BRITISH COLUMBIA
MINISTRY OF FORESTS

Prince George 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 Prince George 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 Prince George TSA is situated in the north-central interior of British Columbia and covers approximately 7.5 million hectares, making it one of the largest management units in the province. There are three forest districts within the TSA: Prince George, Vanderhoof and Fort St. James. Each district is responsible for the administration of forest management activities within its borders.

The Prince George TSA stretches from almost the Alberta border at its southeast corner to Tweedsmuir Provincial Park along its southwest arm, and northwest to the Spatsizi Plateau Wilderness Park. The central and southwestern portion is fairly flat and rolling with gentle slopes, and supports forests of predominantly lodgepole pine and white spruce. The eastern part of the TSA runs along the Rocky Mountains where spruce and subalpine fir dominate the higher elevations, and forests of large old western redcedar and western hemlock dominate the lower elevations. The northwestern portion of the TSA is covered by the Omineca and Skeena mountain ranges. In this part of the TSA, pine dominates the valley bottoms, spruce the lower and mid slopes, and subalpine fir the upper slopes. The TSA includes the Fraser, Nechako, Stuart, Skeena, Sustut, Nation, Parsnip and McGregor river systems, as well as numerous lakes of all sizes.

Approximately 71 percent (5.33 million hectares) of the Prince George TSA land base is Crown forest land. About 62 percent of the Crown forest land (3 325 683 hectares or 44 percent of the total TSA land base) is considered available for timber harvesting. This timber harvesting land base is dominated by lodgepole pine stands (51 percent). The balance is made up of spruce (31 percent), subalpine fir (16 percent), Douglas-fir (1 percent), and cedar and hemlock (1 percent). A high proportion of the pine-leading stands were established 40 or more years ago following major fire disturbances. Rising populations of mountain pine beetle (MPB) currently threaten these stands. Recently harvested stands have been planted to predominantly spruce, lodgepole pine and Douglas-fir. There are also some relatively old stands, mainly comprised of spruce and subalpine fir, in areas with higher precipitation. In addition, there are some very old cedar and hemlock stands in the Interior Cedar Hemlock biogeoclimatic zone located in the eastern portion of the TSA.

The City of Prince George is the largest community in the TSA with a population of over 80,000. Other communities include Bear Lake, Fort Fraser, Fort St. James, Fraser Lake, Giscome, Hixon, McLeod Lake, Shelley, Stellaquo, Stoney Creek, Strathnaver, Tache, Takla Landing, Upper Fraser, Vanderhoof, and Ye Koo Che. In 2000, the total population of the Prince George TSA was estimated to be about 109,285, which represents about a five-percent increase since the 1991 census.

Twenty First Nations groups, comprising about six percent of the Prince George TSA's population, have asserted traditional territories within the TSA. These groups include Nak'azdli, Takla Lake, Tl'azt'en, Nadleh Whut'en, Stellat'en, Saik'uz, Lheidli T'enneh, McLeod Lake,

Yekooche, Cheslatta, Gitxsan, Natoot'en, Lhoosk'uz Dene, Ulkatcho, Kaska Dena, Tsay Keh Dene, Red Bluff, Lake Babine, Nazko, and Tahltan First Nations.

The forest industry is an important source of employment and income for residents of the Prince George TSA. According to a 1996 census, over 30 percent of the TSA's labour force are employed in the logging, forestry services, or forest products manufacturing sectors. In 2000, there were 27 mills operating in the Prince George TSA, including 19 lumber mills, three pulp mills, one paper mill, two chip mills, one pole producer, and one veneer plywood mill. These mills processed over 10.8 million cubic metres of logs annually between 1998 and 2000.

Critical issue: Epidemic mountain pine beetle infestation

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

The Prince George TSA is part of a vast area in central British Columbia that is currently infested by the mountain pine beetle. In this TSA the volume of timber killed on the timber harvesting land base has grown from about five million cubic metres in 1999 to about 38 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 that are reported for 2004 onwards are projections based on mortality expected from the previous year's flight of beetles. For example, the table shows that there will be 79 million cubic metres of pine killed in the Prince George TSA in 2005. This projection is based on the expected number of dead and dying trees in 2004 after the beetles have flown to attack 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

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 have been completely successful and some parts of the TSA, particularly in the Vanderhoof District, are now in danger of being 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 and even colder temperatures in mid-winter. Alternatively, the infestation will end when the MPB no longer has sufficient lodgepole pine to attack.

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 there; however, given the climatic conditions in much of the Prince George TSA, their usability could be for 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 been 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, the three Forest District Managers and the Regional Manager of the Northern Interior Forest Region requested an urgent review of the timber supply in the Prince George 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 Prince George 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 within Forest Range Agreements, 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 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

Since its creation in 1978, the Prince George TSAs allowable annual cut (AAC) has been redetermined several times. In 1986 the AAC was 8 605 000 cubic metres. In 1987 it was increased to 8 855 000 cubic metres to facilitate the use of small diameter pine in the Vanderhoof area. The AAC was increased again in 1988 to 9 255 000 cubic metres to encourage harvest in the Takla Sustut supply blocks. On April 1, 1989 the TSA's AAC was further increased to 9 501 093 cubic metres to reflect a minor AAC credit issued under Section 52 of the *Forest Act* and to facilitate harvest in balsam-leading stands and the salvage of spruce beetle damaged timber. Following this uplift, the minister apportioned 900 000 cubic metres of the AAC to non-replaceable forest licences.

On September 25, 1989 the TSA's AAC was reduced to 9 313 463 cubic metres to account for the creation of tree farm licence (TFL) 53. In 1991, the AAC was reduced to 9 280 499 cubic metres following the establishment of another TFL (TFL 52) and then again to 9 180 499 cubic metres following the expiry of a timber sale licence.

On January 23, 1996 the chief forester set the AAC for the Prince George TSA at 9 363 661 cubic metres. This AAC included a partition of 290 000 cubic metres per year for harvesting cedar and hemlock stands. Of this, 250 000 cubic metres per year was to be directed to the salvage of stands heavily damaged by the hemlock looper over five years. The remaining 40 000 cubic metres was to be directed at stands with lower levels of looper infestation for an indefinite period of time to control future outbreaks.

Effective June 1, 2002, the AAC for the Prince George TSA was set 12 244 000 cubic metres per year. Of this total AAC, 110 000 cubic metres were attributable to cedar and hemlock stands, 160 000 cubic metres to deciduous-leading stands, and 400 000 cubic metres to Supply Block A located in the northwest portion of the Fort St. James Forest District. Three million cubic metres of this AAC was intended to facilitate the salvage of timber damaged by the mountain pine beetle 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 Prince George TSA will be 14 944 000 cubic metres, an increase of about 22 percent from the previous AAC. The purpose of this increase is to provide the districts with sufficient AAC to salvage timber killed by the current and projected MPB epidemic. Of this total AAC, 160 000 cubic metres are attributable to deciduous-leading stands, 110 000 cubic metres to cedar- and hemlock-leading stands, and 400 000 cubic metres to Supply Block A.

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 2002 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 Prince George TSA include the following:

- *Expedited timber supply review for the Lakes, Prince George and Prince George 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;
- *Prince George TSA Analysis Report*, BCFS, September 2001;
- *Prince George TSA Public Discussion Paper: Information about a proposed temporary allowable annual cut increase due to mountain pine beetles*, BCFS, March 2002;
- *Prince George Timber Supply Area: Rationale for AAC Determination*, May 2002;
- Forest Inventory Planning file, BCFS;
- *Prince George TSA Inventory Audit*, BCFS Resource Inventory Branch, 1998;
- *Prince George Forest District Vegetation Resource Inventory Phase II Sampling Project*, MSRM, 2002;
- *Prince George Land and Resource Management Plan (LRMP)*, March 1999;
- *Vanderhoof Land and Resource Management Plan (LRMP)*, January 1997;
- *Fort St. James Land and Resource Management Plan (LRMP)*, March 1999;
- *Vanderhoof Crown Land Plan*, August 1984;

- *Prince George Crown Land Plan*, December 1981;
- *Robson Valley Crown Land Plan*, November 1985;
- *Managing Identified Wildlife Guidebook*, 1999, Ministry of Environment, Lands and Parks (MELP) and BCFS;
- *Identified Wildlife Management Strategy*, BCFS and MELP, February 1999;
- *Mountain Caribou Management Strategy, Prince George Forest District,* January 12, 1994;
- *Habitat Management Strategy for Caribou for the Vanderhoof Forest District* - October 2001;
- *Mountain Pine Beetle: Biology & Outbreak Development;* A. Carroll, L. Safranyik, and D. Linton, Canadian Forest Service, http://www.pfc.cfs.nrcan.gc.ca/entomology/mpb/;
- *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;
- 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; 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 Prince George 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 licenses (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.

In the Prince George TSA, government's approval of the Vanderhoof LRMP in 1997, and the Prince George and Fort. St. James LRMPs in 1999, and decisions on protected areas have clarified many aspects of land and resource use and management. Implementation of these LRMPs will provide further certainty regarding resource management in the area. The timber supply analysis and my considerations in this AAC determination assume consistency with the direction from the respective LRMPs.

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 Prince George 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 Prince George TSA, 'version 3.2'), 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 Prince George TSA

The data on which this timber supply analysis was based was the same as used in the previous 2001 analysis updated for growth and harvest depletions. A summary of the management practices and the assumptions used in that analysis was included in the public discussion paper released for public review in 2001. A second public discussion paper was released in March 2002 due to the spread of the mountain pine beetle infestation and in the interest of expediency, a new data package was not published.

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.

As stated earlier, the Prince George TSA is one of the largest management units in the province. The terrain, forest types and climate vary widely across the length and breadth of the TSA. Pine-leading stands occupy 84 percent of the timber harvesting land base in the Vanderhoof District, 38 percent in the Prince George District, and 43 percent in the Fort St. James District. As a result, pine mortality from the MPB also varies across the TSA. In considering this information, I decided that a TSA-wide analysis would not provide the level of resolution needed for this determination. I therefore asked that the timber supply analysis be conducted at the district level to account for the variation in pine mortality across the TSA. Thus, for this determination I was provided with three base case forecasts, one for each district.

