BRITISH COLUMBIA
MINISTRY OF FORESTS AND RANGE

Lillooet
Timber Supply Area

Rationale for
Allowable Annual Cut (AAC)
Determination

Effective May 1, 2009

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Objective of this Document

This document provides an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia (BC) in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Lillooet Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Acknowledgement

I am indebted to staff of the BC Ministry of Forests and Range (MFR) in the Cascades Forest District, the Southern Interior Forest Region, and the ministry's Forest Analysis and Inventory Branch, for compilation and preparation of the information I have considered in this determination. I am also grateful to Forsite Consultants Limited for the 2005 timber supply analysis and its March, 2008 addendum, and to the First Nations, licensees and other interested parties who have contributed information for my consideration through consultation and the public review process.

Description of the Lillooet Timber Supply Area

The Lillooet TSA covers approximately 1.125 million hectares in southwestern British Columbia, between the Coast Mountains and the Thompson-Okanagan Plateau. The TSA is administered by the MFR Cascades Forest District in Merritt, BC, with a small field office in Lillooet.

Rugged topography and the dramatic climatic variations of mountainous terrain give rise to seven biogeoclimatic zones with 30 variants in the Lillooet TSA. The varied landscapes include dry grasslands, coniferous forests, and alpine tundra, at lower, middle, and higher elevations respectively. In the western portion of the TSA, temperate rainforest conditions predominate, while eastern areas are dominated by the semi-arid and dry grassland landscapes of the province's interior dry belt. These wide-ranging landscapes support diverse forest types dominated by lodgepole pine, Douglas-fir and spruce-leading stands, with other species including ponderosa pine, whitebark pine, subalpine fir (balsam), western redcedar and hemlock.

Of the total area in the TSA, approximately one-third lies above the tree line, and about 528 000 hectares are considered productive forest land. About 47 percent of the productive forest area is considered suitable and available for timber harvesting; this area, known as the 'timber harvesting land base', usually abbreviated as 'THLB', covers approximately 250 000 hectares, or 22 percent of the total area of the TSA. About 80 percent of forest stands on the THLB are over 60 years of age at this time, but over time, timber harvesting and beetle-related tree mortality will lead progressively to more extensive areas of younger forest. The TSA contains approximately 17.6 million cubic metres of merchantable lodgepole pine, of which about 84 percent are found in forest stands predominated by pine and 8 percent in stands predominated by Douglas-fir. The MFR projects that the current mountain pine beetle (MPB) infestation will kill about 80 percent of the mature pine in this TSA over the next 12 years, with the majority likely occurring by 2012.

The varied landscapes and the lakes and streams in the Lillooet TSA support a wide variety of wildlife, bird and fish species, some of which are at risk with declining populations across the

province; ten red-listed species (Endangered or Threatened), and 23 blue-listed species (Species of Concern) may be found in the TSA.

The several provincial parks and protected areas located in the TSA support significant recreation activities, including mountain biking, hiking, climbing, fishing, camping, wildlife viewing, whitewater boating, heli-skiing, snowmobiling, ski mountaineering, and cross-country skiing.

The regional service centre in the TSA is the town of Lillooet which accounts for roughly 40 percent of the relatively small population of about 6,500 in the TSA. The village of Lytton is the only other incorporated settlement in the TSA, whose larger unincorporated communities include Bralorne, Gold Bridge and Spences Bridge. A large portion—an estimated one-half—of the TSA's residents are First Nations' members. St'át'imc and Nlaka'pamux First Nations communities reside within the TSA and some Tsilhqot'in and Secwepemc communities have interests in the TSA.

The communities in the TSA have long based their economy on natural resources, and forestry continues to be the largest industry. However, the only major timber processing facilities in the TSA are Ainsworth Lumber Co. Ltd.'s veneer plant and Bridgeside's value-added plant (which had been closed but has recently re-opened with a single shift), both of which are located in Lillooet; there are currently no primary breakdown facilities for sawlogs, which must leave the TSA to be processed, typically in Chasm and Merritt. Other contributors to the regional economy include tourism, agriculture and mining, and joint ventures between business, industry and First Nations are being developed. Outdoor recreation opportunities in the TSA are exceptional. First Nations culture-based tourism is gaining in popularity, as are markets for botanical and other non-timber forest products. The area is well linked to the rest of BC by four highways and three rail lines.

History of the AAC for the Lillooet TSA

Prior to 1982, the AAC for the Lillooet TSA was 650 000 cubic metres. In 1982 the AAC was temporarily increased to 800 000 cubic metres to allow for the control of the MPB including the salvage of damaged timber. In 1988, the temporary increase expired, and the AAC was returned to 650 000 cubic metres. In 1996, the AAC was reduced to 643 500 cubic metres, accounting for the designation of the Stein Valley Nlaka'pamux Heritage Park. Effective January 1, 2002, the AAC was further reduced to 635 900 cubic metres, accounting for the issuance of new woodlot licences.

Apportionment of the AAC, and Recent Harvesting History

The AAC for the Lillooet TSA is currently apportioned as follows (cubic metres per year):

Forest Licences, Replaceable	398 731
Forest Licences, Non-replaceable	67 320
BCTS Timber Sales Licences	138 366
Community Forest Agreements	25 683
Woodlots (unallocated)	2100
Forest Service Reserve	3700
TOTAL	635 900

From 2003 to 2007, the annual timber harvest in the Lillooet TSA averaged 291 561 cubic metres, less than half the AAC of 635 900 cubic metres. The MFR Harvest Billing System indicates that, based on scale data, the actual harvest in the ten-month period from January 1 to October 31, 2008, was just 86 538 cubic metres.

New AAC determination

Effective May 1, 2009, the new AAC for the Lillooet TSA will be 570 000 cubic metres, of which 400 000 cubic metres are specified as harvestable from species other than pine. It is my expectation that the overall AAC will be managed wherever possible to address the priority problem of the mountain pine beetle infestation in the TSA. This AAC represents an overall reduction of approximately 10 percent and provides an essential step toward ensuring the ongoing sustainable use of the non-pine species currently preferred for harvesting in the TSA, and of the other forest values associated with these stands. This new AAC excludes all volumes in issued woodlot licences and the Probationary Community Forest Agreement and will remain in effect until the next AAC is determined, which must take place within five years of the effective date of this determination.

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- *Forest Practices Code of British Columbia Act Regulations*, 1995, and amendments.
- *Forest Practices Code of British Columbia, Guidebooks*, MFR and MELP.
- *Ministry of Forests and Range Act,* (consolidated to March 30, 2006).
- Technical review and evaluation of current and expected operating conditions through comprehensive discussions with MFR staff, including the AAC determination meeting held in Lillooet on December 9, 10 and 11, 2008.
- Input received from First Nations through the consultation process.
- Information received at a meeting in the Lillooet Recreation Centre on December 10, 2008, between representatives of First Nations bands and tribal councils, myself as chief forester, and MFR region, district and branch staff.
- Information received at a meeting in the Lillooet Recreation Centre on December 9, 2008 between representatives of major licensees, myself as chief forester, and MFR region, district and branch staff.
- Information received from licensees through the referral process.
- Firsthand information regarding the terrain of the TSA, and the distribution, accessibility and potential operability of various timber types, from observations on a 2.75 hour helicopter flight on December 10, 2008, accompanied by MFR region and district staff.
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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 and unavoidably simplify the real world and involve uncertainty in many of the inputs, due in part to variations in physical, biological and social conditions, to existing limitations in knowledge, and to the complexity arising from interacting ecological, social, cultural and economic systems. While ongoing, science-based improvements in the understanding of ecological dynamics will help reduce some of these uncertainties, technical information and

analytical methods alone cannot incorporate all of the social, cultural and economic factors relevant to forest management decisions, nor do they necessarily provide complete answers or solutions to the forest management problems addressed in AAC determinations. However, they do provide valuable insight into potential outcomes of different resource-use assumptions and actions—important components of the information that must be considered in AAC determinations.

In determining this AAC for the Lillooet TSA I have considered and discussed known limitations of the technical information provided, and I am satisfied that the information I have relied upon has provided 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 land use and management plans and associated objectives and guidelines, or the *Forest and Range Practices Act*.

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

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

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

In the Lillooet TSA in particular, while the TSA has a long history of land-use planning, many of the related implications for forest management and for timber supply remain unresolved. A Lillooet Land and Resource Management Plan (LRMP), covering the entire TSA, which was commenced in 1996 and received Cabinet approval in principle in 2004, has not been finalized and remains essentially in draft form, with an unclear future. Attempts by the provincial Integrated Land Management Bureau (ILMB) and the St'át'imc First Nation to analyse and compare implications of the draft LRMP and the St'át'imc draft Land Use Plan have become stalled, with no current plans to continue or complete the LRMP. Nonetheless, my considerations of some of the potential impacts related to the draft LRMP in the absence of its overall formal approval—for instance respecting grizzly bear, spotted owl and protected areas—are included in this document, in view of their having been implemented through other mechanisms, such as Government Actions Regulation (GAR) orders for Wildlife Habitat Areas, and park designation. Although the LRMP remains incomplete, in April, 2008, a Land Use Planning Agreement was reached between the Lil'wat Nation and the Province of British Columbia as represented by the Minister of Agriculture and Lands, for areas covering parts of the Lillooet TSA, and my considerations related to implications of this plan are documented in appropriate sections below. Specific concerns identified by First Nations in relation to their aboriginal interests within the TSA are addressed in various sections throughout this rationale.

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

Some persons have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are

available. I agree that some data are incomplete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency in the early 1990s to redetermine many outdated AACs and institute formal legal requirements to determine AACs regularly. 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.

Other persons 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 recent court decisions. These obligations include the obligation to consult with First Nations regarding asserted rights and title (aboriginal interests) in a manner proportional to the strength of their aboriginal interests and the degree to which the decision may impact these interests. In this regard, I will consider the information provided to First Nations to explain the timber supply review (TSR) process for the Lillooet TSR, any information brought forward respecting First Nations' aboriginal interests including how these interests may be impacted, and any operational plans and actions that describe forest practices to address First Nations' interests, before I make my decision. As I am able, within the scope of my authority under Section 8 of the *Forest Ac*t, where appropriate I will seek to address aboriginal interests that will be impacted by my proposed decision. When aboriginal interests are raised that are outside my jurisdiction, I will endeavour to forward these interests for consideration by appropriate decision makers.

The AAC that I determine should not be construed as limiting the Crown's obligations under court decisions in any way, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Lillooet TSA. It is also independent of any decisions by the Minister of Forests and Range with respect to subsequent allocation of wood supply.

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

The role of the base case

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

For most AAC determinations, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer simulation model, a series of timber supply forecasts can be produced, reflecting different

starting harvest levels, rates of decline or increase, and potential trade-offs between short- and long-term harvest levels.

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

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

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

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

Base case for the Lillooet TSA

The timber supply analysis used as one of the bases of reference for my considerations in this AAC determination was originally performed, under contract to MFR, by Forsite Consultants Limited, from a data package prepared in 2004 by Timberline Forest Inventory Consultants for public and First Nations review. Forsite Consultants updated the Data Package, completed the analysis using the FPS Atlas model (v6.0.2.0), and compiled the March 31, 2005 analysis report.

In the 2005 analysis report, the implications of the current MPB infestation were not explored. To provide information on this account, again under contract to MFR, on March 3, 2008, Forsite completed and published the *Lillooet TSA Timber Supply Review Mountain Pine Beetle Impact Assessment, Addendum to the Lillooet TSR3 Analysis Report (March 31, 2005).*

The 2005 base case projection incorporated a harvest flow designed to maintain the harvest at the current AAC for as long as possible, consistent with providing for a managed and gradual transition from the short-term to the mid- and long-terms by avoiding large, abrupt disruptions in timber supply. The analysis showed that, under the base case assumptions,

ignoring the implications of the MPB— which I have considered below in '*mountain pine beetle*' in reference to the addendum analysis—a harvest at the current AAC of 635 900 cubic metres could be maintained for 60 years followed by declines over 50 years to a long-term annual harvest level of 379 920 cubic metres, 40.3 percent below the current AAC.

I have reviewed in detail and, with the qualifications noted and accounted for in various sections of this document, I concur with the assumptions and methodology incorporated in the base case projection and in the addendum analysis and related scenarios. As part of this review, I have examined projections over the forecast period for the growing stock of timber in the TSA, including the dominant tree species, their age classes on the landscape, and their mean average age at harvest, as well as their contributions to the volumes of timber projected to be harvested over time. Details of my considerations of particular aspects of the analysis and its projections, in some cases in relation to uncertainties in associated assumptions, are provided in following sections.

From my review of the timber supply analysis, including detailed discussions with MFR analysts who directed and reviewed the analysis in detail, I find that the base case forecast provides a workable and helpful basis of reference for my considerations in this determination. In addition to the base case, I have reviewed sensitivity and alternative analyses, including projections under various market scenarios, which have also been helpful in my considerations as documented in the following sections and in the reasoning 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 the timber harvest

- *general comments*

The overall area of the Lillooet TSA, as estimated from inventory data and reported in the 2005 timber supply analysis, is 1 124 999 hectares. This total land base includes both forested and non-forested lands of various ownerships that include parks, Indian and government reserves, woodlot licence areas, and private and other lands. Some of these areas do not contribute either to timber harvesting or to forest cover requirements for other objectives, and are therefore excluded from the timber supply analysis. Other areas, such as woodlot licences and Community Forest Agreements, supply timber that is harvestable but which is administered and considered separately from the AAC for the TSA. A third category, areas that do not directly supply harvestable timber, such as parks and riparian reserves, nonetheless usually provide habitats and forest cover that may assist in meeting a variety of management objectives in the TSA, thereby contributing indirectly to the timber supply of the TSA.

Areas in the TSA which contribute directly to timber harvesting as well as to forest cover requirements are considered part of the timber harvesting land base, the '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, or 'CFLB'. For the Lillooet TSA, after excluding all private land, reserves, woodlots, miscellaneous leases, non-forested areas, areas of non-productive forest, non-commercial brush, and unclassified existing roads, trails and landings, the total CFLB area is 528 096 hectares, roughly 47 percent of the total TSA area.

Within the CFLB, the THLB comprises those parts of the productive forest that are currently considered to be economically and environmentally suitable and available for timber harvesting. In deriving the area of the THLB for any TSA, a series of deductions must be made from the total TSA area in recognition of many factors that, for economic or ecological reasons, effectively reduce the extent of the productive forest area that is suitable and available for timber harvesting. In the analysis for the Lillooet TSA, some of the most significant deductions were for: 'inoperable' areas considered unsuitable for operations for economic or physical reasons; areas of low timber productivity; areas of unstable or sensitive terrain; non-merchantable or 'problem' forest types, and established parks.

In making these land base deductions for each of these reasons in deriving the THLB, appropriate assumptions or projections must be made about many factors. In cases where an area falls into more than one category, only one deduction is made to ensure that there is no 'double counting'. My considerations of the reasonableness of particular deductions are documented in the immediately following sections. Some land base exclusions from the THLB which are required to meet management objectives for specified resource values other than timber are considered, as required, under Section 8 (8)(a)(v) below, in 'Integrated resource management objectives'. Those considerations include riparian reserve zones and management areas, as well as wildlife habitat and recreation areas.

The THLB derived in the 2005 base case analysis for the Lillooet TSA is 250 426 hectares for the short term, and—following deductions for wildlife tree patches projected to be established in the future, and for roads, trails and landings yet to be built—the estimated long-term THLB is 225 670 hectares.

- *woodlot licences*

The MFR's Forest Tenure and Administration (FTA) records, supplemented by information from Cascades Forest District staff, show the number of issued woodlot licences in the Lillooet TSA is 16, with a total Crown AAC of 15 433 cubic metres, on 8376 hectares of Crown land, an increase of 312 hectares since the AAC determination effective January 1, 2002. District staff also anticipate that two more woodlot licences will be topped up by from 400 to 600 hectares in future years, representing roughly another 0.2 percent of the THLB area that may be required to meet future woodlot expansion. Since the expansions of these woodlots have not been approved at this time I have not accounted for this potential reduction in the timber supply for the TSA.

However, in the 2005 base case analysis and the 2008 addendum, the land base exclusion that was applied to account for issued woodlots amounted to 9743 hectares of Schedule B (Crown) land, 1367 hectares more than the area indicated as necessary by district records. This represents an underestimation of 0.5 percent in the THLB, and I have accounted for this in my determination as discussed in **'Reasons for Decision'**.

- *Probationary Community Forest Agreement*

The Provincial Government has recently signed a Forest and Range Opportunity (FRO) agreement with the Xaxli'p First Nation, that includes a Probationary Community Forest Agreement (PCFA) in an area located in the Fountain Valley which MFR and licensees have been managing for many years as a no-harvest 'log-around'. The total area affected is 23 356 hectares, including approximately 12 679 hectares in the THLB. The long-term sustainable annual harvest from this area is estimated to be about 19 236 cubic metres. This area was not excluded in the derivation of the THLB for the 2005 base case analysis and 2008 addendum, and its exclusion will incur a decrease of approximately 5 percent in THLB for the TSA when the PCFA receives final approval and a licence is issued. Government's intended use of this land has been made clear and under current management no harvesting by major licensees is foreseeable for this area. In my AAC determination for the TSA I have therefore accounted for an overestimation in the THLB of approximately 5 percent, as discussed in **'Reasons for Decision'**.

- *roads, trails and landings*

I have reviewed the land base deductions applied in the base case analysis in respect of existing, classified, 16-metre highways of all slopes and 12-metre regional paved roads of all slopes, and the deductions applied in respect of unclassified logging roads and trails of various identified widths and slopes. I have also reviewed the deduction for landings as applied to all stands harvested prior to 1996 when rehabilitation was not required. The methodology is described in the analysis report, and from my discussions with MFR staff I am satisfied that the related reductions are consistent with standard practice and that the timber supply projections in the analysis are reliable in each of these respects.

I have also reviewed the methodology applied in the deductions made for future roads, trails and landings, and I conclude that the approach and results are reasonable and have provided the best available information for incorporation in the analysis. I therefore consider that the base case harvest forecast accounts reliably for the respective land base deductions for these purposes.

The Bonaparte Indian Band made a submission based on a 2002 study by the Silva Forest Foundation, which is applicable to less than one-fifth of the Lillooet TSA, that logging and roads have had direct impacts on 21 percent of the study area and have influenced a further 42 percent. The Bonaparte Band also submitted a 2004 report by Thomas and Norwell on the Robertson Ecosystem Based Plan, which the Band Chief identified as representing the Band's current view of forest management planning. The report's authors recommended that roads should maintain natural drainage patterns, that unnecessary on-block roads should be deactivated, and that road crossings through reserves should be minimized.

These submissions provide a basis for helpful discussion of forest practices. However, they do not provide specific data from which to consider any quantitative adjustment to any of the particular deductions applied in respect of roads, trails or landings in the derivation of the THLB in the 2005 analysis. I therefore remain satisfied that, for the Lillooet TSA, the timber supply implications of these factors are adequately accounted for in the base case projection.

- *physical operability*

The lines delineating areas of operable timber potentially available for harvest in the Lillooet TSA from inoperable and therefore unavailable timber are based primarily on physical limitations to access as defined and identified in work originating from 1995 by MFR in consultation with licensees. District staff advise that most harvesting in the TSA has occurred inside the identified lines, except for known specific areas totalling 7451 hectares, an area about 3 percent as large as the THLB. In my experience, particularly in areas with the very uneven topography typical of the Lillooet TSA, while operability lines do provide a generally reliable guide for the feasibility of potential operations, in doing so they often *exclude* some particular areas of potentially operable forest land such as those identified here. However, the lines also usually *include* some areas—as operable—that will in fact prove inoperable, but whose locations have yet to be identified; the net implications for timber supply are not determinable by assessing one or other of the two categories in advance of operational experience.

The authors of the 2002 study by the Silva Forest Foundation submitted by the Bonaparte Indian Band presented a series of land base deductions that could potentially result in a smaller THLB than that derived through the deduction methodology used in the 2005 Forsite analysis. MFR district staff consider from their experience and knowledge of the land base and operations in the TSA that, overall, a generally higher percentage of the total land base in the TSA may appropriately be considered potentially harvestable based on current practices than would be indicated by the identified characteristics specific to the study area. The Traditional Area identified by the Bonaparte Indian Band occupies less than 3 percent of the THLB of the TSA.

From these considerations, and from my review of a sensitivity analysis showing the implications for timber supply if the THLB area were increased or decreased by 10 percent, I conclude that any potential net over- or underestimation in the THLB on this account in the 2005 analysis is within reasonable limits of uncertainty. No quantifiable net increase or decrease in the size of the THLB or in the associated projection of the short-term timber supply is warranted or supportable by the available information, and the incorporation of the existing operability line work in the timber supply analysis reflects a generally reasonable and adequate approximation to the physically operable areas in the TSA from which to project the timber supply. Of potentially much greater implication for the reliability of the projected timber supply is the estimated *economically* operable area, considered next.

- *economic operability*

Under the recent and currently experienced adverse market conditions for British Columbia's forest products, compounded by an absence of processing facilities for sawlogs in the Lillooet TSA, a very significant amount of the timber in the TSA that is suitable, available and physically accessible for harvesting has become economically inoperable. An indication of the extent of this condition is provided by the significantly reduced volumes of timber actually harvested in the TSA in recent years. From 2003 to 2007, the annual timber harvest in the TSA averaged only 291 561 cubic metres, less than half the AAC of 635 900 cubic metres, and the MFR Harvest Billing System indicates that, based on scale data, the actual harvest in the ten-month period from January 1 to October 31, 2008 was just 86 538 cubic metres.

This limited harvest is consistent with generally high access costs for much of the timber in the TSA, which I confirmed visually during my AAC determination meeting in Lillooet, in an extensive two-and-three-quarter-hour helicopter flight over the TSA on December 10, 2008. Although extensive stands of good quality pine and non-pine timber are evident in the TSA, many of them are located either well beyond existing roads, often necessitating road-building over difficult terrain and through long reaches of lower-quality, currently uneconomic timber, or, where such stands are already physically accessible, they are often located at prohibitively long haul distances from processing facilities. Although good quality Douglas-fir and spruce logs may readily be processed to advantage in Ainsworth's peeler facility in Lillooet, at present there is no primary breakdown plant in the TSA suitable for processing sawlogs—including the mounting supply of dead and dying pine resulting from the MPB infestation. Instead, sawlogs must be hauled all the way to Chasm or Merritt, to compete with logs brought over much smaller distances from other areas. Broadly speaking, in this situation, although some minor portions of the pine in this TSA may in fact prove economic in the near term, overall in today's terms the non-pine component generally appears to be the only economically accessible portion of the TSA.

