BRITISH COLUMBIA
MINISTRY OF FORESTS

Quesnel
Timber Supply Area

Rationale for
Allowable Annual Cut (AAC)
Determination

Effective October 1, 2004

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act* (the Act), of the allowable annual cut (AAC) for the Quesnel timber supply area (TSA). This document also identifies the need for new forest policy to address forest management issues arising from the mountain pine beetle epidemic in the province.

Description of the TSA

The Quesnel TSA is located in the northern part of the Southern Interior Forest Region, lying in the Fraser Basin and the Interior Plateau between the Coast Mountains on the west and the Cariboo Mountains on the east. To the west of Quesnel and of the Fraser plateau, the TSA includes the Itcha-Ilgachuz mountain ranges and the intervening gently rolling terrain encompassing the Blackwater and Nazko river systems. To the east lie the Quesnel highlands, Barkerville, and the Cariboo River. The climate, terrain and forests of the TSA are varied. West of the Fraser River, a relatively dry climate supports forests predominated by lodgepole pine. East of the Fraser River, the forests receive more rainfall and contain more spruce and balsam. Overall, the TSA is covered by stands of lodgepole pine (85 percent), spruce (10 percent), and Douglas-fir (3 percent) with hemlock and balsam, and deciduous species forming minor components. The Biogeoclimatic Ecosystem Classification (BEC) zones present in the TSA (in descending order by total area in the TSA) are sub-boreal pine-spruce; sub-boreal spruce; montane spruce; Engelmann spruce-subalpine fir; interior Douglas-fir; interior cedar-hemlock; and alpine tundra.

The TSA covers about 1.6 million hectares in total, of which approximately 81 percent—1 301 777 hectares—is productive Crown forest. About 290 000 hectares of the productive Crown forest area in the TSA are either used for critical wildlife habitat, wildlife tree patches or riparian reserve areas, or are in areas of environmental sensitivity or low productivity, or support non-merchantable forest types, or for other reasons are unavailable for timber harvesting. About 78 percent of the productive forest, or 63 percent of the total TSA area, is included in the current timber harvesting land base of 1 010 888 hectares.

The TSA is administered by the Ministry of Forests' Quesnel Forest District office in Quesnel. The Quesnel Forest District includes, in addition to the Quesnel TSA, 65 woodlot licence areas and two tree farm licences—numbers 5 and 52. The information provided in this rationale pertains to the TSA only, unless otherwise specified.

The major population centre in the TSA is the city of Quesnel with a population of 11,114. The adjacent communities of Red Bluff, Barlow Creek, Dragon Lake and Bouchie Lake, contribute the TSA's total population of 24,426 (City of Quesnel and Statistics Canada). Other communities include Wells and Barkerville in the east, and Nazko and Kluskus villages in the west. The economies of the communities in the TSA are largely resource-based, and the majority are dependent on the local forest industry. Ranching, mining and tourism are also integral to communities in the TSA.

The Kluskus Band, the Lhtako-Dene First Nation (Red Bluff Band), Alexandria Band, and the Nazko Band, as well as ten other First Nations communities located outside the TSA, have all asserted traditional territories or interests within the TSA. First Nations are actively involved in the forest industry; First Nations companies hold 13 non-replaceable forest licences of varying

terms with a total annual harvest of 353 000 cubic metres. There is one joint major licensee/ First Nation non-replaceable forest license with an annual harvest of 125 000 cubic metres.

Twelve wood-processing facilities, including lumber mills, veneer and plywood operations, and two log-home operations, are located in the Quesnel area. Their estimated combined annual processing capacity based on 480 8-hour shifts per year is 2 891 000 cubic metres. Also located in the Quesnel area are two pulp mills and a medium density fibreboard (MDF) operation, with an estimated total annual capacity (based on 345 24-hour days per year) of 1 120 000 bone-dry units of chips and wood-waste. Additional shifts and recent mill construction/upgrades have increased the local processing capacity to 4 108 377 cubic metres.

Critical issue: Epidemic mountain pine beetle infestation

This section introduces the considerations presented in detail later under the Epidemic mountain pine beetle infestation section.

The Quesnel TSA is part of a vast area in central British Columbia that is currently infested by the mountain pine beetle (MPB). In this TSA the volume of timber killed on the timber harvesting land base has grown from about four million cubic metres in 1999 to about 28 million cubic metres in 2003. The infestation is epidemic in the TSA and now threatens most of the mature and near-mature lodgepole pine stands in the TSA—the majority of the TSA's harvestable and merchantable timber. Table 1 shows the results of an analysis conducted by staff from the BC Ministry of Forests Research Branch and the Canadian Forest Service. The data in the table shows the observed volume of pine greater than 60 years old killed up to 2003 and the projected volume killed up to 2010. The numbers reported for 2004 onwards are projections based on the previous year's flight of beetles. For example, the table shows that there will be 56 million cubic metres of pine killed in the Quesnel TSA in 2005. This projection is based on the expected number of trees attacked in 2004 after the beetles have flown to their new host trees.

Table 1: Estimated merchantable volume (millions m3) of beetle-killed pine on the timber harvesting land base in the Lakes, Prince George and Quesnel TSAs, 2004.

TSA	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Lakes	0.3	1	4	9	16	21	25	30	34	38	42	46
PG	5	7	10	21	38	59	79	100	127	141	158	171
Quesnel	4	4	7	13	28	44	56	66	73	79	83	87
Total	**9**	**13**	**21**	**43**	**83**	**124**	**160**	**196**	**234**	**258**	**283**	**304**

Source: Derived from the Provincial Level Projection of the Current Mountain Pine Beetle Outbreak, MoF & CFS (unpublished). May 2004.

The current mountain pine beetle infestation in the interior of British Columbia is unprecedented in recorded history. There are two contributing factors to the current outbreak that may not have occurred together before in BC. The first of these is the climatic conditions that have prevailed in the last 8-10 years in the northern interior. Over this time period, there have been unusually mild winters coupled with relatively warm summers. These conditions have allowed the mountain pine beetle populations to build relatively unchecked by winter mortality. The second factor contributing to the current outbreak is the large volume of mature lodgepole pine, which is the primary host for the mountain pine beetle. The combination of these two factors has allowed the

epidemic to become unusually large, and to continue for a long period of time. The extremely large numbers of beetles being produced by this epidemic are contributing to the continuation of the attack, and allowing for unusual behaviour, including significant areas of younger pine trees being attacked.

In recent years a number of actions have been tried in the TSA to reduce the rate of spread of the beetle. Unfortunately, none of these actions have been completely successful and the TSA is now considered over-run by the MPB. The best chance of ending this beetle infestation is for cold spells with temperatures of minus 25 degrees Celsius in early fall or late spring. Alternatively, the infestation will end when the MPB no longer has a suitable lodgepole pine host.

It is unclear exactly how long timber damaged by the MPB will be usable for manufacturing lumber, or even pulp. Stands in the Chilcotin are still being harvested 20 years after the infestation; however, given the climatic conditions in much of the Quesnel TSA, their usability could be as little as 5 years. There are also ongoing risks of loss to fire. The severity of the current infestation not only places the future timber supply from much of the TSA in jeopardy, it also affects watershed functioning and impacts many other forest values, including recreation, biodiversity, landscape aesthetics, cultural heritage, range, fish and wildlife, and possibly residential areas.

Since accelerated harvesting can help to salvage at least part of an already rapidly growing and otherwise potentially very large economic loss, an urgent, early review of the AAC for the TSA has now being completed.

Expedited process for an urgent AAC determination to address the infestation

Prompt harvesting of stands in which beetles are still present may reduce the rate of spread, conserving forest values and recovering otherwise lost timber resources and Crown revenues. For this reason, to the extent possible, the current AAC is completely dedicated to removing, as a first priority, timber that has already been attacked. Even so, without an increased harvest level, much of the already attacked timber has the potential to become unsuitable for lumber manufacturing. The current AAC does not include sufficient volume to harvest at the level necessary to ensure recovery of the value of the already infested and damaged timber and it is clearly insufficient to keep up with projected ongoing losses, even after consideration is given to retaining unharvested areas to meet environmental goals.

In contemplation of the need to provide remedies for this and similar situations, the *Forest Act* (section 8(8)(e)) requires the chief forester, in determining AACs for TSAs, to consider

> **abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.**

In January 2004, both the Quesnel Forest District Manager and the Regional Manager of the Southern Interior Forest Region requested an urgent review of the timber supply in the Quesnel TSA, and in particular, early consideration of a possible temporary increase in the allowable annual harvest level to facilitate salvage operations necessary to address the mounting severity of the MPB problem.

In response to these requests, the review of the timber supply for the Quesnel TSA was given a high priority and the review process itself was modified to allow for an early completion. To provide an opportunity for public review under the accelerated schedule, a shortened, 30-day period for public review and comment was provided in place of the normal 60-day period,

following the release, on June 10, 2004, of a public discussion paper (PDP). In accordance with existing commitments, First Nations groups were allowed 60 days–until August 13, 2004– to provide comments on the PDP.

Having considered the rapid increase in the MPB population in the TSA, as well as the proximity of the infestation to a large area of the beetles' preferred host—mature lodgepole pine—and the potential effects of the infestation on the standing timber inventory, on the future timber supply and on other values in the TSA, I was satisfied that the epidemic indeed had reached a level that posed an immediate and severe risk to the TSA. Having also reviewed the results of the analysis in the PDP, I became further satisfied that an early AAC determination, with particular weight given to considerations under section 8(8)(e) of the *Forest Act*, could be of crucial assistance in remedying some of the serious problems related to the MPB infestation.

On this basis I have proceeded to make such a determination in as timely a manner as possible, giving consideration to all of the land use, forest growth, forest management, social and economic and other factors required by the statute to be considered. Under the circumstances described and for the reasons given, I have placed particular weight on my considerations under section 8(8)(e) of the *Forest Act*. This rationale statement details the full considerations and reasoning on which my determination is based.

History of the AAC

The AAC for the Quesnel TSA was first established in 1981, at 2.3 million cubic metres.

In 1985 a severe MPB epidemic swept across the Chilcotin Plateau to the south and the AAC for the Quesnel TSA was increased by 50 percent to 3 450 000 cubic metres. The beetle infestation was subdued in 1984 and 1985 by extremely cold early winter weather, and, although the infestation in the Quesnel TSA never reached the high levels experienced in the Chilcotin area, the AAC increase (through a licence that expired in 1990) allowed a consortium of local licensees to harvest trees under attack and to salvage forest stands killed by beetles. In 1989, the AAC for the TSA was increased by 50 000 cubic metres to accommodate a 'partition' for harvesting attributable to deciduous species. In 1990, when TFL 52 was removed from the TSA, the AAC for the remaining area of the TSA was determined at 2 450 000 cubic metres. This included 400 000 cubic metres attributable to harvesting in 'problem forest types' (PFTs); in 1992 this partition was reduced to 300 000 cubic metres for a total AAC of 2 350 000 cubic metres. In 1996, the AAC was determined at 2 340 000 cubic metres, of which 1 965 000 cubic metres were attributable to conventional sawlogs, 300 000 cubic metres were attributable to PFTs, and 40 000 cubic metres were attributable to deciduous species.

Effective July 1, 2001, the AAC for the Quesnel TSA was set at 3 248 000 cubic metres per year. Of this total AAC, 300 000 cubic metres were attributable to problem forest types as defined by the Quesnel Forest District Manager, and 20 000 cubic metres were attributable to deciduous species. This increase in AAC was intended to facilitate the salvage of timber damaged by the mountain pine beetle (MPB) and diminish the extent of future damage. At the time of that determination I asked staff to monitor the condition of the MPB infestation, on the understanding that, if and when required, the determination may be revisited at a date earlier than required by statute.

New AAC determination

Effective October 1, 2004, the new AAC for the Quesnel TSA will be 5 280 000 cubic metres, an increase of about 63 percent from the previous AAC. The purpose of this increase is to provide the district with sufficient AAC to salvage timber killed by the current and projected MPB epidemic. Of this total AAC, 20 000 cubic metres are attributable to deciduous-leading species and 450 000 cubic metres are attributable to problem forest types as defined by the Quesnel Forest District Manager.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination. However, the following observations are important to, and form an integral part of this determination. The previous 2001 AAC increase and the new increase should be targeted in pine stands that have been impacted by the beetle infestation, with the 2004 increase primarily aimed at mortality in the moderately and severely impacted pine stands. Staff of the BCFS will monitor and apprise the chief forester of the condition of the MPB infestation, on the understanding that, if and when required, this determination may be revisited at a date earlier than required by statute.