For each district in the Prince George 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. The *2004 beetle forecast*, or base case, for the Prince George District shows that a harvest of 5.3 million cubic metres per year is required for 5 years to harvest moderately and severely impacted pine stands followed by a harvest of 4.4 million cubic metres per year for the following five years. Harvest then declines in the second decade to a harvest level of 3.638 million cubic metres per year. The long-term harvest level of 3.708 million cubic metres per year is attained thirteen decades from now. The base case for the Vanderhoof District shows that a harvest of 6.5 million cubic metres per year is required to harvest moderately and severely impacted pine stands for five years followed by a harvest of 3.64 million cubic metres per year for the following five years. The harvest then drops to 1.25 million cubic metres per year in the second decade before recovering to a mid-term level of 1.58 million cubic metres per year. The long-term harvest level of 1.72 million cubic metres per year is attained sixteen decades from now. The base case for the Fort St. James District shows that the current harvest level of 3.0 million cubic metres per year is adequate to harvest the moderately and severely impacted pine stands before they become unusable and the same harvest level can also be maintained for the entire forecast period of 250 years. 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 the AAC for the Prince George TSA, I have relied in part on these base case projections of the timber supply and several other related forecasts, and assessed 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 Prince George 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 Prince George TSA, as estimated from BCFS inventory data updated to December 31, 1996 is 7 508 191 hectares. Of this, 5 327 273 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 (THLB).

In the Prince George TSA, almost 2 million hectares, or 37 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, 62 percent of the productive forest is included in the current timber harvesting land base of 3 325 683 hectares. My considerations respecting the individual deductions applied in deriving the timber harvesting land base are presented in the following sections.

- Crown land plans

Crown land plans (CLPs) are sub-regional plans jointly developed by provincial government agencies and local governments to coordinate the development and use of Crown lands and to reduce potential conflicts between competing interests. CLPs identify land-use designations for Crown land both within and outside the provincial forest. In the Prince George area, some CLP land-use designations (such as agriculture development areas, settlement reserve areas, recreation, wildlife habitat, natural environment areas, and community leases and licences) are considered to not be compatible with forest management activities.

CLP areas not considered to be compatible with the commercial production of timber were excluded from the Prince George TSA THLB during the timber supply analyses. In the analyses, a total of 50 216 hectares were excluded in consideration of land-use designations identified in the Prince George, Vanderhoof and Fort St. James CLPs. Since land-use designations made under CLPs do not change the legal status of the Crown land, I must consider these CLP areas as contributing to the THLB and timber supply until their legal status is changed under the appropriate legislation. For this determination, I conclude the timber supply has been

underestimated by an unquantified amount in consideration of CLPs and will discuss this matter further under 'Reasons for Decision'.

- cedar/hemlock stands

Cedar-hemlock stands are those stands of the interior cedar hemlock (ICH) biogeoclimatic zone in the eastern portion of the Prince George TSA. These stands, which are entirely in the Prince George District, amount to 73 600 hectares of productive forest. In my last determination I reduced the partition to harvest looper-damaged, cedar-hemlock timber from 290 000 cubic metres to 110 000 cubic metres per year. This reduction addressed the limited interest in the remaining damaged timber due to marginal wood quality and poor markets. As well, I noted this partition would be subject to the economic viability of these stands. Ministry staff recently completed an evaluation of the looper-damaged stands and determined that the moderately and severely damaged stands, such as those in the Torpy River drainage, have become uneconomical to harvest. It was noted that the current and future market for these looper-damaged stands is limited and diminishing over time. Harvesting under this partition also considers the objectives established under two nonreplaceable forest licences. One forest licence (80 000 cubic metres) permits the harvest of green volume or looper-damaged volume to meet several objectives; creating and maintaining employment opportunities in forest management and value-added manufacturing; encouraging value-added manufacturing of cedar; and harvesting timber from damaged hemlock- and cedar- leading stands. The second forest licence (30 000 cubic metres) permits the harvest of looper-damaged volume to meet the objective of harvesting and utilizing damaged hemlock- and cedar- leading stands i.e. - salvage. Other factors that I have considered include the established old growth management areas, landscape biodiversity objectives (old growth retention levels in natural disturbance units) and the ongoing public interest in the ICH zone.

In the 2001 analysis, approximately 50 percent of cedar-hemlock leading stands were considered unsuitable for harvesting due to economic and physical operability and environmental constraints. The remaining stands (approximately 35 700 hectares) were included in the THLB. The 2001 analysis indicated that this area could support a harvest of 100 000 cubic meters per year for five decades before declining to 85 000 cubic metres by decade seven.

I agree with the assumptions in the 2001 analysis and have decided, for the term of this determination, to retain the cedar-hemlock partition at the current levels of 110 000 cubic metres per year. It is also noted that the Regional Executive Director of the Northern Interior Forest Region and the Prince George Forest District Manager have the management flexibility to continue to administer this partition appropriately. Decisions regarding this partition in subsequent determinations will continue to be subject to a complete analysis and review of current management practices within the ICH zone.

- deciduous forest types

Deciduous forest types are those stands dominated by deciduous, broad-leaved species. To date, utilization of the predominantly deciduous stands in the Prince George TSA has been very limited but plans have been approved to harvest various birch stands this winter and aspen birch types under a new non-replaceable forest licensee held by Prince George Hardwoods.

The Prince George TSA inventory file identified approximately 192 000 hectares of aspen-leading stands and 28 800 hectares of birch-leading stands. These deciduous-leading stands were not included in the base case analyses. However, in the previous timber supply review separate analyses were conducted for the deciduous-leading stands. These analyses estimated a timber harvesting land base of 61 700 hectares of aspen-leading stands and 13 800 hectares of

birch-leading stands. In my rationale for the June 2002 AAC determination for this TSA I decided to establish an allowable harvest level of 160 000 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 harvest of large areas of infested pine. However, in consideration of the extent and location of deciduous species and their generally lower biological rotation ages, I have decided to maintain an allowable harvest level of 160 000 cubic metres attributable to deciduous species and will discuss my considerations further under 'Reasons for Decision'.

- *Supply Block A*

Supply Block A is located in the upper northwest reach of the Fort St. James Forest District. This remote area is primarily undeveloped and is only accessible by air and rail. Supply Block A is over one million hectares, of which 17 percent is included in the THLB. Subalpine fir is the dominant species in this area, and is mostly mature (greater than 140 years of age) and highly susceptible to the balsam bark beetle which is active in the area. District staff also report considerable MPB infestation in the lodgepole pine stands which occupy about 13 percent of the THLB in Supply Block A.

In my previous AAC determination for this TSA I established a partition of 400 000 cubic metres per year for Supply Block A to avoid concentrating the timber harvest outside Supply Block A and to salvage losses due to the MPB within the Block. Given the increased beetle activity within Supply Block A and the large amount of growing stock in the area, I find it necessary to maintain this partition and will discuss my considerations further under 'Reasons for Decision'.

Existing forest inventory

- *status of current inventory*

The new Vegetation Resource Inventory file that reclassifies and updates the forest cover across the entire TSA, is nearing completion but was unavailable for this analysis. As a result, the TSR 2 forest cover inventory file (FC1) was used with heights, stocking and ages projected to 1997. The file accounts for harvesting activities and disturbances, such as fire and insect damage that occurred up to 1995. Instead of updating the inventory file, the analysts accounted for harvest depletions and stand growth to 2003 by 'harvesting' and 'ageing' in the timber supply model.

The 1998, the Ministry of Forests' Resources Inventory Branch completed an inventory audit for this TSA. The audit results concluded that mature stand volumes in the forest cover inventory could be overestimated and this is discussed under *volume estimates for existing natural stands*. With the qualifications noted in this section, 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 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 Prince George TSA.

In 1998, the Ministry of Forests' Resources Inventory Branch completed an inventory audit for this TSA. The audit showed a statistically significant (22 percent) difference between the estimated mean mature volume obtained from the inventory and that obtained from the audit for the operable portion of the forest in the Prince George District. The difference between audit volume and inventory volume for the Vanderhoof and Fort St. James Districts were not significant. More recently, a comparison was made between the new VRI phase 2 inventory ground plots and the old forest cover inventory file used in this analysis for the Prince George District. The results largely support the findings of the 1998 audit but the differences are smaller than that reported in the audit. As the new VRI project ground sampling is not yet complete, MSRM staff were called on to provide their best estimate of the overestimation of volumes on the forest cover inventory file used in this analysis. They estimated that mature fir/pine volumes were overestimated by 3 percent and spruce volumes by 10 percent in the Prince George District.

To understand the implications of this overestimation, subsequent to the determination meeting I asked for sensitivity analysis to be carried out that reduced fir/pine and spruce mature volumes by 3 percent and 10 percent, respectively. The sensitivity analysis indicated that harvest in the first 10 years could be maintained but, more 'green' or low/non-infested pine stands would be harvested in this 10-year period relative to that harvested in the 2004 beetle forecast. As a result, timber supply in the Prince George District was reduced by 143 000 cubic metres per year (3.9 percent) from decades 2 to 16 relative to the 2004 beetle forecast. The overestimation of existing stand volume in the Prince George District 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 Prince George TSA were taken directly from the forest inventory files due to the time constraints placed on completing this analysis and the lack of availability of local adjustment data for much of the TSA. In my previous determination for this TSA I concluded that '…while the exact magnitude of the productivity increase is not certain, I believe it is highly reasonable to expect that most second-growth stands will grow more quickly than productivity estimates based on site index values derived from

old-growth stands would suggest.' I find that conclusion is still valid and I expect that timber supply in the mid to long term is greater than projected in the base case, and I will discuss my considerations of this further under 'Reasons for Decision'.

- use of select seed

The Forest Practices Code requires that the best genetic quality seed source available be used for reforestation. Better genetic quality (select) seed can be collected from superior natural stand provenances and seed orchards. Select seed sources are determined or developed through field trials, which are designed to identify naturally-occurring, broadly-adapted, healthy and vigorous trees capable of passing on their desirable genes. No genetic engineering is involved in these activities.