In 2003, the licensees of the Lillooet TSA conducted a Timber and Economic Recovery Plan (TERP) that evaluated stands for short-term economics under differing market conditions, and modelled the corresponding timber supply implications. In the study, each stand was assigned both a value (based on species and on expected product recovery as for peeler, sawlog or pulp log) and a cost, based on the expected costs of harvesting, hauling, and silviculture. The difference between the value and the cost defined whether or not a stand was economic to harvest. Based on the product value, three market conditions were defined as 'Low', 'Moderate', and 'High'. The economically harvestable land base under the 'High' market condition corresponded to the THLB of 250 426 hectares that was modelled in the base case. The 'Moderate' market condition resulted in a THLB that was reduced from this by 29 percent to 176 989 hectares. In the 'Low' market, the THLB was reduced by 41 percent, to 148 378 hectares, a reduction roughly the same size as the entire area of harvestable pine included in the base case THLB, implying that essentially only non-pine stands would be economically harvestable in this market condition. Notably, the average product prices in the BC interior over the past five years have corresponded closely with the average prices of the 'Low' condition identified in the TERP study. At an October 7, 2008 meeting with MFR staff in Kamloops, licensees advised that in their experience the current economic conditions are worse even than assumed in the TERP 'Low' scenario.

Modelling the timber supply based on the THLB for each market condition resulted as follows: The 'High' market predictably is exactly the base case projection. The 'Moderate' condition resulted in a lower initial annual harvest level of approximately 600 000 cubic metres and a more rapid decline to a long-term level 100 000 cubic metres lower than in the base case and reached after seven decades instead of eleven. In the 'Low' market, the initial harvest level was reduced to 500 000 cubic metres with a further-reduced long-term harvest level, reached at the same as in the 'Moderate' condition.

From all of these considerations it is reasonable to conclude first that the THLB derived in the base case analysis is based on a much more optimistic assessment of the economic operability of many stands in the TSA, particularly pine stands, than is borne out by current economic conditions. Second, the implications of this for the timber supply are very significant as identified in the alternative projections under the differing market conditions. In my

determination, therefore, I have remained mindful of these implications, which I have considered in conjunction with matters related to the sustainability of the non-pine harvest in the TSA, as discussed in **'Reasons for Decision'**.

- *environmentally sensitive areas*

Environmentally sensitive areas (ESAs) are forested areas that are considered to be sensitive for a variety of reasons such as terrain stability, reforestation issues, hydrologic issues, or avalanche risk, or as being of value in meeting other resource objectives. In the Lillooet TSA, terrain stability mapping has been completed for 95 percent of the operable land base. Using this mapping—complemented by earlier ESA information from inventory files for the 933 hectares of CFLB not covered by this mapping— areas totalling approximately 35 000 hectares (net of overlaps) of unstable or sensitive terrain, or land prone to avalanche, were identified in the CFLB and excluded in deriving the THLB for the base case analysis. I have reviewed in detail, and concur with the appropriateness of, the underlying methodology. Other specific considerations related to environmental sensitivity, such as riparian areas, various wildlife habitats, and visually sensitive areas, are addressed in their own sections.

The 2002 Silva Forest Foundation report submitted by the Bonaparte Indian Band, which, as noted earlier, applies to less than 20 percent of the Lillooet TSA, used criteria based on terrain uniformity, soil depth, soil moisture and slopes to derive a THLB that excluded, within the studied area, about 21 percent more area (for ecologically sensitive terrain classes delineated by Silva) than was excluded in deriving the THLB in the base case for the MFR's TSR2 analysis. However, for a direct comparison, additional exclusions made in the TSR2 analysis for riparian reserves, roads, and wildlife tree patches would also need to be considered.

The MFR Research Geomorphologist for the Southern Interior Forest Region reviewed the Silva report in July 2004 and, noting that the recent terrain stability mapping was not completed at the time of the Silva report, attributed the differences in results to differences in the scales of mapping, in the intensity of field sampling, and in judgements regarding terrain stability. On my extensive helicopter survey of the TSA I saw no evidence of road slumps or in-block surface failures, and many areas of successful, vigorous regeneration were evident. I am advised by district staff that some earlier surface failures do exist in the TSA but are typically avoidable instances of sub-standard road building rather than evidence of unaccounted-for terrain instability or sensitivity.

The 2004 report by Thomas and Norwell, submitted by the Bonaparte Indian Band, recommended reserving sensitive sites such as rock knobs and very dry sites; this was considered by a consultant policy advisor to the Bonaparte Band to be consistent with the Band's environmental concerns and potential cultural values. I have addressed environmental concerns of various kinds in many of my considerations in this document, and cultural values in particular are addressed in '*First Nations' cultural heritage resources and spiritual use*'. Noting those additional considerations, I am satisfied that the assumptions incorporated in the base case relating specifically to the sensitive areas addressed in this section provide a reasonable accounting of the implications for the timber supply available on these areas.

- *unmerchantable forest types*

The CFLB in the Lillooet TSA includes forest stands that are physically operable but are not currently utilized because the timber they contain is too low in quality or volume. In the base

case analysis, net of overlaps, 31 281 hectares of CFLB were excluded from contributing to the THLB specifically on this account. I have reviewed the characteristics of the stands and the criteria applied in excluding the areas that comprise this figure, and I concur with the need for their removal in deriving the THLB.

The 2002 Silva Forest Foundation report submitted by the Bonaparte Indian Band identified the ecological importance of low elevation deciduous forests and the need to address the maintenance of these forest types. The 2004 Thomas and Norwell report submitted by the Bonaparte Band recommended protecting rarer ecosystems including all deciduous forest types. I note that the 2005 analysis does indeed exclude from the THLB all deciduous-leading stands that have not been previously logged. Other areas of environmental sensitivity are addressed and referenced in the immediately preceding section.

I am advised that an independent forestry consultant has agreed that there is likely little timber harvesting opportunity in the non-merchantable sites excluded in the analysis, and I am satisfied that these stands were properly excluded from the THLB on the basis of the best information available, and that the base case projection adequately accounts for current practice and management in these areas.

- *sites of low productivity*

Some growing sites may have a low productivity either due to inherent site factors such as nutrient availability, adverse exposure or excessive moisture. In the base case analysis, as in all previous analyses for this TSA, all stand types on sites of low productivity that are not considered harvestable were excluded in deriving the timber harvesting land base, resulting in a net reduction of 45 387 hectares on this account.

The 2002 Silva Forest Foundation report submitted by the Bonaparte Indian Band identified ecological concern for sensitive dry soils, suggesting such sites be removed from the THLB. I agree that some sensitive dry soils may not be suitable for harvesting and should not be considered part of the THLB. I expect that many of these sensitive areas will have been removed from the THLB through deductions such as for low productivity, although, as noted above, in '*environmentally sensitive areas'*, assumptions in the Silva Forest Foundation report that differ from those incorporated in the base case analysis are not necessarily directly comparable.

I am aware that site indices were adjusted based on findings of Vegetation Resource Inventory (VRI) work done in 2003/04. The site index thresholds employed in the analysis, however, were developed using the pre-VRI inventory and have not been field verified against the adjusted inventory. Therefore, there is some uncertainty regarding the area deducted to account for low sites. In particular, there is a possibility that some sites unsuitable for harvesting may have been included in the THLB. However, in consideration of likely overlaps between many of the potentially newly included sites and areas already excluded for such reasons as unmerchantability or inoperability, any net discrepancy would be small, unquantifiable, and on a scale that will not have introduced any significant error into the base case projection. Overall, I consider the criteria for identifying areas of low productivity to be adequate and suitable for this determination.

Existing forest inventory

- *status of the forest cover inventory*

In British Columbia, to improve forest cover inventory standards, the older forest cover inventory (FC1) mapping for TSAs and TFLs is being replaced over time by the Vegetation Resources Inventory (VRI), common database structures and a suite of tools to support file update and management. The forest cover inventory for the Lillooet TSA was completed in four separate re-inventory projects between 1988 and 1990. The present forest cover inventory was updated to November, 2002 to account for changes from harvesting, and was projected to January 1, 2004 to account for growth. A VRI Phase 2 statistical attribute adjustment study was completed in April, 2003 and was updated in July 2004. For the 2005 analysis, the forest cover inventory was adjusted using the results of the VRI Phase 2 study. The specific adjustment factors that were applied to particular species groupings are provided in the analysis report, Table 21. These show that before the adjustments, timber volume estimates were overestimated for dry-belt fir and for wet-belt fir over 140 years of age, and were underestimated for all other species groupings.

From this I believe all reasonable efforts have been made to update the inventory information for recent harvesting and growth in order to appropriately reflect the timber volume and attributes of the forests of the Lillooet TSA. I am therefore satisfied that this inventory has provided an adequate basis from which to analyse and project the timber supply in the current base case forecast.

- *volume estimates for existing, natural, unmanaged stands*

Existing natural, unmanaged stands are stands that have not been logged, or are not subject to forest management by planting or density control. In the 2005 timber supply analysis for the Lillooet TSA, the Variable Density Yield Prediction (VDYP) model, supported by the MFR, was used for estimating timber volumes for all existing natural stands and for all coniferous stands that will be harvested in the future by partial harvesting. Volume estimates were based on average stand attributes aggregated into analysis units by dominant species (inventory type group), site index, stand age, and silvicultural management regime.

I am satisfied that these volume estimates were obtained by appropriate, standard procedures, and that they provide a suitable basis for projecting the timber supply in the TSA. Please also note the discussion of interior log grade utilization, below, in '*decay, waste and breakage*'.

Expected rate of growth

- *volume estimates for regenerated, managed stands*

In the 2005 analysis for the Lillooet TSA, forest stands under 28 years of age at the commencement of the projection were considered to be 'existing' managed stands, and all stands scheduled for harvesting after this commencement were considered 'future' managed stands. In the analysis, volume estimates for both existing and future managed stands were based on MFR's BatchTIPSY projections of average stand attributes aggregated into analysis units—groupings base on dominant species (taken from the inventory type group), site index, stand age, and silvicultural management regime. The regeneration assumptions incorporated in the yields were those derived by forest district staff for the 2001 TSR2 analysis, based on current performance at that time.

Cascades Forest District staff identified, based on MFR's 'Reporting Silviculture Updates and Land status Tracking System' (RESULTS) summaries, that more lodgepole pine than Douglas-fir is being established following harvest on blocks in the Lillooet TSA; from 2003 to 2006, recently regenerated stands include about 53 percent lodgepole pine and 35 percent Douglas-fir. On any given site in the TSA, lodgepole pine typically grows slightly faster than Douglas-fir.

For dry-belt Douglas-fir analysis units, where partial harvesting typically occurs (on nearly 12 percent of the THLB), future stand yields were modelled based on natural stand yield curves from weighted average VDYP curves with 40 percent of the volume being removed on the first entry, and 30 percent of the original standing volume being removed on each subsequent entry, on an ongoing 30-year cycle.

All TIPSY projections of volume yields for managed stands are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition. However, certain operational conditions, such as a less-than-ideal distribution of trees, the presence of small non-productive areas, endemic pests and diseases, or age-dependent factors such as decay, waste and breakage, may cause yields to be reduced over time. Two operational adjustment factors (OAFs) are therefore applied to yields generated using TIPSY, to account for losses of timber volume resulting from these operational conditions. OAF 1 is designed to account for factors affecting the yield curve across all ages, including small stand openings, uneven tree distribution, endemic pests and other factors. OAF 2 accounts for factors whose impacts tend to increase over time such as decay, and waste and breakage. Standard or 'default' provincial reductions of 15 percent for OAF 1 and 5 percent for OAF 2 are often applied in timber supply analysis but these may be adjusted, based on local conditions. In the base case analysis for the Lillooet TSA, these standard OAF values were applied. Pathogens and pests may reduce yields further than the standard operational factors but no direct local information was available from which to reliably vary the OAFs for this analysis.

Genetic gains of 8 percent for spruce and 0.7 percent for pine (for which relatively little Class A seed is currently available) were incorporated in the managed stand yield tables.

Through a consultant policy advisor, the Bonaparte Band identified concerns related to the implications of climate change for regeneration, site protection, and forest growth. The Band recommended that forthcoming potential changes in areas such as the Montane Spruce (MS) biogeoclimatic zone, on south slopes in the Interior Douglas-fir zone, and in the Bunchgrass zone should be considered not just as long-term issues, but in respect of short-term management requirements for addressing mid-to-long-term issues. For instance, the consultant asserts that more Douglas-fir, rather than lodgepole pine, should be planted in the MS zone. In response, I note that the MFR's Climate Change and Forest Carbon Work Unit and other staff throughout the ministry are working on many programs and projects, such as the Future Forest Ecosystem Initiative, designed to help the ministry to adapt its management framework for the province's forests and range to changing climates, with the recognition of the need for ecological resilience being a key principle of this adaptation.

I am satisfied that the volume estimates for regenerated, managed stands used in the analysis are based on the best available information and take into account as well as possible both the volume increases attributable to the use of select seed and the losses attributable to practical and operational factors that decrease yields from ideal levels. I conclude that the projected

harvest levels in the base case analysis are therefore reliable in this respect. Nonetheless, staff should remain mindful of potential deviations from expected yields due to factors such as underestimation of pest impact and differences in species composition, and future management changes related to climate change. In **'Implementation'**, below, I have included an instruction that as part of the Forest and Range Evaluation Program (FREP) district staff should monitor the performance of regenerated stands with particular reference to the appropriateness of the OAF assumptions, the presence of pests and disease, and any significant volume-related or other implications of the conversion of harvested Douglas-fir stands to pine stands.

- *site productivity estimates*

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

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

Site productivity estimates for the 2005 timber supply analysis were based on site indices derived from the adjusted forest cover inventory estimates of height and age in the VRI Phase 2. The adjustment of height and age, based on the field samples of the VRI Phase 2, likely provides some correction at a management unit level.

Under appropriate circumstances, site indices may be correlated with the provincial Biogeoclimatic Ecosystem Classification (BEC) system, to develop what are called 'SIBEC' site productivity estimates. However, application of site productivity estimates derived from SIBEC information requires approved, local, Predictive Ecosystem Mapping (PEM) or Terrestrial Ecosystem Mapping (TEM). In the Lillooet TSA, a PEM project was developed, but the mapping did not meet accuracy standards and the results were not incorporated in the base case projection. A sensitivity analysis showed that the result of applying the potential SIBEC data would be a small (6.9-percent) increase in the long-term harvest level, beginning at the 11th decade.

I concur with the Southern Interior Forest Regional Growth and Yield Forester and the Regional Forest Ecologist who both consider the adjusted inventory attributes used in the

base case to be more appropriate for use at this time than the SIBEC data based on unapproved PEM information. Nonetheless, increasing the accuracy of our understanding of the productivity of forest soils wherever possible is important for many reasons, including improving estimates both of the timber supply and of the ongoing potential of the province's forests to provide carbon sequestration, discussed later in this document. While I accept that the site productivity estimates used in the analysis provide adequate data for use in the current base case projection, in '**Implementation'**, below, I have encouraged licensees to make every effort to realise a benefit from the already significant investment in site productivity work by improving the PEM to make more accurate and usable information on site series and hence productivity available for incorporation in the next timber supply analysis.

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

For the 2005 Lillooet TSA analysis, minimum harvestable ages were defined for existing natural (unmanaged) stands as 80 years for all stands of pine and all stands of wet-belt Douglas-fir, and 100 years for all other coniferous stands. For future managed stands, the minimum harvest age was based on the length of time required for stands in each analysis unit to reach 90 percent of the maximum mean annual increment or culmination age (CMAI). District staff believe that a figure of 120 years would more appropriately reflect current practice for wet-belt Douglas-fir than the 80-year figure used; however, this is moot given that most of these stands already exceed 120 years in age. Sensitivity analysis shows that a 10-year increase in minimum harvestable age would reduce by one decade (from six to five) the time over which the projected harvest level can be maintained. However, this result was due primarily to an increase in harvestable ages for managed stands, with a consequential lengthening of the time over which existing stands would need to be allocated for harvest. Therefore, the district concern that harvestable ages for existing wet-belt Douglas-fir were underestimated in the analysis does not create a significant uncertainty for this determination.

Based on my review of the minimum harvestable ages assigned to the various analysis units in the TSA, I am satisfied that the related assumptions incorporated in the analysis are reasonable and adequate for use in support of this determination.

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

Regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. Based on the TERP (see '*economic operability*') and recent observations, a regeneration delay of 2 years was included in the TIPSY growth and yield model for use in the 2005 analysis; licensees and MFR staff considered the 2-year delay an appropriate average value, applicable to all analysis units.

A field survey by Cascades Forest District staff of 72 blocks harvested in the year 2000 showed that average regeneration delay was 1.6 years. District staff confirm that in general, with appropriate site preparation and reforestation techniques (either natural regeneration or planting), except for the occasional trampling of seedlings by cattle, there are no significant impediments to reforestation objectives within the Lillooet TSA.

Having reviewed the regeneration modelling assumptions applied in the analysis by forest type, in the absence of significant current or foreseeable impediments to regeneration, I am satisfied that known regeneration delays are appropriately incorporated in the harvest levels projected in the base case.

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, the total area of which fluctuates with the amount of disturbance—harvesting or fires—currently taking place. The reforesting of all harvested areas on Crown land in BC has been a legal obligation since 1987. Where a site was harvested prior to 1987 and a suitable stand has not yet been regenerated, a classification of 'backlog' NSR is applied.

I have reviewed in detail with MFR district staff the procedures for identifying both the extent of any residual backlog NSR land in the TSA, and the area of current NSR land associated with recent harvesting. District staff advise that their work has identified no treatable area of backlog NSR in the TSA, although this is not yet reflected on the inventory file where some data remains to be updated following the conversion of records from the Integrated Silviculture Information System (ISIS) to the RESULTS system. A total of 2144 hectares of current NSR has been identified, which is within the amount to be expected from the regeneration delay associated with roughly two years' harvesting.

In the 2005 analysis, it was assumed that there was no backlog NSR in the TSA and that the current NSR area represented no more than the area attributable to the regeneration delay from recent harvesting, which is already accounted for in the modelling of the regeneration assumptions. From my review of the specific figures associated with the components of NSR in the TSA and their records as discussed with district staff, I am satisfied that the modelling of NSR lands appropriately reflects operational reality.

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

Silvicultural systems

The dominant silvicultural regime in current practice in the Lillooet TSA is clearcutting followed by planting, although alternatives are employed in specific circumstances, such as in visually sensitive areas. This regime was modelled in the 2005 analysis, the only exception being for Douglas-fir dry-belt stands in which a selection-harvest silvicultural regime was modelled whereby 40 percent of the volume was assumed to be removed on the first entry, and 30 percent of the original available volume was removed in each subsequent entry, modelled as occurring every 30 years once the stand had reached the minimum harvestable age for the first time. In the analysis, this selection silvicultural system was applied to 29 656 hectares (11.8 percent) of the THLB.

In current practice, after harvest some stand types are allowed to regenerate naturally while others rely on planting, or on a combination of the two, which was reflected in the analysis by a 2-year regeneration delay, modelled as discussed above.

The Bonaparte Indian Band advised that one of its core values is to use partial cutting as much as possible. The 2002 Silva Forest Foundation report, submitted by the Bonaparte Band, noted that a fundamental problem with clearcutting is the removal of all, or of the vast majority, of the trees from a growing site, while science indicates the need for large, live and dead trees as critical components of biodiversity in forest ecosystems. The management of biodiversity both at the stand level and the landscape level is discussed in the two respective sections below.

The 2004 Thomas and Norwell report submitted by the Bonaparte Indian Band and identified as representing the Band's current view of forest management planning recommended the following silvicultural systems: For pine types, a variable retention or clearcut-with-reserves regime that maintains Douglas-fir, balsam, and wind-firm spruce at a typical 15 to 80 mature stems per hectare. For mixed spruce, and for spruce types, a group selection system was recommended with a maximum of 30 percent of the basal area being removed. For Douglas-fir types with no logging history, a single- or group-selection silviculture system was recommended, and a recommended no harvest for 30 to 50 years in areas already logged.

As noted, selection harvesting has been practiced in the TSA, in the dry-belt Douglas-fir forest stands most suited to the system and to the extent that MFR staff consider it appropriate to model partial harvesting under current practice, this regime was modelled in the 2005 analysis. In the future, if partial harvesting systems become prevalent in other forest types, I expect that such regimes will be reflected in the analysis and related information will be provided to me in future AAC determinations.

From these considerations I am satisfied that the silvicultural systems in use in current management practice in the TSA are adequately incorporated in the base case timber supply forecast.

Incremental silviculture

In general, incremental silviculture includes commercial thinning, juvenile spacing, pruning and fertilization which are not part of the basic silviculture obligations required to establish a free-growing forest stand. In the Lillooet TSA, except for a recent fertilization trial, no

incremental silviculture work has been carried out. No incremental silviculture was modelled in the 2005 analysis or its 2008 addendum, which is consistent with 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

Timber utilization standards define the species, dimensions and quality of trees that are harvested and removed during harvesting operations, usually in terms of maximum stump height, minimum top diameter inside bark, and minimum diameter at breast height, by species. Utilization standards are included in the calculation of merchantable volumes.

I have examined the utilization levels evident in current regional standards, licence requirements and current performance. The utilization standards assumed in the analysis were identical to those in current performance in the TSA.

I note that the utilization standards for Pulpwood Agreement (PA) 16 differ slightly from these standards in that, for PA 16, the minimum standards for coniferous stands are reduced, and deciduous species are to be utilized, while no deciduous harvest was assumed in the base case analysis. Information from the previous TSR shows that the differences for coniferous species only negligibly affect the stand volumes within the PA 16 area. Deciduous species were included in a sensitivity analysis performed to examine the implications of harvesting under PA 16 (which otherwise used utilization standards identical to those in the base case). This analysis is discussed under the PA 16 section below and indicates that 25 000 cubic metres per year could be harvested from the PA 16 area for a decade without affecting the harvest in the rest of the TSA.

The Bonaparte Indian Band expressed concern related to the harvesting of piece sizes greater than 0.2 cubic metres in PA 16, and suggested that given the currently excessive amounts of wood on the market there is no reason to anticipate harvesting under the PA. The MFR has responded to this concern, noting that under PA 16 the licence holder will not have the ability to harvest a piece size greater than 0.2 cubic metres without amendment to the management plan, which would require consultation with the Bonaparte Indian Band. A consultant policy advisor to the Bonaparte Band identified concern over residual volumes present within 'burn piles' that cannot be accessed for other purposes. I must assume that to the extent that these volumes are included within harvestable log grades they are properly charged to the appropriate licence AAC.

I conclude that since no harvesting in this TSA has yet occurred under PA 16 and none is expected under foreseeable economic conditions, and since all other utilization standards in current practice were directly incorporated in the analysis, the harvest levels projected in the base case forecast are reliable with respect to the utilization currently required and practiced in the TSA. A related issue, '*interior log grades*', is discussed under that heading, below.