Information sources used in the AAC determination

Information considered in determining the AAC for the Quesnel TSA includes the following:

- *Quesnel Timber Supply Area: Rationale for AAC Determination*, June 2001;
- *Expedited timber supply review for the Lakes, Prince George and Quesnel timber supply areas Public Discussion Paper*, June 2004;
- *Provincial Level Projection of the Current Mountain Pine Beetle Outbreak: An Overview of the Model (BCMPB) and Draft Results of Year 1 of the Project*, 2004, Canadian Forest Service and BC Forest Service*;*
- *Mountain pine beetle, Forest Pest Leaflet 76*, Unger, L.S. Forestry Canada, Pacific Forestry Centre, Victoria, BC. 1993;
- *Cariboo- Chilcotin Land Use Plan Integration Report*, 1998;
- CCLUP Biodiversity Conservation Strategy, 1996;
- Cariboo Region Landscape Unit Planning Strategy, 1999;
- CCLUP Caribou Strategy Committee Update, 1998;
- Forest Inventory Planning file, British Columbia Forest Service (BCFS);
- Quesnel TSA licensee Forest Development Plans;
- Major Licence Silviculture Information System records; BCFS;
- *Quesnel TSA Inventory Audit*, BCFS Resource Inventory Branch, 1999;
- *Forest Practices Code Managing Identified Wildlife Guidebook*, 1999, Ministry of Environment, Lands and Parks (MELP) and BCFS;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;

- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Letter from the Deputy Ministers of Forests and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts on timber supply from biodiversity management;
- *Forest Practices Code Timber Supply Analysis*, BCFS and MELP, February 1996;
- *Forest Practices Code of British Columbia* Guidebooks, BCFS and MELP;
- *Higher Level Plans: Policy and Procedures,* BCFS and MELP, December 1996;
- *Riparian Management Area Guidebook*, BC, December 1995;
- *Landscape Unit Planning Guide* BCFS and MELP, March 1999;
- *Forest Practices Code of British Columbia Act*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Act: Regulations and Amendments*, consolidated to June 1999;
- *Forest and Range Practices Act*, consolidated to November 2002;
- CCLUP 90-Day Implementation Report; and
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the Ministries of Forests, Sustainable Resource Management and of Water, Land and Air Protection at the AAC determination meeting held in Prince George, BC, July 13-15, 2004.

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

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

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for timber supply areas (TSAs) and tree farm licences (TFLs). Section 8 is reproduced in full as Appendix 1.

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) re-determining 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 re-determine these AACs every five years. This principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs I attempt to reflect, as closely as possible, operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect to factors that could work to *increase* the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or with respect to factors that could work to *reduce* the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the Forest Practices Code—'the Code'—which is now in transition to the Province's *Forest and Range Practices Act*.

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

As British Columbia progresses toward the completion of strategic land-use plans, in some cases the eventual timber supply impacts associated with land-use decisions resulting from various regional and sub-regional planning processes remain subject to some uncertainty before formal approval by government. In determining AACs it has been and remains my practice not to

speculate on timber supply impacts that may eventually result from land-use decisions not yet finalized by government.

In some cases, even when government has made a formal land-use decision, it is not necessarily possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring for instance the establishment of resource management zones and resource management objectives and strategies for those zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. In such cases the legislated requirement for frequent AAC reviews will ensure that future determinations address ongoing plan-implementation decisions. Wherever specific protected areas have been designated by legislation or by order-in-council, these areas are deducted from the timber harvesting land base and are not considered to contribute any harvestable volume to the timber supply in AAC determinations, although they may contribute indirectly by providing forest cover to help in meeting other objectives, for example for biodiversity or community watersheds.

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

The Quesnel TSA lies within the area covered by the Cariboo Chilcotin Land-Use Plan (CCLUP). Forest development in the TSA is required to be consistent with aspects of the plan that incorporate Higher Level Plan (HLP) direction as provided under the Forest Practices Code. The Cariboo Mid-Coast Interagency Management Committee (CMCIAMC) and the Cariboo Chilcotin Regional Resource Board (CCRRB) are mandated by government to monitor the implementation of the CCLUP. The CMCIAMC and CCRRB provide advice to the FPC statutory decision makers regarding the best information available with respect to consistency with the CCLUP. The timber supply analysis and my considerations in this AAC determination assume consistency with the direction from the Statutory Decision Makers to licensees as representative of current management.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to re-determine many outdated AACs between 1992 and 1996. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

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

Overall, in making AAC determinations, I am mindful of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under Section 8 of the *Forest Act*, under the Code, and under the new *Forest and Range Practices Act*.

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

Guiding principles with respect to First Nations

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Quesnel TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

The British Columbia Court of Appeal decided in March 2002 that the Crown has an obligation to consult with First Nations with respect to asserted rights and title in a manner proportional to the apparent strength of the claimed interests. As a matter of course, I consider any information brought forward by all parties respecting First Nations' interests. In particular I consider information related to actions taken to protect interests, including operational plans that describe forest practices designed to address First Nations' interests. In this context, I re-iterate that my AAC determination does not prescribe a particular plan of harvesting activity, nor does it involve allocation of the wood supply to any particular party.

Subsequent to a determination, if I become aware of information respecting First Nations' interests that would substantially alter my understanding of relevant circumstances, I may revisit my determination sooner than as required by the *Forest Act*.

The role of the base case timber supply analysis

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

For each AAC determination for a TSA a timber supply analysis is carried out by British Columbia Forest Service (BCFS) staff using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (FSSIM—'Forest Service Simulator'; in this case for the Quesnel TSA, 'version 3'), a series of timber supply forecasts is produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. Often termed the 'base case', this serves as a reference forecast, and forms the basis for comparison when assessing the implications of uncertainty for timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case reference 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 reference forecast(s) are realistic and current, and the degree to which the resulting predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

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

Base case forecast for the Quesnel TSA

The timber supply analysis was based on the same data that was used in the 2001 analysis, and updated for growth and harvest depletions and for the spread of the mountain pine beetle infestation. That data package, which included detailed descriptions of the management practices and the assumptions used to incorporate them into the analysis, was released for public review in June 1999. In the interest of expediency, a new data package was not published for this analysis.

Because forest management is inherently a long-term undertaking, uncertainty is present in much of the information used in analysing the timber supply. Any base case thus provides only a part of the timber supply picture for a TSA, and should not be viewed in isolation from accompanying sensitivity analysis. In my determination I have considered a number of relevant sensitivity analyses in assessing particular uncertainties, as well as several alternative harvest forecasts, as documented in this rationale statement.

For the Quesnel TSA, a harvest forecast was selected to represent the potential timber supply based on the beetle infestation projected to 2005 (i.e. reflects the projected mortality associated with the 2004 beetle flight) by staff from the Ministry of Forests, Research Branch. This *2004 beetle forecast*, or base case, shows that a harvest of 6 million cubic metres per year is required for ten years to harvest the moderately and severely impacted pine stands before declining in the second and third decade to a harvest level of 1.7 million cubic metres per year. The long-term harvest level of 2.2 million cubic metres per year is attained nine decades from now. The implications for the projected timber supply are considered in detail under Epidemic mountain pine beetle infestation, and are further discussed in various sections including Impediments to prompt regeneration, Forest stewardship principles, and Alternative harvest flows.

For the purpose of determining this AAC for the Quesnel TSA I have relied in part on this base case projection of the timber supply, and also on several other related forecasts, in accordance with my assessments of the validity of the assumptions incorporated in the projections, as discussed in the following sections of this document.

In this rationale, I will discuss many of the analysis assumptions in the context of my considerations for this AAC determination. However, for some factors, my review of the assumptions has indicated that I am satisfied the factor was appropriately modelled in the base

case of the timber supply analysis. In such cases I will not discuss my considerations in this document, other than to note my agreement with the approach adopted in the base case. However, some factors for which the assumptions were appropriately modelled in the analysis may warrant discussion for other reasons, such as public input, lack of clarity in the analysis, or concerns resulting from the previous determination for the Quesnel TSA. As a result, I may choose to provide my consideration of such factors in this rationale.

I have also considered all public input received on the public discussion paper, and where appropriate I discuss this input in my considerations under the various factors presented in this rationale.

Consideration of factors as required by section 8 of the *Forest Act*

Section 8 (8)

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

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

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

Land base contributing to timber harvest

- general comments

The total area of the Quesnel TSA, as estimated from BCFS inventory data updated to December 31, 1998 is 1 603 111 hectares. Of this, 1 301 777 hectares are productive Crown forest land.

As part of the process used to define the timber harvesting land base for a TSA, (i.e. the area estimated to be economically and biologically available for harvesting), a series of deductions is made from the total area of the productive forest. These deductions account for factors that effectively reduce the suitability or availability of the productive forest for economic, ecological or social reasons (e.g. parks). In timber supply analysis, assumptions, and if necessary, projections, must be made about these factors, prior to quantifying appropriate areas to be deducted from the productive forest, in order to derive the timber harvesting land base.

In the Quesnel TSA, a total of 290 889 hectares, or 22.3 percent of the productive Crown forest is currently used to provide critical wildlife habitat, wildlife tree patches, riparian reserve areas, roads, trails and landings, or lies in areas of environmental sensitivity or low productivity, or supports non-merchantable forest types, or for other reasons is unavailable for timber harvesting. These areas were deducted from the total productive Crown forest area in deriving the current timber harvesting land base. As a result, 77.7 percent of the productive forest, or 63.1 percent of the total TSA area is included in the current timber harvesting land base of 1 010 888 hectares. My considerations respecting the individual deductions applied in deriving the timber harvesting land base are presented in the following sections.

- alienations from Provincial Forest

Between 1995 and 1999 a total of 654 hectares were removed from the Provincial Forest in the TSA for agricultural and other purposes. District staff estimate that a further 508 hectares of this land are still in the timber harvesting land base. Consequently, all of the forecasts have therefore

overestimated the timber supply by a very small amount. By itself, the implications for the timber supply of such a small area relative to whole timber harvesting land base appears insignificant in comparison to those currently contemplated to arise from the MPB infestation, as discussed under that section below. Nonetheless, in AAC determinations it is sometimes possible for individually insignificant implications arising from a number of factors under consideration to combine into an effect which may have significance for the overall timber supply. Therefore, I have taken into account the need for deduction of 508 hectares and a consequent minor overestimation in the analysis of the timber supply, affecting the mid and long terms as noted in 'Reasons for Decision'.

- *problem forest types*

Of the total current AAC for the Quesnel TSA, 300 000 cubic metres is attributable to 'problem forest types' (PFTs) as defined by the Quesnel Forest District Manager. As noted in the 1996 AAC rationale, the definition and the extent of problem forest types in the TSA were subject to considerable uncertainty.

In 1998, a report called the 'Problem Forest Type (PFT) Inventory Project' was completed for the ministry. The objective of the project was to provide information about PFTs, which were defined as stands comprised predominantly of pine (80 percent and over) in the Kluskus, and the Narcosli East and West Supply Blocks. The study estimated that there were 130 000 hectares of pine PFT forest types in these blocks. In the 2001 timber supply analysis, the PFT land base was 139 000 hectares and District staff considered this estimate to reasonably reflect the actual land base as this area approximated the 1998 PFT project.

Earlier, it was suggested that PFT stands, often being younger and smaller in diameter, may be less susceptible than other more mature pine forest types to beetle attack. However, current information indicates that these stands have significant levels of beetle attack as the epidemic-level beetle population is moving into both younger and smaller diameter pine stands in the TSA. From this, it seems reasonable to increase the PFT harvest to manage the beetle infestation in these forest types.

Three mills in the TSA depend in whole or in part on the PFT harvest. Some licensees have suggested that the management of PFTs needs to be integrated with any initiative taken to deal with the MPB infestation. Another licensee submitted that it is important to maintain the partition to ensure the smaller profile is utilized and the areas are reforested. Furthermore, they suggested that it would be logical to increase the PFT harvest level. Since a significant increase (about 63 percent) in the AAC for the TSA is currently proposed as a means of managing the infestation, I have contemplated the proportion of the increase that should logically apply to the PFT harvest level. In addressing the particular question of the harvest attributable to problem forest types, I have reasoned as follows.

