BRITISH COLUMBIA
MINISTRY OF FORESTS AND RANGE

Fort Nelson Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective November 10, 2006

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Objective of this Document

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

Description of the Fort Nelson Timber Supply Area

The Fort Nelson TSA is the second largest TSA in British Columbia and covers an area of almost 9.9 million hectares in the north-eastern corner of the province, within the Northern Interior Forest Region. The TSA is bordered to the east by Alberta, to the north by the Northwest Territories and the Yukon Territory, to the west by the Cassiar TSA and the Rocky Mountains, and to the south by the Fort St. John and Mackenzie TSAs. The TSA is administered from the Fort Nelson Forest District office in Fort Nelson.

The Fort Nelson Forest District, which encompasses the Fort Nelson TSA, is located entirely in the Boreal forest. Forests in this area consist mainly of old and mature stands of spruce, pine, aspen, cottonwood, and birch, in a wide variety of landscapes. The topography of the TSA forms a gradient of increasing relief from east to west, encompassing parts of the Alberta plateau, the Rocky Mountain Foothills, the Liard Plateau, the Liard Plain, the Kechika River Valley and a portion of the Cassiar Mountains. The entire region lies within the Arctic watershed and is largely drained by the Liard River and its major tributaries, including the Fort Nelson, Prophet, Muskwa, Toad, Kechika and Petitot rivers.

The southwestern portion of the TSA overlaps a large portion of the more than six-million-hectare Muskwa-Kechika Management Area, where wilderness and wildlife habitat support sizeable populations of a diverse range of large mammals. This area is designated for various levels of protection, conservation and use, to permit economic development under high management standards while protecting a large, intact, predominantly unroaded wilderness. The Fort Nelson TSA includes 39 parks, protected areas and ecological reserves—including Muncho Lake Park, Stone Mountain Park, and the Northern Rocky Mountains Park—totalling over 1 052 516 hectares or 10.7 percent of the area of the TSA.

Three biogeoclimatic zones occur in the TSA: The Boreal-White-and-Black-Spruce—which is the dominant zone covering about two-thirds of the total TSA land base; the Spruce-Willow-Birch; and the Alpine Tundra. The Boreal-White-and-Black-Spruce Zone is very important for wintering ungulates; frequent forest fires over the years have formed a mosaic of upland forests of different ages, providing a variety of habitats. The zone has the least snowfall of all the northern zones in BC. The extensive deciduous forests, which frequently achieve advanced ages here, are important for ungulates, birds and small mammals.

While the severe climate of this TSA does limit wildlife occurrence in some isolated portions or at certain times of year, the TSA contains vast tracts of relatively undeveloped land that support abundant, diverse and internationally significant wildlife populations. Large mammals, including Moose, Black Bear and Grizzly Bear, are common, as are smaller furbearers such as Wolverine, Wolf, Lynx, Weasel, Mink, River Otter, Beaver and Coyote. The TSA also contains a unique range of bird species including the Bay-breasted Warbler, Blackthroated Green Warbler, Cape May Warbler, Connecticut Warbler, Nelson's Sharp-Tailed Sparrow, Trumpeter Swan, and others, many of which are not found elsewhere in BC. The abundant rivers, lakes, and wetlands provide important staging grounds during the migration of water birds such as Pintails,

Widgeons, Geese and Teal. Fish species in the TSA include Trout, Whitefish, Burbot, Arctic Grayling, Northern Pike and Walleye, with rare occurrences of Salmon. Approximately 15 fish species occur only in this area of the province. There are few species of reptiles and amphibians. The TSA is home to 11 endangered or threatened species, and 16 species of concern.

Demographically, three-quarters of the population in the TSA reside in the town of Fort Nelson, away from which area the region is sparsely populated but does contain a number of smaller settlements, all situated adjacent to the Alaska Highway—Prophet River, Toad River, Muncho Lake, Liard River, Coal River, Fireside, and Lower Post. BC Statistics, cited in the 2005 Timber Supply Analysis Report, estimates the population of the town of Fort Nelson in 2005 at 4834, up by a net 5.02 percent from 1996. Over the same period the population of the Northern Rockies Regional District (NRRD) was estimated to grow by a net 7.96 percent to 6602. Positive population growth has been predicted for the entire NRRD over the next decade.

Eight First Nations are resident in or have traditional territory within the Fort Nelson TSA. Four of these—the Fort Nelson First Nation, the Dene Tsaa Tse K'Nai (Prophet River) First Nation, the Dena Tha' First Nation, and the Halfway River First Nation—are signatories to Treaty 8, which covers the TSA. The Kaska-Dena First Nations—the Daylu Dena (Lower Post) First Nation, the Dease River First Nation, the Tahltan First Nation, and the Fort Liard First Nation, which is part of Treaty 11 in the Northwest Territories—all have traditional territory in the TSA.

About 5.7 million hectares, about 58 percent, of the TSA are considered productive forest area and in the analysis it was assumed that about 25 percent of this productive forest—15 percent of the total TSA area—are considered available for timber production. The forest industry is an important driver of the local economy, directly accounting, in 2001, for about 27 percent of the region's labour force. Other important sectors are oil and gas, the public sector, mining, tourism, fisheries, agriculture, construction, and the service industry. In general the Fort Nelson TSA has a healthy economy with an expanding population and labour force, and a low unemployment rate.

Notably, the Mountain Pine Beetle, now causing widespread damage and forest health problems further south, is not known to exist in significantly damaging populations in this TSA at this time. However, the substantial beetle-related increases in harvest levels in some TSAs to the south are of current significance in this TSA, as the 'uplift' harvests and additional milling in the south negatively affect the economics of harvesting and milling dimension lumber in the Fort Nelson TSA.

One more notable descriptive characteristic of the Fort Nelson TSA is its relatively recent commencement of development in comparison with most TSAs in the province. The limited history of development in the TSA introduces both uncertainties and advantages. The relatively short operational experience in this extensive and geographically isolated TSA presents difficulty in defining economically harvestable stands, which adds uncertainty to the level of harvest that may reasonably be expected to be achieved. On the other hand, a benefit of the early stage of development is a preponderance in the TSA of extensive areas of older timber that remain undeveloped across the landscape, affording many alternative options and much flexibility for resource management in the TSA. Decisions on the nature and timing of the best means to utilize the advantages among the available options will be subject to and influenced by a number of economic, environmental and social factors.