Decay, waste and breakage

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

In the 2005/2008 analysis for the Lillooet TSA, the initial, existing, net stand volume projections were generated using the default factors for decay, waste and breakage for the MFR Forest Inventory Zones C and D, and the Public Sustained Yield Units 142, 143, and 144, which overlap the TSA, with volumes adjusted in accordance with the VRI Phase 2 as discussed earlier in '*status of the forest cover inventory*'. This adjustment includes a 'Net Volume Adjustment Factor' to account for decay and waste and related losses. I am satisfied that appropriate procedures were followed to incorporate estimates of losses to decay, waste and breakage in the timber supply analysis and that, with the qualification considered in the '*interior log grades*' section immediately following, these losses are adequately accounted for in the base case projection.

- *interior log grades*

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

The 2005/2008 timber supply analyses did not account for the increase in scaled timber volumes related to the log grade change. 'Dead' wood volumes are not reported within the growth and yield model VDYP used for existing stands. 'Dead' wood volumes are not reported in the TIPSY growth and yield model for managed stands; however, this is not an issue in this determination since managed stands are not projected to contribute a substantial portion of the harvest until several decades into the future.

Possible sources of data on historical levels of potentially useful dead volume within stands include inventory audit plots, VRI phase 2 ground samples, permanent sample plots, temporary sample plots, and harvest billing records. At this time, the VRI is considered one of the best such sources for the Lillooet TSA. These data indicate that dead potential volume amounts to approximately 9.9 percent of the total green timber volume over 60 years of age on the forested land base in the TSA. Data from an earlier inventory audit identified a similar value of 9.3 percent.

Concern has been expressed that large amounts of dry grade 4 timber might be left on harvested sites due to MPB infestation. This concern is unwarranted in large part due to the low level of harvesting in pine stands.

From all of this, I conclude that while appropriate adjustment procedures were used in estimating normal volume losses to decay, waste, and breakage, the 'dead' wood that has now become billable was not accounted for in the timber supply analysis; if the full species profile of the TSA were being harvested, this would represent an underestimation of over 9 percent of the volumes projected in the harvest levels of the base case forecast. I have accounted for this in my determination as discussed in '**Reasons for Decision**'.

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

Integrated resource management objectives

The Ministry of Forests and Range is required under the *Ministry of Forests and Range Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are co-ordinated and integrated. The *Forest and Range Practices Act* (FRPA) and other legislation provide for, or enable, the legal protection and conservation of timber and non-timber values. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

- forest cover requirements for cutblock adjacency and green-up

To manage for resources such as water, wildlife and scenic areas, and to avoid concentrating harvesting-related disturbance in particular areas, operational practices limit the size and shape of cutblocks as well as the maximum permissible disturbances (areas covered by stands of less than a specified height), and prescribe minimum 'green-up' heights 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.

Green-up requirements may be achieved through patch size distribution if licensees manage consistent with biodiversity objectives as described in the *Landscape Unit Planning Guide* (MFR/MOE 1999). In the 2005/2008 analyses for the Lillooet TSA, green-up requirements were modelled using forest-level objectives rather than block-specific objectives, this being consistent with the operational flexibility afforded by patch size management. The management regimes, including disturbance limits, specified for and applied to the various zones in the TSA in respect of various wildlife habitats, visually sensitive areas, recreation areas and other values, are described and considered under the appropriate headings below. For all harvestable areas without these particular constraints, collectively known as the Integrated Resource Management (IRM) zone, in the analysis no more than 33 percent of the THLB area in each landscape unit was allowed to be less than three metres in height at any time. The average age to reach this green-up was determined at 20 years by calculating a weighted average site index for an average stand type for the entire THLB—a Douglas-fir-leading stand with an average site index of 13.1, associated with an 18-year green-up period; adding the requisite two-year regeneration delay gave 20 years.

From operational experience, MFR district staff consider this 20-year figure reasonable for about 65 percent of the stand types, with the remaining 35 percent more accurately represented by a 15-year green-up period. From sensitivity analysis, it may be deduced that this overestimation of the green-up period for 35 percent of the stands in the TSA has led to an underestimation of nearly 2500 cubic metres per year in the long-term harvest level projected in the base case. Sensitivity analysis also showed that varying the green-up periods for the IRM, visually sensitive, and community watershed zones by five years produced corresponding reductions or increases of only about 2 percent in the long-term harvest level.

The 2004 report by Thomas and Norwell submitted by Bonaparte Indian Band and identified as representing the Band's current view of forest management planning, recommended that appropriate patch size distribution and connectivity must be considered. The adequacy of the provisions in the analysis for accounting for patch size distribution are the subject of my considerations in this present section, and issues related to landscape-level biodiversity, which include connectivity, are considered below, in the section '*landscape-level biodiversity*'.

My conclusion on the adequacy of the representation of forest cover requirements in the analysis is as follows. Sensitivity analysis indicates that the timber supply projection is relatively insensitive to changes in assumed green-up age within the range of the potential uncertainty. A significant, five-year change would cause only small projected differences in the long-term harvest level, of the order of 2 percent, and no changes in the short- or mid-term. Nonetheless, an accurate knowledge of green-up periods is advantageous in providing flexibility in the planning and scheduling of harvesting operations. In view of the current uncertainty in the actual value of the green-up period therefore, in '**Implementation**' below, I have recommended that MFR district staff study actual green-up situations in regenerating stands, to reduce uncertainties in green-up periods, which will assist both in the planning of harvesting in the TSA and in increasing the reliability of the projected timber supply in all periods. For the current determination, given the noted low sensitivity, I am satisfied that the green-up assumptions applied in the analysis are based on a suitable methodology and are adequate for the purposes of this determination.

- *recreation areas*

Operationally, for most of the CFLB in the Lillooet TSA, no specific management for recreation is required other than the avoidance of logging in most recreation sites, the meeting of visual quality objectives where required, and the provision of protection to some trails that cross cutblocks. The management of wilderness recreation is accomplished primarily through access management and by the use of visual design. Visually sensitive areas, riparian zones, ungulate winter range habitat areas, and community or domestic watersheds tend to overlap important recreation areas such that the forest cover requirements for these zones help to meet recreational objectives. For these reasons, under current management, recreation objectives are able to be accommodated operationally without incurring any additional associated constraint on the timber supply.
In the 2005 base case analysis, 771 hectares were identified as designated for Use, Recreation and Enjoyment by the Public (UREP), and 397 hectares for miscellaneous reserves. These areas were excluded from the CFLB and hence the THLB.

In public input, the Lillooet Naturalist Society advocated the need for hiking trail development and retention. Since recreation objectives are achieved through management for the objectives for other forest values, including visual resources and others, which I have addressed elsewhere in this document, I am satisfied that the use of the forest for recreation purposes is adequately reflected in the base case projection, without further adjustment at this time.

I note that the Bonaparte Indian Band has expressed concern regarding the potential for soil degradation by excessive use of all-terrain vehicles in the area covered by the Robertson Ecosystem Based Plan, and a belief that too many hunters in the area leads to a less rewarding hunt during the fall by Band members. A strategy of proactive access control was suggested.

I have addressed hunting implications below, in '*ungulates*', and I recommend that the Bonaparte Indian Band bring specific concerns about excessive use of all-terrain vehicles to the attention of the Ministry of Environment.

For the current determination, I am satisfied that consideration for recreation has been adequate in the analysis.

- *visually sensitive areas*

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

For visually sensitive areas in the Lillooet TSA, VQOs were revised in 1994 and approved by the district manager on an interim basis pending completion of the LRMP. These areas are now managed as scenic areas with established VQOs. Additional areas that have been mapped and added to the landscape zone since that time are managed as scenic areas with recommended VQOs. Since these scenic areas have been carried forward under the FPPR they are considered current management, and were modelled as such in the base case analysis.

In the TSA, under current practice a total of 142 210 hectares of the CFLB, including 66 648 hectares of the THLB, are managed for visual sensitivity. I have reviewed the permissible disturbances under the preservation, retention, partial retention and modification objectives, for high, medium and low landscape sensitivity ratings, taking into account that in the sensitive areas various retention-based silvicultural systems—including clearcut-with–reserves, patch cutting, and shelterwood—are frequently employed, that visual design concepts are routinely incorporated into harvest plans, and that visible roads and site disturbance are minimized during harvest planning and operations.

The 2004 report by Thomas and Norwell submitted by Bonaparte Indian Band identified for the Robertson Ecosystem Based Plan the goal of planning cutblocks to fit into the landscape, regardless of the viewing point. In response, I note that the approval of cutblocks is the responsibility of the district manager and that current visual requirements to design cutblocks and to apply visual green-up time periods largely address this goal within scenic areas. For this determination, as discussed earlier in '*forest cover requirements...*' the timber supply is relatively insensitive, even in the longer term, to changes in green-up times. Cutblock design, while often requiring additional planning and operational efforts, does not necessarily affect timber supply.

In conclusion, in the analysis, established and recommended VQOs with the appropriate, specified permissible disturbance levels were modelled for scenic areas totalling 66 648 hectares of the THLB. I am satisfied that this represents an appropriate accounting for visually sensitive areas, and that the harvest levels in the base case projection adequately reflect current practice in this respect.

- *riparian management*

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

altogether, and riparian *managemen*t zones where constraints are placed on timber harvesting. In the Lillooet TSA, current practices within riparian management zones also result in areas being excluded from the THLB, consistent with best management practices described in the *Riparian Management Area Guidebook*.

In the 2005 base case analysis, such areas were represented by the 100-percent exclusion of an effective overall buffer defined by assumptions for each of the various classes of riparian reserve zones (i.e. for lakes, wetlands, stream classes and rivers) and additional widths proportional to expected requirements for the management zone.

Lakes and wetlands were identified using Terrain Resource Information Management (TRIM) information, consistent with the 1997 MFR *Riparian Management Guidebook*, and the appropriate effective buffers were then derived as described in the guidebook and excluded from the THLB.

For streams and rivers, appropriate stream classifications from S1 to S6 were assigned through TRIM information using a classification algorithm intended to be consistent with the *Riparian Management Guidebook*. Within community watersheds, including the Twaal and Gun, riparian classes were limited to S1 to S4 streams.

For the analysis, 'effective' buffer widths were derived as above for S1 to S5 streams, and the appropriate areas were excluded from the THLB. The MFR Cascades district staff advise that for S6 streams, which are normally not buffered and where logging may typically occur only to the edge of a steep gully, current practice is to consider any buffer area to occur in non-THLB or in other reserves, incurring no additional retention in the THLB.

Through these procedures, net of overlapping objectives a total of 7557 hectares were excluded from the THLB for riparian management, roughly equivalent to a one-percent constraint on the harvest level throughout the base case projection.

The Bonaparte Indian Band has identified as one of its core values the protection of all water. The 2002 Silva Forest Foundation report submitted by the Bonaparte Band identified wetland areas as ecologically sensitive areas that should be excluded from harvesting. Wetlands were identified from forest cover inventory definitions and from TRIM water features that were not present in the forest cover inventory. In the study, reserves were modelled by applying 20-metre buffers around intermittent streams, 40 metres on permanent streams, 100 metres on lakes over five hectares, 50 metres on lakes smaller than five hectares, and 40 metres around wetlands. Wetland complexes of many small, closely spaced, open wetlands within a forest matrix were identified and removed from the potential timber management land base. A consultant policy advisor to the Bonaparte Band also recommended that, as in the Robertson Ecosystem Based Plan, wider riparian buffers should be used.

In response, I note that the land base exclusions for riparian management which I take into account in AAC determinations are based on current management as defined under the FRPA. Under the more restrictive Silva assumptions, in which more wetlands and wetland complexes would be removed and larger overall buffers applied to riparian zones, the land base removals would be proportionately larger, as expected. From the 2005 analysis it appears that within the Bonaparte traditional area about 2 percent of the gross area was excluded for riparian reserves under FRPA, compared with 12 percent in the Silva study.

Similarly, the 2004 Thomas and Norwell report submitted by the Bonaparte Indian Band stated with respect to the Robertson Ecosystem Based Plan that all classified streams should have 50-metre no-harvest reserves, that all ponds and wetlands should have 20-to-50-metre reserves plus a management zone, that unclassified ephemeral drainages should have 20-to-50-metre reserves, and that steep draws with a stream, non-classified drainages, or moist ground, should have reserves 20 metres past the top of the break. Again, I note that current management practices in the TSA are defined in legislation by the FRPA and are accounted for as such in the timber supply analysis.

A consultant policy advisor to the Bonaparte Band expressed concern over the effects of timber harvesting from forests over or near perched moist sites or wetlands that are considered to be in the THLB. In response, a MFR hydrologist has suggested that seasonal wet areas could be ribboned out during harvest operations to protect the ground surface to prevent gouging or tamping, to retain the shrub and herb layer mostly intact. An MFR silviculture systems researcher has noted that ecological impacts from trampling by livestock with access to these wet vegetation types can exceed that of the harvesting itself. This appears to be an issue with an operational, rather than a directly AAC-related, solution, which I have referred to again briefly in my conclusion to this section.

The consultant policy advisor to the Bonaparte Band also noted that the Bonaparte Indian Band has been working to have the Bonaparte Watershed, which lies mainly outside the Lillooet TSA, to be designated as a fisheries sensitive watershed. If any related designation incurs timber supply implications within the TSA, these will be reflected in future data packages, analyses and determinations.

In concluding, I acknowledge and share the importance placed by First Nations and the Silva Foundation on riparian reserve zones for streams, rivers, lakes and wetlands. These are important resource features which have been recognized as such by the MFR and in respect of which protective standards have been incorporated in legislation and regulations, formerly under the *Code*, and now under the FRPA. The modelling in the timber supply analysis carefully accounts for this protection. As a safeguard, the MFR's active Forest and Range Evaluation Program (FREP) program includes monitoring protocols for streams, wetlands and water quality that are based on the best available scientific knowledge and are designed to test the efficacy of the current legislative provisions. The monitoring will either confirm the effectiveness of these provisions in achieving the required results, or identify where specific changes may be required to protect the resource values that are present.

In relation to this I encourage MFR FREP and hydrology staff to examine the concerns identified in relation to the perched moist soils and wetlands issue, to obtain further information for consideration during field evaluations to ensure that soils and water in these areas are indeed appropriately protected.

With these observations, I am satisfied that riparian habitat protection requirements in the TSA were carefully evaluated by appropriate methodology and are adequately accounted for in the analysis.

- *lakeshore management zones*

In the section immediately above, I have considered riparian reserves and management zones for lakes, in respect of requirements for the protection of habitat values for wildlife and biodiversity. In addition to these zones, under the Government Actions Regulation (GAR),

the minister responsible for the *Forest Act* by order may establish, as a Lakeshore Management Zone (LMZ), an area adjacent to a lake with a riparian class of L1, and may specify a width for the lakeshore management zone if the forest resources within the area require special management that has not otherwise been provided for. Lakeshore Management Zones are portions of the lakeshore management area around a lake with a riparian class of L1 that are outside any riparian reserve zone or, if there is no riparian reserve zone, that are located adjacent to the lake.

Lakes in the Lillooet TSA have not yet been classified in respect of the *Lake Classification and Lakeshore Management Guidebook for the Kamloops Forest Region*. The classification process will identify a 200-metre Lakeshore Management Zone for each lake. Management objectives in each case will depend on the classification of the lake and will be subject to public review and comment. Data has already been collected for the lakes in the TSA, and a preliminary lake classification has been completed which included public review. However, completion of the process was anticipated to follow on the completion of the LRMP, the status and future of which are currently unclear.

Provisions for the uncompleted Lakeshore Management objectives could not be formally incorporated in the timber supply analysis. However, a preliminary analysis for the previous TSR indicated that 1700 hectares of THLB lie within LMZs for the 181 most important lakes. Of this, 900 hectares or 53 percent lie within current VQOs. In view of these and other potentially overlapping management objectives for forest values in the TSA which are already accounted for in the analysis, it is likely that if there are any timber supply implications specifically from meeting LMZ objectives these will be very minor. I therefore consider that accounting for LMZ requirements will not significantly alter the timber supply from that projected in the base case.

- *community watersheds*

The Lillooet TSA includes 21 formally designated community watersheds, plus two watersheds—Gun and Twaal creeks—which the district manager has directed be treated as community watersheds. In addition, Mellott Creek was recently established, on February 2, 2009, but the designation has not yet come into effect; this designation may constrain the timber supply to a small but unknown extent which I have acknowledged in my determination. Any associated quantified timber supply implications will be included in the next TSR analysis.

In the 2005 analysis, realistic levels of permissible disturbance in community watershed areas were modelled, as in previous analyses, by requiring that no more than 20 percent of the CFLB in each watershed be under 6.6 metres tall at any time. This reflects the assumption that hydrological recovery for 60 percent of the stands in each watershed is reached at nine metres in height, and at three metres for the remaining 40 percent of stands. Since average stands in watersheds reach the height of 6.6 metres in about 33 years, the implied harvest rotation age under these constraints is approximately 165 years. The community watershed zone to which these constraints were applied covered 22 092 hectares, or 9 percent of the THLB in the TSA.

In addition to these constraints, reserve zones were identified upslope from community watershed intakes within defined community watersheds, and each reserve—modelled as a semi-circle of radius 100 metres, for a gross area of 1.57 hectares—was also excluded from

the THLB, resulting in an additional net exclusion from the THLB of 31 hectares for intakes for the noted 21 community watersheds. The TSA includes a total of 82 active domestic watersheds, including those for individuals; if the constraint were applied to every one, the required exclusion would be an additional 92 hectares, for 123 hectares total.

I am mindful that one of the expressed core values of the Bonaparte Indian Band is the protection of all water in the TSA, and I am advised that MFR district staff have received no specific concerns from First Nations or from the general public in relation management of community watersheds. My conclusion from all of the above is that the forest cover requirements for community watersheds and for community watershed intakes have been adequately modelled and accounted for in the base case analysis, with the possible exception of a 92-hectare overestimation in the THLB related to intake reserves for domestic watersheds, which alone will have negligible implications for the overall timber supply projection for the TSA, and the potential for a small, unquantified overestimation associated with Mellott Creek. With this acknowledgement, noted also in '**Reasons for Decision**', I am otherwise satisfied that the base case analysis incorporated adequate recognition of management to maintain water quality in community watersheds.

- *landscape-level biodiversity and old-forest retention*

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

The Lillooet TSA is one of the most biologically diverse in the province, its forested land base including representation from 30 of the province's Biogeoclimatic Ecosystem Classification (BEC) variants. In the TSA, spatially defined OGMAs satisfy all of the forest cover retention requirements under the June 2004 Order Establishing Provincial Non-Spatial Old Growth Objectives in each landscape unit at the BEC variant level. No old-growth 'draw down' over three rotations was modelled in areas of low Biodiversity Emphasis Option (BEO) as no timber supply impact was anticipated.

Although most parks may contribute toward forest cover retention targets in landscape units, in the Lillooet TSA the Stein Valley Nlaka'pamux Heritage Park constitutes one complete, independent landscape unit in itself, and therefore does not contribute to reducing the amount of forest cover retention required in surrounding areas where timber harvesting may occur.

In the base case analysis, spatially defined OGMAs cover 16 079 hectares or 6 percent of the THLB. Of this area, 5489 hectares overlap other constraints for objectives related to VQOs, community watersheds, or spotted owl habitat. I have reviewed the percentage old-growth seral stage requirements for low, intermediate and high BEOs by BEC zone and natural disturbance type, and I note that these were appropriately based on the recommendations in the *Biodiversity Guidebook* and the *Landscape Unit Planning Guide* which are consistent with the Non-Spatial Old-Growth Objectives.

I also note that the boundaries for 18 landscape units in the TSA were approved in 2003 but have not yet been legally established, and that the legal retention requirements are based on a non-spatial biodiversity order. To determine the implications of achieving the required

retention non-spatially through applying percentage seral constraints to each landscape unit-BEC variant rather than through spatially defined OGMAs, a sensitivity analysis was performed which showed no change in the short- or mid-terms, but after 10 decades the long-term harvest level was 5 percent higher. The results show higher timber supply impacts if spatial OGMAs were permanently established, in comparison to the non-spatial case in which retained cover may be found from any available non-THLB area as stands age. Thus a slightly higher level of constraint on the THLB was modelled than is currently legally required under the non-spatial old growth order.

The previously noted 2002 report by the Silva Forest Foundation submitted by the Bonaparte Indian Band identified about 29 percent of the landscape in its study area as potential old-growth forest (defined as greater than 120 years for lodgepole pine and deciduous forests and 140 years for other forests), noting that the most ecologically valuable Douglas-fir forests are at low elevations close to the central grasslands and to the Hat Creek riparian ecosystem. However, the Hat Creek watershed was identified as significantly impacted by logging-related ecological degradation, and in ground surveys the authors found only tiny fragments still relatively undisturbed. The study's authors expressed concern for old-growth Douglas-fir forests with dense understory regeneration resulting from fire suppression, which can lead to moisture stress, and also proposed protection or enhancement of specific natural features.

In response I note that the Hat Creek area and any related management and timber supply implications are actually located in the Kamloops TSA, and that in the base case analysis for this present AAC determination, about 17 percent of the CFLB in the Bonaparte's asserted traditional territory in the Lillooet TSA was modelled as constrained in OGMAs.

The consultant policy advisor to the Bonaparte Band expressed concern that the First Nations' function related to biodiversity was not sufficiently considered when the original BEOs were established for the landscape units, and has also indicated that the Bonaparte Band had not had input into determining the OGMAs. Cascades Forest District staff note that the OGMAs are not officially established in the TSA, but since the OGMA requirements were derived from a science-based policy, I have confidence that they appropriately serve the objective of biodiversity protection.

The Bonaparte Indian Band has identified as one of its core values the consideration of the forest as a whole, and the maintenance of a forest-like landscape. The earlier-noted 2004 report by Thomas and Norwell, submitted by the Bonaparte Indian Band, notes that in the Robertson Creek Ecosystem Plan, which the Bonaparte Band identifies as representing its core values for forest management, 34 percent of the land base is located in reserves to address core values. The report identifies both the need to protect rarer ecosystems, including all deciduous forest types, and the importance of reserving sufficient old stands to provide connectivity and forest interior conditions. The report also addressed patch size distribution, the amount of interior forest, and appropriate seral stage distribution as measures for maintaining biodiversity, with reference to the *Biodiversity Guidebook*.

I appreciate the concerns for biodiversity and retained forest cover as expressed by the Bonaparte Band. In response I note that, consistent with these concerns, in the base case analysis all deciduous-leading forest types were excluded from contributing to the timber supply, and that, arising from similar concerns for biodiversity, the criteria for the definition

and selection of OGMAs in the Lillooet TSA are established consistent with the *Biodiversity Guidebook* and the *Landscape Unit Planning Guide*.

From all of this, I conclude that, since the sensitivity analysis shows no short- or mid-term timber supply implication from modelling old forest retention either through the spatially-defined OGMAs, as was done, or through the currently legally required, more flexible, non-spatial requirements, the implications of providing for landscape-level biodiversity have been appropriately accounted for in the timber supply analysis.