The PFT land base is about 130 000 hectares and has been noted in the past as an important component of the overall timber supply for the TSA. While the available data on pine mortality does not distinguish between PFT and non-PFT, I expect salvage operations to be appropriately distributed across all affected stand types. Therefore, I believe it is reasonable to increase the PFT harvest level in about the same proportion as the AAC increase for the TSA. This will increase the PFT level from 300 000 cubic metres to 450 000 cubic metres per year. However, I am concerned that an increase in the PFT partition could compound management and administrative difficulties likely to be experienced in dealing with the infestation while simultaneously coming up with operational criteria to identify which forests are considered eligible for harvest under the partition. In my judgement, the range of forest management objectives in the TSA could likely still be met without a PFT partition at this time. Nonetheless,

for this determination I will maintain the partition and suggest that for the next timber supply review, the need for the partition should be examined. The paramount management focus must be directed to the infestation and if the partition is constraining and not aiding management then the partition could be removed.

I am cognizant of the interests of certain licensees whose operations are well suited to the forest type historically described by the partition. I continue to expect that ongoing operations will be balanced across the profile of affected stand types. Also, I expect that this will be taken into account and reflected in both new licences awarded as well as ongoing operational plan approvals.

While matters of license award and administration are not within my direct jurisdiction, I do feel obligated to make these observations and statements in response to interests expressed to me by an existing license holder with respect to the existing PFT partition.

From these considerations, as noted in 'Reasons for Decision', I have increased the harvest partition attributable to PFTs, which will continue to be operationally defined by the Quesnel Forest District Manager.

- non-merchantable species

In deriving the timber harvesting land base for the analysis, certain forest types described by particular inventory type groups were included or excluded in accordance with their merchantability as defined by cruise data and current harvesting performance in the TSA. In preparing the data for this analysis 2033 hectares of cedar were inadvertently removed during the analysis.

I have reviewed the species included and excluded, and I am satisfied that current practice is adequately represented in the analysis in this respect, with the exception of the removal of the cedar land base. In my determination therefore, as discussed in 'Reasons for Decision', I have accounted for an underestimation in the timber supply analysis associated with the inadvertent removal of 2033 hectares of cedar.

- deciduous forest types

Deciduous forest types are those stands dominated by deciduous, broad-leaved species. To date, utilisation of the predominantly deciduous stands in the Quesnel TSA has been very limited; no specific licences have been issued for deciduous species, although minor volumes of deciduous species are occasionally harvested from predominantly coniferous stands. Some birch has been utilized but birch volumes represent only 10 percent of the deciduous species profile.

My rationale for the January 1, 1996 AAC determination for this TSA included a request for better assessment of the availability and merchantability of deciduous stands. A re-inventory of a portion of the TSA, completed in 1997, has provided improved information for assessing the deciduous component in the TSA. In my rationale for the July 1, 2001 AAC determination for this TSA I decided to establish an allowable harvest level of 20 000 cubic metres per year attributable to deciduous species.

It is clear that deciduous species—which are not targeted by the MPB, but which are in many cases interspersed with pine in areas of severe attack—are potentially capable of making an important contribution to the provision of forest cover for biodiversity purposes following the required harvest of large areas of infested pine particularly in mixed stands. However, in consideration of the extent of deciduous species and their generally lower biological rotation ages, I have decided to maintain an allowable harvest level of 20 000 cubic metres attributable to deciduous species.

- roads, trails and landings

During timber supply analysis, a percentage of the productive forest otherwise considered available for harvesting is excluded to account for the construction of logging roads, trails and landings.

I am satisfied that appropriate procedures have been followed in accounting in the analysis for the effects of roads, trails and landings on the size of the timber harvesting land base.

- protected areas

All formally designated protected areas were excluded in deriving the timber harvesting land base used in the timber supply analysis.

However, the province's Protected Areas Strategy has two goals. The first is to protect viable, representative examples of natural diversity in the province, representative of the major terrestrial, marine and freshwater ecosystems, the characteristic habitats, hydrology and landforms, and the characteristic backcountry recreational and cultural heritage values of each ecosection. The second goal is to protect the special natural, cultural heritage and recreational features of the province, including rare and endangered species and critical habitats, outstanding or unique botanical, zoological, geological and paleontological features, outstanding or fragile cultural heritage features, and outstanding outdoor recreational features such as trails.

The Cariboo-Chilcotin Land Use Plan (CCLUP), which includes the entire Quesnel TSA, provides for 'Goal 2' protected areas totalling up to 0.25 percent of the area covered by the plan. No logging currently takes place in areas identified as candidates for 'Goal 2' areas, except where necessitated by beetle activity. However, these candidate areas have not yet been formally established by government, and may be relocated through sub-regional planning processes. It is possible that some or all of the Goal 2 areas may displace portions of the timber harvesting land base.

In the analysis, no accounting was made for any loss of harvestable land base associated with 'Goal 2' protected areas. Because these areas have not yet been finally located or designated by government, in accordance with the guiding principles set out earlier in this document, and with similar decisions taken earlier on other management units and upheld in provincial courts, I will not attempt to speculate on how government may decide on these areas, or on the possible implications their designation could have for the timber supply. For the purposes of this AAC determination I therefore accept the inclusion in the timber harvesting land base of these uncertainly located and as-yet-undesignated 'Goal 2' protected areas. When these areas have been formally designated with definite locations, any timber supply implications can be analysed and accounted for in a future AAC determination.

- riparian land base exclusions

Riparian reserves totalling 30 041 hectares were identified in the TSA, requiring a reduction (net of overlaps for other objectives) of 26 602 hectares of productive forest in deriving the timber harvesting land base. Similarly, a further reduction of 15 787 hectares was made to account for partial harvesting in the riparian management zones.

- woodlot licences

The *Forest Act* requires AACs for TSAs to be determined in exclusion of timber supply contributions from issued woodlot licences. When a woodlot licence is initially issued, the associated harvest level is allocated from an appropriate apportionment under the AAC for the

TSA. The woodlot harvest level remains as an apportioned part of the AAC for the TSA until the next AAC determination for the TSA, when the TSA land base is reduced by the area of Crown land in all the woodlot licences issued since the previous determination. At this time the total volume in issued woodlot licences is excluded from contributing to the AAC for the TSA.

In the Quesnel TSA, a total of 34 500 cubic metres were issued as woodlot licences up to 1996, and a further 38 370 cubic metres were issued between 1996 and 2001. In adjusting the timber harvesting land base to reflect the exclusion and the separate administration of these woodlot licence volumes from the AAC for the TSA, ownership codes for 6825 hectares were incorrectly assigned, resulting in an underestimation by that amount in the timber harvesting land base used in the analysis. In my determination, as noted in 'Reasons for Decision', I have accounted for the exclusion of this area as a slight underestimation in the projected timber supply.

Existing forest inventory

- *status of current inventory*

The Quesnel TSA encompasses 188 whole or partial mapsheets and all significant harvesting and other disturbances from 1995 to 1998 were incorporated into the file used for the timber supply analysis. Instead of updating the inventory file, the analysts accounted for harvest depletions to 2003 by 'harvesting' in the timber supply model. Forest stand characteristics, and growth and yield were projected to December 31 1998. The inventory data file included a reclassification of the forest cover across the entire TSA, completed to pre-Vegetation–Resource-Inventory standards between 1988 and 1997. Further, stocking class was recalculated for each stand in the productive forest. The file was compiled by staff of the Cariboo Forest Region early in 1999, and included various theme layers obtained from the Ministry of Environment, Lands and Parks (MELP).

In June of 1999, the Ministry of Forests' Resources Inventory Branch completed an inventory audit for this TSA. The audit results for the immature component of the inventory suggested an acceptable level of accuracy for site index assignment in young stands, and I have discussed this below in – *estimates for site productivity*. For the mature component, the audit results suggested that the timber volumes in existing mature stands may be overestimated by approximately 12 percent, as discussed under *volume estimates for existing natural stands*. With the qualifications noted in these sections, I am satisfied that the existing inventory on which the timber supply analysis was based is of a standard comparable to forest inventory files used for management units in the remainder of the province, is reliable for strategic planning purposes, represents the best available information, and is therefore adequate for use in this determination.

- *volume estimates for existing natural stands*

The Variable Density Yield Prediction (VDYP) model version 6.4a, developed and supported by the Ministry of Forests' Resources Inventory Branch, was used to estimate timber volumes for existing natural stands for the 2004 timber supply analysis for the Quesnel TSA.

In June 1999, the Ministry of Forests' Resources Inventory Branch completed an inventory audit for this TSA. The audit showed a statistically significant 13-percent difference between the estimated mean mature volume obtained from the inventory and that obtained from the audit (all stands operable and inoperable). For stands in the operable land base, the results suggested that the timber volumes in the existing-mature-stands component of the inventory may be overestimated by approximately 12 percent.

Post audit analysis work identified the Narcosli (east and west) as the main source of the variation. A breakdown of samples by Biogeoclimatic Ecosystem Classification (BEC) zone showed that the Sub-Boreal Pine-Spruce (SBPS) zone overestimated actual volumes by about 25 percent. Where the SBPS and the Narcosli overlap the overestimate approached 28 percent. The overestimation of existing stand volume affects short-term timber supply, and I have taken this into account in my determination as discussed in 'Reasons for Decision'.

Expected rate of growth

- estimates for site productivity

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the height of the stand as a function of its age, and is typically expressed in metres reached by the age of 50 years. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced in regenerated stands, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In general, in British Columbia, site indices determined from young and old stands may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification (SIBEC) suggest that actual site indices may be higher than those indicated by existing data from old forests. In recent years it has been concluded from such studies that site productivity has generally been underestimated by the inventory file data.

The site index values assumed in the base case analysis for the Quesnel TSA were taken directly from the forest inventory files as there are no local data for adjusting site indices. Staff from BCFS and major licensees are currently reviewing the possible need for adjustments to or re-assignment of site index values, based on OGSI and SIBEC studies in the region.

As noted earlier, the results of the recent BCFS inventory audit for the immature component of the inventory (defined as stands greater than free growing and less than 60 years of age) suggested 'an acceptable level of accuracy for site index assignments in currently regenerated young stands in the TSA.' In my previous determination for this TSA, I concluded *"…based on the higher site productivity suggested by SIBEC studies, the analysis using site indices directly from the inventory file underestimates the timber supply to some degree. While the magnitude of the impact is uncertain, I am satisfied that the general trend of higher medium-term timber supply shown in the SIBEC sensitivity analysis is a reasonable expectation."* No new information has been made available concerning site productivity in the Quesnel TSA since the last determination. I therefore find my previous conclusion still valid and I have taken this into account as discussed in 'Reasons for Decision'.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has grown or will grow to a harvestable condition. The minimum harvestable age assumption mainly affects

when second growth will be available for harvest. This in turn affects how quickly existing stands may be harvested such that a stable flow of harvestable timber may be maintained.

Forest district staff reviewed cruise information to determine the minimum volume at which sawlog stands were harvested. Based on licensee performance, the minimum volume per hectare considered harvestable, provided utilization criteria are met, is 140 cubic metres per hectare for stands that were not moderately or severely attacked by the MPB. This minimum volume of 140 cubic metres per hectare was used to determine the minimum harvestable ages. For stands that were moderately or severely attacked by the MPB minimum harvestable ages were set at 60 years in the analysis, as these volumes would be lost if not harvested. For the moderately and severely attacked pine stands harvested at 60 years of age, the projected volumes harvested could be as low as 100 cubic metres per hectare.

In the analysis, it was assumed that forest stands would be harvested in a sequence termed 'relative oldest first', and in many cases stands were not harvested until beyond minimum harvestable age due to management objectives for other resource values.

District staff advise me that the minimum harvestable ages assumed in the analysis are reasonable given current utilization and minimum operable volumes. I am satisfied that the minimum harvestable ages represented in the analysis are indicative of reasonable assumptions of growth and yield, and are acceptable for use in the timber supply projections I have considered in this determination.

- shelf life

An important consideration in developing management strategies and determining harvest levels is the length of time beetle-killed trees will be merchantable, i.e. - the shelf life. The epidemic in the Chilcotin during the 1980s resulted in the continual harvesting of beetle-killed trees for over 20 years after the stands were attacked. However, for areas north of the Chilcotin the climate is noted to be wetter and wood decay is expected to occur faster than in the drier Chilcotin area. While beetle-killed trees may remain standing for over 20 years, their merchantability as sawlogs and recoverable lumber is projected to decline more quickly within the first few years as the trees dry and start to check. Ultimately shelf life will be based on a number of factors and will vary widely based on market prices, available milling technology and biological conditions.