A stand established from select seed can yield greater volumes at a given age than if it were established using locally collected seed. The genetic gain of select seed is measured and expressed as a percentage of volume gain over local wild seed at a certain age. Use of select seed can therefore have a significant positive influence on timber supply. No adjustments were applied however to account for the use of select seed in the base case forecast for the Prince George TSA.

Seed use records maintained by the BCFS indicate that currently 100 percent of spruce planted in the Prince George TSA is derived from select sources. The average genetic gain of select spruce seed is 13 percent and it is expected to increase over time. The use and genetic gain of select lodgepole pine and Douglas-fir seed is also expected to increase in the near future as the orchards established for these species increase production. On this basis, this factor represents an upward pressure on timber supply in the mid and long term, which I will discuss further under '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 meters 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 deterioration in wood quality 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 Prince George 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 between three and six years was modelled. In practice, such stands are regenerated within 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 for severely attacked pine stands are reliable for use in this determination. For stands other than severely attacked pine, a longer regeneration delay was assumed in the analysis than occurs operationally causing timber supply to be underestimated by

an unquantified amount in the long-term and I have taken this into account as discussed in 'Reasons for Decision'.

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.

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 younger stands, the proximity to older infested pine stands make the young stands susceptible to mortality.

Data on mortality levels due to MPB in immature pine-leading stands was collected for three landscape units in the Vanderhoof Forest District. Preliminary results indicate that mortality may be as high as 31 percent in pine-leading stands between the ages of 40 and 60 years old. Estimates of mortality in immature pine-leading stands in the Prince George District are much lower at about 5 percent. 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, this action may be creating 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 regeneration 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 Prince George TSA are shown in the following table:

Leading species	Utilization		
	Minimum diameter at breast height (centimetres)	Maximum stump height (centimetres)	Minimum top diameter inside bark (centimetres)
Small diameter pine in supply block D	10.5	15	10
All other pine	12.5	30	10
Coniferous species except pine in supply blocks A, B, C, E, G, & H	17.5	30	10
Coniferous species except pine in supply blocks D & F	15.0	30	10
Deciduous species	17.5	30	10

BCFS staff note that these standards were reasonably reflected in the analysis.

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 Prince George 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 was not generally being measured or 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. I am otherwise satisfied with the assumptions used in the analysis and make no adjustments on account of this factor.

(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 Program 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 Vanderhoof Forest District is particularly severe since it 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 Prince George 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 1,000 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 openings would also be larger. 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, retention of some area, 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 this activity.

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 integrated resources management (IRM) zone (the zone least constraining on timber supply), which covers 88 percent of the timber harvesting land base, a constraint was applied requiring at least 75 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 IRM zone was waived for 30 years. After 30

years this requirement, along with all the others, were in effect for the remainder of the planning horizon. Sensitivity analyses showed that if the cutblock adjacency requirement was waived for only 10 years in the Vanderhoof District, timber supply in the second decade – when the constraint took effect– was not affected.

Other specific cover constraints were applied to reflect particular objectives for caribou habitat, forest ecosystem networks, and scenic values. To ensure adequate representation of requirements for landscape-level biodiversity, the modelling assumptions in the analysis were consistent with the *Forest Practices Code Landscape Unit Guide*.

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 this regard I note that the MSRM is working on the issue of young forest patch size distribution across the Prince George TSA and will be releasing guidelines in the near future.

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 respective LRMPs 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. I have previously acknowledged – as noted in *Forest stewardship principles*, that the base case reflects additional retention objectives that in fact do constrain short-term timber supply as a result of 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, 'Retention,' 'Partial retention,' or '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.

To reflect the requirement that visible evidence of harvesting be kept within the specified limits in the base case, no more that four percent of the forested areas classified as 'Retention' were allowed to be covered by forest less than five metres tall. In 'Partial retention' areas no more than 11 percent of the forested area was allowed to be covered by forest less than five metres tall.

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. Subsequent slope analysis studies indicated that the forests in the Vanderhoof District attained VEG at a height of about 4.1 metres rather than the default of 5 metres as used in the base case. This reduced the time required before additional areas can be harvested in visually sensitive areas by about 2.5 years. I therefore consider that this will have a slight upward pressure on timber supply in the Vanderhoof District throughout the analysis horizon and I will discuss this further under 'Reasons for Decision'.

- *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 Prince George TSA, no wildlife habitat areas (WHA) have been established or proposed to date. It is not possible to specify the exact location or precise amount of habitat area that will be required within the THLB to implement the IWMS. However, given the Province's commitment both to implement the IWMS, and to limit short-term timber supply impacts to one percent province-wide, as well as the expected occurrence of identified wildlife in the TSA, I requested that staff account for the one-percent reduction to the THLB when developing the base case. Given that this was done, I accept that the IWMS was accounted for in the analysis.

- *caribou*

The Prince George TSA is home to both mountain (arboreal lichen feeding) and northern (terrestrial lichen feeding) caribou herds. These species are sensitive to disturbance, and the mountain caribou in the TSA have been designated a 'blue-listed' species. In accordance with LRMP direction, habitat for the mountain caribou was modelled in the base case through a combination of land base removals and forest cover constraints.

Habitat for the northern caribou herd in the Fort St. James Forest District, identified in the Fort St. James LRMP and amounting to 60 593 hectares, was not deducted from the THLB as management objectives for this herd and area have not yet been defined. Similarly, no deductions were made to the THLB in consideration of the Vanderhoof LRMP as it did not specifically preclude harvesting activities in identified caribou habitat areas.

In October 2001 the BCFS, MWLAP and licensees in the Vanderhoof Forest District developed a habitat management strategy to maintain the quality of caribou habitat while providing opportunities for timber harvesting. This strategy, which restricts harvesting in some caribou habitat areas, was not considered in the analysis. Regional staff have estimated that this strategy could have a 0.9 percent downward impact on timber supply in the mid to long term.

Similarly, Regional staff have estimated that accounting for the northern caribou herd in the Fort St. James Forest District in consideration of the LRMP's caribou management strategy, could have a 1.1 percent downward impact on timber supply in the mid to long term. I accept these estimates and will discuss this further in my '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. Under the Forest Practices Code, 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 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 the relaxed utilization standards—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. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests.

Old-growth management areas (OGMAs) were spatially established for three landscape units in the Prince George District but these areas were not removed from the THLB in the analysis. In the base case, forest cover constraints for landscape-level biodiversity were modelled according to the recommendations in the *Landscape Unit Planning Guide* and the impact of removing these OGMAs has likely been accounted for in the short term through the non-spatial constraints modelled in the analysis.

Staff from MSRM reported that they have developed aspatial old forest and old interior forest objectives for the TSA. Examination of the proposed objectives by Regional staff indicate that their implementation will lower long-term timber supply by about 1.4 percent. I will discuss this further in my ‘Reasons for Decision’.

In the 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 if the forest was not "disturbed". Some staff 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 but due to its projected very minor effect on timber supply in the long-term I will not make any adjustments to the base case 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.

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.

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

First Nations considerations

Fourteen First Nations groups comprise about six percent of the Prince George TSA population. Nine First Nations have communities within the TSA which include Nak'azdli, Takla Lake, Tl'azt'en, Nadleh Whut'en, Stellat'en, Saik'uz, Lheidli T'enneh, McLeod Lake, and, Yekooche First Nations. In addition, eleven First Nations; Cheslatta, Lhoosk'uz Dene, Ulkatcho, Gitxsan, Lake Babine, Natoot'en, Kaska Dena, Tsay Keh Dene, Red Bluff, Nazko and Tahltan have asserted traditional territories within the Prince George TSA.

Bands that hold timber tenures in the Prince George TSA include the following:

- The Lheidli T'enneh Band have signed an Agreement in Principle within the B.C. Treaty process. As part of this process and included within an interim measures agreement, with the MoF, they have been offered a community forest pilot agreement for deciduous volume. They continue to work on development of this opportunity. Within the interim measures agreement they also have a non-replaceable forest license for 150 000 cubic metres over a period of three years. The band was also offered a forest range agreement (FRA) with revenue sharing over the term of the agreement.
- The Saik'uz First Nation has signed an interim measures agreement which was replaced with an FRA allowing for the harvest of 750 000 cubic metres of wood focused on beetle control and the revenue sharing over the five-year term of the agreement.
- The Stellat'en and Nadleh Whut'en First Nations have both signed interim measures agreements for 450 000 cubic metres over the three-year term of the agreement. Both have subsequently been offered a FRA. The Stellat'en have declined and the Nadleh Whut'en are currently considering the offer.

- The Yekooche First Nation have signed a FRA for 47 900 cubic metres and revenue sharing over the term of five years.
- An offer for a FRA has also been offered to the Takla Lake First Nation for 18 195 cubic metres and revenue sharing over five years.

Both the Yekooche and Nadleh Whut'en First Nations have acquired additional harvesting rights competitively.

- 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 Prince George TSA remain unclear. 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.

<u>Land and resource management plans</u>

Portions of plans arising from strategic land-use planning processes such as regional or subregional planning (e.g., land and resource management plans (LRMPs)) may be declared as higher level plans under the Forest Practices Code. A higher level plan defined under the Forest Practices Code establishes government's social, economic and environmental objectives, thereby setting the resource management context for developing subsequent operational plans.

Three LRMPs covering the Prince George TSA, as described earlier, were completed and approved by government. Protected areas identified in the LRMPs were excluded in the derivation of the THLB in the analysis. My consideration of LRMP recommendations that guide current practices for Crown land plans, caribou habitat, and visually sensitive areas are discussed separately under each respective factor.

The LRMPs will soon undergo a review in accordance with the MPB action plan update for 2004. Scenic values, biodiversity, access management and wildlife habitat are some of the aspects that will be considered. Draft old-growth management objectives for the PG TSA are currently in the public review phase. These objectives have taken into account the current MPB infestation and call for a certain retention of MPB-killed forest.

(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, live, 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 levels are indicated for only five to ten years. 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 and cedar/hemlock stands 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 Prince George TSA, as discussed under *visually sensitive areas*, the LRMPs set limits on the permissible impact these may have on timber harvest levels. 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.