Economic factors relevant to rates of development in the TSA will include market influences from harvest rates in adjacent management units and the future desirability and availability of healthy pine stands. Environmental and social factors will include currently increasing global concerns over climate change, wildlife issues, and appropriate rates and levels of development in the world's boreal forests. Accordingly, the utilization or conservation of alternative options

among the wide range remaining in this TSA will feature prominently in the considerations leading to this and future AAC determinations.

History of the Fort Nelson AAC

In 1989, the AAC for the TSA was set at 972 000 cubic metres, of which 750 000 cubic metres were attributed to harvesting in coniferous-leading stands and 222 000 cubic metres were attributed to deciduous-leading stands. In 1994, the AAC was determined at 1 500 000 cubic metres, of which 600 000 cubic metres were attributable to coniferous-leading stands (of which it was assumed that at least 80 000 cubic metres would come from lodgepole-pine-leading stands) and 900 000 cubic metres were attributable to deciduous-leading stands—this latter increase being due to the improved economic prospects for utilizing aspen. In 2000, the AAC was maintained by determination at 1 500 000 cubic metres, with the same components attributable to coniferous- and deciduous-leading stands.

The current AAC of 1 500 000 cubic metres is apportioned by the Minister of Forests and Range as shown in the following table. (N.B. Under current legislation the Minister may, by apportionment, allocate licences to harvest a total volume of timber in a TSA that exceeds the AAC for the TSA.)

Form of Agreement	Conventional		Deciduous-leading		Total	
	m^3	%	m^3	%	m^3	%
Forest Licence – Replaceable Canadian Forest Products Ltd.	442,973	71.68	110,743	12.30	553,716	36.48
Pulpwood Agreement - Timber Sales Licences Canadian Forest Products Ltd.			610,000	67.78	610,000	40.18
BCTS - Timber Sale Licence/ Licence to Cut	136,227	22.04	163,441	18.16	299,668	19.74
Woodlot Licence	6,400	1.04	1,600	0.04	8,000	0.53
Community Forest	14,400	2.33	3,600	0.4	18,000	1.18
Forest Licence – Non-replaceable Tsa Cho Timber Ltd.	18,000	2.91			18,000	1.18
Forest Service Reserve			10,616	1.18	10,616	0.71
Total	**618,000**	**100**	**900,000**	**100**	**1,518,000**	**100**

New AAC determination

Effective November 10, 2006, the new AAC for the Fort Nelson TSA will be 1 625 000 cubic metres. This effectively increases the AAC for the TSA by approximately 8 percent. The increase includes an adjustment to account for harvested volumes of grade 3 endemic and grade 5 logs, which began to be charged to AACs in British Columbia on April 1, 2006. The partition specifying separate harvest volumes attributable to deciduous-leading and to coniferous-leading stands is discontinued. This AAC excludes all volumes allocated to woodlot licences. This AAC will remain in effect until a new AAC is determined, which must take place within five years of the present determination.

Information sources used in the AAC determination

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- Nigh, G.D. 1999. *Smoothing top height estimates from two lodgepole pine height models.* B.C. Ministry of Forests, Research Branch. Victoria, B.C. Ext. Note 30.
- North et. al. 1996. *Archaeological Overview of the Fort Nelson Land and Resource Management Plan Area, Heritage.* Prepared for the Ministry of Sustainable Resource Management.
- BC Ministry of Forest and Range 2005. *DFAM Interim Standards for Public and First Nations Review*.
- BC Ministry of Forest and Range 2004. *Modelling Options for Disturbance of Areas Outside of the Timber Harvesting Land Base.* Draft Working Paper.
- BC Ministry of Forest and Range 2003. *Ministry of Forests Consultation Guidelines*.
- Letter from the Minister of Forests and Range to the chief forester, dated July 4, 2006, stating the economic and social objectives of the Crown (see Appendix 3).
- *Forest and Range Practices Act*, 2002 and amendments.
- *Forest and Range Practices Regulations*, 2004 and amendments.
- *Forest Practices Code of British Columbia Act*, 1995, and amendments.
- *Forest Practices Code of British Columbia Act Regulations*, 1995, and amendments.
- *Forest Practices Code of British Columbia, Guidebooks*, BCFS and MELP.
- *Ministry of Forests and Range Act*, (consolidated to March 30, 2006).
- Technical review and evaluation of current and expected operating conditions through comprehensive discussions with staff of BCFS, including the AAC determination meeting held in the Fort Nelson Forest District on April 19-20, 2006, and a helicopter review of major portions of the TSA on April 19 with district and branch staff.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester, in determining AACs, to consider biophysical, social and economic information. Most of the technical information used in determinations is in the form of a timber supply analysis and its inputs of inventory and growth and yield data. These are concerned primarily with biophysical factors—such as the rate of timber growth and the definition of the land base considered available for timber harvesting—and with management practices.

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

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

Statutory framework

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

Guiding principles for AAC determinations

Rapid changes in social values and in the understanding and management of complex forest ecosystems mean there is always uncertainty in the information used in AAC determinations. In making the large number of periodic determinations required for British Columbia's many forest management units, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. In any specific circumstance where I may consider it necessary to deviate from these principles, I will explain my reasoning in detail.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations I consider particular uncertainties associated with the information before me and attempt to assess and address the various potential current and future, social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, in cases where projections of short-term timber supply are not stable, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine these AACs every five years. This principle is central to many of the guiding principles that follow.

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

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

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

In some cases, even when government has made a formal land-use decision, it is not necessarily possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring for instance the establishment of resource management zones

and resource management objectives and strategies for those zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. In such cases the legislated requirement for frequent AAC reviews will ensure that future determinations address ongoing plan-implementation decisions. Wherever specific protected areas have been designated by legislation or by order-in-council, these areas are deducted from the timber harvesting land base and are not considered to contribute any harvestable volume to the timber supply in AAC determinations, although they may contribute indirectly by providing forest cover to help in meeting resource management objectives such as for biodiversity.