In the base case (2004 beetle forecast) it was assumed that beetle-killed trees would be useful for 10 years. Input from the public suggested that the 10-year shelf life was too optimistic, whereas input from one oriented-strand-board manufacturer suggested a shelf life in excess of 15 years. Sensitivity analysis conducted on the base case showed that if the shelf life is increased it is possible to lower but extend the initial harvest level as there is more time to recover the dead trees. Conversely, if the shelf life is reduced there is less time to recover the same amount of dead trees. In the absence of any further data about the shelf life of beetle-killed trees in the Quesnel TSA, I accept the assumptions in the base case as adequate for making this AAC determination. The assumptions about shelf life used in the analysis are noted as reflecting the experience and expectations of field staff who have been observing ongoing developments in the area in recent years.

(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 time that elapses between when an area is harvested and when it becomes occupied by a specified minimum number of acceptable, well-spaced seedlings.

In the base case, a 15-year regeneration delay was applied to severely attacked pine stands that were not projected to be harvested prior to the end of the ten-year shelf life. It was assumed that these stands did not have enough sound volume to be considered merchantable so they were assigned an extended regeneration delay and assumed to re-grow as natural stands. For all stands other than severely attacked pine, a regeneration delay of one year was modelled. In practice, such stands are regenerated two years after harvesting using 1-year old seedlings.

The presence of advanced regeneration caused some staff to argue that there was no delay in regeneration for some stands and that those regenerating stands were in fact about ten years old already. However, it was pointed out that those understory stands were usually affected by diseases such as needle rust and mistletoe and will likely require rehabilitation in order to produce a viable, healthy future stand.

Sensitivity analysis showed that assumptions of longer regeneration delay in severely attacked pine stands do not affect timber supply projections as most severely attacked pine stands are harvested prior to the end of the 10 year shelf-life. I am satisfied that the regeneration assumptions used in the analysis are reliable for use in this determination.

Impediments to prompt regeneration

Despite the validity of the regeneration assumptions as described in the previous section, the response to the MPB infestation has the potential to adversely affect the regeneration delay period in some areas. In the effort to control the spread of the MPB, numerous small (less than one hectare) patches were created throughout the TSA. Licensees are not obligated to reforest small, isolated patches and this practice could reduce timber supply if the patches are numerous. In the base case it was assumed that all areas harvested are reforested within the regeneration delay period.

I was informed that since harvesting operations in the TSA have switched from beetle control mode to timber salvage mode, larger openings are created and these openings are being reforested within two years of harvest. As well, subsequent harvest operations adjacent to the small patches have led to the entire opening being reforested. I have therefore made no adjustments to timber supply to account for impediments to prompt regeneration.

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 after harvesting are considered ‘current’ NSR. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is ‘backlog’ NSR.

Silviculture records indicate that there are approximately 30 348 hectares of current NSR and 3570 hectares of backlog NSR in the Quesnel TSA.

In the analysis, all 'current' NSR was assumed to regenerate within the identified regeneration delays. It was also assumed that all backlog NSR would be restocked within 10 years.

From discussions with district staff I note that there is some uncertainty about the capability to reforest the backlog NSR. For the present determination I am prepared to accept the restocking assumptions as applied in the analysis, on the basis that the level of uncertainty in this factor is not sufficient to pose any appreciable risk to the projected timber supply.

Mortality in immature pine stands

In the base case it was assumed that stands younger that 60 years would continue developing with normal levels of mortality as projected in the growth models used by the BCFS. However staff have observed varying levels of mortality due to the MPB in pine-leading stands as young as 30 years. It is likely that ongoing beetle attack is more closely related to tree diameter rather than tree age. Even though the beetles do not thrive in these younger stands, their proximity to older pine stands that are the source of beetles, make these stands highly susceptible to the MPB.

The mortality levels due to MPB in immature pine-leading stands in the Quesnel TSA have not been quantified and I would like staff to monitor this situation so that it can be quantified in future analyses. Higher than normal mortality levels in immature stands reduces timber supply in the mid- and long term, and I have taken this into account in my determination as discussed in 'Reasons for Decision'.

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

Silvicultural systems

With the exception of the caribou areas and mule deer winter ranges, harvesting in the TSA is primarily by clearcutting. In beetle infested areas, clearcutting of the leave strips between previous clearcuts have created patch sizes ranging from 1000 to 3000 hectares. Such large patches are a direct result of having vast areas of dead and dying trees. At this time further thought needs to be given to the regeneration objectives for these large patches. If these large areas continue to be reforested with lodgepole pine, it may create one of the conditions—a source of food—for another MPB infestation 80 to 100 years from now. At this time it is not clear what represents the best strategy for species and densities. However, I certainly note that this current MPB infestation creates the obligation for forest managers to develop and consider options for designing and planning the structure and condition of the future forest. I urge forest managers to develop strategies for the future tailored to the TSA and the severity of the MPB infestation. These considerations are discussed further under *Forest stewardship principles.*

Rehabilitation programs

In general, rehabilitation programs are silvicultural treatments applied to areas with the intention of making them more productive and/or bringing those areas into the timber harvesting land base. There are no rehabilitation programs planned in the TSA for stands killed by the MPB but not harvested. I will discuss the potential for such activities further under *Forest stewardship principles.*

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

Utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. The standards applied in the Quesnel TSA are shown in the following table:

Analysis unit	Utilization		
	Minimum diameter at breast height (centimetres)	Maximum stump height (centimetres)	Minimum top diameter inside bark (centimetres)
Sawlogs:			
Pine	12.5	30	10
Other species	17.5	30	10
Problem Forest Types:			
Pine species	7.5	20	5 - 7
Other species	12.5	20	7.0

BCFS staff note that these standards were reflected in the analysis except that the VDYP model used to generate volume projections is limited to a 10-centimetre minimum top diameter inside bark, while pine species are in fact utilized to a 5-to-7-centimetre top. This difference does not affect the *area* projected to be logged, but only the volume per hectare expected from the area logged. In previous AAC determinations I acknowledged this discrepancy but noted that the implications for timber supply are relatively small. I therefore accept that the utilization assumptions used in the timber supply analysis are adequate for use in this determination.

Decay, waste and breakage

The VDYP model used to project volumes for natural stands incorporates estimates of the volumes of wood lost to decay, waste and breakage. Decay losses are built into the volume estimates, while standard waste and breakage factors are applied to the analysis in the development of VDYP yield curves. These estimates of losses have been developed for different areas of the province based on field samples. For regenerated stands, an operational adjustment factor (OAF2) is applied to account for anticipated decay, waste and breakage, and the value applied for OAF 2 in the Quesnel analyses increased from zero through to 5 percent at the point where forest stands reached an age of 100 years.

Government has changed the standards for acceptable waste in stands affected by the MPB epidemic. Under the new standards, licensees are allowed to leave as waste, nine cubic metres per hectare in dry sites, 15 cubic metres per hectare in transition sites, and 25 cubic metres per hectare in wet sites. The intent was that this waste, which is in addition to that accounted for in the yield model, would be charged to the AAC. District staff expressed differing interpretations regarding the intent of the communication on this matter and reported that the additional waste may not be charged to the AAC. Since this additional waste is part of the timber supply projected for the TSA I would have expected that it would be charged against any AAC that I set for this unit.

In light of this observation, I have raised this issue provincially with the appropriate policy staff and asked that it be reviewed and the policy direction clarified and confirmed.

(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:

Forest stewardship principles

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. 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.

During the past several years with the increasing spread of the beetle infestation in the province, forest practitioners have been contemplating the question of stewardship principles that might be different from standard approaches when faced with catastrophic events and potentially large salvage programs. Last spring, when the need for an expedited timber supply review was announced by government, I asked my staff in the Forest Sciences Section to further research this question.

The results of their investigation lead to the paper "Forest Stewardship in the Context of Large — Scale Salvage Operations", which was attached to the public discussion paper released on June 10, 2004. The paper contains a number of recommendations designed to better inform decisions about harvest level increases and potentially future forest practices that might be different than current practices.

In preparation for the expedited timber supply reviews, timber supply analysts thoroughly reviewed the recommendations and where possible they included them in the *2004 beetle forecasts*. In the following sections — *cutblock adjacency, forest cover and green-up, and stand level biodiversity,* I have further discussed my consideration and accounting of the recommendations as they apply to the timber supply and harvest levels.

As the stewardship paper outlines, some contend that the magnitude of the current outbreak is at least partially the result of human influence on BC's pine forests, principally due to forest fire suppression (Stadt 2002, Taylor and Carroll 2003). Others contend that the outbreak is a "natural" event (Hughes and Drever 2001). If so, then the large areas of partially dead forests created by the outbreak are within the "range of natural variability" (Swanson et al. 1994, Wong and Iverson 2004).

I do not believe that anyone can profess to know exactly what caused the expansive nature of the infestation. I am informed about the increased amount of mature lodgepole forests due in part to forest fire suppression in the province over the last century, and that warmer weather has increased the historic range of the pine beetle in BC. However, these events are only available for our recent recorded history, about the last one hundred years. It is unknown if these events have combined in such a manner in previous centuries. I note that the Sierra Club claims that the forest stewardship paper fails to address the underlying causes of the infestations. While it is difficult to determine the exact causes, forest researchers and practitioners are trying to understand the nature of the epidemic and develop adaptive forest management practices in response to it.

The infestation in the Quesnel TSA is particularly severe since its has such a significant component of near mature and mature lodgepole pine stands. Since most of the stands are primarily comprised of pine, it is possible that few live, mature pine trees will remain once the infestation has ended. Given this high degree of projected impact, the current infestation will have a large impact on the environment whether the trees are salvaged or remain unharvested.

The stewardship paper recommends that during large-scale salvage operations, large openings (> 1,000 hectares) will be appropriate, provided that they are designed to respect existing land-use planning objectives. Current forest practices and policies state that larger openings in natural disturbance types (NDTs) with historic large disturbance patterns such as found in the Quesnel TSA, are permissible. Therefore the recommendation for larger openings requires no further policy change. However, the recommendation to require proportionately larger reserves or legacies of unharvested areas in the openings (up to 25 percent in the case of 1000-hectare openings) is not current practice. As well, the recommendation to increase the legacies of coarse woody debris and their spatial distribution to represent the "matrix" of adjacent forests is not required as part of current practice. I have discussed coarse woody debris further below under *stand-level biodiversity.*

In the timber supply analysis, the most significant variance from current practice was the increase in the amount of retention. This variance accounts for the stewardship recommendation to increase the size of reserves since it was assumed that most opening would also be increasing. For the moderately and severely impacted pine stands where the large openings are expected, the overall retention level assumed in the base case was 20 percent (in TSR2 the retention level was about 8 percent). Without this higher retention level, the harvest forecast would have been correspondingly higher than reported.

There are a number of other recommendations that although not directly accounted for in the analysis are operationally important, such as recommendations to develop strategies for appropriate access management, rehabilitation of some areas, hydrologic stability, planting regimes (species diversity), and the development and implementation of a long-term monitoring program.

The Ministry of Water, Land and Air Protection (WLAP) expressed concern about the lack of information to predict impacts of such a massive beetle infestation and subsequent salvage harvesting on non-timber values, especially where there has already been extensive harvesting. In particular, they noted the lack of information on the risks associated with changes to hydrology, e.g., increased peak flows, changes to timing of water delivery to streams, and increased water yield affecting water quality, quantity, fish and aquatic organisms; changes to sedimentation and stream morphology; and changes to habitats of species at risk and associated predators.

Although WLAP staff note support of the conservation values as reflected in the timber supply analysis, they submit that it is more important to understand how the conservation concepts will be applied on the ground. They recommend the development, testing, application and monitoring of methods and tools to decide where and when not to harvest (i.e. - to retain, protect or conserve non-timber values).

I note that some public comments stated the proposed changes are not contained in the *Forest and Range Practices Act* and that the MoF must attempt to assess the potential combined effects of large-scale salvage operations and the outbreak before committing to these changes. Some questioned the wisdom of additional forest cover requirements in a salvage scenario, especially given the size of the unsalvaged losses. Others commented that managing for biodiversity by applying higher retention levels is a sound strategy.

The Sierra Club noted that it seems clear that the forest stewardship proposal will inform ministry managers, but that it is not clear how it will form the basis of new policies or operational constraints. Also, they stated that the stewardship paper makes reference to monitoring the ecological effects of the large-scale salvage operations, but leaves out details as to which ministry will be responsible for monitoring.