- *stand-level biodiversity and wildlife tree retention*

Wildlife tree patches (WTPs) and coarse woody debris are important to the conservation of biodiversity at the forest stand level. The FRPA legislation provides for the retention of wildlife trees in harvested areas through the FPPR, Section 9.1: 'The objective set by government for wildlife and biodiversity at the stand level is, without unduly reducing the supply of timber from British Columbia's forests, to retain wildlife trees'.

Under FRPA, the default current practices for managing stand-level biodiversity through Forest Stewardship Plans (FSPs) include the practices requirements listed in the FPPR, Division 5, Biodiversity, Section 66, Wildlife Tree Retention. These require that, in a 12-month period, the total area covered by wildlife tree retention that relates to the cutblocks harvested during that year must be a minimum of 7 percent of the total area of the cutblocks. Further, on completing the harvesting of each cutblock, the total amount of wildlife tree retention relating to the cutblock must be at least 3.5 percent of the cutblock area. A retained wildlife tree area may relate to more than one cutblock if all of the cutblocks to which it relates collectively meet these requirements. Alternatively, under the FRPA, licensees may develop their own results and strategies to meet the government objective described above.

In the Lillooet TSA, BCTS has developed results and strategies in its FSP that mimic this FRPA default practice while in addition allowing no more than 500 metres between forest cover retained within cutblocks and other areas of cover of at least 0.25 hectares in size, whether inside or outside the cutblock, where practical.

Ainsworth and the other major licence holders have developed results and strategies committing to a spacing requirement allowing no more than 500 metres within a cutblock without retention of a mature stand of at least 0.25 hectares. These results and strategies were developed based on analyses undertaken on behalf of Ainsworth Lumber Co. Ltd. as described below, but have been implemented too recently to assess how the actual area retained on the THLB for WTPs will correlate with the modelling.

An analysis specific to the Lillooet TSA, completed by Forsite in 2006 for Ainsworth indicated that stand-level biodiversity targets can be met without including WTP's in all cutblocks. Cascades Forest District staff agree with the potential feasibility of this strategy, in which up to half of the WTPs are located in proximate patches of suitable forest types and stand structures in appropriate age classes within 500 metres of each other in areas of inoperable forest adjacent to planned cutblock areas throughout the TSA. In this analytical approach for Ainsworth, a gross percentage of the area of each landscape unit and BEC Zone was retained as wildlife trees, either in patches or as individual trees. While in this strategy the WTP retention is not expected to occur on each cutblock, it will be designed to satisfy maximum spacing requirements between areas of retained cover. By accounting in this way for the high proportion of forested area outside the THLB in the Lillooet TSA that is eligible

to count toward WTP targets, the study found that the overall average gross WTP retention requirement in the Lillooet TSA implied a reduction of 3.7 percent to the THLB, a smaller overall impact than the 5.8 percent modelled in the 2005 base case.

In the 2005 base case analysis, as in analyses for many other TSAs, WTP retention was modelled by reducing yield curves for the whole THLB to account for the volume left in cutblocks as wildlife trees and patches, in accordance with requirements of the *Forest Practices Code*, then still in force. The required volume reduction was determined at 5.8 percent—5.3 percent to account for patches, and 0.5 percent for single trees. This same procedure had been applied in the analysis for the previous AAC determination in this TSA. This approach was based on the *Landscape Unit Planning Guide* as updated May 15, 2000, and the Provincial Wildlife Tree Policy of February, 2000.

The 2002 Silva Forest Foundation report submitted by the Bonaparte Indian Band noted that 'ecosystem-based forest use generally calls for directing 15 to 25 percent of net timber productivity on the timber management land base to this purpose [of] the protection [of biodiversity] and maintenance of full cycle trees'.

The earlier noted 2004 report by Thomas and Norwell on management for Robertson Creek, submitted by the Bonaparte Indian Band, provides a list of target attributes for wildlife tree patches, and suggests maintaining 10 to 25 percent of the basal area of original forest stands either in WTPs or individual or grouped leave trees. The report also suggests maintaining coarse woody debris features such as large stumps and logs or snags. The Bonaparte Band identified as one of its core values the retention of significant cover at the stand level in WTPs and leave trees.

My conclusions from this information are as follows. Both of the noted reports appear to advocate considerably higher levels of retention in wildlife trees within or attached to cutblocks than was anticipated and modelled in the 2005 analysis but the degree to which the retention objectives suggested in these studies would be met by the large amount of forest in the non-THLB is unclear. Moreover, while noting that the percentage retention objectives advocated in the studies exceed those from current provincial WTP guidelines, I have confidence in the overall level of recommendations for retention in the provincial guidelines, since those guidelines, and the WTP requirements modelled in the 2005 base case, were developed in a science-based process consisting of advice from the appropriate experts.

I am advised that in current practice in the Lillooet TSA, licensees are in the early stages of planning cutblocks with stand-level biodiversity strategies in their FSPs. As such, the degree to which unharvested areas will in fact meet wildlife tree retention requirements without necessitating further reservation of WTPs within the cutblocks themselves, remains uncertain. While I have no reason to dispute the results of the Ainsworth analysis, I fully recognize the importance of ensuring that the appropriate, legislatively required provisions for meeting biodiversity objectives at the stand level are realised operationally. For this reason, in the '**Implementation**' section below, I have included an instruction for licensees and district staff to monitor the licensees' WTP results and strategies, to ensure that provisions for meeting biodiversity objectives at the stand level are realised operationally.

It is possible that there may be an underestimation in the projected timber supply associated with the difference between the 5.8-percent and 3.7-percent constraints on the THLB indicated as attributable to WTPs in the base case and Ainsworth analyses respectively.

However, at the present stage with results from the strategy as yet unproven, it is too early to apply reliably any specific adjustment to the projected timber supply. Therefore, pending definitive results from the noted monitoring, I will accept the adequacy of the timber supply implications from WTPs as modelled in the base case, and will account for any changes resulting from the identified strategies in future AAC determinations, in response to field-based, operational confirmation, as this becomes available.

- *wildlife habitat and identified wildlife*

    - *Identified Wildlife Management Strategy*

'Identified wildlife' refers to two categories of wildlife designated by the Minister of Environment under the FRPA. These categories are: (1) species at risk (i.e., species that are endangered, threatened, or vulnerable); and (2) regionally important species that rely on habitat that may be adversely impacted by forest or range practices on Crown land and that may not be adequately protected by other management strategies, such as those for biodiversity or riparian management. The establishment of these categories of species enables a number of provisions under the FRPA to be used to manage habitat for identified wildlife; including Wildlife Habitat Areas (WHAs) and objectives, and General Wildlife Measures and objectives. The provincial government announced its Identified Wildlife Management Strategy (IWMS) Volume I in February 1999. The IWMS Version 2004 contains an updated list of identified wildlife, updated species accounts, and updated procedures for implementing the IWMS. Government has limited the impact of management for identified wildlife to a maximum of 1 percent of the short-term harvest level for the province.

Forty-two wildlife species of concern, including 13 designated as 'Identified Wildlife', exist in distributions that may extend into the Lillooet TSA. A FPPR Section 7 notice for the Survival of Species at Risk in the Cascades Forest District has been in effect since December 30, 2004, with an associated timber supply impact budget of 1 percent of the total mature THLB in age classes older than 80 years. This budget is in addition to the 5000 hectares and 8000 hectares of mature THLB identified for northern spotted owl habitat and grizzly bear habitat respectively, which I have considered separately under those headings.

First Nations have expressed concern for other important species beyond red- and blue-listed species (red-listed meaning threatened or endangered, and blue-listed meaning particularly vulnerable to changes in environmental conditions) in the TSA that are identified with the Conservation Data Centre listing. The noted studies presented by Bonaparte Indian Band identified the many plant and animal species important for the purposes of food, medicine and technology, some of which are red- and blue-listed species. The Bonaparte Indian Band has identified as one of its core values the protection of wildlife and its habitat. The Bonaparte Band identified in respect of the Robertson Ecosystem Based Plan that protection was needed for: wildlife trails, especially adjacent to wetlands and streams; squirrel populations, due to their role in maintaining large cone-bearing Douglas-fir; and goshawk nest sites, for which a 12-hectare reserve should be established.

In the 2005 analysis, no spatial land base exclusion for Identified Wildlife was included, since no WHAs had then been designated in the TSA. Since then, nine WHAs have been designated with negligible impact on the THLB except in three cases which are for northern

spotted owl and thus do not contribute to the one-percent IWMS mature timber supply impact budget and are modelled separately in the 2005 analysis.

In view of the significant number of Identified Wildlife species present and the heightened concern expressed for their habitat, since no specific provision was made for these species in the analysis, then in consistency with my practice elsewhere I will assume that the full one-percent budget for these habitats will be required in the Lillooet TSA. In my determination therefore, as discussed in **'Reasons for Decision'**, I have assumed that the base case timber supply projection has overestimated the timber supply on this account by 1 percent throughout the forecast horizon.

- spotted owl

The northern spotted owl is an identified red-listed Species at Risk in BC with a global conservation status of 'vulnerable to extirpation or extinction', and a designation of 'endangered' from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). A number of spotted owl locations and nesting sites have been identified in the Lillooet TSA, which is at the northernmost extent of the owl's range. Planning under the draft LRMP allowed for an impact of 5000 hectares in mature stands on the THLB, with recommended management objectives that 67 percent of the forested area in 7 Long Term Activity Centres (LTACs) be retained in stands of at least 100 years of age at all times, and that each nesting site be buffered with a reserve of 80 hectares. While the LRMP has not been approved by Cabinet, as discussed below, some of the elements related to spotted owl are included in other plans that are reflected in legal mechanisms and current practice.

The FPPR Section 7 notice which came into effect in December, 2004, for the survival of Species at Risk including the spotted owl in the Cascades Forest District, provided for the legal establishment of a maximum impact not exceeding 5000 hectares of mature THLB in the TSA. Following the BC Spotted Owl Recovery Action Plan, in June 2006, three LTACs were designated in the TSA as WHAs with 100-percent retention. The spotted owl Recovery Action Plan is currently being updated and will result in a habitat plan that will be provided to the Federal Government early in 2009. In the Lillooet TSA, this habitat plan will result in new mapping of spotted owl habitat, and an expected recommendation for the designation of three additional LTACs as WHAs in the TSA, for a total of six WHAs with 100-percent retention.

In December 2008, summaries of the existing three WHAs identified 2830 hectares of the THLB as affected, including 2096 hectares in stands older than 80 years, and 734 hectares in immature stands. Preliminary summaries of the three additional proposed WHAs identify that the WHA allotment of 5000 hectares of mature THLB would all be used, plus a further 830 hectares of immature stands in the THLB, for a total retention of 1564 hectares of immature stands, at least in the short term, in all six WHAs, in addition to the ordered, ongoing mature retention.

The 2005 base case timber supply analysis reflects spotted owl management identified in a Memorandum of Understanding between the licensee Ainsworth and the MFR, which directs forestry activities within LTACs, as well as in a Spotted Owl Operational Plan adopted in 2004. To summarize this modelling, for each of the 7 LTACs which together cover a total 16 808 hectares of the CFLB including 8459 hectares of THLB, a minimum of 67 percent of the CFLB is required to remain in stands over 100 years old, and three-quarters of this area (i.e. of the 67 percent) must be in stands of over 140 years. Further requirements, related to

height, crown closure, elevation, and species composition also apply. All spotted owl management areas fall within the low-to-moderate zones of the timber economic recovery plan (see earlier section, '*economic operability*') and overlap with prime, operable Douglas-fir forest types. A land base summary indicates that two-thirds of the CFLB area required to be maintained in stands greater than 100 years for the LTACs was met outside the THLB, with about 3744 hectares initially required to be found in the THLB. This area is approximately 1300 hectares smaller than the area indicated in the Spotted Owl Recovery Plan and draft LRMP.

Operationally, MFR district staff advise that current management respects both the three LTACs now officially designated as WHAs and the remaining four of the seven original LTACs. In Ainsworth's FSP, the results and strategies for the management of spotted owl reference the MOU as well as the recommended Spotted Owl Operational Plan guidelines and the recommendations in the draft LRMP for the seven original LTACs.

Public input was received from the organization 'Ecojustice', requesting more consideration for the retention of old growth for spotted owls as this would also contribute to carbon sequestration. The 100-percent retention of the large areas of mature timber for owl habitat discussed in this section will certainly also contribute to carbon sequestration, which I have considered separately under that heading.

The only input on spotted owls from First Nations was advice from a Cayoose Indian Band member that the band had no Forest and Range Agreements (FRA) or Forest and Range Opportunities (FRO) as all its land was 'tied up' in spotted owl habitat, and that the design of LTACs to accommodate some timber harvesting could be beneficial.

From all of this information I will summarise and conclude as follows. Government's clear objective is to maintain and avoid extirpation of the northern spotted owl, through science-based measures and incorporating planning and consultation with stakeholders and First Nations. The necessary accommodation as originally estimated in the LRMP and in early recovery team work, and as reflected in the timber supply analysis base case, resulted in the retention of 3744 hectares within the THLB in 7 LTACs. Later work based on the Section 7 order has resulted in the identification of six LTACs to be designated as WHAs with 100-percent retention affecting a full 5000 hectares, as well as the commitment of additional area in immature timber to provide for future flexibility in locating ongoing suitable habitat in consistency with the issuance of appropriate future orders. It is anticipated that the immature timber types within the WHAs will develop suitable spotted owl habitat conditions through natural stand development or through applied silvicultural treatments, such as commercial thinning or partial harvesting, to achieve desirable attributes in stands at an earlier stage than through natural succession. The final habitat plan is to be submitted for government approval in March, 2009, with only final details of the implementation plan remaining to be confirmed.

From this I agree with MFR staff calculations that the constraints modelled for spotted owl in the 2005 timber supply analysis will have underestimated the impact on the THLB from spotted owl management under the Section 7 notice by some 1300 hectares for mature timber, and overall—including the impact on immature timber—by up to 2900 hectares. On the modelled THLB of 250 426 hectares, this represents overestimations in the projected base case harvest levels of roughly 0.5 percent in the short term and 1.1 percent in the long term. (The impact of reserving owl habitat is focused on Douglas-fir leading stands in the low-to

moderate market economic zone.) In my determination I have accounted for an overestimation in the overall projected timber supply of 0.5 percent in the short term increasing to approximately 1 percent in the longer term, as noted in '**Reasons for Decision**'.

- grizzly bear

Current forest management practices in the Lillooet TSA include establishing temporary 50-metre forested buffer zones adjacent to avalanche areas containing critical grizzly bear habitat. The 2004 draft LRMP planned an overall allowance of 8000 hectares for grizzly bear management. Specific direction for grizzly bear management requires reduced stocking standards and cluster planting in particular ecosystems, as well as the protection of critical habitats. On December 30, 2004, a FPPR Section 7 notice came into affect for the Cascades Forest District, specifying 8000 hectares of mature timber on the THLB as the allowed area impact from grizzly bear management in the Lillooet TSA.

The 2005 base case analysis included no specific modelling of grizzly bear habitat. However, the LRMP scenario analysis (see '*alternative harvest flows*') included investigation of an allowance for a total area of 7942 hectares of critical bear habitat in the THLB, based on spatial data provided in January, 2005, by the MOE (then MWLAP) Large Carnivore Specialist, which identified priority habitat areas for modelling purposes. Given the comparable areal impacts of bear habitat management under the LRMP and under the Section 7 notice, implementing the Section 7 notice will likely incur timber supply implications similar to those analysed in the LRMP scenario. In the LRMP scenario, provision for grizzly bear management reduced the THLB derived for the base case analysis by 1.8 percent. The harvest forecast showed the decline from the current AAC beginning a decade earlier than in the base with a long-term level 3.9 percent lower than in the base case. This long-term impact is relatively high in proportion to the area of THLB affected, due to higher than average site indices on the areas excluded from harvesting, which are also relatively unencumbered by OGMAs, VQOs or other constraints in the base case analysis and thus would have contributed freely to the base case timber supply.

Of the modelled grizzly bear habitat area, 78 percent occurs in zones viable for harvest during moderate market conditions, and 45 percent occurs in zones still viable during low market conditions. A 2008 draft of identified critical habitat and buffer areas for grizzly bear, in 19 Grizzly Bear Identified Watersheds, shows these areas would have an impact of about 7366 hectares on the THLB, of which 3350 hectares lie within the area viable under low market conditions, and 5735 hectares in areas viable under moderate markets. The impact would tend to be larger under low economic conditions, due to the higher composition of non-pine species in bear habitat. The MOE is developing grizzly bear best management practices which may allow for some timber harvesting in grizzly bear habitat, slightly reducing the related THLB impact.

I note that the Bonaparte Indian Band has identified the protection of wildlife and its habitat as one of its core forest management values, and that the St'át'imc Preliminary Draft Land Use Plan, Part 1, of March 2004, references land designations including habitat protection areas for grizzly bear.

To conclude, the FPPR Section 7 notice provides an indication of the seriousness of government's intention to provide adequate cover for grizzly bear habitat, which is consistent with the draft form of the LRMP. Clearly, managing responsibly to maintain the grizzly bear will have some impact on the timber supply, and it is reasonable to anticipate that the impacts

of implementing the Section 7 notice will resemble those modelled under the LRMP scenario. Although there may be some uncertainty associated with the implementation of best practices and with other factors, the best currently available quantitative indication of the timber volume impact of grizzly bear management is provided by the LRMP analysis which suggested no impact in the short term, and a reduction in the long-term level of 3.9 percent associated with the 1.8-percent THLB impact. Since no provision for the grizzly bear was included in the base case analysis, in my determination I have accounted for an overestimation in the base case THLB of 1.8 percent, and a small associated short-term volume overestimation increasing to 3.9 percent in the long term, as discussed in **'Reasons for Decision'**.

- *ungulates*

Ungulate species in the Lillooet TSA include elk, bighorn sheep, mule deer, moose and mountain goat. Most habitat requirements for these species have been accommodated through consideration during operational planning without significant impacts to the THLB, since ungulate winter ranges include large areas of forest outside the THLB and since ungulate habitat requirements overlap extensively with areas already constrained in OGMAs, visually sensitive areas, lake shore zones, and areas under green-up constraints. For these reasons, the 2005 timber supply analysis included no specific modelling assumptions for ungulate habitat, and at the time district staff considered this an appropriate reflection of current practice.

In December, 2004 a FPPR Section 7 Notice for the management of the habitat required for the winter survival of ungulate species in the Lillooet TSA legalized an allowance of 6000 hectares on the THLB for elk, bighorn sheep and mule deer. The Notice also applied to moose and mountain goat, but without an associated allowed impact on the THLB. Habitat requirements for each noted ungulate species are discussed sequentially, next.

elk: Approximately 100 elk reside in a small area in the south-east corner of the TSA, where district staff consider that achieving management objectives for other forest values will contribute adequately to their habitat requirements without any required allocation from the 6000-hectare THLB allowance.

bighorn sheep: Bighorn sheep are one of the species considered to have been managed successfully in the TSA through operational planning without impact on the timber supply. The draft LRMP states that management for mule deer winter range (MDWR) also provides adequate habitat for bighorn sheep in forested areas. Consistent with this, no specific constraints for bighorn sheep were modelled in the base case or LRMP scenario analyses.

mule deer: The December, 2004 FPPR Section 7 Notice for the winter survival of the three ungulate species provided for a maximum combined habitat area of 232 155 hectares with a net impact on the timber supply equivalent to 100-percent forest cover retention on 6000 hectares of mature and immature stands on the THLB. The Notice matches provisions for mule deer in the draft LRMP, except for deletion of the LRMP requirement for 5-percent basal area retention in each cutblock for MDWR.

Mule deer winter range has been and currently is managed in the TSA without formal guidelines, on a site-specific basis, by methods including restricting the size of clearcut cutblocks, faller selection with wildlife tree retention, and partial harvesting. As noted, in

the 2005 base case analysis it was assumed that the timber supply impacts of these types of practices were already accounted for in the measures modelled for other IRM values, and no specific provisions for any ungulate habitat were included. The MOE expects to release a GAR order with respect to UWR in the near future.

In the analysis for the 2002 AAC determination for the Lillooet TSA, MDWR was modelled by requiring 20 percent of an area of 172 000 hectares, including 88 000 hectares of the THLB, to be in forest of at least 80 years of age. The related timber supply impacts were essentially negligible, which is consistent with the results of the modelling in the 2005 LRMP scenario, in which specific requirements were applied to meet management objectives under varying expected levels of snow pack. These objectives were applied on 125 135 hectares of the CFLB, including 56 994 hectares of the THLB, with only small timber supply impacts of approximately 1 percent in the long term, and no short- or mid-term impact.

moose: The allowance for moose in the December, 2004 Section 7 Notice was a maximum of 88 383 hectares of the CFLB to be accommodated without impact to the timber supply, as determined in consistency with the most current timber supply analysis. Operationally, licensees in the Lillooet TSA typically include management of moose winter range habitat in FSPs by defining a result and strategy that provides thermal cover by retaining at least 67 percent of the coniferous-leading stands in moderate-to-high crown closure and at least 5 metres in height. As noted, this management strategy was not modelled in the base case, as district staff assumed that land base exclusions and constraints for other values also provide for moose habitat with no specific, additional impact on the timber supply.

mountain goat: The allowance established for mountain goats under the December, 2004 Section 7 Notice is a maximum of 108 823 hectares without impact to the timber supply as determined in consistency with the most current timber supply analysis. Again, district staff have assumed that reductions for other values achieve habitat requirements for mountain goat, with no additional timber supply impact.

In the draft LRMP, a Wildlife Management Area was planned for designation in the Cayoosh Range, to ensure sustainable management of local mountain goat herds while providing continued opportunities for resource development and commercial use. Due to the very limited amount of THLB in this area, no related modelling considerations were applied in the 2005 base case.

First Nations' considerations related to ungulate habitat include the following: A 2003 report by Peacock and Chambers, submitted by the Bonaparte Indian Band, identified that Bonaparte peoples traditionally hunted deer and moose (among many other species, some with archaeological evidence) and I am mindful that the Bonaparte Band has expressed as one of its core values the protection of wildlife and its habitat. The 2004 Thomas and Norwell report submitted by the Bonaparte Band (i.e. the Robertson Ecosystem Based Plan) expressed that it is important to protect deer winter range attributes, such as open Douglas-fir forest, on south- and west-facing slopes, and also identified concern by Bonaparte Band members about declines in ungulate populations believed by the First Nation to be associated with over-hunting; a strategy of proactive access control was suggested. I have also noted the Bonaparte's concern for over-hunting in '*recreation areas*', in respect of the number of hunters and all-terrain vehicles.

The forestry representative for the Ts'kw'aylaxw First Nation noted that a MDWR study commissioned by Ainsworth resulted in management direction for Ainsworth's harvesting practices in Ts'kw'aylaxw Territory in the form of 100-percent retention for MDWR, leading to a total of approximately 60 hectares being reserved from harvest in Ainsworth's cutting permits in the last 1.5 years.