In the Fort Nelson TSA, land use, development and forest management practices generally follow the direction of and are consistent with the goals and objectives of the 1997 Fort Nelson Land and Resource Management Plan (LRMP), a consensus-driven, Cabinet-approved plan detailing management zones and associated management strategies. In the Muskwa-Kechika Management Area, the *Muskwa-Kechika Management Area Act* and the Muskwa-Kechika Management Plan Regulation provide direction for local management, planning and practices. Where applicable, I have referred in this rationale document to aspects of these approved plans.

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

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

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

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from decisions in recent years made by the Supreme Court of Canada. I am aware of the Crown's legal obligation to consult with First Nations regarding asserted rights and title in a manner proportional to the strength of their claimed interests and the degree to which the decision may impact these interests. In this regard, I will consider any information brought forward respecting First Nations' aboriginal interests, including operational plans that describe forest practices to address First Nations' interests. As I am able, within the scope of my authority under Section 8 of the *Forest Act*, I will address those interests. When aboriginal interests are raised that are outside my jurisdiction, I will endeavour to forward these interests for consideration by appropriate decision makers.

The AAC that I determine should not be construed as limiting the Crown's obligations under the Court's decisions in any way, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Fort Nelson TSA. It is also

independent of any decisions by the Minister of Forests and Range with respect to subsequent allocation of wood supply.

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

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

The role of the base case

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

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

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

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

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

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

Base case for the Fort Nelson TSA

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

The base case projection incorporated the following harvest flow objectives: Maintain the current harvest level until reductions are necessary for long term sustainability; prevent the mid-term harvest level from falling below the sustainable long-term harvest; decrease the volume of harvest by no more than 10 percent per decade where declines in harvest rate are necessary; and maintain the maximum even-flow harvest in the long term consistent with a stable growing stock.

Although the current AAC for the TSA is 1 500 000 cubic metres per year (comprised of 600 000 cubic metres from coniferous- and 900 000 cubic metres from deciduous-leading stands) in the base-case forecast it was found that all the specified harvest flow objectives could be met with an initial harvest rate set much higher at 3 163 000 cubic metres per year. This harvest level could then be maintained indefinitely, with a stabilized growing stock projected for 550 years.

This base-case forecast projected an overall even-flow harvest comprised of averaged annual harvests of 1 719 500 cubic metres from coniferous species and 1 443 500 cubic metres from deciduous species, in each case reflecting both major and minor components in mixed stands. The proportions of deciduous and coniferous species comprising the harvest varied significantly year by year, and in the base case, deciduous species—being generally older—supplied most of the harvest for the first 35 years. An alternative projection showed that the *average* coniferous harvest throughout the forecast could be increased to 1.8 million cubic metres per year without affecting the *overall* harvest level, indicating considerable flexibility and robustness in the forecast. However, the projected significant year-to-year variations in the respective harvests achievable for the deciduous and coniferous stands would in practice limit the duration over which a reliable, minimum harvest rate could be established and sustained for either component.

The forecast harvest rate of 3 163 000 cubic metres per year in the current base-case is 38 percent higher than the rate of 2 276 000 forecast in the 2000 timber supply analysis report considered in the 2001 AAC determination for this TSA. The factors underlying this difference are complex and are reviewed in the timber supply analysis report as well as in various sections of this rationale document.

I have reviewed in detail the assumptions and methodology incorporated in the base case projection, as well as projections of: the total growing stock for the whole TSA and for the merchantable deciduous and coniferous components; the harvest contributions from unmanaged and managed stands; the average age of coniferous and deciduous stands harvested over time; the respective mean harvest volumes per hectare, the total area harvested annually; and the age-class distribution now, in 50 years, in 150 years and in 250 years' time. Details of my assessment of particular aspects of the analysis and its projections, in some cases in relation to very significant uncertainties in associated assumptions, are provided in the following sections.

From my review of this timber supply analysis, including detailed discussions with BCFS analysts who reviewed the analysis, I find that the analysis in general and the base case forecast in particular—whose inputs, assumptions and methodology have all been submitted to public review—provide an acceptable basis of reference for my considerations in this determination. In addition to the base case forecast I was provided with a number of sensitivity and alternative analyses carried out using the base case as a reference. All of these analyses have been helpful in the considerations and reasoning, documented in the following sections, which have led to my determination.

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

Section 8 (8)

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

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

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

Land base contributing to timber harvest

- general comments

The overall area of the Fort Nelson TSA, as estimated from inventory data reported in the 2005 timber supply analysis, is 9 868 067 hectares, including over 1.6 million hectares of land transferred from the Cassiar TSA. This total includes both forested and non-forested lands of various ownerships that include parks, federal, Indian and military reserves, woodlot licence areas, and private and other lands. Some of these areas do not contribute to timber harvesting or to forest cover requirements for other objectives and are excluded from the timber supply analysis. Other areas, such as woodlot licences, supply timber that is harvestable but that is administered and considered separately from the AAC for the TSA.

Some areas that do not directly supply harvestable timber, such as parks and riparian reserves, do provide habitats and forest cover that assist in meeting a variety of management objectives in the TSA, thereby contributing indirectly to the timber supply of the TSA. Areas in the TSA which contribute directly to timber harvesting as well as to forest cover requirements are commonly referred to as the timber harvesting land base, or 'THLB.' Areas of productive forest that contribute to forest cover requirements, whether or not they contribute directly to the timber supply, are known as the Crown forested land base. For the Fort Nelson TSA, after excluding other ownerships, non-forested areas, non-productive forest areas, existing roads, trails and landings, non-commercial brush, and alpine areas, the total productive Crown forested land base is 5 741 212 hectares.

The THLB consists of those parts of the TSA that are currently considered to be economically and environmentally suitable and available for timber harvesting. In deriving the area of the THLB for any TSA, a series of deductions must be made from the total TSA area in recognition of many factors that, for economic or ecological reasons, effectively reduce the extent of the productive forest area that is suitable and available for timber harvesting. In the analysis for the Fort Nelson TSA, some the most significant deductions were for areas considered unsuitable for operations for economic or physical reasons—areas of low timber productivity, non-forest and non-productive areas, parks, and stands of predominantly black spruce, which is not targeted for harvest, and environmentally sensitive areas, in addition to other areas deducted for a number of other reasons as detailed in the timber supply analysis.