In summary, I accept that the epidemic represents a catastrophic event and regardless of whether it is caused by natural or human-influenced events, it is evident that forest managers must consider new forest management strategies and responses to the ongoing epidemic. I understand that the Provincial Mountain Pine Beetle Coordinator is currently developing strategies regarding implications to land use planning, forest practices and the stewardship recommendations, as well as reforestation and rehabilitation programs. These strategies are essential for the implementation of any large salvage program.

For the purpose of this decision, I have decided to reflect the stewardship recommendations as modelled in the base case. While I acknowledge that they are not mandatory, I feel it is appropriate to consider their implications in the decision in order to ensure that adequate opportunity is given to other government decision makers to consider how to respond to this new information. This seems more reasonable in the short term rather than precluding its consideration by implementing an uplift that would compromise their possible attainment. In the meantime, I strongly encourage the appropriate policy analysis and resolution of how to consider this information from an operational perspective through the new *Forest and Range Practices Act*. This will be discussed further under 'Reasons for Decision'.

- cutblock adjacency, forest cover and green-up

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

In the analysis, for the general resources management (GRM) zone (the zone least constraining on timber supply), which covers 86 percent of the timber harvesting land base, a constraint was applied requiring at least 65 percent of the forest cover to be at least 3 metres tall at all times. To facilitate the salvage of timber killed by the MPB, the requirement for cutblock adjacency in moderately and severely attacked pine stands in the GRM zone was waived for 30 years. After 30 years this requirement, along with all the others, was in effect for the remainder of the planning horizon. Sensitivity analyses showed that if the cutblock adjacency requirement was waived for only 10 years, timber supply in the second decade – when the constraint took effect– decreased from 2 million cubic metres per year to 1.5 million cubic metres per year.

Other specific cover constraints were applied to reflect particular objectives for moose habitat, caribou habitat, mule deer winter range, and scenic values, as detailed in the appropriate sections below. To ensure adequate representation of requirements for landscape-level biodiversity, the modelling assumptions in the analysis were consistent with the Biodiversity Conservation Strategy of the CCLUP.

Some members of the public commented that assumptions concerning cutblock adjacency as used in TSR2 are no longer valid, whereas others argue that no scientific rationale was provided for the

creation of large openings. The Sierra Club suggested that assumptions in the timber supply analysis should reflect the range of natural variability for the central interior of the province.

In considering the appropriateness of the forest cover assumptions in the analysis generally, I note that the constraints applied for multiple-use areas, scenic areas and caribou habitat were consistent with the CCLUP and are therefore suitable for use in this determination. I am also satisfied that the waiving of adjacency requirements in the short term for MPB management and the creation of large patches is appropriate for the purposes of salvaging dead timber and I make no further adjustments to the base case timber supply. As I have previously acknowledged in the Forest stewardship principles, the base case reflects additional retention objectives that in fact do constrain short-term timber supply as a result of the forest stewardship considerations.

- *visually sensitive areas*

Careful management of scenic areas along travel corridors and near recreational sites, parks and major communities, is an important IRM objective that requires visible evidence of harvesting to be kept within acceptable limits in specified areas. Currently, the Code provides for scenic areas to be identified and made known, and for visual quality objectives (VQOs) to be established to limit the amount of visible disturbance permitted in sensitive areas. Visual landscape inventories are carried out to identify, classify and record those areas of the province that are visually sensitive, and appropriate visual quality classes (VQCs) are recommended—for example 'Preservation,' 'Retention,' 'Partial retention,' 'Modification', or 'Maximum Modification'—to identify levels of alteration appropriate to particular areas. Guidelines to meet the VQOs include setting a maximum percentage of a specified area or 'viewshed' that is allowed to be harvested at any one time, and setting a 'visually effective green-up' or 'VEG' height at which a stand of reforested timber is perceived by the public to be satisfactorily greened-up.

Visually sensitive scenic areas that have been made known in the Quesnel TSA represent 4.4 percent of the total TSA land base. Objectives have been specified for each of these areas. To reflect the requirement that visible evidence of harvesting be kept within the specified limits, depending on the visual sensitivity of the area and its objective, between 77 to 95 percent of the scenic areas were required to be covered with trees at least three metres tall at all times.

In this TSA, with vast areas of beetle-killed forest, dead trees are being left to satisfy the visual quality objectives. The rationale for leaving trees to meet VQOs was developed during a period when operations were harvesting, or leaving, live trees. Now that harvesting operations are primarily directed at harvesting or leaving dead trees, I urge staff from the Ministry of Forests, Ministry of Sustainable Resource Management, and the Ministry of Water, Land and Air Protection to reconsider whether leaving dead trees do indeed meet the objectives for VQO (as well as for wildlife, biodiversity and riparian area management).

The current timber supply analysis accounts for all visually sensitive areas now made known to licensees, and reflects all the management constraints to which licensees are presently required to adhere. I therefore consider that for the purposes of this determination the constraints on timber supply from areas currently managed for visual sensitivity have been modelled appropriately in the analysis.

- *identified wildlife*

Identified Wildlife are those wildlife species and plant communities that have been approved by the Ministry of Water, Land and Air Protection as requiring special management. On February 19, 1999, the province announced its Identified Wildlife Management Strategy (IWMS)

for dealing with endangered, threatened, vulnerable, and regionally significant species that have not been accounted for by existing management strategies for biodiversity, riparian management or ungulate winter range, or through the application of other forest cover constraints.

In the Quesnel TSA, six Wildlife Habitat Areas (WHA) have been established under the IWMS for the White Pelican. This has had no impact on timber supply for the TSA and I make no adjustments to the base case.

In the area covered by the CCLUP, management objectives for identified wildlife are required to be achieved without compromising the targets established in the plan for timber supply. To this end, it is expected that management for mule deer, caribou and other identified fish, birds and mammals will be accommodated within the area-based HLP targets available for management of non-timber values (equivalent excluded area). In my previous AAC determination for this TSA I concluded that the CCLUP contained adequate provisions for meeting the objectives for identified wildlife species. That conclusion is still valid and I therefore make no further adjustments to the base case timber supply projections.

- *Lower Blackwater Local Resource Use Plan*

A local resource use plan (LRUP) is a plan usually approved by the district manager for a portion of the provincial forest that provides area-specific resource management objectives for integrating resource use in the area. These plans are prepared pursuant to section 4 (c) of the *Ministry of Forests Act.*

The Quesnel TSA includes the Lower Blackwater LRUP area. Zone 1 of the LRUP covers 3364 hectares and is managed primarily for fish, wildlife and recreation values. Ninety percent of this zone is unavailable for timber harvesting. The remaining ten percent—336 hectares—is available for harvesting, but only under the constraints applied to meet 'partial retention' visual quality objectives. Under these constraints, 85 percent of the area must be maintained in forest cover at least 3 metres tall at all time. The zone contains a portion of a prominent recreation feature, the Alexander Mackenzie Heritage Trail (most of which lies in the adjacent Prince George Forest District). Part of this trail, extends beyond the boundaries of Zone 1, occupying approximately 2241 hectares of productive Crown forest land that could otherwise be considered part of the timber harvesting land base.

Both the LRUP and the trail predated and are accounted for in the CCLUP. However, due to delays in updating inventory files, deductions accounting for Zone 1 of the LRUP and for the portions of Alexander Mackenzie Heritage Trail in the Quesnel TSA were inadvertently omitted in deriving the timber harvesting land base for the current analysis.

I agree that this has resulted in an overstatement of the timber harvesting land base by a net area of approximately 5300 hectares, and I have taken this into account in my determination as discussed in 'Reasons for Decision'.

- *stand-level biodiversity*

Biological diversity, or biodiversity, is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, and the evolutionary and functional processes that link them. In practice, biodiversity in a given management unit is assessed and managed at the stand and landscape levels.

Stand-level biodiversity has two components. The first is for wildlife trees either dispersed throughout the cutblock or in wildlife tree patches (WTP) within the cutblock and in adjacent

areas to provide structural diversity and wildlife habitat. The other provision for stand-level biodiversity is the retention of coarse woody debris throughout the cutblock.

As described under *forest stewardship principles*, it was recommended that the level of in-block retention should increase as block size increases and should vary up to 25 percent of total block volume. In the analysis, a retention level of 20 percent was modelled for moderately and severely infested pine stands since it was assumed that salvage blocks would be quite large. For other areas where normal operations are expected to occur, a retention level of about eight percent was modelled.

District staff advise that there are large amounts of coarse woody debris left after harvesting—particularly due to current utilisation practices —but that this debris is usually at roadside rather than distributed throughout the cutblock. Licensees often burn this debris whereas landscape ecologists indicate there would be ecological benefits to having it distributed throughout the cutblock. Even though it is not required in forest legislation or policy, I find that the levels of retention modelled in the base case are reasonable and I encourage local forest managers to work together to find practical, cost effective ways to attain the higher retention levels modelled and to distribute it throughout the cutblock. For the present determination, I am satisfied that the timber supply projections include an adequate accounting for stand-level biodiversity objectives.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that this—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives as discussed throughout this document—will provide for the habitat needs of most forest and range organisms.

The landscape-level biodiversity requirements for the Quesnel TSA are rather complex and were documented in detail in my previous determination in June 2001, for this TSA. One significant change was that in the previous analysis the forest in the non-timber harvesting land base was assumed to age in perpetuity without being disturbed by events such as fire and insects. As a consequence, an increasing proportion of the older forest required for landscape-level biodiversity was met from the non-timber harvesting land base as time went on. In the current base case, forest in the non-timber harvesting land base was not allowed to age beyond 280 years. Upon reaching this age, the forest in this part of the land base was "disturbed" and its age re-set to 30 years. This means that a greater proportion of mature and old forest required for landscape-level biodiversity now have to be met from the timber harvesting land base than would have been the case previously. I note that "disturbing" the forest in the non-timber harvesting land base only has a minor affect on timber supply in the longer term.

While I recognise that both sets of modelling assumptions have their shortcomings, I am satisfied that the current base case assumptions adequately reflect the contribution of forests in the non-timber harvesting land base and I make no further adjustments to timber supply on this account.

Staff from MWLAP commented that they would support harvesting in the non-timber harvesting land base if that would lead to less road access in critical habitat elsewhere on the timber harvesting land base. I understand the concern about access especially in view of the proposed increase in harvesting and I urge District staff to work closely with other agencies and the forest industry in order to carefully manage access development (and deactivation where appropriate) in the coming years.

Others have pointed out that allowing lodgepole pine to age to 280 years is too long since pine normally die much sooner. I agree with this observation and I note that it may cause a very slight downward pressure on timber supply in the long term. However, since "disturbing" the non-timber harvesting land base did not affect the timber supply forecast significantly, I will not make any adjustments to the base case projections for this determination at this time.

Finally, I note the substantial amount of area and volume that was constrained and not available for harvesting as discussed earlier under *Forest stewardship principles*. These additional requirements—combined with all other land use and forest practices requirements, including stand- and landscape-level biodiversity objectives—do ensure that significant area is reserved from harvesting in order to meet important environmental objectives.

From all the foregoing, I am satisfied that the requirements for landscape-level biodiversity as prescribed in the CCLUP and the Forest Practices Code, even under the current conditions of extreme MPB infestation, have been respected and incorporated as fully as possible in the timber supply analysis.

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

First Nations considerations

Four First Nations (Alexandria Band, Lhoosk'uz Dene (Kluskus), Red Bluff Band, and Nazko Band) have resident communities in the Quesnel TSA. The Saik'uz First Nation, Ulkatcho Band, T'exelc (Williams Lake), Xats'ull (Soda Creek), Lheidli-T'enneh Band, Tsi Del Del (Alexis Creek) and Tl'etinqox (Anaham) are neighbouring communities who have asserted traditional territories in the TSA. First Nations have generally stated they want opportunities to become more involved in management of the natural resources within their areas of interest. Considerable change has occurred whereby the First Nations are being encouraged to increase their participation within the forest sector. Currently there is an increasing involvement by First Nations in forest harvesting, primarily through the implementation of interim measures agreements allowing them to take advantage of Section 47.3 of the *Forest Act.* The current AAC uplift in the TSA has increased the opportunities for First Nations involvement.