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 Prince George 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 were made available to forest workers, environmental groups, ranchers, consultants and interested individuals in the Prince George and other adjacent TSAs. Copies of the documents were provided to 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 presented in the *Mountain pine beetle, Forest Pest Leaflet 76*, 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 Prince George 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 Prince George 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 79 million cubic metres of merchantable pine killed in the Prince George 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**

In the Prince George TSA, the MPB attack is most extensive in the Vanderhoof and Prince George Forest Districts. The areas attacked in the Fort St. James are more scattered and on a smaller scale as compared with that in the other two districts. Since the attack patterns vary by district, I asked that the timber supply analyses be conducted at the district level to provide the resolution needed to determine a TSA-wide AAC. 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 Prince George TSA is projected to be 171 million cubic metres.

Staff of the Vanderhoof and Prince George Districts have reviewed the projected volume of beetle kill resulting from the provincial level study for the 2004 flight and concluded that the numbers appear reasonable based on their local knowledge and data.

Fort St. James district staff compiled local MPB mortality figures subsequent to the determination meeting and compared them to the provincial level mortality figures used in the analysis. They concluded that mortality in the district could be as much as 50 percent higher than that projected in the provincial study and used in the analysis. The district also reported that the 2004 MPB flight appears to have spread at a rate unprecedented in their experience and that other beetles are also active in the district (Spruce Beetle, Douglas fir Beetle and Western Balsam Bark Beetle). Given the more refined local assessments, I accept that epidemic mortality figures used in the analysis for Fort St. James are underestimated and I will discuss this further in my 'Reasons for Decision'.

- *'controlling' the MPB*

As noted in the publication *Mountain pine beetle, Forest Pest Leaflet 76, Pacific Forestry Centre,* 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 Prince George TSA.

However, as noted in *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 Prince George 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 objectives of the respective LRMPs in the Prince George TSA. In response to the growing MPB epidemic the province developed a bark beetle strategy in 2001. This strategic plan consisted of the appointment of a beetle management coordinator; introduction of a bark beetle regulation; amendments to the stumpage system; provision for transferring cutting rights across TSA boundaries; administrative efficiencies; increased cut control flexibility; coordination of fire protection; improved transportation infrastructure; and pursuit of federal emergency funding.

All of the Vanderhoof Forest District, the southern portion of the Fort St. James Forest District and the southwestern portion of the Prince George District have been designated an 'emergency bark beetle management unit' under the *Bark Beetle Regulation*. In these units the harvesting emphasis is on recovering the economic value of the killed timber rather than attempting to control the spread of the beetle. Harvesting is concentrated on removing at risk pine with only incidental harvesting of other species. Recent volume billings reflect the pine emphasis. As an example, 85 percent of the volume harvested in the Vanderhoof Forest District was lodgepole pine in 2003.

In the short term the analysis assumes that the majority of the harvest will be directed at cutting moderately and severely attacked lodgepole pine stands. Of the three districts that make up the Prince George TSA, the Fort St. James District has the largest impediments to redirecting the majority of its current harvest to address the existing MPB outbreak. Some of the existing cut (500 000 cubic metres per year) has been transferred to the Vanderhoof District to address the more severe MPB outbreaks occurring there and approximately 850 000 cubic metres per year of harvest is associated with rail agreements in the more northern portions of the district. In addition, some harvest is required to address the other epidemic beetle populations active in the

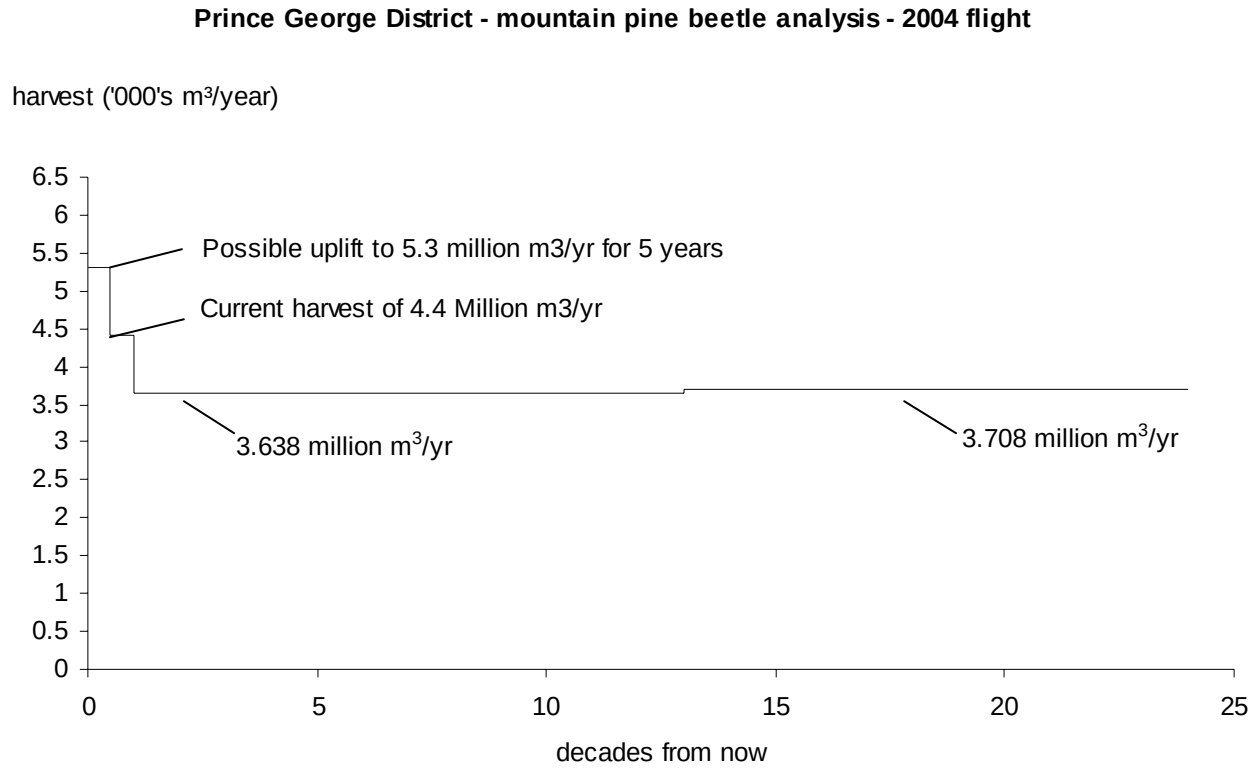
district leaving limited flexibility to use the existing harvest level to address the district MPB epidemic. The base case harvest forecast for the Fort St. James District does not reflect this limited flexibility to direct the existing cut toward the MPB outbreak and therefore the current harvest level will not be as effective in dealing with the outbreak as the forecast indicates. I will discuss this further under 'Reasons for the Decision'.

- 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 was directed at pine stands with moderate- and severe-levels of attack first (worst first).
- It is assumed that beetle-killed wood can be used for 10 years and is 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 do not become exceedingly old.

The figure below shows a harvest forecast for the Prince George District based on 2005 mortality projected from this year's (2004) flight of beetles. This 2004 beetle forecast was chosen as the base case for this AAC determination and indicates that a harvest level of 5.3 million cubic meters per year is required to harvest moderately and severely attacked pine stands before the stands become unusable.

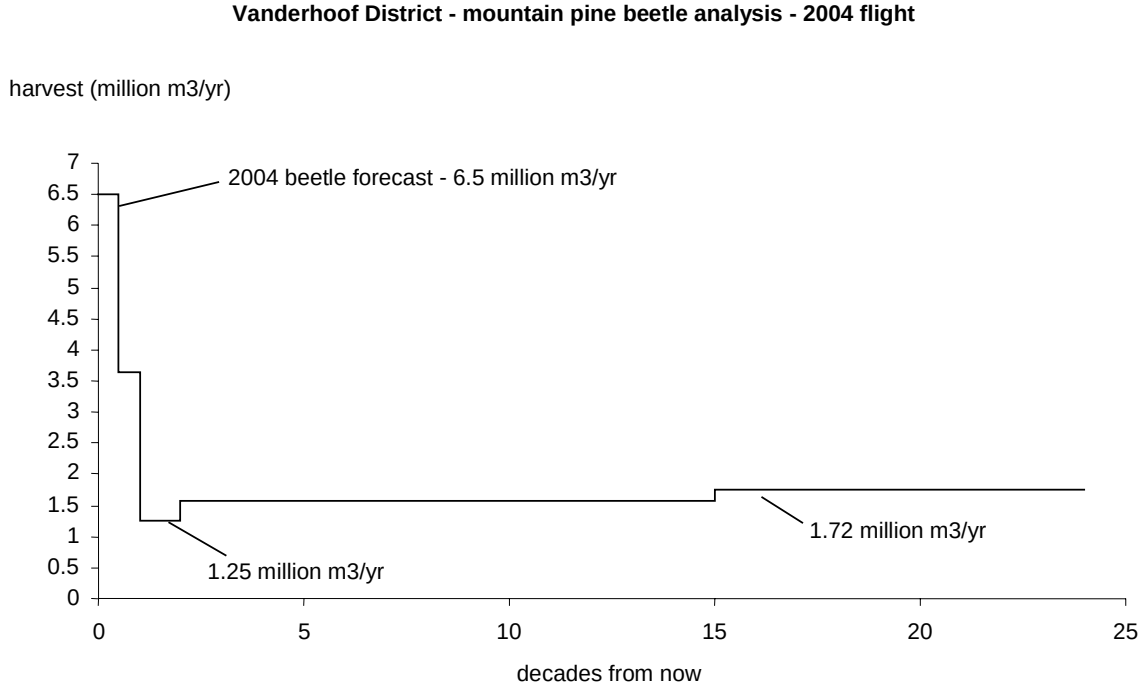


The total attacked volume reported for the 2004 flight (detectable in 2005) in the Prince George District is 22 million cubic metres. It was assumed in the 2004 beetle forecast that there will be no further mortality from 2005 onwards.