In making these land base deductions, appropriate assumptions or projections must be made about many factors, prior to quantifying the associated net area to be deducted in each case, while allowing for any portion that may have been deducted earlier in the series in respect of another, overlapping objective. Details of the net areas deducted are given in Table 5 of the 2005 timber supply analysis. The area of the current THLB so derived is 1 432 269 hectares, about 25 percent of the productive Crown forested land base, and nearly 15 percent of the total TSA area. My considerations of the reasonableness of specific land base deductions as applied in the analysis are documented as follows.

- *other ownerships*

In the analysis, a total of 1 059 861 hectares of parks, protected areas, ecological reserves, and *Land Act* Reserves or UREP's (for the Use, Recreation and Enjoyment of the Public Reserve) were excluded from contributing to the timber supply but were assumed to contribute to meeting forest cover requirements. In addition, other deductions totalling 29 927 hectares were applied for: private land; federal, Indian and military reserve lands; woodlots, miscellaneous leases; and miscellaneous reserves, as detailed in the analysis report—these areas were not assumed to contribute to meeting forest cover requirements. About 20 690 hectares of Agricultural Land Reserve, currently classified as not being used for agriculture and therefore available for timber harvesting, were included, contributing 1.45 percent of the THLB area.

Since reasonable information was used to define and quantify these areas, and having discussed it with forest district staff, I am satisfied that the assumptions applied in the base case adequately accounts for these areas.

- *non-forest and non-productive sites*

In the analysis, except for parks, ecological reserves, UREPs and riparian areas, all areas that had been previously logged were retained in the Crown forest land base to contribute to the THLB, whether or not their classification on a current map sheet was 'non-productive' or any other category to be removed from the Crown forest land base as discussed in the following sections. For other areas with multiple mapsheet classifications that included non-forest and non-productive sites, a methodology was adopted whereby each polygon was re-classified, and either included or excluded, based on a process of 'rounding up' from a 50-percent representation, or 'rounding down,' from a lower representation. In this way, a total of 3 705 856 hectares of land classified as 'non-forest' or as 'non-productive forest' were excluded from the THLB.

Having discussed the methodology with the MoFR Forest Analysis and Inventory Branch timber supply analyst who reviewed the DFAM analysis, I find it reasonable to conclude that each of the individual errors introduced by this rounding process has an approximate equivalent likelihood of over- or underestimating the actual area in a particular classification, such that an overall compounding of error does not occur, and any overall aggregate error is most probably acceptably small. In future analyses, procedural refinements should be considered with regard to the partial exclusion and inclusion of polygons.

- *parks, protected areas and ecological reserves*

The province's Protected Areas Strategy has two goals, to protect viable representative examples of the natural diversity of the province, and to protect special natural, cultural heritage and recreational features of the province.

In the Fort Nelson TSA, protected areas were outlined in the Fort Nelson Land and Resource Management Plan (LRMP) approved by Cabinet in 1997, and the proposed protected areas and ecological reserves have now been formally established by Order-in-Council.

In the 2005 timber supply analysis, areas in parks and ecological reserves were not considered to contribute to the timber harvest, but were assumed to contribute to landscape-level biodiversity requirements in the TSA. In the analysis, after accounting for preceding overlaps, an additional 371 322 hectares of productive Crown forested land were excluded from contributing to the timber supply on this account.

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

- *alpine areas*

In the analysis, all areas classified as alpine tundra and sub-alpine parkland in the Biogeoclimatic Classification system were considered non-harvestable and were completely excluded from the Crown forest and from the THLB.

Since any trees that do occur in these areas are usually stunted in growth and widely spaced, since any such trees rarely meet the minimum harvestable dimensions and therefore have no merchantable value, and since the best available inventory information was used in deriving the associated land base deductions, I am satisfied that the analysis has appropriately fully excluded any potential contribution to timber supply from alpine areas.

- *non-commercial cover*

In the timber supply analysis, all areas classified in the inventory as non-commercial brush, a total of 350 671 hectares, were excluded not just from the THLB but also from the Crown forested land base, the latter due to an insufficiency of data—on species, crown closure, stand age or wood volume—for determining whether such areas are actually forested.

In many TSAs, non-commercial cover is assumed to be able to make a contribution to biodiversity requirements and as such is considered to be part of the Crown forested land base. In this TSA, past silvicultural experience for particular areas showed that, of the area classified as non-commercial brush and actually reviewed on the ground, about half the area was accurately classified, non-productive, wetland. The other half was forested to some extent, with willow, alder, deciduous or coniferous species, some of which was productive, but most of which was too wet or unsuitable for other reasons to become commercially viable. Overall, about 10 percent were considered dry enough to be potentially convertible to productive, commercial cover.

Extensive but dispersed oil-and gas-related activities in the TSA (discussed further in their own section below) affect the THLB, the Crown forest land base, and non-commercial cover, to varying, uncertain extents. In some cases, the activities result in the clearing of forested land which, without treatment could become non-commercial brush, or, with treatment could be converted into commercial cover. The extent to which such areas are potentially treatable and convertible depends on many factors, including funding.

If funding becomes available to carry out some of this conversion and to assess the potential for further conversion, this information can be accounted for in future AAC determinations. For the

present determination, a reliable accounting for the potential conversion of non-commercial brush to productive forest is not possible.

The area removed in the analysis as non-commercial brush derives from the most recent inventory information, and as such is best available information. In the absence of data defining the extent to which areas so classified are in fact capable of being forested and of contributing to biodiversity requirements, I conclude that their complete removal from the Crown forested land base in the analysis is appropriate for the TSA at this time in view of the very extensive forested areas that remain undisturbed on landscapes across the TSA which can more than compensate for any comparatively minor error so introduced. On this basis, I accept the complete exclusion of non-commercial brush as modelled in the analysis as an adequate representation of this area for the purpose of generating the base case harvest forecast.

- *roads, trails and landings*

In the timber supply analysis, nine categories of road or linear feature were identified in the TSA: BC Rail, highway, paved, road, mainline, petroleum development road, gravel, rough road, and overgrown road. For each category, the lengths, widths, and buffer widths derived from Geographic Information Systems (GIS) were combined to identify the area necessary to exclude in deriving the current THLB. Since this information did not include allowances for landings and trails, these were accounted for by an average 2-percent reduction per cutblock, as determined from all data available in the Integrated Silviculture Information System between 1962 and 2003 for non-productive, unnatural areas. Any area with a logging history received an additional 2-percent reduction to capture unmapped roads within cutblocks. The total area identified by these means was 46 686 hectares. After accounting for preceding overlaps, an additional exclusion of 37 395 hectares was applied to the productive Crown forest land base to account for existing roads, trails and landings.