Bands that hold timber tenures in the Quesnel TSA include the following:

- The Alexandria Band holds two non-replaceable forest licences in the Quesnel TSA. The first is a ten-year licence is for 150 000 m³ (Billyboy Logging and Contracting), expiring July 2011. The second is a five-year licence for 75 000 m³ (Esdilagh Enterprises Ltd.), expiring in May 2005.
- The Nazko band holds four non-replaceable forest licences in the Quesnel TSA. The first is a ten-year licence is for 150 000 m³, expiring May 2011. The second is a five-year licence for 350 000 m³, expiring in February 2007. The third is a three-year licence for 50 000 m³, expiring in February 2005. The fourth is a five-year Forest and Range Agreement non-replaceable forest licence for 79 000 m³, expiring in December 2009.
- The Red Bluff band (Red Bluff Development Corporation) holds a ten-year, non-replaceable forest licence in the Quesnel TSA for 150 000 m³, expiring in September 2012.
- Ulkatcho band (Yun Ka Whu'ten Enterprises) holds two non-replaceable forest licences in the Quesnel TSA. The first is a ten-year non-replaceable forest licence is for 150 000 m³, expiring

in May 2011. The second is a five-year non-replaceable forest licence for 250 000 m³, expiring in September 2008.

- Williams Lake band (Borland Creek Logging Ltd.) holds two non-replaceable forest licences in the Quesnel TSA. The first is a ten-year non-replaceable forest licence for 150 000 m³, expiring in May 2011. The second is a two-year non-replaceable forest licence for 25 000 m³, expiring in December 2004.
- The Soda Creek band (Xat'sull Logging Ltd.) holds a ten-year, non-replaceable forest licence in the Quesnel TSA for 150 000 m³, expiring in March 2011. They also hold a four-year non-replaceable forest Licence, held jointly with Tolko Industries Ltd., for 500 000 m³, expiring in December 2006.
- The Kluskus Band (Kluskus Management Holdings Ltd.) holds a five-year non-replaceable forest licence for 375 000 m³, expiring in September 2008.

- First Nations consultation

Prior to the release of the Public Discussion Paper on June 10, 2004, District staff provided early notification to the First Nations with asserted territories in the TSA advising them of the expedited TSR process and encouraging their opportunity to provide input. A second notification, a copy of the public discussion, and an offer to meet was also sent.

I note the level of participation of First Nations in timber harvesting activities (see section above) in the TSA. At this time, the nature, scope, and geographical location of potential aboriginal rights and title within the Quesnel TSA remain inconclusive. To the extent that further information on aboriginal interests becomes available during the term of the new AAC, I will consider it in the next AAC determination. I encourage continued consultation with First Nations on operational activities to enable design and timing of forest operations to minimize and hopefully eliminate negative impacts on First Nations' interests.

As I have noted in my *Guiding principles with respect to First Nations*, the AAC that I determine should not in any way be construed as limiting the Crown's obligations as described in court decisions with respect to aboriginal rights and title. The AAC that I determine does not prescribe any particular plan of harvesting activity within the TSA by requiring any particular area to be harvested or not harvested.

As I make my AAC determination, I am mindful of the responsibility of other statutory decision-makers to administer the AAC in a manner consistent with other legislation and with relevant decisions of the courts respecting the interests of First Nations.

Cariboo-Chilcotin Land-Use Plan

The Quesnel TSA is included in the area covered by the Cariboo Chilcotin Land-Use Plan (CCLUP) approved by Cabinet in October 1994. A Higher Level Plan (HLP) Order, making a number of components of the plan legally binding under the Forest Practices Code, was established by Cabinet in January 1996. Subsequently, an approved Integration Report was published in April 1998 to ensure compatibility between components of the CCLUP, following which a Variation to the HLP Order was issued in June 1999. Forest development in the TSA is required to be consistent with the Higher Level Plan.

The CCLUP incorporates a number of components, including management strategies for caribou in the eastern and western areas of the TSA and for mule deer winter range, a biodiversity strategy, and sub-regional planning processes.

I have noted that the access to harvestable timber in the TSA is sufficient to support the projected harvest levels throughout the base case without compromising the amount of unharvested area required to meet the CCLUP seral stage targets (although it is noted that most of the unharvested pine areas projected to be retained will have suffered high levels of mortality due to the epidemic). Throughout my considerations I have also been mindful that any accelerated harvesting required to salvage timber killed by the MPB in the TSA needs to be consistent with HLP direction. Staff from the MSRM are current reviewing land values with respect to MPB mortality to determine if there are thresholds beyond which core values are so diminished as to warrant harvesting and replacement. The Cariboo Mid-Coast Interagency Management Committee and the Cariboo Chilcotin Regional Resource Committee are mandated by government to monitor the implementation of the CCLUP. MSRM will keep these groups informed of the MPB salvage harvesting strategies and will request their advice or direction where required to manage any risk to achievement of the CCLUP targets and objectives.

From detailed discussions with staff from the BCFS, MWLAP and MSRM, I am satisfied that the requirements of the CCLUP—as these are currently understood and interpreted by those primarily responsible for its implementation—have been carefully and adequately represented in the timber supply analysis. On the basis of the foregoing, I have accepted the representation of the objectives of the CCLUP in the base case as adequate for my consideration in this AAC determination.

Planning deferrals

- *Kluskus supply block*

The Kluskus supply block covers 263 113 hectares near the western extremity of the Quesnel TSA and includes 139 005 hectares—13.6 percent—of the TSA's timber harvesting land base and provides a lower proportion, about 8 percent, of the productive capacity of the TSA. In the rationale document for the January 1996 AAC determination, reference was made to a disproportionately low contribution from this area to the total harvest in the TSA, resulting from a historic lack of operations associated with planning delays in the area. The potential was identified for these delays to cause increased harvesting pressure in other parts of the TSA, and concern was expressed over the degree to which the timber supply from this area may reasonably be expected to continue to contribute to the AAC for the TSA.

In assessing this contribution for the purposes of the current determination, I have considered the following information. The CCLUP has resulted in the establishment of zones in the Kluskus area in which timber harvesting is either prohibited or modified to preserve caribou habitat. This greatly restricts the contribution that could be made by this area to the timber supply in the TSA, even if it were developed to the full extent of the applied limitations.

The Kluskus supply block is now part of the Quesnel sustainable resource management plan and there is approval of the location for a main forest access road linking the west Kluskus area to Quesnel. The Lhoosk'uz Dene First Nation has a non-replaceable forest licence in the Kluskus area and have commenced harvesting this year. The level of beetle attack has increased greatly since the last determination and District staff expect to issue new licences for this area. From this, it is reasonable to assume that in the near future, the level of operations in the Kluskus will increase and may eventually become consistent with the timber supply contribution to be expected from the area under the strict requirements applied in respect of caribou and other forest values.

In my June, 2001 rationale I removed the partitioned harvest for the Kluskus to allow forest managers the flexibility to deal with the epidemic beetle infestation in the TSA. Given that the level of beetle infestation has increased in the TSA, I will not specify any harvest as attributable

to the Kluskus under a partitioned AAC. For this determination therefore, I will accept the timber supply as modelled, with the extensive constraints applied, as an appropriate representation for the Kluskus area. Any further developments or new information will be reviewed in the next analysis.

- Pulpwood Agreement (PA) 5

Pulpwood Agreement 5 (PA 5) overlaps a portion of the Quesnel TSA. Harvesting under PA 5 could affect the availability of mature timber for sawlog harvesting in the TSA by creating cut-over areas that must be reforested and meet green-up requirements before adjacent sawlog forests can be harvested. The harvest from problem forest types could similarly be affected. BCFS region and district staff advise that the extent and timing of any future harvesting under PA 5 are not clear at this time, that no harvesting has been conducted in the past, and that none is currently proposed for the near future.

No constraints were applied in the timber supply analysis to account for possible implications from harvesting under PA 5. In view of the current emphasis on harvesting dead trees it is possible that there may be insufficient quantity or quality of chips from the sawmilling sector to meet the needs of the licensee holding PA5. In this event, harvesting taking place under PA 5 in the near future. However, I am satisfied that the harvest levels projected in the timber supply analysis require no adjustment at this time in respect of any potential harvesting under PA 5.

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

Alternative harvest flows

In public input, First Nations drew attention to the fact that the proposed AAC increase is clearly unsustainable, will lead to an economic 'boom' that will be 'difficult to scale back' and will not give future generations the same level of prosperity. Generally, I agree with these observations, although I would add that scaling back will be driven by an overall reduction of harvestable mature timber. I also note that the lower future harvest level is basically a result of the beetle mortality rather than the short-term salvage program. In my determination I have been mindful of these concerns and have considered them in context of the urgency of the need to salvage the mortality and to minimize the overall damage brought about by the MPB in the TSA.

Specifically, in the timber supply analysis the elevated harvest level is indicated to be sustained for ten years only. I have noted elsewhere that during that time, even with elevated harvest levels, it could be possible for the MPB to attack all susceptible lodgepole pine stands on the timber harvesting land base. The elevated harvest levels now under consideration are not contemplated as sustainable levels; rather they are temporary, extraordinary measures designed to deal with an extraordinarily widespread MPB attack, and to contain any negative consequences to the extent possible. Increased levels of socio-economic activity will occur for the duration of the elevated harvest and will necessitate adjustment when the harvest level subsequently declines. However, the harvesting and reforestation activities now contemplated are expected to leave the forests in a better, less damaged condition for the future than if no additional effort were made at this time to salvage the killed timber. Thus, as further discussed throughout this document, despite the noted concerns I have considered a temporary significant increase in harvest level to be an appropriate response to the current epidemic infestation.

(c) Repealed.

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

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 4) and a memorandum dated February 26, 1996, (attached as Appendix 5). This letter and memorandum together include references to forest investments, forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

The government's objective with respect to reductions in AACs is not directly applicable in this TSA at this time as no immediate AAC reduction is contemplated. However, the temporary increase under consideration is projected to be followed by an equivalent decrease, and in determining this AAC I have been mindful of the government's objective with respect to the size of the eventual reductions.

With respect to commercial thinning, I have noted that this has been tried in the TSA, but that the economics are currently not advantageous. Partitioned harvests attributable to deciduous species are already in effect in the TSA, and also form integral parts of the current AAC determination as noted in the appropriate sections and in 'Reasons for Decision'.

The Minister's memorandum addressed the effects of visual resource management on timber supply. In it, the Minister asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. In the case of the Quesnel TSA, as discussed under *visually sensitive areas*, the CCLUP includes broad requirements implying that more extensive visually sensitive areas may need to be accounted for in the future, but also sets limits on the permissible impact these may have on timber harvest levels. Clearly the eventual visual quality requirements approved under the CCLUP will be consistent with government's own objectives, and in the meantime the current timber supply analysis accounts for all areas now made known to licensees, and reflects all the management constraints to which licensees are required to adhere to.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

In the abbreviated timber supply review process for the Quesnel TSA, the BCFS provided opportunities for public review and comment on the *Expedited timber supply review for the Lakes, Prince George and Quesnel timber supply areas – Public Discussion Paper*, released in

June 2004. Copies of the report were mailed to local governments and Members of the Legislative Assembly, First Nations and licensees, and made available to forest workers, environmental groups, ranchers, consultants and interested individuals in the Quesnel and other adjacent TSAs. Information meetings were offered, copies of the documents were provided to the public and local media, and their availability was advertised.

In response, many submissions were received, from the forest industry, local government, First Nations, interest groups and the general public. I have reviewed the submitted information. Wherever possible, I have attempted in the appropriate sections of this rationale to respond briefly to the views expressed, and consideration of this input has been an important component of this determination.

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

Epidemic mountain pine beetle infestation

- the beetle

The mountain pine beetle (MPB), *Dendroctonus ponderosae* Hopkins (Coleoptera: Scolytidae) is widely considered to be the most damaging of all the insects that attack lodgepole pine in western Canada. The insect is a small, cylindrical-shaped bark beetle that kills mature trees by boring through the bark, mining the phloem—the layer between the bark and the cambium or inner wood of a tree—and interrupting the flow of nutrients up the tree stem. Details of its life cycle and its devastating power in destroying forests are reported in the *Mountain pine beetle, Forest Pest Leaflet 76*, a Pacific Forestry Centre publication, from which the following extract is taken:

> Tree foliage begins to dry out as soon as the conduction of water up the tree is interrupted. As a result, the color of the foliage on infested trees gradually changes from bright to dull green. This early symptom in the lower crown will often become visible 2-3 months after attack. However, more distinct color changes occur during the onset of the growing season the spring following attack. Most lodgepole pine change from yellowish green to an orangey red by July and rusty brown by late summer. At this time most of the beetles will have left the tree. Other tree species display varying color patterns: ponderosa pine seldom turns red but develops more of a straw color, while white pine tends to become bright red. With time, retained foliage color becomes more dull, and most of the foliage drops in 2-3 years; this will vary from species to species and with weather conditions. These rapid and distinct color changes are used to schedule aerial mapping of recently attacked trees.