In the 2004 beetle forecast, the volume lost after allowing for stewardship reductions is projected to be 5.9 million cubic metres.

Of the 5.9 million cubic metres lost in the 2004 beetle forecast, 5.6 million occurs in low-impacted stands not prioritized for harvest. The remaining 0.3 million cubic metres are in moderately- 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).

The figure below shows a harvest forecast for the Vanderhoof Forest District based on 2005 mortality projected from this year's (2004) flight of beetles. This 2004 beetle forecast was chosen as the base case for this AAC determination and indicates that a harvest level of 6.5 million cubic meters per year is required to harvest moderately and severely attacked pine stands before they become unusable.

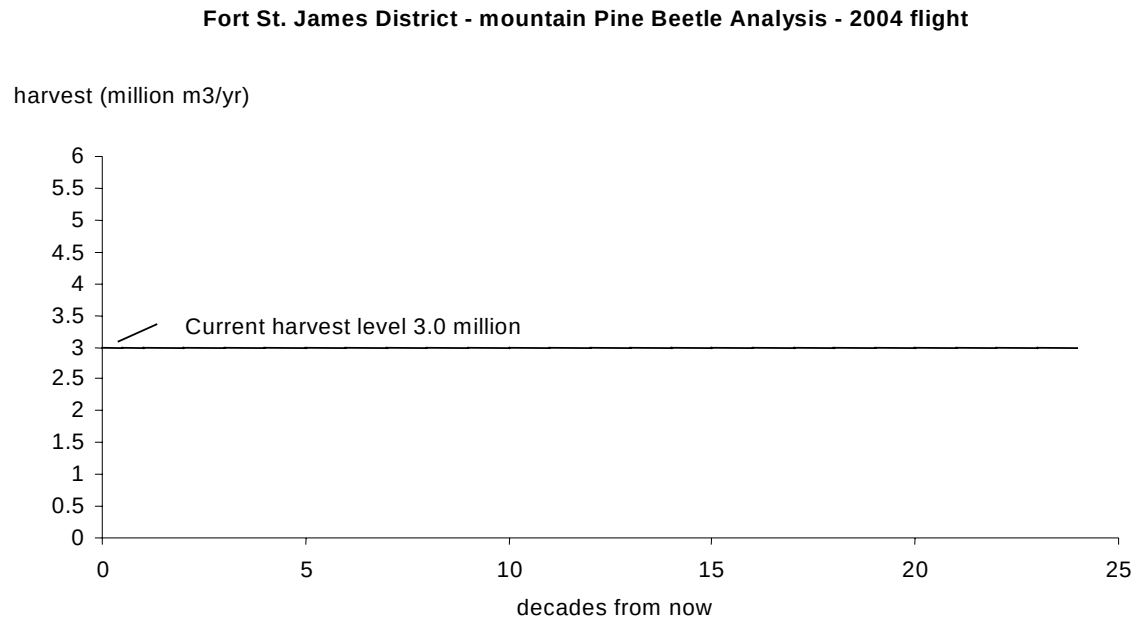


The total attacked volume reported for the 2004 flight (detectable in 2005) in the Vanderhoof Forest District is 40 million cubic metres. It was assumed in the 2004 beetle forecast that there will be no further mortality from 2005 onwards.

In the 2004 beetle forecast, the volume lost after allowing for stewardship reductions is projected to be 16.7 million cubic metres.

Of the 16.7 million cubic metres lost in the 2004 beetle forecast, 10 million occurs in low-impacted stands not prioritized for harvest. The remaining 6.7 million cubic metres are in moderately- and severely-attacked pine stands which were not cut due to forest cover constraints (note: the cutblock adjacency constraints were removed for these stands but all other constraints were applied).

The figure below shows a harvest forecast for the Fort St. James District based on 2005 mortality projected from this year's (2004) flight of beetles. This 2004 beetle forecast was chosen as the base case for this AAC determination and, given the forecast assumptions, no increase was required to harvest moderately and severely attacked pine stands before they become unusable. It also shows that the current harvest level of three million cubic metres per year could be maintained for the entire forecast horizon.



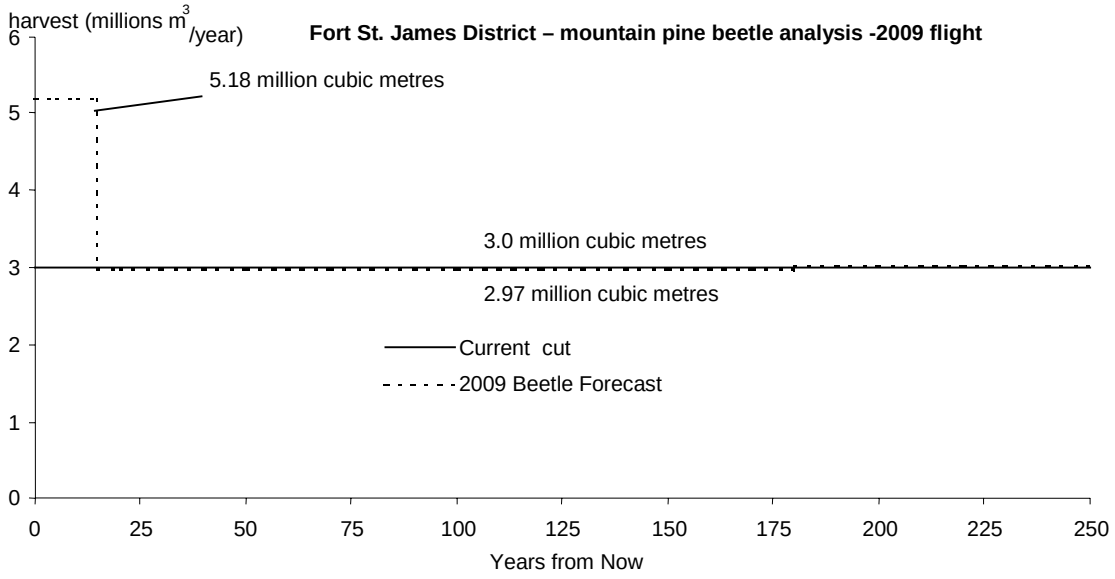
The total attacked volume reported for the 2004 flight (detectable in 2005) in the Fort St. James Forest District is 17 million cubic metres. It was assumed in the 2004 beetle forecast that there will be no further mortality from 2005 onwards.

In the 2004 beetle forecast, the volume lost after allowing for stewardship reductions is projected to be 13 million cubic metres.

All of this 13 million cubic metres lost in the 2004 beetle forecast occurs in low-impacted stands not prioritized for harvest. In the analysis all moderately- and severely-attacked pine stands in the district were harvested. However, as noted earlier, district staff have asserted that actual mortality levels are higher than assumed in this analysis.

- *timber supply analysis—alternative projections*

Alternative timber supply projections were provided for each district 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 pine mortality projected to the 2009 flight for the Fort St. James Forest District compared to the 2004 beetle forecast. If the outbreak continues to 2009, the analysis indicates that a harvest level of 5.18 million cubic meters per year would be required to harvest moderately and severely attacked pine stands in the Fort St. James District before the beetle-killed wood becomes unusable. For the 2009 beetle forecast, the shelf life was extended to 15 years to reflect the fact that volume will be killed over the next 5 years and therefore the 10 year shelf life will not start for some stands for up to 5 years from now.



The 2009 beetle forecast for the Prince George District shows an initial harvest level of 5.62 million cubic metres per year (six percent higher than shown in the 2004 beetle forecast) for 15 years. The harvest level then declines to 3.45 million cubic metres per year for the remainder of the forecast horizon.

The 2009 beetle forecast for the Vanderhoof Forest District shows the same initial harvest level of 6.5 million cubic metres per year as shown in the 2004 beetle forecast. This harvest can be maintained for 10 years. The harvest level then declines to 5.2 million cubic metres per year for five years before declining to less than one million cubic metres per year. After about 50 years from now the harvest level gradually increases to a long-term level of about 1.72 million cubic metres per year as shown in the 2004 beetle forecast.

All projections account for the requirements of the respective district LRMPs 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 are inevitable for the Vanderhoof District under all forecasts. The projected reductions for the Prince George District are quite moderate in comparison. The Fort St. James District has the most robust timber supply of the districts due to the preponderance of non-pine species in that district and the large area involved. 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 the Prince George and Vanderhoof Districts. In the event of beetle damage in excess of that represented in the 2004 beetle forecast, the Fort St. James District would need a significant increase in harvest levels to salvage the affected beetle-killed stands.

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

Reasons for Decision

In reaching my AAC determination for the Prince George 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 insufficient susceptible host stands remain. 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*, in 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 79 million cubic metres of affected timber (less salvage) 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 Prince George TSA as reasons why the timber supply projected in the base case forecast may have been underestimated to degrees that may be not be readily quantified with accuracy (where the factor is district specific it is noted otherwise the factor applies to all three districts):

- *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.

- *Use of select seed*: The use of select seed for all planted stock in the TSA indicates that in the mid- and long-term, timber supply will be higher than modelled in the base case.
- *Regeneration delay*: The assumption of a longer regeneration delay for stands other than severely attacked pine caused mid-and long-term timber supply to be underestimated.
- *Crown land plans*: The removal of CLP areas from the timber harvesting land base led to an underestimation of timber supply throughout the forecast horizon.
- *Visually sensitive areas*: The assumption of a visually effective green-up height of 5 metres rather than 4.1 metres in the Vanderhoof Forest District caused timber supply to be underestimated throughout the forecast horizon.
- *Assessment of the mountain pine beetle epidemic*: I accept that MPB mortality estimates developed by the BCFS Research Branch for the 2004 beetle flight are likely low for the Fort St. James District and the short-term harvest level required to salvage impacted pine stands has been underestimated as a result.
- *Current management strategy*: The assumption that the majority of the existing harvest level can be used to address the MPB outbreak does not reflect the operational constraints in the Fort St. James District and a higher level of harvest will be required in the short term than the base case forecast indicates.