For future roads, trails and landings, the necessary land base reduction was estimated by extrapolation from the current percentage area requirements. This was achieved by spatially applying a buffer of 200 metres to each side of all existing roads and seismic lines (as an estimate of the average yarding distance) to determine the area required for road allowance to date as an approximate percentage of the area currently accessed. This figure, 3.9 percent of the THLB area with existing roads, was then applied to the 'non-roaded' area of the THLB to estimate future requirements, assuming continuation of an equivalent road density in harvested areas in the future. The resultant net exclusion of 29 825 hectares for future roads was applied in deriving the THLB.

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

- *physically and economically inoperable areas*

Those portions of a TSA which are not physically accessible for harvesting or which are not feasible to harvest economically are excluded in deriving the THLB. A revised operability analysis was developed for the Fort Nelson TSA based on the methodology from a 1997 harvest method mapping project undertaken in the Bulkley TSA. The Fort Nelson operability analysis produced a spatial operability coverage for the entire TSA, in which 'operable' polygons were identified through combinations of three derived attributes: forest-stand-quality codes; harvest methods; and available land base. The 'stand quality' codes were derived from forest inventory

information and classified forest stands into merchantability categories based on species, age, volume, diameter at breast height, and site productivity (site index). 'Harvest method' codes were defined by slope classes; stands on slopes of less than 35 percent were considered to be available for harvest by ground-based means. Licensees are not pursuing cable or helicopter logging at this time. The 'available land base' was defined as the available Crown forested land base.

From the combination of merchantability criteria and harvest method, 361 670 hectares were excluded as inoperable area in deriving the THLB.

Sensitivity analyses were conducted to examine changes in the timber supply projection if the THLB were 10 percent larger than in the base case, or 10 percent smaller. With a 10-percent larger THLB, a harvest level 9 percent higher than in the base case could be maintained throughout the forecast period. With the THLB 10 percent smaller than in the base case, the base case level could still be maintained for about 125 years, followed by a decline to a long-term level 9.4 percent lower than in the base case.

In assessing the applicability of the operability mapping procedure to the Fort Nelson TSA, I note that typically in the Bulkley TSA, most of the areas identified as physically accessible are probably also economically operable. This is not necessarily the case in some portions of the much larger Fort Nelson TSA that are characterized by far greater hauling distances to processing facilities or markets. Despite approved land use decisions identifying certain areas as suitable for development, access to some of the presently unroaded areas in this TSA will not be achieved without the complex and expensive construction of long switchback mountain roads.

I also note that landscape unit objectives remain to be established for this TSA, and that since the Identified Wildlife Management Strategy process has not been completed here, additional areas may become identified as valuable habitat and so become unavailable for harvest, due to designation as Wildlife Habitat Areas or through General Wildlife Measures, which could potentially affect the accuracy of the operability mapping. This could have particular implications for the relatively recent and somewhat remote Cassiar addition. In the section on *mature and immature stands of unproven merchantability* I have also noted additional factors that could potentially affect the accuracy of the operability mapping as applied in the analysis.

While for all of these reasons the operability mapping may somewhat overstate the actual availability of operable land in the TSA under current conditions, I am satisfied that the mapping will prove to provide a reasonable representation of the operable land base generally available over time under fluctuating market cycles and changing economic conditions. Since the sensitivity analysis indicates significant robustness in the short-term timber supply relative to changes in the available land base, any differences between the mapped and the actual current economic operability are in and of themselves not sufficient reason to question the general validity of the base case projection on this account, over the forecast period. Nonetheless, in my considerations I have elsewhere identified more specific, directly related issues that do indeed have significant implications for the timber supply projection in the short term and potentially beyond, as I have discussed below, in the sections *mature and immature stands of unproven merchantability,* and *uncertainty in harvesting in the Fort Nelson West.* Since the land base exclusions considered in those sections are reflective of the profile of the THLB as a whole, leaving predominantly mature stands, I am satisfied that the timber supply on the smaller contemplated land base will remain comparably robust.

- stands predominated by black spruce

In typical operational experience in the Fort Nelson TSA, quantities of black spruce are occasionally harvested as a component of a mixed stand, or as a stand predominated by black spruce that occurs in a small pocket adjacent to other, more merchantable species. Although depletion information supplied by the DFAM group indicates that up to 4.2 percent of the area harvested was from stands of predominantly black spruce, these stands are in fact only very rarely, if at all, individually targeted for timber harvesting.

For this reason, in the base case analysis, while all volumes of black spruce occurring as minor components in stands of mixed species were assumed to contribute to merchantable volumes, all stands of predominantly black spruce were excluded from the THLB. On this account, a net area of 143 258 hectares of productive Crown forest land was excluded from the THLB.

Procedures for updating the Vegetative Resources Inventory (VRI) for a number of mapsheets in the TSA have shown that 10 percent of stands previously typed as spruce were in fact stands predominated by black spruce, or 'black-spruce-leading stands.' If this misclassification applies similarly to areas not yet updated by the VRI—i.e. to the other 50 percent of the TSA—then up to 17 000 hectares of 'spruce' may actually be black spruce, implying that the THLB used in the base case may be overestimated in this respect by 17 000 hectares, or 1.2 percent.

In my operational experience, certain individual pieces of black spruce may well be assessed as merchantable, based on piece size, and may be opportunely utilized; this does not mean that entire stands of black spruce—a species typically of relatively small piece size and diameter—are likely to be targeted and utilized. Based on harvesting performance in this TSA, I therefore consider the removal of black-spruce-leading stands in the analysis to be appropriate. I also recognize the demonstrated capability of the VRI in refining spruce classifications, and therefore accept that the exclusion for black spruce, based on inventory information prior to the VRI refinements, has been underestimated by 17 000 hectares, or about 1.2 percent of the THLB. Sensitivity analysis shows that, considered separately, this land base change could well be absorbed negligibly in the robustness of the short-term timber supply, to be considered as an impact only in the longer-term. However, in combination with the many other constraining factors identified in this determination, the need to account more directly for the corresponding overestimations in the timber supply is indicated, as discussed in '**Reasons for Decision**.'

