helpful in many respects, and I appreciate all of the time and thoughtfulness applied to the submissions. These comments provided important considerations in my determination.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties in the information provided. It is my determination that a timber harvest level that takes into account the need for stability in the long-term timber supply, that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, that permits continued management of the mountain pine beetle epidemic, and that includes the adjustment occasioned by the change in accounting for interior log grades, can be best achieved in the TSA by establishing an AAC of 536 000 cubic metres, which includes the continuation of a partition of 6000 cubic metres for harvesting attributable to stands of predominantly deciduous species.

This determination is effective August 4, 2006, 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 MOFR staff and licensees to undertake the tasks and studies noted below, which are also 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 Robson Valley TSA.

- *Foster and Caribou landscape units*: In view of the considerable uncertainty in the contributions to timber supply from these areas, an early assessment of the operability of these areas should be undertaken if their complete removal is to be avoided in the next determination.
- *Land use*: I encourage all affected agencies to collaborate in obtaining the timely formal completion of all land use decisions related to the Crown Land Plan and the Canoe Mountain Development.

- *Roads, trails and landings*: In view of the potential effects of changes in harvesting practices, I recommend that district staff monitor the extent of the land base occupied by roads, trails and landings in actual operational experience, to ensure appropriate analytical methodology and reduce uncertainty in future analyses and determinations.
- *Seed production stands*: District staff should discuss with MoFR's Tree Improvement Branch the most appropriate means to ensure the availability of seed from these areas for the future, possibly through the establishment of a government objective under the GAR.
- *Riparian areas*: Improved quantification is needed for the areas required for deduction in respect of riparian areas, to reduce associated uncertainty in the next determination.
- *Grizzly bear habitat*: District staff should engage the other affected agencies in finding the most appropriate means of integrating the already existing policy direction with the new inventory information, to decide which of the avalanche chutes are high value habitat that require the 100-metre buffer, and to establish the legal means for designating and enforcing the required management.
- *Site productivity*: Local site-index information should be generated for incorporation in the next timber supply analysis and AAC determination. Much beneficial information can be gathered through differing methods such as valid site index adjustment sampling or, predictive or terrestrial ecosystem mapping and SIBEC correlation. The current timber supply analysis indicates the potential benefits are significant.
- *Partial harvesting*: In view of the several potentially significant uncertainties associated with various levels of partial harvesting in the TSA, I recommend ongoing assessment of:
 - the stand volumes that may be expected to be achieved over time in response to various management regimes;
 - the regeneration response to planting under the remaining stand after first harvest;
 - the effectiveness of maintaining visual quality objectives by on-ground assessment of the results of partial harvesting.
- *Unsalvaged losses*: To maintain a current perspective on forest health in relation to these losses, I have noted in 'Implementation' a recommendation that MoFR staff work with licensees to obtain updated information on unsalvaged losses for use in the next analysis and AAC determination.
- *Interior log grades*: To reduce related uncertainties for future determinations, MoFR district staff should ensure that inventory projections appropriately reflect volume estimates that include the 'dead-potential' component.



Jim Snetsinger
Chief Forester

July 28, 2006

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's letter of July 4, 2006



JUL 04 2006

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

Dear Jim:

Re: Economic and Social Objectives of the Crown

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

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

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

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**Minister of
Forests and Range
and Minister Responsible
for Housing**

Office of the
Minister

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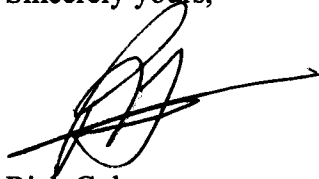
Jim Snetsinger

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

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

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

Sincerely yours,

A handwritten signature in black ink, appearing to be 'Rich Coleman', with a long horizontal line extending to the right from the end of the signature.

Rich Coleman
Minister

Appendix 4: List of those who submitted comments, provided responses and/or attended DFAM open houses

First Nations

Simpcw First Nation

Non-Government Organizations

Larry Stamm, Fraser Headwaters Alliance

Julie Zammuto, Save-The-Cedar League

Individuals

Gordon Carson

Hugh Perkins

Roy Howard

David Radies

William & Virginia Karr

Companies

Adrian Van der Zwan, Northwest Specialty Lumber Ltd.