The St'át'imc Preliminary Draft Land Use Plan, Part 1, March 2004, indicated that mule deer are a species of special management concern in St'át'imc territory because of their cultural importance, their sensitivity to landscape changes in their winter ranges, and the vulnerability of their migration routes and fawning areas. The St'át'imc Land Use Plan indicates that areas of MDWR, as well as migration and fawning areas should be entirely reserved.

My conclusions from these considerations are as follows. The timber supply projection as currently modelled in the base case includes no specific provision for any ungulate habitat. Until now this has been considered appropriate in view of overlaps between habitat requirements and areas managed for objectives for other forest values. However, the draft LRMP included significant provisions for mule deer habitat, and government's Section 7 notice now affords a very considerable level of expected protection for ungulate species. From this, and given the significant interest in and concern for these species expressed by First Nations, it is clearly necessary to determine whether it is realistic to continue to assume that adequate levels of protection can be provided indefinitely for all of these species, solely through overlapping constraints, without any related implication for the timber supply.

District staff advise that licensees who are now working with 200-hectare draft planning cells in relation to the Section 7 Notice increasingly believe that planning at this scale will result in the unavailability of some timber formerly considered harvestable. When constraints begin to be applied at this scale on the more than 200 000 hectares of identified habitat, it is most likely that some impacts on the THLB will be experienced, as allowed for in the Section 7 Notice. However, until operational experience is gained with implementation, the extent to which the 6000-hectare allowance under the Notice will be required to manage for ungulates will be uncertain. Excluding this full area would indicate roughly a two-percent overestimation in the base case projection. Management by overlapping constraints should continue as extensively and as effectively as possible, but I recognize that eventually some impact on the timber supply is likely to occur.

For these reasons, in my determination, in relation to the provision of ungulate habitat, I have accounted for an unquantifiable overestimation of something less than 2 percent in the short-term harvest level projected in the base case, as discussed in '**Reasons for Decision**'. In '**Implementation**, I have instructed licensees and MFR district staff to monitor the implementation of the Section 7 notice over the next five years, with particular respect for the timber supply impacts resulting from tenure holders' management practices in relation to meeting government's objectives.

- *range considerations*

The trampling of seedlings by cattle, which in occasional instances has resulted in delays in achieving free-to-grow status, represents only a small risk to the projected timber supply, since site-specific issues are currently being addressed operationally. Some grasslands are undergoing conversion to forested lands, due to modern fire suppression activities.

The 2004 Thomas and Norwell report submitted by Bonaparte Indian Band identified as a goal a limitation on cattle use to ensure that overgrazing is minimized and water quality is maintained. I have noted this concern in '*recreation areas*' and '*ungulates*', and while I acknowledge the potential for overgrazing as a concern for range management, it will not affect the timber supply projection.

My finding from discussion with MFR staff is that although the timber analysis did not account for any conversion of grasslands to forested lands, or for any impacts to timber supply from livestock damage, any related implications are too small to affect the projected timber supply for the TSA.

- *community fire interface*

Thirteen communities in the Lillooet TSA are under wildfire threat levels rated as 'high' or 'extreme' and in 2004 the entire town of Lillooet was placed on evacuation alert. In addition to the 13 communities of relatively high population densities, the TSA includes numerous lower-density populations and individual homes distributed throughout forested areas. Hazard assessments conducted from 2000 through the winter of 2002 on each of the 13 communities indicated that since the MPB infestation began, each community's hazard rating, in areas of forest predominated by pine, has increased in severity.

Many complex factors must be considered in a wide variety of threat mitigation strategies. Many communities in the TSA have initiated Community Wildfire Protection Plans and are in varying stages of implementing prescriptions to reduce the fire hazard ratings. Many First Nations communities have implemented MPB Fire Management plans, and the MFR Cascades Forest District has recently initiated a Fire Management Planning process.

Typically, threat reduction prescriptions involve a combination of the use of fire and physical removal of material by pruning, spacing or harvesting. Since public safety is the primary objective in interface areas, such areas will not necessarily be managed for sustainable timber production, which could affect the projected timber supply. Insufficient related information was available for taking any such implications into account in the current analysis. Nonetheless, I congratulate the Cascades Forest District on the progress made to date in the beneficial work of engaging local communities in interface planning and in the implementation of threat-mitigation strategies. I encourage continuation of this work, and as the initiative proceeds, as I have noted below in '**Implementation**', if new information becomes available on any related implications for timber supply, I hope to see this taken into account in the next analysis for my consideration in the next AAC determination for the TSA.

- *carbon sequestration*

Forests have dynamic and complex functions in the global carbon cycle, which includes the exchange of carbon dioxide between the atmosphere and the biosphere. A forest is considered a source when, overall, it emits more carbon dioxide and other greenhouse gases than it removes from the air in a given time period. It is considered a sink when it removes more than it emits. These emissions and removals are determined not only by natural processes but also by influences from forest management activities such as harvesting, tree planting, and efforts to fight fires and insects. Forest-related carbon fluctuations have become an important factor in evaluating strategies to reduce currently increasing levels of carbon dioxide in the atmosphere to mitigate related climate change.

Although neither the 2005 base case timber supply analysis nor the 2008 analysis amendment reported on carbon balance over the analysis horizon, in recognition of the trend toward global warming and climate change, the MFR has established a number of initiatives to research and implement appropriate mitigative and adaptive management approaches in carbon and forest management. In December, 2005, as chief forester I established the collaborative Future Forest Ecosystems Initiative, FFEI, led by the Research Branch of the MFR, with help from the BC Ministry of Environment, the Canadian Forest Service, and Non-Governmental Organizations. The FFEI works to adapt BC's forest and range management framework to a changing climate, by better predicting the impacts of climate on forest and range ecosystems, by identifying critical areas of risk, by modifying and developing new management practices and policies to ensure adaptation to climate change by ensuring that to the extent possible work undertaken by MFR programs and external partners supports highest priority needs, by supporting the use of results in directing MFR activities, and by communicating to share emerging knowledge both within the MFR and with other stakeholders.

Within the MFR itself, the Climate Change and Forest Carbon Work Unit provides me with advice on adapting policy in context of a carbon-constrained world. One emerging important component of this is the investigation and incorporation of the implications of appropriate carbon management in timber supply analysis, in recognition of which in late 2008 the Forest Analysis and Inventory Branch within the Forest Stewardship division of the MFR engaged a carbon analyst to assist in developing suitable methods for accounting for carbon balances in the analyses.

Staff of MFR and MOE are also working to define standards for including forest ecosystems and forest products in BC's greenhouse gas inventory, in provincial, Western Climate Initiative, and national carbon-offset trading programs. As part of a government-wide initiative, the MFR is working toward carbon-neutral operations, toward which a variety of consumption and emission-reduction actions have been taken and more are planned.

In the public input to this AAC determination, a letter dated November 3, 2008 was received from the organization Ecojustice, which referred to a report by Duncan Knowler and Kristin Dust of Simon Fraser University, funded by the David Suzuki Foundation, the Sierra Legal Defence Fund and the Western Canada Wilderness Committee. The letter stated that, for the Fraser TSA, when non-timber values of old-growth forests such as carbon sequestration and storage are more fully taken into account, it is economically preferable to preserve these old-growth forests rather than to harvest them. The letter claimed that the results from the Fraser TSA are applicable to the Lillooet TSA, and requested that the letter be accepted as a public comment on this current AAC determination for the Lillooet TSA, as well as significant new information supporting the need to reconsider the timber supply in the Fraser TSA, and as general information for future AAC determinations. In this rationale I will address those aspects of the letter which pertain directly or indirectly to the present AAC determination for the Lillooet TSA.

The 2008 Knowler-Dust report evaluated the economics of protecting old-growth forests in the Fraser TSA by considering three different levels of old-growth protection as potential management approaches for spotted owl habitat, which were analysed in the most recent TSR for that TSA. The levels of protection considered were that provided by the current Spotted Owl Management Plan, plus two additional levels, identified as 'higher' and

'maximum'. Each level of protection was related to a projected rate of timber harvest for the TSA and as expected intuitively the harvest rates were in inverse relationship to the level of protection.

In the Knowler-Dust modelling, the factors with the most significant impact on the economic results were the assumptions made respecting discount rates and carbon prices. For each of the three habitat protection scenarios, the authors applied three discount rates of one, four and seven percent, and three carbon prices of $20.00, $75.00 and $150.00 per tonne of carbon. The study showed that, in all protection scenarios, with a discount rate of four percent and a price of $75.00 per tonne, the forest held more economic value when left unharvested.

Staff of MFR's Forest Analysis and Inventory Branch and Research Branch reproduced the methods of the Knowler-Dust study and agreed that, in the maximum owl habitat protection scenario, after 100 years, more carbon remains stored within the forest ecosystem than under the 'current' management plan. However, staff point out that, conversely, under the 'current' scenario, more carbon will become stored in forest products and in landfills than in the 'maximum' habitat scenario, with the result that, after 100 years of management, the total carbon stored terrestrially in the forest, in products and in landfills under the 'current' owl habitat scenario would be 82 metric tonnes against 79 metric tonnes under the 'maximum' owl habitat scenario. Uncertainties in the estimates of carbon flows and stocks render this three-metric-tonne difference insignificant.

Notwithstanding these findings, the carbon modelling results for the Fraser TSA are unlikely to prove validly transferable to the Lillooet TSA. The Knowler-Dust results are sensitive both to the yield per hectare, and to the amount of old-growth forest available. In the Lillooet TSA, both of these factors have been affected by the MPB. Further, due to differences in species, climate, soils and disturbance regimes, the forests are generally less productive than those in the Fraser TSA.

Another concern with respect to the accuracy of the Knowler-Dust results is that while a four-percent discount rate may be reasonable as a base case, without a definitively 'correct' value it is necessary to acknowledge the significant uncertainty and variation introduced to the results by this choice. Significant economic uncertainties are also present; the price for carbon on the Montreal Climate Exchange is currently about $37.00 per tonne, or $10.00 per tonne for carbon dioxide equivalent. In the Chicago Climate Exchange, prices have varied from $3.70 to $26.00 per tonne, and in 2008, William Nordhaus reported that in the summer of 2007, trading emissions permits in the European Union were selling for about $100.00 per tonne of carbon. At a price of $37.00 per tonne of carbon, the conservation benefits of the lower harvest options (i.e. with higher habitat protection) in the Knowler-Dust study would be reduced essentially to zero. Clearly a significant source of inherent uncertainty is introduced by unknown future developments in carbon prices over the modelling period. Carbon markets and trading are still very much evolving, and prices will remain difficult to predict until more certainty is gained in the systems and rules that will be adopted.

One other factor that must be addressed in assessing the value of carbon stored in protected forests, which the Knowler-Dust report appears not to have accounted for, is the overall reduction achieved in carbon emissions when wood products are used to displace more energy-intensive building products such as concrete and steel.

From all of this, I conclude as follows. The MFR is aware of the importance and the urgency of developing and implementing management strategies to both mitigate and adapt to climate change, and is actively working to incorporate forest carbon as a factor in a variety of forest management decisions. In this context I am grateful to Ecojustice for taking the initiative to place a timely and important focus on an issue of rapidly emerging significance, which our analysts have only recently begun attempting to integrate with the wide array of factors already embedded in the process of modelling and forecasting timber supplies. While this integration is still in its early stages, one thing is clear. The solutions to questions about the optimal management of carbon will be more complex, more dynamic, and further-reaching than a relatively direct accounting of the amount of carbon that may be sequestered in standing forests. With forests and forest products being used for a wide range of purposes, critiquing the current management structure by straightforwardly comparing the benefits of logging with the benefits attached to protection and other uses is methodologically incomplete. In view of acknowledged uncertainties in methodologies, trading schemes, and market prices, other studies of forest carbon are less equivocal on the benefits of completely reserving forest land from harvesting. No doubt governments will be called on to analyse and prioritise the many alternative potential uses of the forest, from which to derive and provide a range of socially acceptable management objectives. Analysis of the carbon implications of forest management alternatives will be important information for consideration in the making of such decisions on society's behalf by our elected representatives. I must also emphasize that Cabinet and specific statutory decision makers have reached decisions on land use and management with respect to the spotted owl while considering protection of that species in the context of a broad suite of environmental, social and economic values. While carbon management is an important consideration, I am not in the position to alter the decisions made by others under appropriate statutory authority. (Please refer to my earlier considerations of owl habitat in '*spotted owl*'.)

For all of the above reasons, I consider that in determining this AAC for the Lillooet TSA, I am not the appropriate authority, and this AAC determination does not provide the appropriate mechanism, either to vary the level of forest protection as currently contemplated by government, or to anticipate the outcomes of complex and potentially far-reaching decisions on carbon management which are requiring to be made by government on behalf of society. Accordingly, I have made no adjustment to the projected timber supply on this account. As government and society address the important considerations related to carbon management and climate change mitigation, and reach decisions on how all of the potential uses of forest land should be balanced with carbon management, those decisions will be reflected in future AAC determinations.

- *First Nations' archaeological sites*

Provincial legislation requires that BC's forests be managed in a sustainable manner that includes considering the social and cultural needs of First Nations. The *Forest Act* defines a cultural heritage resource as 'an object, site, or location of a traditional societal practice that is of historical, cultural or archaeological significance to the province, a community, or an aboriginal people'. Cultural heritage resources other than archaeological resources are considered in the section following this present section. In this present section I will consider those resources that are strictly archaeological with potential to affect the assessment of the timber supply.

In the Lillooet TSA, those First Nations' archaeological resources which are both known and recorded have been mapped. For the timber supply analysis, these sites and protective buffers around them were excluded in deriving the THLB. The TSA encompasses a relatively high number of both recorded and unrecorded, known, archaeological sites, and it is suspected that in addition a high number of sites are scattered across the THLB in unknown locations. In the base case analysis, for archaeological sites affecting a total of 1883 hectares of CFLB, a THLB land base exclusion of 818 hectares was applied, net of overlaps with other objectives.

Typically, Archaeological Overview Assessment (AOA) models are used to assess the potential for finding archaeological evidence, and to suggest sites that may require detailed field assessments. While an AOA was completed for the Lillooet TSA in 1998, it has since proven to be unreliable as a predictor of archaeological potential. Therefore, in consideration of the *Heritage Conservation Act*, licensees in the TSA work closely with First Nations to determine archaeological potential and to determine where to conduct preliminary field reconnaissance. Depending on the findings of such reconnaissance, further archaeological study may be undertaken. When archaeological resources are discovered during reconnaissance, areas are often excluded from cutblocks. Confidentiality issues often prevent MFR obtaining adequate information from which to assess and record related impacts on timber supply.

The Bonaparte Indian Band has identified as one its core values the protection of all archaeological sites, resources, and values. A 2003 report by Peacock and Chambers, submitted by the Bonaparte Band, notes that the current distribution of archaeological sites suggests higher occurrence in valley bottoms and lower elevations, with fewer sites found in forested zones, although this may in part reflect the visibility of sites and the intensity of sampling. The policy consultant to the Bonaparte Band noted that the Band has spatially identified, through the FRA process, proposed no-harvest zones for spiritual areas and for specific cultural management areas, including an addition to the proposed Marble Canyon protected area.

Cascades Forest District staff note that a map overlay used in the analysis for the 2002 AAC determination indicated that most historically recorded archaeological sites occurred outside the THLB, but that most newly discovered sites were being found on the THLB. Upland sites may be under-represented in the 'known' record, partly because they are not easily identified and partly because more archaeological studies have been conducted along river systems at lower elevations. Further study would be required to ascertain the extent of archaeological sites in upland areas.

From my discussions with district staff, I understand that preliminary field reconnaissance for archaeological sites is carried out by licensees for virtually all cutblocks, but the findings are not shared with the MFR. I understand also that it is common practice for First Nations to block out certain areas on maps, which may or may not be archaeologically related, which licensees will then avoid, to minimise conflicting objectives, but that MFR staff are not always advised of the extent of such 'log-arounds'. Without a database and records to identify licensees' actual practices resulting from the field reconnaissance, it is very difficult for MFR staff to learn about and quantify associated implications. In this situation, persistent and inevitable uncertainties will remain in the number, size, type and location of archaeological sites, in the nature of acceptable management practices—such as appropriate

buffer widths for each type of site—and therefore in the related individual and overall impacts on timber supply.

From this I conclude as follows. MFR staff have a good understanding of what is required to manage archaeological resources appropriately, and—as confirmed by my own discussions with licensees—meaningful discussions are being held between First Nations and licensees, both in planning stages and in the field reconnaissance. Therefore, although the MFR does not have all the related information, it is reasonable to conclude that appropriate management is occurring in the field, in respect of which a degree of accommodation was applied in the base case analysis. The extent to which archaeological resources can be protected through WTPs, riparian buffers, and retention for other objectives is uncertain, but at present I have no reason to believe that the assumption applied in the base case does not adequately account for the responsible management of archaeological resources. As more information on archaeological resources becomes available, this can be incorporated into future analyses and AAC determinations.

- *First Nations' cultural heritage resources and spiritual use*

The *Forest Act* defines a cultural heritage resource as 'an object, a site or the location of a traditional societal practice that is of historical, cultural or archaeological significance to British Columbia, a community or an aboriginal people.' Under the FRPA, Section 10 of the FPPR provides the following objective set by government, for which FSPs must include a strategy and result: 'to conserve, or, if necessary, protect cultural heritage resources that are: (a) the focus of a traditional use, by an aboriginal people, and that are of continuing importance to that people, and (b) not regulated under the *Heritage Conservation Act*.' In this present section I will consider resources that are an ongoing traditional or sacred use and are not archaeological in nature.

A total of 26 First Nations communities have asserted overlapping traditional territories in the Lillooet TSA. Ten First Nations' Bands, mostly belonging to the St'át'imc, N'laka'pamux, Secwepemc, or Tsilhqot'in Nations, have asserted site-specific interests in the TSA. Several reports including Traditional Use Surveys (TUS), archaeological overview assessments, water rights reports and studies of ethnobotany, ethnoarchaeology and ethnohistory have been carried out in the TSA. In most cases, First Nations with TUS and other studies on cultural heritage resources keep the studies at their Nation, expressing a preference to interpret the TUS themselves and to provide input to the province when referrals are made. In many cases, the information in TUS is general in nature, outlining interests but not providing specific information on location and extent of those interests, which would be needed to develop estimates for impacts on forest practices. During the consultation process, the MFR requested specific information from First Nations—such as information that is typically included in TUS as well as other sources—on the nature and extent of aboriginal interests that could be incorporated into the timber supply analysis and AAC determination. In cases where First Nations provided specific information, this was considered, as noted below in this section and in several other places throughout this rationale.

The asserted traditional territory of the St'át'imc First Nation covers most of the central and northern part of the TSA. The St'át'imc have developed a preliminary draft land-use plan, and were involved earlier in government-to-government negotiations in an attempt to reconcile the St'át'imc plan with the LRMP; however, the negotiations have been suspended

without reaching conclusive outcomes that could provide guidance for management in the TSA.

The Lil'wat Nation, a St'át'imc community outside the Lillooet TSA, signed a land use planning agreement with the Province on April 11, 2008. This approved 'Sea-to-Sky' plan includes two protected areas plus a 'Wildland Zone' within the Lillooet TSA, where no harvesting is allowed, and a 'Cultural Management Area' or CMA, which is divided into variously restrictive zones to permit some industrial use. I have considered the implications for timber supply related to the protected areas, the Wildland Zone and the CMA in '*strategic land use planning and protected areas'*.

The asserted territory of the N'laka'pamux is in the south-eastern portion of the TSA, and MFR staff advise that licensees and the N'laka'pamux co-operate in incorporating cultural heritage interests in operational planning.

The Secwepemc and Tsilhqot'in Nations assert interests in the north and north-eastern portions of the TSA.

I am advised that, in general, in the past several years, licensees and First Nations have worked cooperatively to identify areas of cultural importance, and to discuss potential opportunities for operations to access some of the significant undercut timber volumes in the TSA. Licensees have also identified 16 672 hectares of 'log-around' areas on the THLB; these areas—some of which may represent only temporary exclusions—have no legal designation preventing harvesting, and were therefore not excluded from THLB in the analysis. Ongoing work under the FREP in relation to Cultural Heritage Values may provide information helpful in assessing related impacts to timber supply.

The implications for timber supply arising from the 2006 Supreme Court decision in Sappier and Gray, regarding the aboriginal right to harvest wood for domestic uses on Crown lands traditionally used for that purpose, have not yet been formally determined. Current MFR legislation enables First Nations' communities to access volume for traditional and cultural purposes including the construction of residential dwellings, but to date First Nations have made no related application within the Lillooet TSA. In my AAC determination for the TSA I do not allocate volume to particular types of harvesting or timber use rights; the allocation of sufficient volume to accommodate these requirements is an operational matter for consideration by the district manager. Nonetheless, I am sure that adequate flexibility exists in the timber supply such that any related required volume can be provided for within the AAC that I determine.

First Nations have provided me with considerable information, for which I am most grateful, on the nature and use of cultural heritage resources in the TSA which I will attempt to summarise as follows.

The Bonaparte Indian Band submitted a 2003 report by Peacock and Chambers identifying its people as having extensive gathering activities including the collection of specific berries, roots, various foods, and medicinal plants. Also identified were such uses of trees as: fir for firewood; pine for posts, rails, fishing poles, and material for baskets; willow for sweathouses; and alder for smoking meats. The report indicates that the Secwepemc and other Interior Salish peoples made use traditionally of between 200 to 300 plant species, for foods, medicines, materials and spiritual purposes. Significantly, food plants were widely dispersed geographically and temporally within the traditional territory. Concerns by

Secwepemc elders were also expressed, via a 1997 report by Ignace, submitted by the Bonaparte Indian Band, regarding: the effects of introduced weed species on the growth and propagation of traditional food plants, especially root plants; and reductions in the size of both bulbs and their habitats due to: overgrazing by cattle; due to competition from weed species; due to decreased burning; and due to decreased root digging which formerly propagated the young bulbs. The report notes that the Secwepemc carried out natural resources management through the periodic burning of old plant matter, the pruning of berry bushes, the replanting of immature corms and bulbs, and the selective harvesting of plant and animal species. A variety of tree species is described as important for different foods, medicines, and technological purposes. The report notes increased current interest in traditional medicinal plants and a desire to preserve knowledge and access for present and future use. Concern is expressed in the report that ungulate populations have significantly declined after clearcut logging, partly due to increased access by logging roads and skid trails. Elders were interested in seeing the protection of and limited access to plants that are important in traditional diet and medicine. Concern was also expressed about impacts of clearcut logging on water levels and water flow in lower-elevation areas.

The report made recommendations to: study and resolve the issue of increased access due to logging, which may be destructive to plants and wildlife; to determine the potential impact of clearcut logging on plant species, especially on species of significance for food and medicine; to protect areas where unique plants grow; and to exercise care not to further distribute or enhance the growth of noxious weed species.