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

- *Volume estimates for existing natural stands*: Estimates by staff in the MSRM suggest that in the Prince George District, mature volumes of spruce may be overestimated by approximately 10 percent and mature volumes of pine and fir may be overestimated by approximately 3 percent. Sensitivity analysis showed that short- and mid-term timber supply may be overestimated by about 3.9 percent in this district.
- *Caribou habitat*: In deriving the timber harvesting land base for the Fort St. James Forest District, 60 593 hectares of caribou habitat should have been excluded. This led to an overestimation of timber supply by 1.1 percent in the short to long term. For the Vanderhoof Forest District, similarly not excluding caribou habitat from the timber harvesting land base led to an overestimation of timber supply by 0.9 percent in the mid and long term.
- *Landscape level biodiversity*: Implementation of proposed old forest objectives will reduce long-term timber supply in the Prince George TSA by about 1.4 percent.

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 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.

In the mid and long term, the timber supply is underestimated due to the underestimation of site productivity of stands younger than 41 years and stands older than 140 years, the use of select seed and the assumption of longer regeneration delays. As well, timber supply is underestimated throughout the forecast horizon due to the exclusion of CLP areas and the lower VEG height in the Vanderhoof District. Also, the short-term harvest level required to address the MPB outbreak is underestimated in the Fort St. James District due to the lack of harvesting flexibility with regard to moving the existing cut and the underestimation of the magnitude of the outbreak.

On the other hand, the mortality seen in immature stands leads to an overestimation in the mid- and long-term timber supply for all districts and the proposed old forest objective will reduce long-term timber supply in the Prince George District by about 1.4 percent. The overestimation of THLB in the Fort St. James and Vanderhoof Districts due to caribou habitat, led to an overestimation of mid- and long-term timber supply of about 1 percent for the two districts. The overestimation of existing stand volumes in the Prince George District led to an overestimation of short-term timber supply of about 4 percent.

While the exact nature of the combined 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 timber supply, though uncertain, will not be dramatically different from the respective base cases with the exception of the Fort St. James District.

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 summer's 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. There is evidence that the current mortality in the Fort St. James District is greater than that assumed in the analysis. This decision is therefore premised on salvaging the mortality projected for 2005 in the Prince George TSA with some adjustments to reflect revised local estimates in the Fort St. James District.

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. Including the mortality resulting from this summers flight (2005 mortality figures) the cumulative total amount of beetle-killed timber in the Prince George TSA attributable to the MPB will be about 79 million cubic metres or greater. 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 continue to increase. I also note that significant additional volume was constrained in the analysis to reflect higher levels of retention to reflect additional forest management constraints as a result of the catastrophic impacts of the beetle infestation and the projected higher harvest levels. 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 LRMPs.

Having considered the above, it is my determination therefore that the harvest in the Vanderhoof Forest District—where the MPB infestation is the greatest—can be increased by 1.7 million cubic metres per year to facilitate the salvage of beetle-killed timber. The harvest in the Prince George District—where there is already a significant harvesting capacity to deal with the MPB

infestation—should be increased by 0.5 million cubic metres per year, slightly less then the base case forecast due to the uncertainty of the inventory volume estimates.

The harvest level in the Fort St. James Forest District—where the MPB infestation is beginning to make its full presence evident—could be increased by 0.5 million cubic metres per year. This is higher than the base case forecast indicates is required to harvest the estimated 2004 mortality, however this higher level is necessary to account for the underestimation of the infestation and to account for the limited ability to move existing harvest within the district. In making the decision to account for a higher harvest level in the Fort St. James District, I note that the sensitivity analysis for the district that projects the MPB mortality forward another 5 years (2009 flight / 2010 mortality) indicates that the mid- and long-term timber supply is not impacted when the short-term level is increased, particularly by .5 million cubic metres.

The harvest levels specified by forest district as noted above were simply my way of providing resolution to the MPB infestation that varied in intensity across a very large and ecologically diverse TSA and are not meant to infer a partition of the AAC by district. Since my duty is to set AACs for management units (TSAs and TFLs), it is my determination therefore that an AAC of 14 944 000 cubic metres, which is an increase of 2.7 million cubic metres above the current AAC, is both possible and necessary for the Prince George TSA at this time.

If the MPB continues to expand, the projections show the feasibility of larger harvest increases (i.e. - Fort St James) or extending the duration of the uplift (i.e.- Vanderhoof and Prince George Districts). On the other hand, if the MPB undergoes a population decline, 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 cedar and hemlock leading species, as I have noted in – *cedar/hemlock stands*, I decided it is still appropriate to specify a harvest of 110 000 cubic metres attributable to these stand types.

In order to ensure that harvesting in the Fort St. James Forest District occurs in a manner that addresses the outbreak across the entire TSA and is not concentrated outside the relatively undeveloped Supply Block A, I have decided to maintain the partition of 400 000 cubic metres attributable to this block.

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 maintained, but not increased, the current harvest level of 160 000 cubic metres per year for deciduous species.

As noted under *Forest stewardship principles*, 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 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*.

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 Prince George TSA at this time by establishing an AAC of 14 944 000 cubic metres.

Within this total AAC of 14 944 000 cubic metres, a partition of 160 000 cubic metres is specified as attributable to deciduous forest types, 110 000 cubic metres to cedar/hemlock types, and 400 000 cubic metres to Supply Block A.

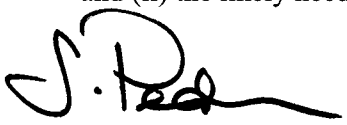
This AAC volume excludes all volumes assigned to issued woodlot licences. This new AAC becomes effective October 1st, 2004, and will remain in effect until the next AAC is determined, which must take place within five years from now.

The following observations are important to, and form an integral part of this determination. The previous 2002 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.

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.

- Initiate work in the TSA to more accurately estimate existing stand volumes.
- Waste in excess of that accounted for in the yield models should be charged to the AAC.
- Continue work to confirm site productivity, in view of the potential increase to the mid- and long-term timber supply.
- Encourage 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.*
- Monitor the MPB infestation with respect to (i) the ongoing achievement of LRMP objectives and (ii) the likely need for continued elevated harvest levels.



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

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis.*

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

Expedited Timber Supply Review for the Lakes, Prince George and Quesnel Timber Supply Areas

Summary of Public Input

BC Ministry of Forests
1520 Blanshard Street
Victoria, BC V8W 3J9

Northern Interior Forest Region
1011 Fourth Avenue
Prince George, BC V2L 3H9

Prince George Forest District
2000 S. Ospika Blvd.
Prince George, BC V2N 4W5

Quesnel Forest District
322 Johnston Avenue
Quesnel, BC V2J 3M5

Fort St. James Forest District
Box 100
Fort St. James, BC V0J 1PO

Vanderhoof Forest District
Box 190
Vanderhoof, BC V0J 3A0

Nadina Forest District
Box 3500
Burns Lake, BC V0J 1E0

Southern Interior Forest Region
515 Columbia Street
Kamloops, BC V2C 2T7

September 14, 2004

This document summarizes the public input received on the expedited Timber Supply Review for the Lakes, Prince George and Quesnel timber supply areas.

This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Expedited Timber Supply Review for the Lakes, Prince George and Quesnel Timber Supply Areas

Background

In June 2004, the British Columbia Ministry of Forests completed an assessment of the timber supply attacked or at risk of attack by the mountain pine beetle in the Lakes, Prince George and Quesnel timber supply areas. On June 10, 2004, it released a *Public Discussion Paper* that summarized the findings and invited comments for 30 days, until July 9, 2004. The *Public Discussion Paper* also included an interpretation paper from the ministry's Forest Science Program recommending stewardship principles in the event of a large salvage program.

In accordance with the *Forest Act*, Section 8, and under normal circumstances, the chief forester reviews and determines new allowable annual cuts for each of the province's 37 timber supply areas and 34 tree farm licences at least once every five years. The harvest level decision may be postponed for up to five more years in cases where the chief forester determines that the allowable annual cut would not change significantly, or it may be determined earlier to deal with unusual events.

The factors listed under Section 8 that the chief forester must consider in determining an allowable annual cut include "abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area".

This report summarizes the input received and provided for the chief forester's consideration when he reviewed the allowable annual cuts for the Lakes, Prince George and Quesnel timber supply areas. The first section of this summary outlines the public review process implemented by the Ministry of Forests, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Ministry of Forests office in Victoria.

Public Review Process and Response

Staff from the five forest districts in the three timber supply areas as well as the Northern Interior and Southern Interior regional offices actively solicited public input through the following actions:

- Copies of the *Public Discussion Paper* were mailed to stakeholders including First Nations, licensees, local governments, environmental groups, and Land and Resource Management Plan participants. Meetings or presentations were offered.
- The *Public Discussion Paper* was made available at the five district offices and two regional offices.
- Advertisements were placed in seven local newspapers, advising the public of the availability of the documents for review.
- A news release was issued and copies of all the documents were made available to the local media.
- Referrals were made to the Ministry of Forests website where documents were available to download.
- Twenty-eight First Nations communities received the public discussion paper, and 10 provided comments related to issues that included economic development, capacity building, cultural concerns and the environment.

The chief forester received 26 submissions to the *Public Discussion Paper* and stewardship interpretation paper (see Appendix 1).

Public Input

This section summarizes public input received in response to the *Public Discussion Paper* and the accompanying interpretation paper, Forest Stewardship in the Context of Large-Scale Salvage Operations, prepared by the Forest Science Program of the Ministry of Forests.

Public Discussion Paper

Increasing the harvest
A number of submissions say harvest levels should increase while others say there appears to be a bias toward an increase even though this has failed to control the outbreak.

In supporting an increase, Ainsworth Lumber Co. Ltd. (Ainsworth) calls for a licensing arrangement similar to the former pulpwood agreement to provide the flexibility to strategically deploy harvesting as the epidemic spreads across and within TSAs.

The District of Fort St. James says that if harvest levels increase in neighbouring districts, they should also increase in the Fort St. James area to encourage local investment, something that is especially important as mill centralization and rationalization continues. The district supports an increase now, saying it will take time to attract and develop new investment.