- areas burned by wildfire and not satisfactorily restocked

The stocking levels for a total of 86 106 hectares in the Fort Nelson TSA, burned by wildfire and classified as NSR, remain uncertain. After accounting for preceding overlaps, a total of 76 632 hectares were excluded from the THLB. District staff had considered it possible that a portion of these areas might be actually adequately stocked and thus should be brought into the THLB, which would slightly increase the projected timber supply from that indicated in the base case. Considering this, I note that since only about 25 percent of the entire forested area in the TSA actually lies in the THLB, only a comparable proportion, about 19 000 hectares of the affected area in this case, would be suitable for inclusion in the THLB. In fact, the THLB component would probably be smaller, due to the heightened fire prevention measures applied to lands in the THLB. Most likely some of the burned land on the THLB would have been rehabilitated or salvaged, and possibly accounted for in the updated VRI data. Staff agree that most of the affected area will become stocked over time, but potentially with black spruce stands, which are excluded from the THLB, or with pine, which is currently not targeted for harvest in the TSA, or with white spruce, which in untended regeneration often converts to non-commercial

brush. In consideration of all of these factors, I conclude that any associated implication for the projected timber supply is negligible.

- species exclusion

The species Douglas-fir, hemlock and cedar do not usually grow naturally within the Fort Nelson TSA. Accordingly, in the 2005 timber supply analysis, any occurrences in the inventory's species codes of forest stands with these as dominant species were considered spurious and any associated areas and volumes were excluded from THLB.

In addition, any components of alder, maple, Douglas-fir, hemlock or cedar in mixed stands were excluded from contributing to the timber supply. Since the total affected area, based on the best available inventory information, amounted to a land base exclusion of only 236 hectares, I am satisfied that any associated error would introduce only negligible error in the projected timber supply.

- mature and immature stands of unproven merchantability

Some forest stands, though physically operable, may not be suitable for utilization due to processing limitations, reduced economic utility, or low productivity. In the Fort Nelson TSA, extensive areas support stands that currently fall into these categories. To examine the extent to which it is reasonable to expect such stands to be harvested, and conversely to what extent they should be excluded, I have carefully reviewed and discussed, with BCFS regional, district and branch staff, tables of depletion data compiled by the regional timber supply analyst from data supplied by the DFAM group. I have reviewed this data in comparison with the species profile of the THLB demonstrated by the DFAM group. The depletion data, though incomplete, provide a reasonably reliable representation of the extent to which predominant tree species in the forest are currently harvested or not harvested. I have also considered the volumes harvested by species, as reported from the BC Harvest Billing System.

Please note that in consideration of this information, a detailed examination of the merits or otherwise of some of the chosen 'cut-off' criteria for including particular growing sites for species other than aspen has been obviated by broader exclusions of larger areas of whole timber types, based on the identified absence of demonstrated harvesting performance in those types.

birch and larch

The depletion data provided by the DFAM group indicates that forests predominated by birch and larch are not harvested. These stands should therefore not contribute to the timber harvesting land base, and indeed the THLB assumed by the DFAM did not include birch- or larch-leading stands. A potential source of uncertainty in the analysis might have arisen from this exclusion of all birch-leading stands when in fact, in the past, some interest had been expressed in utilizing birch in the TSA. District staff advised that immature birch-leading stands (younger than 51 years) with a site index of 16.8 or higher, could potentially be considered merchantable, as could mature birch-leading stands (51 years or more in age) with a minimum stand volume of 140 cubic metres per hectare and a minimum height of 16 metres. From about 248 500 hectares of birch-leading stands in the TSA, it was then considered that about 63 475 hectares (representing an area about 4.4 percent of the size of the THLB) could potentially contribute to the THLB. Sensitivity analysis showed that if these stands were included, the harvest level projected in the base case forecast could be increased by about 4 percent. However, in considering this, I am advised that while some of the birch stands were in fact included in the 2000 timber supply analysis due to the expressed interest, and while a few stands were actually harvested earlier under the Small Business Forest Enterprise Program, the timber recovery was

poor, the colour of the wood was not popular, and consequently no birch-leading stands have been included in harvest plans in recent years. In view of the complete lack of demonstrated performance in birch-leading and larch-leading stands, I therefore consider the complete exclusion of both types to be entirely appropriate and requiring no further adjustment with respect to these species on this account in my determination.

balsam-fir

The depletion data provided by the DFAM group indicates that forests predominated by balsam-fir are not harvested. These stands should therefore also be excluded from the THLB. Since the THLB assumed by the DFAM group included 0.5 percent by area of balsam-fir leading stands, I must assume the current timber harvesting land base and, in almost direct proportion, the associated timber supply, have been overestimated in the analysis by 0.5 percent. I have accounted for this overestimation in my determination, as discussed in '**Reasons for Decision**'.

pine

The depletion data provided by the DFAM group indicates that about 3.6 percent of the total harvest is from forests predominated by pine, while pine-leading stands comprise a much greater proportion, 23.5 percent, of the THLB assumed in the DFAM group analysis. This disparity, between the contribution of pine to the harvest activity in comparison with its contribution to the timber harvesting land base, is a matter of considerable concern for me. The same disparity was already of concern to the previous Chief Forester in the 2001 AAC determination for this TSA, the rationale statement for which notes that:

> 'The actual harvest from lodgepole pine stands should be monitored so that the level of their contribution to the timber harvesting land base and timber supply can be reassessed in future determinations'.

and that

> 'this AAC is premised on contributions of lodgepole pine-leading stands in approximate proportion to their contribution to the timber harvesting land base of the TSA. The contribution of lodgepole pine-leading stands to harvests in the Fort Nelson TSA should be assessed during the term of this determination, *and contribution of these stands to future AACs should be based in part on the rate and nature of their utilization*' (my emphasis).