The Bonaparte Indian Band has also identified as one of its core values the protection of sxusem or soapberries and other berries and cultural plants. Another of its core values is the protection of all spiritual sites, for which a 20-to-50-metre buffer has been suggested. The policy consultant to the Bonaparte Indian Band noted that the Band has spatially identified proposed no-harvest zones for spiritual areas and specific cultural management areas, through the FRA process. It was also noted that hunting is an important cultural use of the Bonaparte Indian Band and that protection of wildlife has a subsistence orientation.

I assume that the log-arounds which I discussed above result at least in part from discussions between First Nations and licensees about protection of cultural heritage uses.

My general conclusion from all of this information, and from my own direct discussions with representatives of both the First Nations and the licensees in the TSA, is that there is a good deal of evidence to support the existence of historical and ongoing aboriginal interests in many locations in the TSA, which licensees are already recognizing, respecting and taking into account in their planning and operations. A strict application of the stated Guiding Principles to which I adhere in determining AACs would normally prevent my taking into account any timber supply implications from related, informal ‘log-arounds’ until the completion of some form of official, government-approved change in land-use designation. However, I also note that recent court decisions respecting aboriginal interests as well as overriding Constitutional obligations require me to consider aboriginal claims even when they have not been formally determined. Within the Guiding Principles themselves, I have noted that under certain circumstances I may deviate from them, provided that in all such instances I document the reason for the deviation. I am persuaded that the management of cultural heritage resources in this TSA, particularly for spiritual purposes, warrants such an approach at this time, for the following reasons.

I cannot be certain at this time that all of the more than 16 000 hectares of informal 'log-arounds' in the TSA, which licensees have identified as areas where harvesting operations are currently avoided, will eventually become formally and completely excluded from contributing to the timber harvest, in perpetuity. I am advised that in many cases, with collaboration and planning, certain portions of such areas now typically become available for harvest while other more sensitive portions remain buffered from development. The Province is currently in a period which government has declared as a 'New Era of reconciliation, opportunity and shared purpose between aboriginal and non-aboriginal British Columbians', for which government's intentions include 'working to materially improve the quality of life, education and health care of aboriginal families'. Consistent with these intentions, given the clearly stated importance attached by First Nations to at least some of these areas and the existence of aboriginal interests, I consider it appropriate, in advance of an eventual formally negotiated land-use designation, to recognize that these aboriginal interests that exist within some of these "log-around" areas are likely to constrain the amount of timber that may be expected to be harvested from them, indefinitely.

While experience has shown that in certain of these areas, some degree of harvesting operations may be agreed to eventually, in others no such opportunity has so far been identified, despite substantial passage of time. The clear conclusion is that areas involving the exercise of aboriginal interests will need to be managed in a very different manner from normally unconstrained portions of the THLB. In recognition of this, in my determination I have accounted for an unquantifiable overestimation in the base case timber supply projection, as discussed in '**Reasons for Decision**'.

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

Other information

- strategic land use planning and protected areas

Land use planning in the Lillooet TSA has been underway for many years under various processes including Co-ordinated Resource Management Plans (CRMPs), Co-ordinated Access Management Plans (CAMPs), Local Resource Use Plans (LRUPs) and, most recently, the Land and Resource Management Plans (LRMPs). The LRMP, as discussed, has not received final approval at this time and the older plans provide little current direction, since they were meant to have been replaced by a completed LRMP and have therefore received no work since 1996 when the LRMP was initiated. District staff suggest that there are no timber supply impacts that can be attributed to these older plans, particularly since they are now rarely referred to and have not been updated for current legislation and planning practices. In 2004, Cabinet approved in principle the LRMP begun in 1996, and mandated staff of the provincial Integrated Land Management Bureau (ILMB) to conclude related discussions with First Nations.

The St'át'imc First Nation has developed a preliminary, draft Land Use Plan, and the ILMB has engaged in some work with the St'át'imc to analyse and attempt to reconcile the St'át'imc plan with the draft Lillooet LRMP. However, this process has been suspended indefinitely and the LRMP remains in provisional form with no current plans for its completion. Cascades Forest District staff have requested to review the St'át'imc First Nation's latest work on its land use plan; however, the land use plan is under revision and has yet to be ratified by the St'át'imc Chiefs. In 2007, analysis by the ILMB of an older St'át'imc plan indicated a

THLB of just 5000 hectares within the St'át'imc claimed territory, and a THLB of 65 000 hectares in the TSA, indicating an extreme level of constraint in comparison with the 243 160-hectare THLB derived in a scenario analysis emulating the draft 2004 LRMP, included in the 2005 Lillooet TSA timber supply analysis (see below, '*alternative harvest flows*'). However, the government-to-government negotiations with the St'át'imc led to one scenario which defined a THLB of 140 000 hectares in St'át'imc territory, or 200 000 hectares in the TSA as a whole.

In the analysed LRMP scenario, a harvest level projected at the current AAC could be maintained for 50 years, i.e. one decade less than in the base case, and the subsequently projected harvest levels fell more quickly to a long-term harvest level lower by 4.1 percent than in the base case. Analysts attribute these results primarily to a reduction in the THLB due to new parks, and to a reduced access to timber due to additional wildlife reserves; these constraints were partly offset by a relaxed constraint for spotted owl habitat and by a smaller area requiring to be managed as visually sensitive, relative to the base case.

Although the LRMP remains in draft with an uncertain future and no immediate plans for its completion, some of its provisional components nonetheless provide helpful information on potential impacts on timber supply. The plan's timber impacts 'budgets' for habitat for grizzly bear and spotted owl have resulted in related GAR orders, which I have considered earlier in separate sections under those respective headings. I have also considered some known implications from protected areas in the TSA, and some that may reasonably be expected, as follows.

The Spruce Lake Protected Area in the Southern Chilcotin mountains, which results from the Lillooet LRMP process, is protected under the *Environmental Land Use Act* (Order-in-Council 524 Vol. 28 No. 11, April 18, 2001). In the analysis, the Spruce Lake Protected Area was therefore modelled as a no-harvest zone. From a total protected area of 71 272 hectares, a net reduction of 20 801 hectares was applied to the Crown Forested Land Base in deriving the THLB.

The July 22, 2004 draft LRMP document identifies eight proposed new protected areas. All of these new protected areas, and the Arthur Seat Study area, which was identified as a proposed study area given the high First Nations values present, have received initial protection as Designated Areas under Part 13 of the Forest Act, effective June 30, 2004. These designations—which were extended in 2008 for 16 months to expire on October 31, 2009—allow the MFR to halt, limit or place conditions on development in these areas. The total area included in the Part 13 Order is 25 761 hectares, including 16 188 hectares of CFLB and roughly 7200 hectares of the long-term THLB. Although this represents roughly 3.5 percent of the THLB, analysis shows that due to large overlaps with OGMAs and to the relatively low site productivity in the proposed protected areas, the projected difference in timber supply attributable to the proposed protected areas is just a one-decade reduction in the duration of the harvest level at the current AAC, and a 1.6 percent reduction in the long term. No temporary AAC reduction has yet been determined in respect of this order. In the 2005 analysis, the Arthur Seat area was treated in the same manner as all other LRMP proposed parks, for a combined total area of protected and proposed protected areas identified in the LRMP of 209 717 hectares.

The Land Use Planning Agreement completed on April 11, 2008 between the Lil'wat Nation and the Province of British Columbia as represented by the Minister of Agriculture and Lands

has resulted in two new protected areas within the Lillooet TSA receiving Royal Assent, the Cerise and the Duffy Extension. In addition, the Sea-to-Sky plan created a Wildland Zone in the Lillooet TSA in which no timber harvesting is allowed. Together these areas reduce the THLB in the Lillooet TSA by roughly 600 hectares.

Other aspects of land use planning in the context of First Nations' interests and identified core values are discussed throughout this document, notably in '*First Nations' archaeological sites*', '*First Nations' cultural heritage resources...'*, and in *'First Nations' consultation process'*.

From all of this information and from my discussion of these issues with MFR regional, district and branch staff, I will summarize and conclude as follows. The provisionally approved LRMP, which includes the proposed protected areas, has become the subject of government-to-government discussions with the St'át'imc First Nation which are now in indefinite suspension. Meanwhile, no harvesting is allowed in the proposed protected areas under a Part 13 Order which expires on October 31, 2009, with no current assurance of any prior resolution or government approval to be reached in part or in full for the land use plan. Pending full government approval of these Part 13 areas I cannot formally account for them as part of this determination under Section 8 of the *Forest Act* as a definitive reduction of 7200 hectares in the THLB, but in any case the analysis shows only relatively minor associated timber supply implications, and these are confined to the longer term. In this circumstance and given the currently low level of harvest in the TSA, I see very little risk in simply waiting for full government approval of some or all of the proposed protected areas before making any associated AAC reduction. If and when areas are formally established as protected areas, I will assess the need, and the most suitable mechanism, for making a timely and appropriate adjustment to the AAC.

Finally, while the Spruce Lake protected area was correctly modelled as a no-harvest zone (albeit with some uncertainty in its size in the LRMP), the Wildland Zone created in the Sea-to-Sky plan does result in a small overestimation of roughly 600 hectares in the THLB, or roughly 0.3 percent in the timber supply, and I have accounted for this in my determination as discussed in '**Reasons for Decision**'.

- *First Nations consultation process*

As chief forester of British Columbia, I must consider information arising from the consultation process with First Nations respecting aboriginal interests and treaty rights that may be affected by my AAC determination. As well, I will consider relevant internal information available to the ministry regarding aboriginal interests.

The TSR process for this AAC determination began in 2003. The first consultation letters to First Nations were dated April 2, 2004, with follow-up letters sent on February 10, 2005, and letters with the analysis package sent on June 9, 2005. The review process was delayed for one year to accommodate a request by the St'át'imc to allow for government-to-government discussions on land use plans, and was recommenced on August 29, 2008, with a consultation letter and a public discussion paper with an update on the implications of the MPB infestation. The 60-day response period, which was afforded all First Nations whether or not an FRA was in place, was due to end on November 3, 2008, but was extended to December 10, 2008, and all information received up to my signing of this document in March, 2009, has been made available to me and duly considered. Some First Nations representatives attended

some of the Lillooet Licensee TSA Group meetings in October, 2008, where the TSR was discussed, and monthly meetings were held between the St'át'imc First Nation and the MFR Technical Committee, although the St'át'imc did not consider this a properly constituted forum for consultation. On November 14, 2008, MFR Southern Interior Forest Region and Cascades Forest District staff made a presentation on the TSR to the Halaw Board with membership from the Northern St'át'imc Bands (Xaxli'p, T'it'qet, Cayoosh Ck, Ts'kw'aylaxw, Seton Lake, and Bridge River Bands) and Ainsworth. From that point, until the AAC determination meeting in Lillooet on December 9-11, 2008, various follow-up invitations to consult were made, and a number of meetings held and submissions received. Records of contact have been compiled and maintained from all meetings, correspondence and submissions. On December 10, 2008, I met in Lillooet with six First Nations' representatives to obtain further input, as noted below.

Consultation for this AAC determination process was engaged in with the following First Nations entities:

> the Ashcroft Indian Band, the Bonaparte Indian Band, the Boothroyd Indian Band, the Boston Bar Indian Band, the Bridge River Indian Band, the Canoe Creek Band, the Cariboo Tribal Council (now the Northern Shuswap Tribal Council), the Carrier Chilcotin Tribal Council, the Cayoose Creek Indian Band, the Cook's Ferry Indian Band, the Esketemc Indian Band, Esh-kn-am, the Fraser Canyon Administration Office, the High Bar Indian Band, the Kanaka Bar Indian Band, the Lillooet Tribal Council, the Lower Nicola Indian Band, the Lower Stl'atl'imx Council, the Lytton First Nation, the Mount Currie Indian Band, the N'Quatqua Band, the Nicola Tribal Association, the Nicomen Indian Band, the Nlaka'pamux Nation Tribal Council, the Oregon Jack Indian Band, the Seton Lake Indian Band, the Siska Indian Band, the Skuppah Indian Band, the St'át'imc Chiefs Council, the Stone Indian Band, the T'it'q'et Administration, the Toosey Indian Band, the Ts'kw'aylaxw First Nation, the Tsilhqot'in National Government, the Whispering Pines Clinton Indian Band, and the Xaxli'p (Fountain) Indian Band.

As reflected elsewhere in this rationale and in this section, it is apparent that the Lillooet TSA is home to many First Nations' people who have significant interests in the area. The efforts at consultation for this TSR and the consideration of the interests in this decision reflect the number and significance of those interests. The chronology of MFR's engagement of First Nations in consultation for this determination, and the key concerns received, are as follows:

> On April 2, 2004, all of the above entities were sent a cover letter, TSR brochure, and draft data package, except for the Cook's Ferry Indian Band, which was missed but whose tribal association was made aware of the review process, and the St'át'imc Chiefs Council, who nonetheless wrote to the Cascades Forest District in May, 2004 in response to the distributed information, as below.
>
> <u>St'át'imc Chiefs Council (SCC)</u>:
>
> The St'át'imc response in May, 2004 described the St'át'imc title and rights throughout its territory, requested that these be addressed and accommodated in any proposed Crown action that is a potential infringement, requested that consultation be carried out with the St'át'imc—identifying the need for a clear and transparent process between the St'át'imc

and the government—and encouraged government to develop and implement a consultation process regarding land and resource use within St'át'imc territory.

In July, 2004 a Government-to-Government Protocol Agreement was developed between the St'át'imc and the provincial government, with one objective of the Protocol Table being to identify changes to decision-making processes related to land and resources. During Protocol Agreement meetings with the St'át'imc in 2005, the St'át'imc requested that the TSR process for the Lillooet TSA be postponed. I agreed to a one-year extension, to August 2006.

In February, 2006, representatives of the St'át'imc and staff from the provincial government began drafting terms of reference for how to engage the St'át'imc in the Lillooet TSR. Later that year, related discussions became stalled in consideration of higher-level issues, and the Protocol Table has not met officially since July, 2007, pending a meeting on Principles with the provincial ministers who signed the Protocol Agreement of 2004.

A letter from the St'át'imc Chiefs Council to my office, dated January 4, 2008, requested a meeting to discuss the current timber supply for the Lillooet TSA. In March, 2008, I advised the St'át'imc of the increasing urgency to reassess the timber supply in consideration of the MPB infestation, the consequent need to continue with the TSR process, and the need to restart the consultation process.

On December 10, 2008, the day I met with a number of First Nations representatives in Lillooet, including a representative of the St'át'imc Chiefs Council, I also received a letter from the Council which included the opinion that the TSR and AAC determination process for the Lillooet TSA is flawed and does not incorporate meaningful consultation and accommodation. An immediate reactivation of the suspended Protocol Table was proposed, and I was invited to attend a meeting of the St'át'imc Chiefs Council. I have responded to that letter, indicating that representatives of ILMB will be contacting the St'át'imc Chiefs Council to discuss high-level issues with respect to government-to-government interactions including those related to forest management.

Bonaparte Indian Band:

Following the public review period ending June 7, 2004, a meeting was held on June 16, 2004 with the Bonaparte Indian Band to discuss the data package. At an FRA meeting on May 2, 2005, the Bonaparte expressed concern that the timber supply analysis had not modelled considerations specific to traditional use. MFR staff advise me that the information which had been provided by the Bonaparte could not be directly incorporated in the analysis or correlated with specific implications for the timber supply. However, the summary information from the Bonaparte was presented to me during the AAC determination meeting, and I have considered related implications in context of each of the factors addressed, as documented throughout this rationale. (In particular, see *First Nations' cultural heritage resources and spiritual use*.)

Following a June 23, 2005 meeting with MFR on the TSR, the Bonaparte Band indicated in a letter dated June 28, 2005 that the process and the analysis did not reflect or incorporate the information it had provided, and did not address issues the Band had repeatedly raised on cultural heritage values, environmental values and socioeconomic priorities. In response, it is important to remember that, while it may not always be

possible for such concerns to be directly, individually and quantitatively accounted for at the analytical stage of the TSR, the AAC determination itself is a combination of analysis and judgement made by the chief forester, rather than a technical calculation, and that, in my determination, I have addressed these noted and many other categories of concern and where possible accounted for them, with reasons, as documented in various sections of this rationale statement.

On October 5, 2006, in response to a request by MFR Southern Interior Forest Region staff for statistics on the portion of the Bonaparte's asserted traditional territory that overlaps the Lillooet TSA, a report '*Bonaparte Indian Band Asserted Traditional Territory Assessment (Lillooet TSA)*', prepared by Forsite Consultants Limited, for the Bonaparte Band, was provided to regional staff. This document contains charts, tables and statistics indicating a gross overlap of 12 284 hectares, including 6496 hectares of the THLB. In my determination I have remained mindful of, and have responded to, the core values and management priorities expressed by the Bonaparte for these overlapping lands, as addressed in my considerations in many parts of this rationale.

In December, 2007, the Bonaparte Indian Band provided MFR with an updated mapping of its Aboriginal Interest Area, identifying a slightly larger area in the Lillooet TSA than in the 2006 report. The Bonaparte Indian Band also provided the MFR Cascades Forest District, during an FRA meeting, with a copy of its '*Bonaparte Land and Resource Management Plan, April 2007*'. Many of the core values and forest management concerns expressed by the Bonaparte in other documents are addressed in this rationale, as follows.

The Bonaparte Indian Band has identified a set of core values with respect to forest management, which are reported in the Robertson Ecosystem Plan by Thomas and Norwell, 2004, as well as in an August 22, 2006 email from Chief Mike Retasket, presented to the FRA table in May 2007, regarding the TSR for the Lillooet TSA. In this rationale I have referred frequently to these identified core values which include: protection of all spiritual areas, archaeological sites, resources and values; protection of all water with 50-metre buffers on each side as riparian reserve zones; maintenance of a forest-like landscape; consideration of the whole forest at the landscape level; retention of quantities of leave trees and strips in ways that are contiguous, as in WTPs; the use of partial cutting wherever this is possible and constitutes best management; protection of sxusem (Soapberries) and other culturally important plants; management for cultural heritage values and sites including for medicines and berries; protection and management for wildlife and its habitat; and promotion of employment and benefits for the Bonaparte Indian Band. The Bonaparte would like these core values to be reflected in all FSPs, and MFR's intention is that all licensees operating within Bonaparte's claimed traditional territory will meet with the Forest Referral Committee to discuss practices at the site plan level before, during, and after harvesting. As far as possible, I have addressed each of these core values in the appropriate section of this document.

<u>Canoe Creek Band</u>:

The Canoe Creek Band expressed concern over the lack of harvest of dead pine in the Lillooet TSA and whether the amount of shade remaining under MPB-killed stands would be adequate for Labrador tea sites. I have discussed various aspects of the economics of harvesting damaged pine under '*economic operability*', '*harvest partitioning objectives*',

'*mountain pine beetle*' and '**Reasons for Decision**', and have discussed issues related to '*Cultural Heritage Resources*' under that heading. While I acknowledge the concern over the lack of shade under MPB-killed stands, in this determination, given the scope of the infestation, there is little I can do to address that risk, beyond noting that it will likely not be worsened by the very limited timber harvesting occurring in beetle-attacked stands.

Ashcroft Band:

The Ashcroft Band expressed concern for the timber supply implications of a volume allotment for domestic use by First Nations, pursuant to the December, 2006 Supreme Court decision in Sappier and Grey; I have considered this under '*Cultural Heritage Resources*'.

Ts'kw'aylaxw:

The Ts'kw'aylaxw Band has requested 100-percent retention in mule deer winter range in its asserted territory, as in the St'át'imc Land Use Plan. I have discussed this in '*ungulates*' and have accounted for a timber supply overestimation in the base case in respect of ungulate habitat.

Xaxli'p:

The Xaxli'p Band, which has a signed FRO and is currently in the application stage of a Probationary Community Forest Agreement (PCFA), enquired if the PCFA volume would be removed from the AAC for the TSA. I have allowed for this in my determination as discussed in '*Probationary Community Forest Agreement*' and in '**Reasons for Decision**'. The Xaxli'p Band has plans to manage the PCFA under an ecosystem-based management planning process, and questioned why the whole TSA isn't managed in this way to attain a more sustainable AAC. The current legislation governing forest management practices in BC is the FRPA, which forms the basis for my considerations in respect of current practice in all TSAs.

Lillooet Tribal Council (LTC):

The LTC is undertaking studies of Species at Risk, mule deer, and grizzly bear, to update the St'át'imc Land Use Plan and recommend management strategies. The LTC is concerned that the St'át'imc Land Use Plan is not incorporated into the TSR, which I have discussed in '*strategic land use planning and protected areas*'. I have also addressed various aspects of the St'át'imc Land Use Plan in the '*ungulates*' and 'g*rizzly bear*' sections of this document. The LTC is concerned over a lack of harvesting of MPB-killed pine in the TSA (please see also 'Canoe Creek Band', above) and over a concentrated harvest in Douglas-fir types, which overlap with mule deer habitat of particular concern to the St'át'imc, and which could affect the sustainability of the AAC in the longer term. I share this latter concern and have addressed and accounted for it in '*Harvest Partitioning Objectives*' and in '**Reasons for Decision**'.

Lytton First Nation:

The Lytton First Nation and the Nlaka'pamux Nation Tribal Council expressed concern over MPB infestations in Ponderosa Pine stands, and I have addressed this concern below, in '*mountain pine beetle*'.

As part of the consultation process, the salient points from nearly 60 pages of comprehensive meeting records and submissions, from 2005 to 2008, detailing First Nations' aboriginal interests and concerns and the approaches taken by MFR to address some of those interests and concerns, have also been presented to me. My consideration of the information on aboriginal interests and the issues raised, and the accommodation measures I consider appropriate, are also documented in appropriate sections of this rationale.

Also as part of the consultation process, on December 10, 2008, together with MFR regional and district staff, I met in Lillooet with six First Nations representatives, from the Lillooet Tribal Council, the St'át'imc Chiefs Council, the T'it'q'et Administration, the Ts'kw'aylaxw First Nation, and the Xaxli'p Band, and earlier in the day I heard from a representative of the Cayoose Creek Band.

The Cayoose Creek representative indicated that First Nations are establishing partnerships with licensees and the AAC should not be reduced in a way that would limit opportunities when economic conditions improve for innovative uses such as bio-fuel for heating, for prefabricated home-building, or other niche-market enterprises that could bring benefits locally to Lillooet. The representative pointed out that habitat constraints for spotted owl preclude workable FRAs or FROs in Cayoose Creek territory, and noted that forests need more management, not just for economic activity but for sustainability and health.