North Cariboo Share Our Resources notes that the AAC will decrease in future due to the infestation, and an increase now would provide short-term employment, increase government revenue, recover value from beetle-killed trees, reduce the risk of massive wildfires, allow prompt reforestation and create opportunities for new industries.

Several individuals agree with this view. One submission says common sense suggests beetle-killed wood should be used before it burns. Another says the opportunity to control the beetle has been lost because the time for discussion has been overextended – it is time for the Ministry of Forests to listen to its trained experts.

One individual who supports an increase says that while the discussion paper is sensitive to many issues it does not adequately address the issue of spatial dispersion and operability. The individual suggests a greater emphasis on modelling resource values to address tactical issues and to test the robustness of the plans and assumptions that lie behind the analysis.

Another individual says the increase could theoretically be as much as desired because the dead wood is not growing stock so there would be little impact on the mid-term timber supply.

Submissions expressing concern about an increase include a joint paper from the Sierra Club, BC Chapter, The David Suzuki Foundation and the Fraser Headwaters Alliance (Sierra Club). The groups say they have serious concerns about the implications of the proposed increases related to both the timber supply forecast and the forest stewardship proposal.

Individual submissions that oppose an increase offer a number of views, including:

- The AAC should be reduced immediately to the long-term sustainable rate; harvesting to manage the pine beetle outbreak is a fallacy – the only reason to review harvest levels is a potential short-term economic burst.
- There seems to be a bias toward increasing harvest to control the outbreak yet this approach has failed in the past.
- Will the level of cut proposed be sustainable in the short term – the next 70 years or so?

One individual disagrees strongly with increasing the AAC and says that forests must be managed according to the limits set by nature and not according to perceptions of waste and efficiency.

Concentrate on beetle-killed wood
A number of submissions say that any increased harvest should be directed specifically at wood affected by beetles, and many called for clear

criteria to identify salvage targets.

The Sierra Club says the stewardship interpretation paper fails to acknowledge that clear criteria are necessary for what type of trees can be harvested to ensure excessive cutting of live timber does not occur.

Babine Forest Products Company (Babine) says the timber supply review must accurately report on the available timber supply in the three timber supply areas and meet government's responsibility to reduce the short- and long-term impact of the beetle outbreak. It says that harvesting as much beetle-killed timber as possible will maximize the value of this timber and return these sites to the productive land base.

Babine says the current AAC in the Lakes timber supply area is not being fully harvested, and there must be a process to ensure that any increase is directed toward trees damaged or killed by beetles. It says the discussion paper and AAC rationale should address how any increase is to be allocated.

Babine also notes that the Lakes TSA is the smallest of the three involved, and suggests amalgamating the Lakes and Morice TSAs, both managed by Nadina Forest District, so licensees from the Morice TSA could salvage timber in the Lakes TSA.

Several individuals say the increase is justified only if the infected portion of the harvest is nearing 100 per cent. One says a successful salvage operation should be guided by very clear criteria for what kinds of stands are candidates for salvage.

One submission says scalers are reporting that green unattacked pine and spruce volume is being harvested, and suggests there will be confusion unless the ministry and industry use the existing AAC to maximize cut in attacked stands. Another notes that industry may be reluctant to harvest heavily attacked stands unless there is a profit motivator or government direction.

One individual says the AAC should remain at or near the long-run sustained yield by allowing a haul differential to mills that are a distance from the outbreak so harvest can be transferred from green trees to dead trees. The individual included a letter sent to the Minister of Forests.

Abnormal infestation

The Sierra Club says the chief forester has not adequately argued that the infestation is abnormal under Section 8(e) of the *Forest Act*. It says the timber supply analysis should be based on the range of natural variability, (RONV) often cited as the best option for assessing biological activities and their relationship to ecosystem integrity. The submission says: "Although the current outbreak is larger in its spatial extent and rate of spread than previous outbreaks in the Interior, without more information on historical variation in the temporal and spatial characteristics of beetle outbreaks, it is difficult to determine whether the extent of this outbreak is unnatural (i.e., outside the RONV) or not."

Prescribed burning

Submissions from the Sierra Club and an individual point to prescribed burning as a management tool for the infestation.

The individual says a proposed harvest increase assumes the infestation spread is beyond control and suggests that the most important strategies – changes in fire suppression and large-scale prescribed burns – have not been adopted. The individual also says fire suppression has accelerated the spread and recommends that the Ministry of Forests redraft a forest management plan to allow natural fires to burn and, as a transition phase, use prescribed burns to restore the forest to a semi-natural state.

The Sierra Club says prescribed burning should be re-introduced as a management tool for beetle control, the maintenance of ecosystem integrity and a reforestation technique. It adds

that this needs to be balanced with the volume harvested in a given landscape so the cumulative impact of burning and logging is within the spatial and temporal range of natural variation of landscape change.

Manufacturing capacity
A number of submissions identify the need to ensure there is manufacturing capacity to handle any increase harvest.

Ainsworth says major expansions in manufacturing capacity are needed if non-recoverable losses are to be significantly reduced, with longer-term commitments and licensing arrangement to justify larger investments. Babine says government needs to promote establishment of facilities that use low-grade sawlogs and pulpwood, and work with existing facilities to increase production.

An individual representing a company in one of the timber supply areas lists potential uses for the wood and potential for wood treatment facilities to preserve the shelf-life of beetle-killed wood. A woodlot owner says the government's recent solicitation for expressions of interest must be acted on quickly.

One individual says encouraging new businesses based on an AAC that is above the sustainable level will create a problem when the wood runs out.

Shelf life
Ainsworth says a review confirms sawlogs have a shelf life of five years and that initial studies show that the shelf life for use in OSB could be longer than 12 years. The company says evaluations using fibre from pine that has been dead for 20 years shows OSB can be produced using beetle-killed timber exclusively although process adjustments are needed to maintain environmental and product standards.

Babine says the focus should be to harvest as much wood within its economic shelf life, and develop manufacturing facilities/products that can economically use dead wood beyond the expected shelf life. There is a time limit on the economic value of the dead timber so there should be no AAC limit placed on harvesting it, and it should not be part of the growing stock to be used in future timber supply analysis.

An individual recommends underwater storage in large lakes in the region of higher-quality timber nearing the end of its fifth year, with retrieval by the bundle as markets become favourable.

Quesnel pine partition
C&C Wood Products Ltd. (C&C) says damaged pine in the Quesnel timber supply area pine partition on mesic or drier sites is deteriorating at a slower rate, and could be usable for up to 20 years. It says the existing partition should be increased significantly but not overwhelmingly, and should be maintained to ensure the smaller profiles are utilized and reforested. The company requests a review regarding a partition uplift proportional with that in the regular sawlog portion of the timber supply area.

Harvesting in the Interior Cedar-Hemlock zone
In its submission, T.R.C. Cedar Limited says the establishment of a long-term, sustainable AAC in the Interior Cedar-Hemlock zone has not been clearly stated or emphasized in the past, likely due to a focus on looper salvage and the fact it was not know if the resource could be effectively utilized. TRC says it believes it is time now to move from a looper-damaged salvage focus (dead stands) to sustainable forest management for the long term (green stands).

Log grading/timber pricing
Several submissions discuss the need to look at log grading and timber pricing.

Ainsworth says the success of an accelerated harvest will be governed by log grading and timber pricing mechanisms envisioned for non-sawlog timber.

Babine says any changes to the pricing and scaling of grade 3 (dry sawlog) may affect government's ability to use the millions of cubic metres of dead wood in the three timber supply areas. It says the process of making more dead wood available for timber harvesting may be nullified if the government makes changes to the current interior log grade system.

Comments in a number of individual submissions refer to stumpage, including:

- $0.25 a cubic metre is a very low price for good dry pine logs.
- Industry will likely demand lower stumpage rates for infected stands.
- Relaxing stumpage charges will ensure beetle stands without significant spruce understory are harvested, which will be especially important in three to five years for alternative uses to conventional sawlog harvesting or when the sawlog market is overloaded due to insufficient mill capacity.
- Blue-stained lumber sells for full value in retail stores so the minimum stumpage should increase to $5 a cubic metre, with half of the additional revenue allocated to help small resource-dependent communities diversify their economies and half to hire more staff to enforce wildlife regulations since there would be increased access.

Other management comments
C&C says it has been harvesting beetle attack pine partitions in the Quesnel TSA for almost four years, and field staff are regularly seeing trees as young as 30 years riddled with beetles.

An individual calls for a voluntary citizen watch so trees showing signs of infestation can be removed, more information on how to protect healthy trees in yards and scientific research on a compound that has the same impact as cold weather

First Nations
The Nadleh Whut'en Indian Band says issues related to their forest licence in the Vanderhoof Forest District must be addressed before any decision is made in regards to the expedited timber supply review. The submission also says the Nadleh Whut'en should be given first priority for the allocation of wood within their territory if there is an increase in the allowable annual cut.

The Sierra Club says the chief forester should assess how current and projected harvest levels will affect aboriginal rights and First Nations potential for economic development. It calls for an examination of the Crown's potential liability for compensating First Nations or its ability to include a land base with adequate forest cover as part of a treaty settlement.

Socio-economic factors
The District of Fort St. James says government should invest in strategies to help offset future AAC decreases, such as assessing intensive silviculture opportunities, revisiting forest management decisions such as greenup and adjacency rules, harvest priority ages.

The Sierra Club says the chief forester has not considered the long-term social and economic implications of the proposed increased, as is required under Section 8. It says the province has not addressed the threat of serious social upheaval in the communities most affected, and that proposed increases will create severe fluctuations in available timber supply in the short term. It cites the 2001 Rogers report to say this is contrary to the wishes of the communities.

The Sierra Club submission notes that the Central Interior economy is extremely vulnerable to changes in the forest sector, and unsustainable harvesting will cause severe fluctuations in harvest levels.

One individual says potential effects of the increased logging on other sectors of the economy are not provided, and another says every effort must be made to provide opportunities for northern communities through meaningful partnership with government and/or industry and investment initiatives.