- assessment of the mountain pine beetle epidemic

The MPB thrives in forests of mature lodgepole pine, and in the past two decades has widely infested a vast area in central British Columbia. As I noted earlier in this document, a large proportion of the Quesnel TSA's timber harvesting land base supports forest stands aged 60 years and higher, the majority of which are pine forests and highly susceptible to attack by the MPB.

Due to this abundant host and to a series of mild winters that have failed to kill the MPB larvae, the infestation has spread rapidly over the past ten years to reach epidemic proportions today in the Quesnel TSA. The last major infestation was in the Chilcotin during the 1980s and covered approximately 400 000 hectares. Beetle-killed trees were harvested as merchantable sawlogs and

pulp (chip) fibre for many years after the infestation was halted by cold winter weather. The current outbreak is believed to have started around 1994. While it increased steadily for a number of years, it has only been in the last two to three years that the outbreak has expanded so rapidly. By 2002, the outbreak had exceeded all previous records and continues to grow at epidemic levels. In April 2004, the BCFS Research Branch reported the *Provincial Level Projection of the Current Mountain Pine Beetle Outbreak: An Overview of the Model (BCMPB) and Draft Results of Year 1 of the Project.* This research was supported by the Mountain Pine Beetle Initiative (MPBI) of the Canadian Forest Service and the BC Forest Service. One of the key aspects of the provincial-level MPB project was the development of a MPB population prediction system. The data shown in Table 1 and repeated below was derived from that draft report. It is expected that in 2005 (as a result of the 2004 flight) there will be about 56 million cubic metres of merchantable pine killed in the Quesnel TSA as a result of the beetles emerging from their brood trees and infesting new host trees this summer.

Merchantable volume (millions m3) of beetle-killed pine on the timber harvesting land base.

TSA	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Lakes	0.3	1	4	9	16	21	25	30	34	38	42	46
PG	5	7	10	21	38	59	79	100	127	141	158	171
Quesnel	4	4	7	13	28	44	56	66	73	79	83	87
Total	**9**	**13**	**21**	**43**	**83**	**124**	**160**	**196**	**234**	**258**	**283**	**304**

The annual rate of kill is expected to peak in 2007 as the availability of suitable host trees decreases. By 2010, the cumulative volume of pine killed in the Quesnel TSA is projected to be 87 million cubic metres.

- *'controlling' the MPB*

As noted in the *Mountain pine beetle, Forest Pest Leaflet 76*, several control methods may be effective for lower levels of infestation. Pheromones may be used to prevent the spread of beetles outside the affected area or to create trap trees to attract beetles. Individual 'brood trees' may be felled and burned, and approved pesticides may be applied under permit, before the MPB larvae have had time to mature and spread. A number of these methods have been applied in the Quesnel TSA.

However, as noted in the *Mountain pine beetle, Forest Pest Leaflet 76*, these methods become ineffective at higher levels of infestation.

> At intermediate infestation levels (up to about 100 trees per patch), small-patch logging can be used if good access is in place, and if beetle attack is concentrated naturally or through the use of pheromone baits. Beyond the intermediate stage, and when infestations exceed 10 ha [hectares], control becomes increasingly more difficult. In larger infestations the rate and range of beetle dispersion increases and any effective control program will require very extensive ground surveys to locate the green, newly attacked trees. Consequently, the only practical control measure at this stage is clearcutting well beyond the areas having red trees in order to remove trees containing beetles.

During the past two years in the Quesnel TSA, the latter measure—'clearcutting well beyond the areas having red trees in order to remove trees containing beetles'—was the preferred option. This

action did not *eliminate* the infestation, which at its current level could only be achieved by a population collapse, either from very cold weather or from complete infestation of all susceptible host trees. However, it was hoped that intense control efforts focussed on the removal of active infestations could *slow* the MPB's population expansion, and remove the large numbers of dead and dying trees from the landscape and salvage their commercial value while it remains. As can be seen from the above table, the current level of control was insufficient to prevent the infestation's serious threat to all susceptible stands in the TSA.

- current management strategy

Regional and district staff of the BCFS, and the local forest industry have been actively working to control and manage the MPB infestation. Since 1998, the management strategy has been to direct harvesting to infested stands as a priority so that the remaining stands can continue to contribute to achieving the HLP targets of the CCLUP. In 2000, the Cariboo Forest Region Mountain Pine Beetle Task Force was formed to assess the beetle epidemic and the effectiveness of past management strategies. Both industry and the BCFS continue to monitor and evaluate the MPB situation and management techniques with the objective of focusing harvest and other activities where they will be most effective in controlling the spread of the infestation.

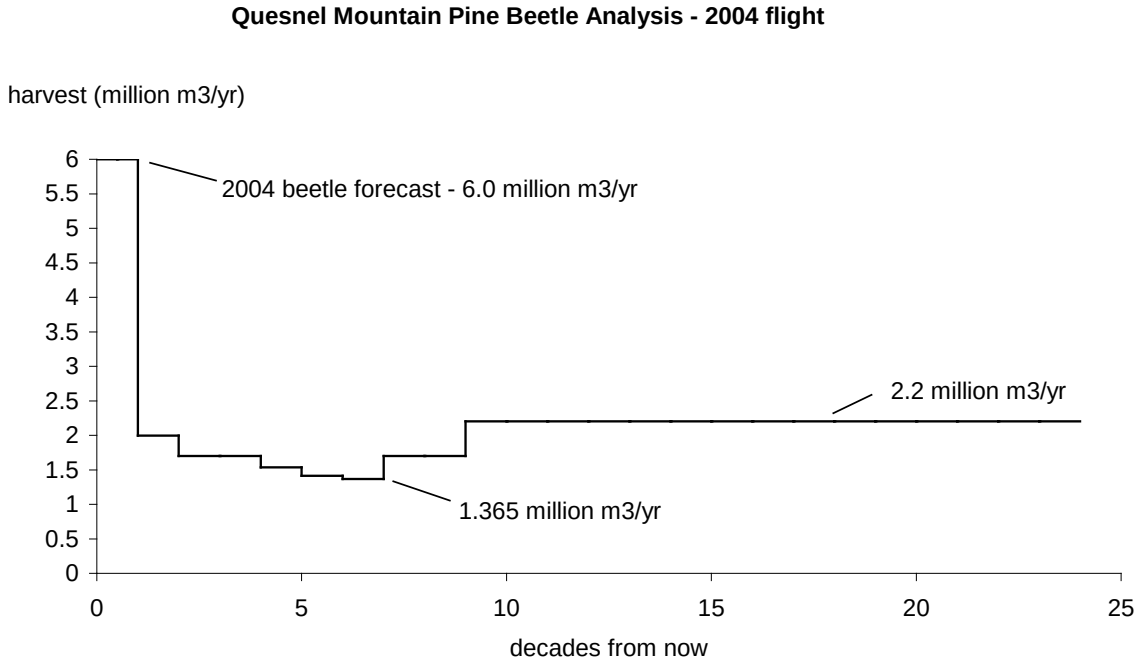
The current strategy recognises that the TSA is over-run by the MPB and the harvesting emphasis is now on recovering the economic value of the killed timber rather than attempting to control the spread of the beetle. Harvesting is heavily concentrated on removing at risk pine with only incidental harvesting of other species. Recent volume billings reflect this pine emphasis with 80+ percent of the volume harvested being from pine.

- timber supply analysis—assumptions and results

From the many complex assumptions on which the analyses were based and which I have reviewed in detail, the following are of particular note with respect to MPB management.

- The TSR2 inventory data was updated to reflect harvesting using harvest-billing information provided by district and region staff.
- For pine-leading stands with moderate and severe levels of attack, stand-level retention was increased to 20 percent (about 12 percent above TSR2 levels) and cutblock adjacency constraints were removed.
- All other forest cover constraints related to higher level plans, landscape-level biodiversity, visual quality, and wildlife habitat were applied.
- In the short term, the harvest targets pine stands with moderate and severe levels of attack first (worst first).
- It is assumed that beetle-killed wood could be used for 10 years and then considered unrecoverable thereafter.
- A 15-year regeneration delay was assumed to apply to severely attacked pine stands that are not harvested within the first 10 years. These stands do not retain enough sound wood to be considered merchantable after the shelf life has expired.
- Disturbance was modelled in the inoperable stands to ensure they would not become exceedingly old.

The figure below shows a harvest forecast based on the projected 2005 mortality level from this year's (2004) flight of beetles. The 2004 beetle forecast, indicates that 6.0 million cubic metres is required to harvest which targets the mortality in the moderately and severely attacked pine stands before they become unmerchantable, was chosen as the base case for this AAC determination.



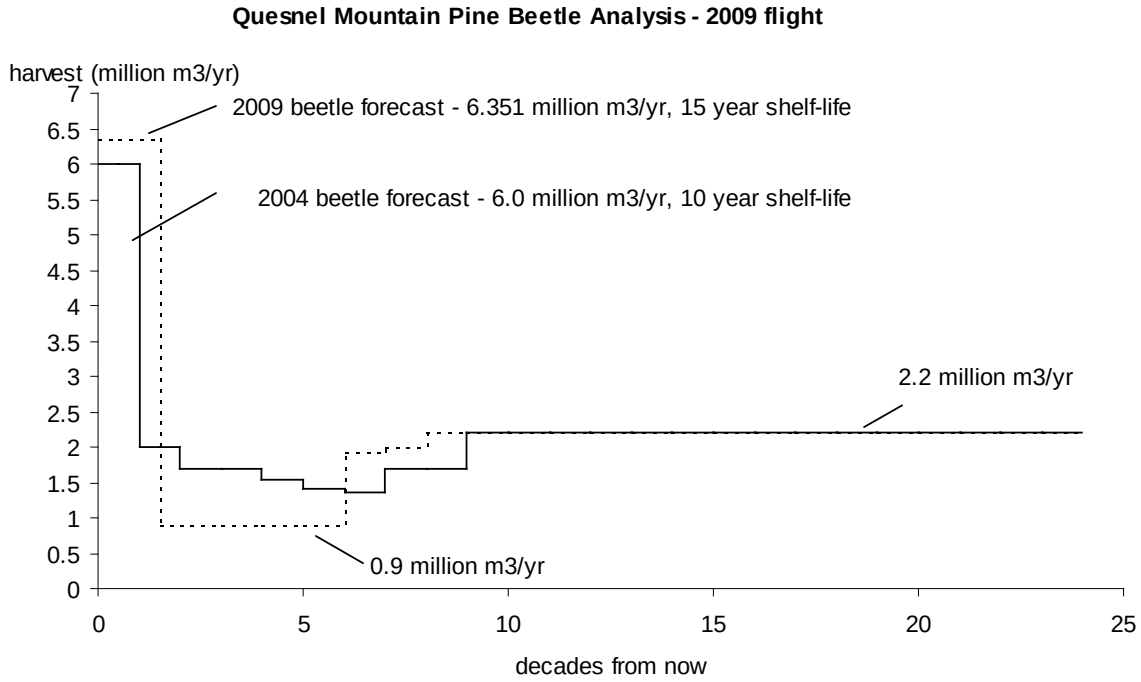
The total attacked volume reported for the 2004 flight (detectable in 2005) in the Quesnel TSA is 56 million cubic metres. It was assumed in the 2004 beetle forecast that there will be no further mortality from 2005 onwards.

In the 2004 beetle forecast, the volume lost after allowing for stewardship reductions is projected to be 17.3 million cubic metres.

Of the 17.3 million cubic metres lost in the 2004 beetle forecast, 13 million occurs in low-impacted stands not prioritized for harvest. The remaining 4.3 million cubic metres are in moderate- and severely-attacked pine stands which were not projected to be harvested due to forest cover constraints (note: the cutblock adjacency constraints were removed for these stands but all other constraints were applied).

- timber supply analysis—alternative projections

An alternative timber supply projection was provided based on the assumption that pine mortality will continue as projected in Table 1 to the year 2010 (2009 flight damage). The figure below shows the results of this analysis.