Considering the magnitude of this ongoing disparity, and recognizing that the small amount of pine that is actually being harvested in the TSA is likely incidental to, rather than a direct result of, targeted harvest activity, I must assume that the current timber harvesting land base and, in roughly direct proportion, the associated timber supply, have been overestimated in the analysis by the noted 23.5 percent. For convenience of reasoning, I have considered the 'Fort Nelson West,' area of the TSA, including its pine contribution, separately from the eastern portion of the TSA, as discussed below, in *uncertainty in harvesting in the Fort Nelson West*. When the eastern side of the TSA is considered separately, the overestimation attributable to the inclusion in the base case of pine stands in the east is 35 000 hectares for small pine (16 to 20 metres) and 41 000 hectares for large pine, and 17 000 hectares of immature pine for a total of about 93 000 hectares, which contributes 6.5 percent of the harvest volume. I have accounted for this overestimation in my determination, as discussed in '**Reasons for Decision**'.

cottonwood

Most of the cottonwood harvested in the TSA is in the form of minor components of stands predominated by other species. The depletion data show that, of the total area harvested in the TSA, about 1.5 percent is stands predominated by cottonwood, but this volume also includes the minor components of other species. The Harvest Billing System, which is species-specific, shows

that up to 7 or 8 percent of the overall harvested volume in the TSA is cottonwood. These figures suggest, and district staff confirm, that practically all cottonwood volumes harvested in the TSA are taken incidentally to the harvest of other stands—mostly from stands predominated by other leading species or, as cottonwood-leading stands, in operational combination with more desirable species. Individual stands predominated by cottonwood are not specifically targeted for harvest. The inclusion of cottonwood-leading stands in the THLB for the analysis therefore does not represent current operational practice, and introduces an overestimation in the volumes that properly can be expected to support the overall timber supply projection. Stands dominated by cottonwood account for 3 percent of the THLB area derived for the analysis. In my determination I have accounted for an overestimation to this extent, as noted in '**Reasons for Decision**'.

aspen

The depletion data indicate that, in practice, the area harvested in forests predominated by aspen comprises about 51.0 percent of the total harvested area in the TSA, while the THLB assumed in the DFAM analysis comprises 40.2-percent aspen-leading stands. For aspen overall, this correlation would at first appear reasonable. However, the TSA contains some mature (aged 81 years or more) aspen stands of lower productivity that have not reached a specified minimum height or volume and that in the analysis are therefore considered unsuitable for timber harvesting. Applying the volume-height criteria in this way is generally considered a more appropriate method for determining this exclusion for mature forest than applying site-index criteria, which was the method used in the 2000 timber supply analysis. To examine the suitability of the resultant exclusion of mature forest in the 2005 analysis, I carefully reviewed and discussed with BCFS regional, district and branch staff the summaries of depletion data in comparison with the assumptions incorporated in the base case. Although incomplete, the depletion data provide a reasonably reliable representation of the actual heights and volumes harvested from 1997 to 2005, as an indication of the extent to which the harvesting of aspen (and spruce) has occurred to date, at or near the cut-off criteria assumed in the analysis.

This review showed that in operational practice 90 percent of the harvesting of mature aspen has taken place in stands with at least 275 cubic metres per hectare, with tree heights of at least 26.9 metres, while in the analysis it was assumed that aspen stands with as low as 140 cubic metres per hectare, and trees as short as 20 metres tall, would be harvested. As a consequence of these differences, the inclusion of 324 584 hectares of mature aspen stands in the THLB in the analysis has over-estimated the appropriate inclusion, based on operational practice, by what BCFS regional and branch timber supply analysts indicate to be approximately 159 000 hectares, or about 49 percent. From this it is clear that the relatively low cut-off assumption applied in the analysis results in the inclusion of an area that is not nearly consistent with current harvesting performance in the TSA for mature aspen stands, and I must conclude that the THLB has been overestimated with respect to the inclusion of mature aspen stands by approximately 159 000 hectares. I have reasoned further from this, below.

Also excluded from the THLB are low-productivity, immature stands of commercial tree species that have not achieved and are not expected to achieve, a productive condition within a reasonable growing period. These stands were identified in the inventory information as having less than a specified minimum site-index (15.9 metres) that indicates the capability to attain a minimum volume and height by a specified age; for immature aspen sites this was 140 cubic metres per hectare and 20 metres in height by age 81 years. However, any stands that did not meet the criteria but which had been previously harvested or treated were kept in the THLB.

The same performance review method as that used for mature stands, described just above, showed that for immature aspen sites, 90 percent of the harvesting took place in stands with a site

index of 19.5 or higher, while the analysis included stands down to a site index of 15.9. As a consequence of this difference, the inclusion of 250 673 hectares of immature aspen stands in the THLB in the analysis has over-estimated the appropriate inclusion, based on operational practice, by what BCFS regional and branch timber supply analysts indicate to be approximately 141 000 hectares, or about 56 percent. Again, it is clear that the relatively low site-index cut-off assumption applied in the analysis results in the inclusion of an area that is not nearly consistent with current harvesting performance in the TSA for immature aspen stands, and in this case I must conclude that the THLB has been overestimated with respect to the inclusion of immature aspen stands by approximately 141 000 hectares.

From these considerations I conclude for mature and immature aspen sites as follows. There is a very significant risk that, at this time, neither the mature nor the immature stands identified in the inventory as having low site productivities will be harvested down to the low heights and volumes, or down to the low site indices, that were assumed, respectively, in the current analysis. Based on the performance review, the contribution to the base case by aspen stands was overestimated in the analysis by 159 000 hectares for mature stands and by 141 000 hectares for immature stands, for an overestimation totalling about 300 000 hectares. Since aspen stands comprise 575 000 hectares of the THLB, this means their aggregate contribution to the timber supply was overestimated in the analysis by about 50 percent. Aspen stands form approximately 40 percent of the THLB area in the TSA, and essentially all of the deciduous THLB.

To assess the impact of this overestimation on the base case timber supply projection, I have reasoned as follows. The timber supply analysis showed that, in the base case, over the 250-year forecast period, the average harvest from deciduous species is projected to be 1 443 500 cubic metres per year. The 300 000 hectares of aspen THLB being removed from the THLB are of lower productivity than the 275 000 hectares of aspen remaining. Since aspen stands comprise most of the deciduous land base in the TSA, the removal of 50 percent of the aspen stands reduces the achievable average deciduous harvest by a little less than half, or by about 600 000 cubic metres per year. This would reduce the base case forecast harvest level by about 19 percent.