An individual submission says there is a fundamental assumption that increasing the allowable annual cut would bring an economic benefit, but no analysis is presented. The individual said there is no need to rush and suggested allocating a year for input from the public, scientific community and economists.
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Several individuals point to the importance of identifying a market for any increased harvest before the wood is cut. Comments include:

- If the intended market is not clear in advance, the trees will be cut and the wood will have little or no value, leading to a negative impact on the forest industry, other sectors of the economy and the environment.
- A sudden increase in the supply of timber will result in lower market value.

A submission from a woodlot owner says log values continue to erode despite excellent lumber and pulp markets, and additional quota to major licensees, B.C. Timber Sales or First Nations will be at the expense of small tenure and private land holders. He says many woodlots are being wiped out and non-susceptible species will need to be left untouched because of the current over-harvest. Proposed expansion of these woodlots would benefit the local economy and the viability of the woodlot program.

Long-term forecasts
One submission says that since the forecasts do not attempt to project the possible timber supply impacts beyond this summer's beetle flight, they mean little given the scope of the infestation. Another individual says the timber supply projections are relatively uninformative as they do not account for the beetle after 2004.

Stewardship Paper

Most submissions comment specifically on the forest stewardship interpretation paper that accompanied the *Public Discussion Paper*, and the environmental implications of large-scale salvage harvesting. Several question whether government will be guided by the recommendations in the paper.

Stewardship paper content
The Sierra Club says the stewardship paper highlights a number of concerns about large-scale salvage operations but does not address these risks. It says the long-term effects of clearcutting, especially at the scale being proposed, may have permanent negative impacts on the ecosystem.

The submission recommends that the implications of such dramatic increases in cut, and the effects this may have on ecosystem recovery and productivity, should be studied and incorporated into a recovery strategy. It further recommends a study on the effects of two successive disturbances and their implications for biodiversity, habitat and productivity recovery that should be built into the model.

An individual submission says the only criterion addressed directly in the stewardship paper is whether an increase would significantly affect the timber supply yet the big uncertainties are the environmental consequences. The individual says the paper gives no guidance and he suggests there is too little information to comment on the balance struck with regard to key values at stake.

Environmental considerations
Ainsworth says there is no need to harvest within areas such as land use plan protected areas or riparian reserve zones. It says the stewardship provisions recommended in the discussion paper are reasonable as strategic guidelines for operations.

Comments in individual submissions about environmental implications include:

- A quantitative discussion of the environmental impact of the current and proposed total AAC is justified since the proposed AAC puts the harvest at roughly twice the sustainable rate. Questions should include the impact on local climates, whether the forests will be susceptible to invasive

species, the impact of replanting the forests with different species and the anticipated impact on fish and wildlife.

- The Ministry of Forests must attempt to assess the potential effects of the combined effects of large-scale salvage and the outbreak. "What are potential combined effects? A permanent large-scale change in the forest ecosystem?"
- Salvage logging in areas where there have been fires subjects the forest to three disturbance events in rapid succession. There will be a severe impact on wildlife even with measures such as larger wildlife tree patches.

Ecosystem recovery

The Sierra Club says the forest stewardship paper does not adequately address the silvicultural strategies to prevent such outbreaks from occurring in the future. It says the paper advocates large openings in the absence of any substantive structural retention objectives.

The submission says that in areas of infestation, mixed harvest regimes should be applied to create and maintain a variety of stand structures with a focus on patch retention systems that enhance landscape heterogeneity without compromising ecosystem productivity or connectivity.

It says large-scale clearcutting (1,000 hectare openings) will almost inevitably lead to another outbreak in the future. Stands with low or moderate beetle mortality, large live and dead trees, nesting cavities, mixed coniferous composition, multi-layered stand structure, or moist cool climates are good candidates for retention.

The Sierra Club recommends:

- Retention targets should be informed by the best available science to ensure ecosystem integrity and recovery.
- Silvicultural implications of this outbreak should be assessed from a prevention perspective and regulations should be then formulated to ensure that the maximum amount of precaution in relation to future outbreaks is taken.

An individual cites the observations of a Burns Lake forester with significant field experience who feels pine stands with significant spruce understory should not be harvested; that the understory crop could mitigate falldown. The individual says parts of Tweedsmuir Provincial Park are greening up with a pine snag overstory and spruce understory. The same individual says the amount of pine planted should not exceed the amount logged, which may mean relaxing greenup guidelines.

Ainsworth says the enhanced productivity of well-managed pine stands is well documented, and ingress of natural regeneration is more relevant to a non-salvage option than an increased harvest option.

There is little uncertainty regarding the expected response of managed pine stands than would emanate from an increased harvesting option. Ainsworth suggests that retrospective ingress studies are a research gap for government, regardless of the harvesting rate increase anticipated.

Regulating harvest increase

The Sierra Club says it is not clear how the effects of increased harvest rates will be regulated and monitored. Traditional licensing mechanisms that regulate harvest based on live timber would not apply to salvage. It suggests:

- Licence arrangements need to be adjusted to accommodate salvage cutting on an area basis.
- Non-pine species should be removed from the timber supply analysis and be reserved from harvest. Prescriptive regulations around tree removal should be implemented to ensure higher-level objectives are met and high-grading does not occur.
- Pricing for non-pine species and non-infested timber needs to be accurate to ensure the maximum level of return to the Crown.

- Long-term monitoring of both the ecological and the socio-economic impacts on communities need to be undertaken by the proper authority.

One individual says the harvest should be increased only if it the Ministry of Forests is given increased funds to monitor and manage the cut, and funds are available for infrastructure and forestry activities.

Integrated resource management considerations

Babine says biodiversity objectives such as seral stage targets for old growth may have to be reassessed in order to harvest dead timber from the best sites. Many higher-level plans for the three timber supply areas were approved before the outbreak and need to be updated.

The Sierra Club says proposed land and resource planning variances continue to put forest values at risk and are occurring in the absence of public and First Nations consultation. It recommends that:

- Local communities and land and resource management plan participants should be involved in any changes to higher-level objectives that accommodate the proposed increase in harvest rates.
- Assessments should be undertaken that calculate the short- and long-term implications of changes to higher-level plan objectives, the implications of which then need to be communicated to communities.

Individual submissions note among other things that:

- The beetles are out of control and it is time to start thinking about protecting other important public values. This means refocusing on higher-level plan objectives, social and community stability and revenue. Large amounts of unsalvaged timber could increase the wildfire hazard and impede regeneration.
- Proposed changes in the *Forest and Range Practices Act* regarding an increase in legacy coarse woody debris and the creation of large openings (more than 1,000 hectares) are not supported by any scientific analysis.
- The stewardship interpretation paper's statement that there should be little to no salvage harvesting outside of the timber harvest land base should be a hard and fast rule rather than a general rule.

Ainsworth says there will be more breakage at beetle salvage sites because of the brittle characteristics of dry wood, reducing the uncertainty of having legacy trees and woody debris on salvage harvesting sites. It encourages government to designate incremental Forest Investment Account funding to develop landscape level strategies to address key conservation values based on the findings of strategic planning pilot projects across B.C.

Individual submissions also question:

- Why government is proposing strategic level initiatives, such as unharvested legacies, that differ from those in land and resource management plans and other strategic level plans.
- Why there would be more constraints in a salvage scenario, especially when there will be large unsalvaged losses.

Landscape level planning

An individual says a landscape harvesting plan would need to be designed to create and use natural fire guards through infected areas, and also address widespread clearcutting, visual objectives, snow pack and watershed integrity, and soil erosion, slope failure concerns.

Fisheries and water resources

Fisheries and Oceans Canada, BC Interior South, supports a management strategy that considers and addresses watershed scale parameters for the protection of fisheries and water resources. Its submission says the infestation presents an opportunity to establish research trials to improve

understanding of the effects of large-scale salvage operations on specific watershed values.

The department says strategies should be identified and applied in the development of management plans, which specifically recommend:

- Implementation, monitoring and reporting (to regulatory agencies and the public) of Interior Watershed Assessment Procedures for affected watersheds.
- Adequate riparian reserve and management zones as required under the Forest Practices Code, as well as for fish streams or streams with significant downstream effects not specified in the code.
- Establishment of "indicator basins" for long-term monitoring to help assess and guide present and future best management decisions.
- Participation of academics and community groups in the development and implementation of an effective monitoring program.

Wildlife
Two individuals focus on the impact salvage harvesting could have on fish and wildlife by increasing forest access – one calls for more fish and wildlife conservation and enforcement and one suggests that the Ministry of Water, Land and Air Protection consider a moratorium on hunting until the salvage harvesting is complete and the forest roads decommissioned. A third individual says care must be taken in areas known to have woodpecker nests since woodpeckers are beetle predators.

Other Comments

Many submissions comment on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Timber Supply Review process
The District of Fort St. James asks for additional consultation if the harvest is increased in the district, especially how the increase is to be allocated and what government is doing to remove any economic impediments to harvesting the uplift.

An individual says 30 days is not enough time to review the public discussion paper given the complexity of the issue and the potential consequences. He says there is no rush because the infected lumber will hold economic value for several years; there likely will not be a significant amount of logging through the summer when the fire danger is high, and previous dramatic increases in the AAC have not slowed the spread.

An individual says people who live and make a living in the working forest other than by logging should be given the same consideration as First Nations, and be consulted about logging priorities, locations and methods.

Government decision making
An individual notes he has grave concern about government decision making on this issue, saying the division of responsibilities over forest management is implicit in the discussion paper. Deliberations are not properly informed if they focus on timber supply rather than the broader framework for forest values.

Appendix 1 — List of submissions received by the Ministry Forests

Submissions received on the Public Discussion Paper and Stewardship Paper

First Nations
Nadleh Whut'en Indian Band

Local government
District of Fort St. James

Federal government
Fisheries and Oceans, BC Interior South

Forest industry
Ainsworth Lumber Co. Ltd.
Babine Forest Products
C&C Wood Products Ltd.
TRC Cedar Ltd.

Consultants
Aspen Ridge Consulting
ScottLyn Contracting

Interest groups
North Cariboo Share Our Resources Society, Quesnel
Joint submission from the Sierra Club of Canada, BC Chapter, David Suzuki Foundation and Fraser Headwaters Alliance

General public
15 individual submissions