At the evening meeting, the respective representatives made the following main points. The St'át'imc Chiefs Council strongly wished to reconvene the suspended Government-to–Government Protocol Table which had been making progress in joint work on the TSR process, and also expressed concern for the management of mule deer and grizzly bear, and for the need for reconciliation between the St'át'imc Land Use Plan and the still draft Lillooet LRMP. I have discussed these issues elsewhere in this document, and again I note that the ILMB will be contacting the St'át'imc respecting engagement between the First Nation and the provincial government. The St'át'imc Chiefs Council representative also delivered to me by hand the December 10, 2008 letter referred to earlier in this section.

The Xaxli'p representative also urged reinstatement of the protocol table, and noted that the amount of timber harvesting under Ecosystem-Based-Management in the proposed Community Forest Agreement could be much less than under conventional practice. My response was to encourage implementation of the agreement under the management regime the First Nation considers appropriate for this land. Another Xaxli'p representative who was also representing the Ts'kw'aylaxw First Nation, identified problems with the volume of referrals in three forest districts, and expressed concerns about Section 18 licence transfers from the 100 Mile House TSA to the Kamloops TSA in respect of MPB-salvage harvesting. He also related concerns about the need for protection of Pavilion Creek, Pavilion Mountain and Robertson Creek from harvesting by BCTS and another First Nation. While acknowledging the First Nation's desire to see these areas protected from harvest, they are not currently part of any land use decision that would lead me to exclude them from contributing to timber supply, and furthermore I am confident that management under the FRPA and continued dialogue between licensees and First Nations will ensure sustainable management, consideration of aboriginal interests and maintenance of the productivity of the forest land in these areas.

The T'it'q'et representative urged reinstatement of the protocol table, and the Lillooet Tribal Council representative urged full consideration of the St'át'imc Land Use Plan. Positions

generally supported by all representatives were that First Nations need to experience better standards of living, which requires their meaningful engagement in an economy that maintains consistency with their culture; this implies a diversified approach in realizing forest-derived benefits. Timber harvesting is therefore not opposed, as long as adequate consultation provides protection for cultural heritage values and for special areas, if referral issues can be resolved, if fair benefits can accrue to First Nations through revenue sharing, if joint decision making can be employed, and if adequate capacity can be built. Reference was made to the desirability of a working relationship with BCTS for cutting permits in the French Bar area.

Most of these concerns are matters which I cannot address directly in an AAC determination. However, to the extent possible with current information, in my determination I have accounted for cultural heritage and other First Nations' values as documented herein, and the AAC itself will include adequate volumes for joint ventures or whatever appropriate and workable opportunities can be arranged for First Nations at the discretion of the Minister of Forests and Range. My role in AAC determinations is to identify the total volumes of timber that may be made available in TSAs for utilization in harvesting opportunities that will be distributed among licensees as decided by the Minister through the apportionment process within the context of sustainable management for all forest values.

As noted above under *First Nations' cultural heritage resources and spiritual use*, 26 First Nations communities have asserted overlapping traditional territories within the Lillooet TSA and several Nations have explicitly asserted aboriginal title to extensive portions of the TSA. I acknowledge that First Nations people make up a significant portion of the TSA's population and that evidence of First Nations' uses is substantial in the TSA; however, the overlapping nature of the claims makes it difficult to be conclusive about where title claims may be strong in particular areas of the TSA. Specifically, communities from the Secwepemc, St'át'imc, and Tsilhqot'in Nations have overlapping claims to areas west and north of Lillooet. Communities from the N'laka'pamux and St'át'imc nations claim overlapping territory in the area south of Lillooet. In the west-central portion of the TSA, where there is relatively little THLB compared to other parts of the TSA, some members bands of the St'at'imc Nation claim territory. Despite the uncertainty, I recognize that there is some potential for claims of aboriginal title to be proven in some of the areas of the Lillooet TSA. However, the question of how those claims could be accommodated in an AAC determination is not clear. I emphasize that the forest management regime employed on Crown land in British Columbia—as codified in the *Forest and Range Practices Act* and related regulations and policies, and reflected in land use decisions—is designed to ensure the maintenance of the capacity of the land to support values associated with forests, such as water, wildlife, fish, trees and other forest vegetation. I have reflected that forest management framework in my AAC determination. In particular, in making an AAC determination one of my objectives is to ensure that timber is continually available through time, and that allowable timber harvest levels in the short term are consistent with a sustainable long-term timber supply. I base the determination on analysis that indicates this objective can be met.

I would like to add in relation to First Nations' generally expressed concerns for habitats and matters of forest stewardship that in all AAC determinations I already must and do consider and account for many wildlife management issues associated with potential implications for timber supply, for instance by ensuring appropriate forest cover provisions for riparian areas,

for ungulate winter range and habitats for other species including grizzly bear, for biodiversity at the stand and landscape levels through OGMAs and wildlife tree patches, and other such objectives, all of which are routinely assessed in operations and in timber supply analysis and accounted for as required by law. In situations where particular interests in stewardship are raised by a First Nation, I can then determine whether operational and analytical procedures are appropriate to address the interests raised or whether further steps may be necessary to address adequately a particular interest and the impact my decision may have on that interest. For example, many of the management preferences identified by the Bonaparte and the St'át'imc in their respective plans are already being considered, and in some cases implemented to some degree, in operational planning and delivery, through cooperative relationships with licensees. Wherever reasonable and appropriate, I have accounted for such changes in practice. However, not all of the input from First Nations is always uniform; concern by some for increased economic opportunities may be inconsistent with others' concerns for implementing ecosystem-based management, reducing harvest levels and reserving areas from harvest. Nonetheless, I have considered all of the input received and in each case I have documented my consideration and response.

From all of the foregoing in this section, I note there has been a long history of consultation with the appropriate First Nations on this AAC determination process, with linkages to the land use planning process. From my review of the records and the aboriginal interest information available to staff and the potential impact my proposed decision may have on these interests, I believe that the MFR has engaged in consultation at an appropriate level on the consultation spectrum as outlined in the Haida decision, and that this consultation was meaningful and adequate for the circumstances.

In conclusion, as reflected elsewhere in this rationale and in this section, it is apparent that the Lillooet TSA is home to many First Nations' people who have significant interests in the area. The efforts at consultation for this TSR and the consideration of the interests in this decision reflect the number and significance of aboriginal interests. I would like to thank the First Nations for a productive and mutually respectful exchange of information and ideas during this consultation process, and I reiterate that most of my considerations with respect to specific aboriginal interests relevant to my decision are discussed elsewhere in this document, in sections under the appropriate headings.

- *pulpwood agreements*

Parts of two pulpwood agreement (PA) areas are located in the Lillooet TSA. Pulpwood agreement PA 2 has never been utilized, and MFR staff do not expect it to be, under currently foreseeable market conditions. Pulpwood Agreement PA 16 is a multi-TSA agreement, established in April, 1990, as a 25-year, non-replaceable licence. The current Management Plan permits a total annual harvest of up to 330 000 cubic metres from four TSAs, of which up to 25 000 cubic metres were originally proposed for harvest in the Lillooet TSA; the current agreement does not restrict the harvest by TSA. Under the agreement, timber of a quality below conventional merchantability limits may be harvested if no mill residues that are suitable for the facilities in the agreement are otherwise available. In the 18-year history of PA 16, the harvested volume has come from other TSAs; no harvested volume has ever been billed under the licence in the Lillooet TSA. Current practice and economic conditions therefore suggest it is reasonable to expect that no volume will be harvested under PA 16 in the Lillooet TSA, and in the 2002 AAC determination no partition was provided for

harvesting attributable to PA 16 stands. Reflecting the lack of harvest from stand types within PA 16 as current practice, in the 2005 base case analysis, the stands meeting the criteria for harvest under PA 16 were excluded from contributing to the THLB. A sensitivity analysis showed that in any case an additional 25 000 cubic metres per year could be harvested from the TSA in PA 16 area until the agreement expires, without affecting the harvest outside the agreement area. In this analysis, the long-term harvest level increased by 1.6 percent, as the harvested PA 16 stands were assumed to be reforested to managed stand conditions, slightly increasing the long-term timber supply.

The Bonaparte Indian Band has indicated that it does not support harvesting from PA 16. The St'át'imc First Nation has noted the need to address accommodation respecting title and rights in general, and specifically with respect to the PA 16 management plan, and has stated the need to consult and accommodate. I am advised that the Settlement Agreement with respect to Crown's duties of consultation and accommodation on the October 22, 2004 amendment to PA 16 notes a revised limit of 44 102 cubic metres for harvesting under PA 16 by Ainsworth in Bonaparte traditional area in the three TSAs. The Bonaparte have also expressed concern for the feasibility of harvesting a piece size greater than 0.2 cubic metres in PA 16, noting that (a) in the current excess of wood in the market there should be no reason why Ainsworth would need to harvest under PA 16 and (b) that licence holder Ainsworth will not be able to harvest a piece size greater than 0.2 cubic metres under PA 16 without amendment to the management plan which requires consultation with the Bonaparte Band.

My conclusion from this information is that, given the PA 16 licensee's ongoing preference for more desirable stands in other TSAs, with the consequence that harvesting under the PA in the Lillooet TSA is unlikely, and given that the analysis shows that the harvest could be taken in any case from Lillooet without affecting the base case projection, the analysts were correct in excluding these stands from the THLB in the base case, and I am satisfied that any implications related to the PA 16 land base are adequately accounted for in the analysis.

- *harvest sequencing and profile*

Harvest priorities established in the timber supply model guide the model to harvest specific types of stands before others, which can influence the available timber supply. For the purpose of this analysis, a 'relative-oldest-first' ordering was selected, under which stands with the largest difference between their minimum harvestable age and their current age are prioritized first. An 'absolute-oldest-first' alternative was modelled, with no change to the projected timber supply in the short- or mid-terms, but a decrease of 2.9 percent in the long term. I have reviewed the characteristics of the modelled harvest flows to determine if any discrepancies from expectations are present, and I am satisfied that the harvest sequencing applied in the base case adequately projects the available timber supply in the short- and mid-terms; any minor implications projected for 12 decades from now can be refined in future analyses. I have considered issues respecting the harvesting of the species profile in '*harvest partitioning objectives*'.

(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 mid- 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.

The 2005 base case projection for the Lillooet TSA incorporated a harvest flow designed to maintain the harvest at the current AAC for as long as possible, consistent with providing for a managed and gradual transition from short-term to the mid- and long-terms by avoiding large, abrupt disruptions in timber supply. This analysis did not account for the MPB infestation and the initial harvest level could be maintained at the current AAC for six decades before declining by 40 percent over several decades to a long-term harvest level of 379 920 cubic metres per year (see '*Base case for the Lillooet TSA*').

The 2005 analysis also included an 'LRMP scenario' which I have summarized earlier, in '*strategic land use planning and protected areas*'.

An alternative analysis was provided which showed that (disregarding the significant implications of the MPB as well as prominent issues of accessibility and economics) the forest composition and current management objectives in the Lillooet TSA enable a sufficient flexibility in the short-term harvest to permit an initial harvest rate of 873 920 cubic metres per year for one decade. This would need to be followed by reductions of 10 percent per decade to reach the same long-term harvest level as, but three decades earlier than, projected in the base case.

In my earlier considerations under '*economic operability*' I described other alternative harvest forecasts with significant implications for the timber supply as identified in alternative projections related to areas of economic operability under differing market conditions defined in the TERP study.

In the 2008 Addendum to the timber supply analysis, I was provided with an alternative analysis, described more fully below in '*mountain pine beetle*', which illustrates the results of assuming (a) that a large volume of pine is killed and its value becomes lost by the end of the first decade of the analysis horizon, (b) that younger pine stands are damaged and regenerate only slowly, and (c) that constraints for visual sensitivity in pine-leading stands are removed for 30 years to permit accelerated salvage harvesting in pine.

In making my AAC determination I have remained mindful of all of these helpful alternative forecasts, and have considered their implications in conjunction with matters related to the sustainability of the non-pine harvest in the TSA, as discussed in **'Reasons for Decision'**. As noted earlier, in '*Base case for the Lillooet TSA*', I am satisfied that the base case projection, in conjunction with the additional information provided in these analyses, forms a satisfactory basis of reference for my considerations in this determination.

- *community dependence on harvest level*

During the December 9-11, 2008 AAC meeting in Lillooet I received from and discussed with MFR Cascades Forest District staff a survey of the socio-economic conditions in the TSA, including primary contributors to the local economy, population trends, mill closures, harvest

levels and other factors. This was partly based on a socio-economic assessment carried out as part of the 2005 timber supply analysis contracted to Forsite. The following are salient points, of which I have remained mindful in this determination.

The total 2001 Census population of 6538 in the Lillooet TSA—of which First Nations people make up approximately one-half—declined by 2.3 percent between 1981 and 2001, while that of the overall province increased by 40 percent. From 2001 to 2006, the population of the town of Lillooet declined by 18.7 percent. The 2001 Census showed the public sector as the largest employer in the TSA, at 38.0 percent, followed by forestry at 19.3 percent (down from 26.8 percent in 1995), tourism at 14.8 percent, and agriculture at 11.6 percent.

Although the forest industry is thus considered one of several important contributors to the Lillooet TSA's economy, industrial forestry activities in the TSA today continue only at a very reduced level. From 2003 to 2007, the actual timber harvest in the TSA averaged 45.9 percent—less than half—of the AAC, having declined from 68 percent in 2002, to 42 percent in 2007. Following the closing in May, 2007 of the Lytton Lumber mill there are no primary breakdown facilities in the TSA. In September 2008, Bridgeside, a lumber remanufacturing facility in Lillooet, also closed down, but has recently re-opened with a single shift. The importance of the forest industry in the local economy is reflected in a May, 2007 study by the Southern Interior Beetle Action Committee (SIBAC) which, due to the downturn in forest sector activity, classified Lillooet among the most vulnerable communities in the Southern Interior Forest Region.

To address the general under-cut in the TSA, to enable the harvest of beetle-damaged pine, and to help create local employment, the MFR has offered several tenure opportunities for harvest of MPB-killed timber in recent years, both to major licensees and as opportunities for First Nations' FRAs, so far with no related harvest activity. While some non-pine-related joint ventures exist in the TSA between major licensees and First Nations, and while there has been some activity in some cases, the overall success of these ventures in the TSA is uncertain.

The overall decline in economic activity in the TSA may be attributed to a number of factors. Recent AAC uplifts in adjacent TSAs for MPB management limit the demand for the higher-cost pine in the Lillooet TSA, which is more remote from processing facilities, particularly now with the closure of the Boston Bar sawmill and the Lytton mill. More generally, reduced traffic and tourism on the TransCanada Highway, the termination of the BC Rail passenger service, and reduced local government services including the closure of the MFR's Lillooet Forest District Office, limit the levels of economic activity in the Lillooet TSA. Some specific adverse aspects of the economics of harvesting in the Lillooet TSA are considered earlier, in '*economic operability*'.

In this problematic context, although the analysis (ignoring MPB) projected the feasibility of a base case initial harvest level of 635 900 cubic metres per year for six decades, the actual economic activity that might result from establishing an AAC at this level is unlikely to be realised in the short term due to the reduced potential for profitable harvesting under current economic conditions. The socio-economic assessment, based on data from 2002-004, indicated that if the initial harvest level projected in the timber supply analysis base case were to be fully utilized, it would support, annually, in the Lillooet TSA, 948 person-years of total employment and 39.6 million dollars of employment income, as well as, in the province as a whole, 1600 person-years of total employment and 62 million dollars of employment income,

together with 11.9 million dollars of stumpage, generating 28.1 million dollars of total BC government revenues. At present, activity at this level in the TSA seems unlikely to be realised.

The Bonaparte Indian Band has indicated that one of its core values is to promote employment and related benefits for the Bonaparte people. The 2004 report by Thomas & Norwell, submitted by the Bonaparte Band, noted that in the Robertson Ecosystem Based Plan the economic and employment goals of the Bonaparte Indian Band include: increased participation by the Band in forest sector activities and access to the economic benefits of harvesting; increased capacity for Band members to be involved in harvesting; and the development of management strategies to ensure that ecosystem functioning and cultural heritage values take precedence over maximizing timber production. I have discussed management provisions for biodiversity and for cultural heritage resources earlier, but as also noted earlier, the allocation of timber harvesting rights and of the associated social and economic opportunities are the legislated responsibility of the Minister of Forests and Range.

The organization Ecojustice submitted that an economic study undertaken at Simon Fraser University had suggested that forest protection would result in more overall economic benefit than using the trees for timber, primarily due to carbon storage and sequestration. I have discussed this issue separately earlier, under '*carbon sequestration*'.

My assessment of the socio-economic situation in the TSA under these conditions is that the TSA has a solid history of community reliance on the forestry sector and, despite the currently generally adverse economic factors, the overall condition of the resource indicates a good potential for continuance of this reliance into the future, within the already diversifying overall economy. With the right combination of opportunities and innovative policies, the industry should be able to continue to provide good forest stewardship and social and economic benefits to local communities, albeit at a scale largely determined by external market factors. In my determination I have considered the potential for the forest sector to contribute to the well-being of people in the area and throughout the province, as evidenced in the willingness expressed by licensees, First Nations, and MFR staff to co-operate toward realizing this potential, under the currently very difficult market conditions.

- *harvest partitioning objectives*

In order to ensure appropriate harvesting of the age and species profiles on forested landscapes, and to avoid any over-harvesting with the potential to adversely affect good stewardship or the integrity of the future timber supply, the provincial *Forest Act* provides for the chief forester, in determining AACs, to specify portions of the harvest as attributable to particular types of timber, or of terrain, in different parts of a TSA or TFL. Allowable Annual Cuts which include such specifications are considered to be 'partitioned'. Recently enacted legislation enables the Minister of Forests and Range also to specify similar limits on volumes licenced for harvest. Importantly, the determination by the chief forester of an AAC in which particular proportions of the timber harvest are attributable only to certain species, terrains or parts of a TSA, does not necessitate the immediate imposition of corresponding, proportionate restrictions on each *licence* in the TSA. The application of any ensuing restriction to a particular licence will flow, under the appropriate circumstances, from considerations of stewardship or other factors, on the recommendation of the regional manager, potentially in consultation with licensees, and not necessarily in such a way as to require all individual licences to harvest directly the proportions of the profile as specified in the AAC.

The current AAC for the Lillooet TSA specifies no such partitioning. However, I am concerned that the recent and current focus of harvesting in Douglas-fir, combined with the significant loss of lodgepole pine to the MPB infestation, presents a risk that short-term harvesting could over-utilize the very species necessary to support harvesting in the mid-term when few pine stands will have grown back to a condition in which they could contribute to the timber supply. Moreover, the Douglas-fir-leading stands contribute substantially to the sustainability of the non-timber forest values in the TSA.

In considering the potential for a partition in the new AAC to assist in addressing this concern, I have reviewed the recent harvesting trends in the TSA as follows. While mature lodgepole pine currently represents about 37 percent of the standing harvestable timber volume (age classes 5 to 8) in all species in the TSA, the pine component of the TSA harvest has declined from 33 percent in 2006, to 24 percent in 2007, and down to just 8 percent from January to October, 2008. This is logically consistent with the May, 2007 closure of the Lytton Lumber sawmill and with district staff observations that, over the past three years, the major licensee Ainsworth, which states that it cannot process MPB-damaged timber, has been primarily harvesting Douglas-fir peeler logs for its successful plywood market, consequently taking only minor volumes of lodgepole pine. For Douglas-fir, which as a leading species comprises 41 percent of the harvestable land base, the actual harvested volume comprised 36 percent of the total harvest in 2003, 41 percent in 2004, 49 percent in 2005, approximately 50 percent in 2006 and 2007, and 69 percent from January to October, 2008.

In weighing the advantages and disadvantages of partitioning this AAC — with respect both to good stewardship and to the maintenance of economic activity in the TSA — I have considered the alternatives of specifying harvests attributable to particular *areas* of the TSA, to reflect the geographic distribution and accessibility of economically viable and non-viable stands, as well as specifying harvests attributable to particular *timber types*, to reflect the current significant imbalance in the harvesting of the species profile in the TSA.

In considering this imbalance, I am aware that roughly 80 percent of the logs processed in the TSA by major licensee Ainsworth are Douglas-fir, the remainder being spruce with minor amounts of lodgepole pine, with the majority of the volume being high quality peeler logs. I am also aware that there is currently no internal, and little if any external, market for MPB-killed pine sawlogs from the Lillooet TSA. In the current economically adverse market conditions therefore, it is clearly advantageous to continue harvesting in the short term whatever level of Douglas-fir is consistent with maintaining the species' ability to contribute to timber supply and to other forest values in the mid term, including maintaining sufficient ecological diversity to support adaptability of forest ecosystems to the possibility of significant climate change. Given the high proportion of Douglas-fir logs which Ainsworth already obtains from outside the TSA, and given the current almost complete absence of pine harvest in the TSA, I believe it is both desirable, and possible, to establish a partition to protect the future integrity of Douglas-fir stands in the TSA without compromising current levels of economic activity in the TSA. The administration of the partition may be carried out by regional and district staff in cooperation and consultation with licensees and First Nations.

I have also considered the possibility of specifying a particular harvest volume as attributable to particular, more remote areas of the TSA that are not currently being accessed. However, my primary concern is for the integrity of the Douglas-fir stands, now and for posterity, which I believe can best be served by a partition between pine and non-pine species, without the

added administrative complication of a partition specifying particular harvests to particular areas in the TSA.

In First Nations' input, the policy advisor to the Bonaparte Band supported the need for a partition, and if necessary a reduction in actual harvest in Douglas-fir-leading stands that meet objectives for other resource values.

From all of these considerations, as addressed further in '**Reasons for Decision**', in determining this AAC I have decided to specify particular harvestable volumes for the pine and non-pine species in the TSA.

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

Economic and Social Objectives

- *Minister's letter*

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

The letter stresses the importance of a stable supply of timber to maintain a competitive and sustainable forest industry while being mindful of other forest values. In respect of this, in the base case projection and in all of the alternative harvest flow projections with which I have been provided for reference in this determination, a primary objective in the harvest flow has been to attain a stable, long-term harvest level where the growing stock becomes stable, neither increasing nor decreasing over time. Consequently in my determination I have remained mindful of the need for the allowable harvest in the short term to remain consistent with maintaining the integrity of the timber supply projection throughout the planning horizon. In particular, I have endeavoured to ensure that the preferential harvesting of certain economically viable forest types in the short term is not permitted to adversely affect the profile of the timber supply in the mid term, as discussed in '*harvest partitioning objectives*'.