A shelf life of 15 years was used for this forecast since much of the volume will be killed over the next 5 years and therefore shelf life has not started for this timber.

All projections account for the requirements of the CCLUP noted and discussed in other sections of this document. The presence of the MPB in the TSA means that severe reductions in the mid-term harvest level is inevitable under all forecasts. In view of the uncertainty in predicting the spread of the MPB, I note that if beetle damage continues as projected, the continuation of the base case harvest level is nearly sufficient to salvage the resulting mortality.

In conclusion, in my determination of this AAC for the Quesnel TSA I have relied extensively, and have placed considerable weight on, my considerations and conclusions in this section, as discussed further in 'Reasons for Decision'.

Reasons for Decision

In reaching my AAC determination for the Quesnel TSA, I have considered all of the factors presented above, and I have reasoned as follows.

It is my view, and that of other staff, that the potential for the current epidemic MPB infestation to compromise the achievement of a range of forest management objectives in the TSA is related to the extent of the damage that the beetle is able to incur before its population collapses, either from a weather event (extreme cold at a critical time) or when all susceptible host stands have been attacked. For that reason, the curtailment of the spread of the epidemic infestation, and the salvage of large and growing areas of damaged timber—before serious losses occur to both commercial value and government revenues—have become urgent, complementary priorities in forest management objectives for the TSA.

Experience has shown, as documented in the *Mountain pine beetle, Forest Pest Leaflet 76*, given the current epidemic stage of the infestation, the only practical control measure for bringing about the required curtailment is 'clearcutting well beyond the areas having red trees in order to remove trees containing beetles'. The application of the current AAC to the harvesting of attacked stands has not kept pace with the beetle in recent years, as a result of which about 56 million cubic metres of affected timber now stand dead or dying in the TSA. The determination of the appropriateness of a significant increase in the harvest level—to remove the affected timber, to capture otherwise lost value, and to avoid extensive regeneration delays from residual unsalvaged areas—is therefore now urgent. In response to this urgency, the process leading to this AAC determination has been expedited and some components of the normal timber supply review process were abbreviated, as discussed earlier in this document under 'Expedited process for an urgent AAC determination to address the infestation'.

The expedited process leading up to my determination, however, has not constrained the rigour of my review of the factors required to be considered in an AAC determination under section 8 of the *Forest Act*. Staff of the Forest Service, MSRM and WLAP have made a significant effort to ensure the information considered in my review is an accurate representation of the facts. From my careful review of the information before me in this determination, I am satisfied that the full range of considerations required to be addressed has been comprehensively presented and assessed. Accordingly, my 'Reasons for Decision' are presented in the same manner as in any other determination, acknowledging the substantial focus on the urgency to consider the abnormal MPB infestation as provided under section 8(8)(e) of the *Forest Act*.

My considerations in determinations under section 8 typically identify various factors which, considered separately, indicate that the timber supply may actually be either greater or less than that projected in the reference or 'base case' forecast. Some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by introducing an element of risk or uncertainty to the decision, but cannot be reliably quantified at the time of determination. These latter factors are accounted for in determinations in more general terms.

The following factors have been identified under the noted sections in my considerations for the Quesnel TSA as reasons why the timber supply projected in the base case forecast may have been underestimated to degrees that may be quantified:

- *Non-merchantable species:* The inadvertent removal of 2033 hectares of cedar forest types in deriving the timber harvesting land base resulted in a small underestimation in the projected timber supply in all time periods.

- *Woodlot licences:* The incorrect assignment of 6825 hectares of woodlot ownership resulted in an underestimation by that amount in the timber harvesting land base.

The following factors have been identified in my considerations as reasons why the timber supply projected in the reference forecast may have been underestimated to a degree that may not be readily quantified with accuracy:

- *Estimates for site productivity*: The application of adjustments based on 'SIBEC' values to site indices for stands younger than 41 years and stands older than 140 years after harvest indicates the likelihood of an unquantified but substantial underestimation in the projected mid-and-long-term timber supply.

I have identified the following factors as indicative of potential overestimations in the timber supply to degrees that may be quantified with some reliability:

- *Alienations from Provincial Forest*: About 508 hectares of land formerly lying in the timber harvesting land base and now removed for other land uses were not deducted in deriving the timber harvesting land base, resulting in an overestimation in the timber supply by this very small amount, affecting the mid and long terms.

- *Volume estimates for existing natural stands*: The June 1999 inventory audit suggested that the timber volumes in the existing mature stands component of the inventory may be overestimated by approximately 12 percent.

- *Lower Blackwater LRUP*: In deriving the timber harvesting land base for the current analysis deductions accounting for Zone 1 of the LRUP and for the portions of Alexander Mackenzie Heritage Trail in the Quesnel TSA were inadvertently omitted, resulting in an overstatement of the timber harvesting land base by a net area of approximately 5300 hectares.

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

- *Mortality in immature pine stands:* There is evidence of trees in pine-leading stands younger than 60 years old being killed by the MPB. The base case only accounted for mortality in stands greater than 60 years old. Higher than normal levels of mortality in these stands indicates the likelihood of an unquantified but substantial overestimation in the projected mid-and-long-term timber supply.

From reviewing all of my considerations documented above, including the above list of factors identifying the under- and over-estimations in the projected timber supply, I have reasoned and concluded as follows.

It is helpful to review the 'quantified' factors arithmetically in a general sense, without contrived precision, as suggesting underestimations in the analyzed timber harvesting land base totalling roughly 8858 hectares and overestimations totalling about 5808 hectares, for a net underestimation in the order of 3050 hectares. In a timber harvesting land base of over one million hectares this is not a consequential adjustment.

In the mid and long term, timber supply is underestimated due to the underestimation of site productivity of stands younger than 41 years and stands older than 140 years. On the other hand, the mortality seen in immature stands leads to an overestimation in the mid- and long-term timber supply. While the exact nature of the combined mid-term result of these factors is difficult to predict with accuracy, it is apparent that there will be some degree of mutual offset and that the resulting mid-term level, though uncertain, will be not dramatically different from the base case.

The one factor that has a significant effect on short-term timber supply is the overestimation of existing stand volumes by 12 percent. Since the harvest projections in the short term are comprised entirely of volume from stands greater than 60 years old, I reason that the initial harvest level of 6 million cubic metres in the base case should be reduced by 12 percent to 5.28 million cubic metres.

There is some uncertainty whether the MPB infestation will continue to 2010 as projected in Table 1. I am fairly confident, however, that the mortality projected to occur as a result of this summers flight (trees attacked this summer will die in the spring of 2005) will in fact occur because the past winter was relatively mild and the beetle flight for this year has already occurred. This decision is therefore premised on salvaging the mortality projected for 2005 in the Quesnel TSA.

In context of the current catastrophic MPB infestation it is not useful to attempt to place any finer point on these generalized considerations, beyond the conclusion that nothing in the considerations I have reviewed indicates that the forecasts presented cannot be relied on as providing a reasonable understanding of the potential effects of the MPB, and its management, on the projected timber supply in the TSA.

In accordance with these projections I therefore conclude as follows. By the year 2005 the cumulative total amount of dead timber in the Quesnel TSA attributable to the MPB will be about 56 million cubic metres. The amount of standing dead timber will be somewhat less because of salvage activities during the past few years. Given recent conditions it is quite likely that mortality will increase. I also note that significant additional volume was constrained in the analysis to reflect a reasonable projection of higher levels of retention due to the catastrophic impacts of the beetle infestation. The base case and sensitivity analyses have shown the feasibility of increased harvests as part of a sound strategic approach to the timber supply in the TSA that includes consistency with the biodiversity objectives of the CCLUP. It is my determination therefore that an AAC of 5.28 million cubic metres, which is an increase of 2.032 million cubic metres at this time, is both possible and necessary.

If the MPB continues to expand, the projections show the feasibility of even larger harvest increases. On the other hand, if the MPB undergoes a population crash, the entire increase may not be required for the duration of the effective term of the AAC. For both of these reasons, I will request that BCFS staff monitor and keep me apprised of the condition of the infestation, on the understanding that, as and when appropriate, I may revisit this determination at a date earlier than required by statute, for the purpose of determining either a further increase, or a reduction, as necessary.

With respect to that portion of the harvest attributable to problem forest types, as I have noted in – *problem forest types*, I have considered it appropriate to increase the harvest attributable to PFTs from 300 000 cubic metres to 450 000 cubic metres per year. I hope that by maintaining the PFT partition, the District staff will still have flexibility to manage the salvage program in the TSA, particularly when attendant risks to other forest values must be carefully managed. I expect harvesting to increase in the problem forest types in response to the high degrees of mortality being experienced in those stands as well. I will ask staff to monitor the situation closely to assess the effectiveness of increasing the PFT partition.

Regarding the portion of the harvest attributable to deciduous forest types, I have noted that deciduous species—which are not targeted by the MPB, but which are in many cases interspersed with pine in areas of severest attack—are potentially capable of making an important contribution to the provision of forest cover for biodiversity purposes. For this reason I have decided to maintain the current harvest of deciduous species at 20 000 cubic metres per year.

As noted in the *Forest stewardship principles* section, I have decided to reflect the stewardship recommendations as modelled in the base case. While I acknowledge that they are not mandatory, I feel it is appropriate to consider their implications in this decision in order to ensure that adequate opportunity is given to other government decision-makers to consider how to respond to this new information. This seems more reasonable in the short-term rather than precluding its consideration by implementing an increase that would compromise their possible attainment. In the meantime, I strongly encourage the appropriate policy analysis and resolution of how to consider this information from an operational perspective through the new *Forest and Range Practices Act*.

Determination

Having considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided, it is my determination that a timber harvest level that (i) accommodates objectives for all forest resources during the next five years, that (ii) reflects current management practices as well as the socio-economic objectives of the Crown, and (iii) provides for the timely salvage of timber damaged by the MPB while (iv) diminishing the overall extent of future damage by the MPB, can be best achieved in the Quesnel TSA at this time by establishing an AAC of 5 280 000 cubic metres.

Within this total AAC of 5 280 000 cubic metres, a partition of 20 000 cubic metres is specified as attributable to deciduous forest types and a partition of 450 000 cubic metres is specified for problem forest types as defined by the Quesnel Forest District Manager.

This AAC volume excludes all volumes in issued woodlot licences. This new AAC becomes effective October 1st, 2004, and will remain in effect until another new AAC is determined, which must take place within five years of the present determination.

The following observations are important to, and form an integral part of this determination. The previous 2001 increase and the new increase should be targeted in pine stands that have been impacted by the beetle infestation, with the 2004 increase primarily aimed at mortality in the moderately and severely impacted pine stands. Staff of the BCFS will monitor and apprise the chief forester of the condition of the MPB infestation, on the understanding that, if and when required, this determination may be revisited at a date earlier than required by statute.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognise that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important in helping to reduce the risk and uncertainty associated with key factors that affect the timber supply in the TSA.

1. Initiate work in the district to more accurately estimate existing stand volumes.
2. Examine the issue of waste in excess of that accounted for in the yield models so that it is charged to the AAC.
3. Initiate work in the district to confirm site productivity, in view of the corresponding potential to increase the mid-term timber supply.

4. Monitor the MPB infestation with respect to (i) the ongoing achievement of CCLUP objectives and (ii) the likely need for continued elevated harvest levels.
5. Monitor harvesting activities and mortality due to the MPB in the PFT.
6. Encourage the resolution of how to implement the stewardship recommendations (from the paper "Forest Stewardship in the Context of Large - Scale Salvage Operations) operationally and in the context of the *Forest and Range Practices Act*.

Larry Pedersen
Chief Forester

September 14, 2004

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1996, c. 157 Consolidated to November 4, 2003, reads as follows:

Allowable annual cut

8 (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest 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, and
  (b) different types of timber and terrain in different parts of private land within a tree farm licence area.
  (c) Repealed. [1999-10-1]

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

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with
  (a) the community forest agreement, and
  (b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider
  (a) the rate of timber production that may be sustained on the area, taking into account
    (i) the composition of the forest and its expected rate of growth on the area,
    (ii) the expected time that it will take the forest to become re-established on the area following denudation,
    (iii) silviculture treatments to be applied to the area,
    (iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
    (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
    (vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,
  (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,
  (c) Repealed. [2003-31-2 (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 to June 20, 2003) reads as follows:

Purposes and functions of ministry

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

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia;

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

Appendix 5: Summary of Public Input