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

- *local objectives*

The Minister's letter of July 4, 2006 suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the TSR where these are consistent with government's broader objectives. To this end, and to ensure appropriate opportunities both for public input and consultation with First Nations, in addition to the formal First Nations consultation process described separately under '*First Nations consultation process*', input was invited on the analysis data package for 60 days ending June 7, 2004, and on the analysis report itself during a review period of 60 days concluding on August 8, 2005. On August 26, 2008, through a widely distributed news announcement, the Cascades Forest District again made the public aware of the TSR process and invited input with particular reference to the MPB Public Discussion Paper (PDP), which was

available on the internet and at some government offices. The MPB PDP was also distributed widely through an extensive mail-out to First Nations as part of the final consultation phase. The TSR was the focus of many stakeholder meetings held in the period from 2004 to 2008. Copies of the PDP were available to the public at the Cascades Forest District Office in Merritt, and at the Lillooet Field office of the Cascades Forest District. The District of Lillooet was contacted by telephone, and its Forestry Committee has studied the implications of the TSR for the Lillooet TSA. In addition, together with MFR regional, district and branch staff, I met with representatives of forest licensees, and of First Nations, respectively, on December 9th and 10th , 2008, in Lillooet, to obtain comments related to this AAC determination.

In response to these initiatives, in addition to the wide range of submissions received through First Nations' consultation, which I have considered in various sections of this rationale, the following was received as input of relevance to the assessment of local objectives.

The organization Ecojustice commented by mail and by e-mail, primarily in respect of the spotted owl and the need for carbon sequestration through forest protection, each of which issues which I have considered and responded to in sections under those headings.

Written input was also received from the Lillooet Naturalist Society, as noted in other sections.

At a meeting between MFR and Forest Licensees on October 7, 2008 in Kamloops, MFR gave a presentation on the TSR, which was followed by discussion on partitioning the AAC, and I have reviewed minutes from this meeting. Significant observations, related to local socio-economic objectives, included that the current market economic conditions are even below the 'low' scenario in the TERP (see '*economic operability*') and that determining an AAC with a partition would adversely affect the viability of licences and should not be done without consultation with licensees—for which reason among others I met with licensees on December 9th, 2008, as noted.

In the December 9, 2008 meeting, Ainsworth, the largest licensee in the TSA, reiterated that the company cannot process MPB-damaged timber and is dependent on an economically viable supply of Douglas-fir peeler logs, which it believes partitioning the AAC could constrain. Ainsworth, however, also noted that it currently purchases more logs than it harvests under licence and that most of the logs it processes originate from outside the Lillooet TSA. Ainsworth also noted its good working relationship with one of the First Nations. Ainsworth expressed concern about the combined constraints against an economic timber supply that have been accumulating from multiple planning initiatives. Other representatives emphasized the need to avoid partitioning the AAC, to retain harvesting flexibility for smaller licensees.

I thank the industry representatives for all of the input they have provided, which I have considered carefully in my determination. In particular, my deliberations and conclusions respecting the need for a partitioned AAC are presented earlier, in '*harvest partitioning objectives*'.

In summary, in making my determination, in addition to the information received through consultation with First Nations and addressed throughout this document, I have also received, reviewed, documented and considered local objectives expressed in public input, as recommended by the Minister.

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

Non-recoverable losses

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

- *losses to forest health factors, wind, wildfire*

Using procedures from '*Methods to Estimate Unsalvaged Losses for Timber Supply Reviews*', developed by the MFR Forest Practices Branch, the average annual volume losses over the long term on the THLB to factors other than the MPB for which the volume lost will not be recovered or salvaged, are currently estimated to be 4894 cubic metres lost to damage by other insects, 24 079 cubic metres to fire, 5470 cubic metres to wind throw, and 1000 cubic metres to miscellaneous causes (landslide areas, mammals, flooding, drought, frost and winterkill) for a total annual unrecoverable loss of 35 443 cubic metres. This represents an increase of 53 percent over the previous analysis, when annual losses were estimated at an average 26 080 cubic metres, with the difference largely attributable to higher damage rates by fire and insects.

The current estimates of unsalvaged losses were based on the following data: For insects, on 8 years of aerial forest health survey data; for fire, on 10 years of district fire reports; for wind throw losses, on 8 years of aerial forest health survey data. The losses also accounted for small isolated patches or individual trees on the edges of cutblocks that may blowdown without salvage. The volumes of salvaged timber were based on 9 years of forest licensee salvage and cutting permits, timber sales, and small scale salvage Forest Licenses To Cut. All losses to MPB were removed and are discussed in the following section.

The 2004 Thomas & Norwell report submitted by Bonaparte Indian Band referred to forest health concerns in the area of the Robertson Ecosystem Based Plan, including the salvage of the economic value of MPB-attacked trees, and the acceptability of mistletoe in some stands, for purposes such as food for grouse. However, these concerns do not affect the validity of the modelling of unsalvaged losses in the 2005 or 2008 analyses.

The NRL estimates incorporated in the 2005 base case were not the current estimates (totalling 35 443 cubic metres annually) but those derived for use in the 2002 AAC determination (totalling 26 080 cubic metres annually. This indicates that the harvest levels projected throughout the base case forecast include an overestimation of 9363 cubic metres per year, or 1.5 percent, and I have accounted for this in my determination as discussed in '**Reasons for Decision**'. Given the significant difference between current estimates and those used in the base case analysis, and given the current absence of salvage harvesting in the

TSA, in '**Implementation**' below I have requested that MFR staff and licensees collaborate to reduce what appears to be significant uncertainty in these loss estimates.

- *mountain pine beetle*

In the Lillooet TSA, the MPB is well distributed in pine types of higher susceptibility, including the smaller Chilcotin pine in the French Bar and Watson Bar areas, the larger pine in moister areas such as Goldbridge and Tyaughton Creek, and moderately-sized pine in areas adjacent to the Merritt and Kamloops TSAs, such as the Tom Cole/Pavilion and Murray/Botanie areas.

The very high MPB expansion rate in the TSA from 2005 to 2007 slowed in 2008. District staff anticipate that additional area will be affected in 2009; however, the expansion rate of the infestation is slowing. This agrees with the predictions in MFR's beetle prediction analysis model BCMPB v.5, which projects that by 2012 the MPB will have killed about 72 percent of the pine in the TSA.

I have reviewed the distribution of lodgepole pine in the Lillooet TSA, from which I am aware of the percentages of the total volume of pine occurring in stands predominated by particular species. The TSA contains about 14.8 million cubic metres of merchantable pine, of which 97 percent occur in stands dominated by pine, with minor amounts in stands dominated by Douglas-fir or spruce-balsam.

In the 2005 timber supply analysis, no accounting was included for timber volumes lost to the MPB or for any associated change in the rate of harvesting. In 2008, these implications were analysed in the *Lillooet TSA Timber Supply Review Mountain Pine Beetle Impact Assessment, Addendum to the Lillooet TSR3 Analysis Report (March 31, 2005)*. The MPB modelling was based on the model BCMPB v.4. The model BCMPB v.5 which is now available shows only a small decrease in the rate of spread of the infestation for the Lillooet TSA. District and analysis staff of MFR consider that the current BCMPB modelling provides the most accurate available representation of the MPB situation in the TSA.

In the 2005 base case, forest stands predominated by pine were assumed to contribute to the harvest flow in proportion to their contribution to the overall timber inventory, which has not proved consistent with recent and currently experienced low levels of harvesting in pine stands. In the base case, the modelled harvest was higher than the actually experienced harvest level, in proportion to the absence of the pine harvest. As such, within the overall reduced harvest, the harvest of non-pine species is relatively consistent with the profile of those species. However, any increase in the non-pine harvest, most particularly in Douglas-fir, could be inconsistent with future sustainable harvests; for this reason, and to encourage more harvesting in pine stands, I have attributed a specific volume to the non-pine species, as discussed in '*harvest partitioning objectives*' and '**Reasons for Decision**'.

The 2008 addendum analysis included three scenarios, the detailed assumptions incorporated in which may be found in the report, but which may be described essentially as follows.

- 'Optimistic' scenario: If the salvage of damaged lodgepole pine stands in the TSA were economically viable and roughly two-thirds of the AAC were directed toward this salvage in the next decade, the falldown from the current AAC would be 28 percent in 10 years' time, rather than 10 percent in 60 years' time as was projected in the base case.

- 'Middle of the Road' scenario: If only 14 percent of the AAC could be dedicated to MPB pine salvage in the next decade, and lodgepole pine stands could continue to be accessed in future, the falldown would be by 34 percent from the current AAC, in 10 years' time.
- 'Pessimistic' scenario: If harvesting lodgepole pine stands in the TSA proves perpetually uneconomic, such that 39 percent of the THLB and associated growing stock become entirely unavailable for harvest, the projected harvest rate would drop immediately to 30 percent below the current AAC.

From considering the analytical scenarios in detail and the associated contributions of particular species over time to the projected harvest in each case, I have concluded as follows. The current absence of any significant harvest of pine stands in the TSA appears to validate the third, 'Pessimistic', scenario, of no MPB salvage, as the most reasonable representation of MPB implications in the Lillooet TSA—but only for the near term. In the mid and longer terms at least, pine may reasonably be assumed to contribute to the timber supply in the TSA; pine is present across the landscape in different age classes, not all of which are susceptible to MPB attack, and therefore not all of which will be killed. The TSA is on the periphery of the MPB infestation in the province, and the analysis model already shows a declining rate of attack for the TSA. Thus it is most unlikely that all pine trees in the TSA will be attacked and die, and the stands never recover. Some pine forest will remain, and at some point at least some component of the attacked forest will have recovered. In both cases, subject of course to market economics, some pine stands will be available for harvest to some degree.

For these reasons, while I acknowledge that the current absence of harvest in pine stands is potentially a significantly constraining factor on the projected timber supply, I do not agree that the inevitable implication is a 30-to-40 percent reduction in the timber supply projected to be available in the base case. Given the complexity of the pine contribution to the timber supply under various circumstances in context of the MPB and of contributions from other stand types—particularly Douglas-fir—I have made other considerations affecting the harvest of pine in the TSA under '*harvest partitioning objectives*'.

The 2004 report by Thomas & Norwell, submitted by the Bonaparte Indian Band, identifies various harvesting and treatment strategies for mountain pine beetle in the Robertson Ecosystem Based Plan, including 'do nothing', 'fall and burn', 'bait and hold', 'harvest prior to flight', and 'salvage harvest'. All of these strategies are currently considered operationally by Cascades Forest District Staff and are employed as and where appropriate and viable.

Both the Lytton First Nation and the Nlaka'pamux Nation Tribal Council have expressed concern over infestations of MPB in stands of Ponderosa Pine and their implications for the timber supply. I understand that since many of the infested trees are on lower, south-facing slopes, these infestations are quite significant in some areas. As discussed in '*harvest partitioning objectives*' and in '**Reasons for Decision**', in the new AAC I am encouraging harvesting from pine stands, where economically and operationally viable, such that trees killed in the MPB infestation can be utilized before they become unmerchantable, and where possible, the spread of the infestation may be controlled.

Reasons for Decision

In reaching my AAC determination for the Lillooet TSA, I have made the considerations documented above, all of which are integral to the reasons for my decision, and from which I have reasoned further as follows.

The current AAC for the TSA, determined effective January 1, 2002, is 635 900 cubic metres. The 2005 base case analysis, which did not account for losses or management complications arising from the MPB infestation, projected that a harvest at this level could be maintained for sixty years before declining as described earlier in '*Base case for the Lillooet TSA*'. The 2008 addendum to the analysis, which did account for implications arising from the MPB infestation—as described and considered in '*mountain pine beetle*'—projected that, even under an optimistic scenario where two-thirds of the entire AAC for the TSA could be directed toward the salvage of timber damaged by the MPB, a harvest at the current AAC could only be maintained for 10 years before falling by 28 percent. Currently, due to very adverse market and general economic conditions, almost no harvesting of pine-leading stands, whether attacked by the beetle or not, is carried out in the TSA.

Despite the current lack of harvesting in pine stands, my considerations throughout the determination thus far have been made in reference to all of the standing timber on the THLB supporting the base case projection, on the assumption that it would be inappropriate to entirely discount the mature pine land base from now on (for reasons given in the MPB section) and that, at some point, pine stands will again contribute to the harvest in rough proportion to their profile on the landscape. The comments that follow in these reasons reflect this assumption, with further qualification as appropriate.

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

I have identified a number of such factors in my considerations for this determination, but before reviewing them in detail I will briefly outline the general context in which this determination is being made. Current markets and related conditions amount to a sweeping, overall limitation on the validity of the size of the THLB assumed to be supporting the projected timber supply. In the 2005 base case analysis, projecting a harvest level at the current AAC was predicated on a derived THLB of 250 426 hectares for the short term. Currently, in the 'low-to-moderate' economic conditions reviewed in the TERP study, and with almost all harvesting in the TSA confined to non-pine stands, the effective THLB is more likely reduced to something in the order of 140 000 to 176 000 hectares, or less if licensees are accurate in their assessment of current conditions as worse than the TERP 'low' condition. Compounding this is the remoteness of many parts of the TSA, which imposes strong limitations on the economic viability of delivering harvested timber to mills, particularly in combination with the timber pricing anomaly whereby timber in the TSA continues to be appraised as if it were to be transported to, and processed at, the Lytton Lumber mill, the closing of which now necessitates much longer, more costly, transportation routes to processing facilities.

With these observations as a general context, in my considerations I have identified the following specific factors as reasons why the timber supply actually available in the Lillooet TSA may have been overestimated in the 2005 base case projection:

- The signed FRO agreement between the Provincial Government and the Xaxli'p First Nation for a Probationary Community Forest Agreement (PCFA) in the Fountain Valley will reduce the THLB for the TSA by 12 679 hectares or approximately 5 percent. Sensitivity analysis indicates that this also implies a 5 percent overestimation in the available timber supply by volume.
- The no-harvesting areas (parks and zones) created in the Sea-to-Sky plan result in a small overestimation of roughly 600 hectares in the THLB, or roughly 0.3 percent in the timber supply.
- Areas involving aboriginal interests, cultural heritage resources and spiritual use will need to be managed very differently from unconstrained portions of the THLB, in recognition of which I recognize an unquantifiable but potentially significant overestimation in the base case.
- The 92-hectare requirement for intake reserves in community watersheds, in combination with the current establishment of the Mellott Creek community watershed, represents a small, unquantified and potentially negligible overestimation in the overall timber supply projection for the TSA, which will be analysed and accounted for as necessary in the next determination.
- No specific provision was made for Identified Wildlife species in the analysis, but a significant number of these species are present in the TSA and heightened concern has been expressed for their habitat. I have assumed a related 1-percent overestimation in the base case projection.
- The reservation of 1300 additional hectares of mature non-pine-leading stands for spotted owl habitat corresponds to an overestimation of 0.5 percent in the short-term harvest level projected in the base case, increasing to approximately 1 percent in the longer term.
- Management of additional habitat for the grizzly bear corresponds to a small overestimation in the base case projection increasing to 3.9 percent in the long term, corresponding to 1.8 percent overestimation in the THLB.
- Providing additional ungulate habitat pursuant to the Section 7 Notice will constrain the timber supply to an unquantifiable degree, in the order of something less than 2 percent in the short-term harvest level projected in the base case.
- Applying current estimates for non-recoverable losses will constrain the projected timber supply by an additional 9363 cubic metres per year, or 1.5 percent.

Offsetting the above overestimations, in my considerations I have identified the following factors as reasons why the actual timber supply may have been underestimated in the base case projection:

- The excess land base deduction of 1367 hectares more than required for woodlot adjustments represents an underestimation of 0.5 percent in the THLB, roughly equivalent to a 0.5 percent underestimation by volume.

- The need to account for available volumes of 'dead-potential' wood indicates an underestimation of approximately 9 percent in the timber supply as projected at least for the short- and mid-terms, assuming full harvesting of the species profile.

From reviewing all of the above-listed over- and underestimations in the projected timber supply, I have reasoned as follows. The net results of the indicated adjustments are a total overestimation of approximately 12.1 percent plus the unquantified factor of managing for First Nations' aboriginal interests, cultural heritage resources and spiritual values, placed against underestimations that total roughly 9.5 percent. Acknowledging and considering the range of uncertainties inevitably present, in my judgement it is reasonable to assess the overall combined implication of all of these indicated corrections as a net overestimation in the base case initial harvest level of approximately 10 percent.

Applying such an adjustment to the projected initial harvest level of 635 900 cubic metres indicates a level, rounded to the nearest thousand cubic metres, of approximately 570 000 cubic metres for the total AAC of the TSA.

Within this AAC, as I have discussed in some detail in '*harvest partitioning objectives*', I am concerned over the current imbalance between the contributions of the various species to the overall profile on the TSA landscape and the contributions of the respective stand types to current harvest levels. As I concluded in that section, in the interest of good stewardship, specifically that of protecting the integrity both of the timber supply profile for the future—in particular the Douglas-fir stands in the TSA—and the non-timber values present in those stands, which are of identified concern to First Nations, I consider it incumbent upon me at this time to specify particular portions of the harvest as attributable (a) to pine-leading stands, and (b) to non-pine-leading stands.

Pine-leading stands currently account for nearly 40 percent of the growing stock on the THLB, and non-pine-leading stands for roughly 60 percent. Applying these proportions by species group to the overall AAC that I have determined for the TSA supports the specification of an allowable annual harvest level for pine-leading stands of at least 170 000 cubic metres, with a maximum of 400 000 cubic metres for non-pine-leading stands.

I would like to emphasize that the primary purpose of this partitioned harvest is to regulate appropriately the harvest of the non-pine stands, rather than to place a ceiling on the harvesting of pine stands. If economic conditions improve, if viable uses for additional volumes of pine can be found—such as the niche-market enterprises advocated by the Cayoose Creek First Nation representative—and if partnerships can be formed between First Nations, licensees and communities to take advantage of emerging opportunities, then analysis shows that adequate flexibility exists in the timber supply to accommodate higher levels of pine harvest in the near term. The AAC I have determined should not in any way become a limiting factor against resuming aggressive harvesting in MPB-damaged pine stands as a desirable management priority.

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

In conclusion, I recognize and encourage the strong efforts underway in this TSA to establish and maintain good working relationships between First Nations, the MFR and licensees, both

toward the creation of partnerships to take advantage of economic opportunities, and also to ensure that cultural heritage resources and archaeological values are identified and accommodated appropriately in planning and operations, in combination with other management objectives. In accordance with my Guiding Principles I am not making *de facto* land use decisions to fully protect the larger spiritual areas identified by First Nations, in anticipation of results from other, due process. Nonetheless, in view of the clearly expressed sensitivities attached to certain areas, I have attempted to ensure that, in the accounting I have made in this determination for the range of constraints applied to meet various non-timber objectives, I have left room for adequate planning and operational flexibility to accommodate these sensitivities at least in the near term, without unduly constraining mutually beneficial economic opportunities.

Determination

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

A timber harvest level that accommodates as far as possible the objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, that accounts for First Nations' expressed interests in forest lands, and that includes an essential step toward ensuring the ongoing sustainability of the non-pine species currently preferred for harvesting in the TSA, and of the other forest values associated with these stands, can be best achieved in the TSA by establishing an AAC of 570 000 cubic metres, of which:

- 400 000 cubic metres are attributable to species other than pine.

It is my expectation that the overall AAC will be managed wherever possible to address the priority problem of the mountain pine beetle infestation in the TSA.

This determination, which excludes all woodlot licence volumes and the Probationary Community Forest Agreement becomes effective on May 1st 2009 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.

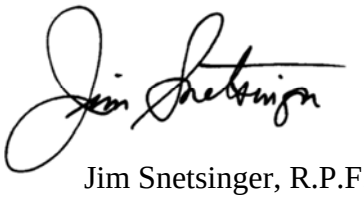
Implementation

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

1. As part of the FREP program, district staff should monitor the performance of regenerated stands with particular reference to the appropriateness of the OAF assumptions, the presence of pests and disease, and any significant volume-related or other implications of the conversion of harvested Douglas-fir stands to pine stands.
2. I encourage licensees to make every effort to derive some benefit from the already significant investment in ecosystem description work by improving the PEM or

similar tools to make more accurate and usable information on site productivity available for incorporation in the next timber supply analysis.

3. MFR district staff should study actual green-up situations in regenerating stands to reduce uncertainties related to green-up times, which will assist both in the planning of harvesting in the TSA and in increasing the reliability of the projected timber supply in all periods.
4. Licensees and district staff should monitor licensees' WTP results and strategies, to ensure that provisions for meeting biodiversity objectives at the stand level are realised operationally.
5. Licensees and MFR district staff should monitor the implementation of the FPPR Section 7 ungulate habitat notice over the next five years, with particular respect for the timber supply impacts resulting from tenure holders' management practices in relation to meeting government's objectives.
6. I encourage continuation of the Cascades Forest District's valuable work on Community fire interface planning and threat-mitigation strategies; if new information becomes available on related potential implications for timber supply, this should accounted for in the next analysis for my consideration in the next AAC determination for the TSA.
7. District staff and licensees should collaborate to reduce uncertainty in the estimates of non-recoverable losses, for incorporation in the next analysis.



Jim Snetsinger, R.P.F.
Chief Forester

March 26, 2009

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1996, reads as follows:

8. 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 agreement areas and woodlot licence areas, and
(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or
(b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (2) or (3),

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

(c) within 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,
(b) different types of timber and terrain in different parts of private land within a tree farm licence area, and
(c) repealed [1999-10-1].

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

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

(a) the community forest agreement, and
(b) any directions of the chief forester.

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

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

(i) the composition of the forest and its expected rate of growth on the area,
(ii) the expected time that it will take the forest to become re-established on the area following denudation,
(iii) silviculture treatments to be applied to the area,
(iv) the stand of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

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

(c) Repealed. [2003-31-2 (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, 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 Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(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 co-ordinated and integrated, in consultation and co-operation with other ministries and agencies of the government and with the private sector;
(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and
(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

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

BRITISH COLUMBIA

JUL 0 4 2006

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

Dear Jim:

Re: Economic and Social Objectives of the Crown

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

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

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

Minister of Forests and Range and Minister Responsible for Housing

Office of the Minister

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

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

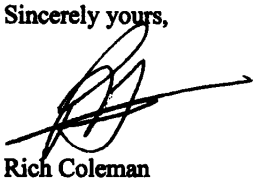
Jim Snetsinger

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

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

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

Sincerely yours,



Rich Coleman
Minister

Appendix 4: Responses from First Nations, Licensees and General Public:

First Nations:

Formal written submissions were received from the following First Nations:

the Bonaparte Indian Band; the Esketemc Indian Band; the St'at'imc Chiefs Council; and the Stone Indian Band.

Letters were received from

the Bonaparte Indian Band; the St'at'imc Chiefs Council; the Bridge River Band; the Lillooet Tribal Council; and the Tsilhqot'in National Government.

The main concerns and issues arising from the submissions, and from meetings—notably on December 10, 2008 in Lillooet, and others, and other less formal input, are recorded and addressed in a number of sections in this rationale, notably in '*First Nations consultation process*'. Comprehensive records of all related communications are maintained in the Cascades Forest District Office.

Licensees:

Written submission received at meeting presentation by licensees, December 9, 2008, Lillooet.

Comments received during multiple stakeholder meetings 2004 – 2008, notably October 7th, 2008, in Kamloops.

General Public and Organizations:

Letters were received from

Ecojustice; and the Lillooet Naturalist Society.

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