Is this a reasonable expectation for the level of contribution from low-productivity aspen stands? The finding that the cut-off criteria for these stands in this TSA at this time would be higher than in some other TSAs is not really surprising, given the relatively short history of harvesting in the TSA and the obvious abundance here of far more economically attractive, higher-volume, taller, accessible stands still remaining to be preferentially targeted for harvesting. This does not mean that the cut-off criteria as applied are not at all reasonable, but it does mean the stands thereby brought into the THLB are unlikely to be harvested under economic conditions foreseeable for the near future.

District staff note, and I agree, that under different economic conditions, in some cases even lower exclusion criteria than those applied in the analysis might plausibly be used. At some future date, under improved economic conditions, when the abundance of harvestable beetle-damaged wood to the south of this TSA is reduced, and when more of the higher volume stands in this TSA have been harvested, some of the lower-productivity stands may well become more economically attractive and begin to be included in the harvest. For the present determination, however, based on the recorded lack of performance and on the large land areas associated with the differences between the assumed and actual harvestable heights, volumes and site indices, I must assume that the current THLB, and the associated timber supply, have been overestimated in the analysis on these accounts, to the considerable degree indicated. I have accounted for this overestimation in my determination, as discussed in '**Reasons for Decision**'.

spruce

I have applied the same review methodology used for aspen stands to spruce-leading stands in the TSA, comparing the depletion data, harvest billing data, and analysis assumptions, with the following results. The area actually harvested in stands predominated by spruce comprises 43.3 percent of the total harvested area, against the 32.8 percent of the THLB area assumed for these stands in the analysis, indicating adequate performance to warrant their inclusion at the level assumed in the analysis.

For lower-productivity, mature spruce stands, 90 percent of the harvesting took place in stands with at least 192 cubic metres per hectare, with tree heights of at least 21.2 metres, while in the analysis it was assumed that spruce stands with as low as 140 cubic metres per hectare, and trees as short as 20 metres tall, by age 121, would be harvested. This resulted in the inclusion of about 22 000 hectares of stands with limited harvesting performance.

For lower-productivity, immature spruce stands, 90 percent of the harvesting took place in stands with a site index of 11.2 in practice, against 10.8 in the analysis, indicating reasonably close correlation.

From these considerations I conclude that the contribution by spruce stands to the base case was overestimated in the analysis by 22 000 hectares for mature stands. Since spruce stands comprise 471 000 hectares of the THLB, this represents an overall difference of about 4.7 percent, which I conclude is within a reasonably expectable range over the reviewed period. For the purposes of this determination, therefore, I conclude that the THLB derived for the base case analysis adequately reflects current operational practice with respect to spruce-leading stands, including the lowest productivity of mature and immature stands of spruce that may reasonably be expected to be harvested in the TSA in the foreseeable future.

- uncertainty in harvesting in the Fort Nelson West

In the Fort Nelson TSA, the primary transportation corridor is the Alaska Highway, which roughly bisects the region between east and west. The only other all-weather roads are Highway 77—the Liard Highway to Fort Simpson in the Northwest Territories, which joins the Alaska Highway just north of Fort Nelson—and the Sierra-Yoyo-Desan road providing access to oil and gas exploration areas in the east of the region. The portion of the TSA known as the 'Fort Nelson West,' generally lying to the west of the Dunedin River and including the Muskwa-Kechika Management Area and several parks and protected areas, extends over about 4.6 million hectares in total, has no developed road system, and is remote from transportation routes to timber processing facilities.

For the purposes of the 2005 timber supply analysis, it was assumed that the Fort Nelson West would provide 370 715 hectares or 25.8 percent of the total THLB area in the TSA. The extent to which this area will be able to contribute to the TSA's timber supply in practice, however, is subject to considerable uncertainty. This uncertainty arises from the remoteness of the area and the consequent questionable economic viability of developing the area to harvest the timber there—much of which is small pine and other species growing on sites of lower productivity—and from the costs of getting this timber to suitable processing facilities. When current market demand and prices are considered for the particular types of timber in the western area and for the products that may be derived from them by facilities within reasonable transportation range, the economics become very marginal. Suitable processing facilities are distant. The only sawmill in Fort Nelson has closed and is reportedly being dismantled, leaving only plywood and OSB manufacturing plants there. The only reachable sawmill is now the South Yukon plant in Watson Lake. When these factors and the inevitably high harvesting and transportation costs involved are

taken fully into account, the inclusion of the Fort Nelson West area in the THLB—at least at this time—may very significantly overestimate its viable contribution to the timber supply.

To investigate the magnitude of the potential implications of this uncertainty for the projected timber supply, the DFAM Group provided a sensitivity analysis in which this entire area was assumed not to make any contribution to the timber supply. In this sensitivity analysis, however, this change was combined with additional changes in other assumptions, such that the analysis did not accurately quantify the effects of the required land base removal. I have therefore relied on numerical analysis provided by MoFR staff to quantify the appropriate areas for exclusion in the Fort Nelson West.

As noted above, the THLB in the Fort Nelson West comprises 370 715 hectares, including stands of various species, the timber supply implications of some of which I have already considered for the TSA as a whole, in earlier sections. Already accounted for in my considerations respecting the exclusion of the THLB in the Fort Nelson West are all stands of black spruce, birch, cottonwood, balsam-fir, Douglas-fir, cedar, hemlock, maple, and lower-productivity aspen, for a total of 37 000 hectares already excluded. The remainder of the land base in the Fort Nelson West comprises primarily spruce, aspen on sites of better productivity, and the remainder of the pine not already excluded on the east side of the TSA. Specifically, the areas remaining to be excluded comprise 243 771 hectares of pine, 6516 hectares of aspen, and 83 964 hectares spruce, for a total of 334 000 additional hectares to be removed. The land base in the Fort Nelson West comprising these components amounts to 23 percent of the THLB for the whole TSA.

In my determination, I have taken into account the fact that this area includes considerable volumes of timber that, when proven to be economically recoverable under more favourable conditions, could represent a potential opportunity for development and thereby become eligible to contribute at some point in the future to the timber supply for the TSA. For the period of the current determination, however, it is my judgement that until viable plans are produced demonstrating the economic operability of the stands in the Fort Nelson West, it is not reasonable to expect the majority, or even any of these stands, to contribute to the timber supply. On this account therefore, I have adjusted the projected timber supply to reflect the current economic unavailability of the entirety of the area known as the Fort Nelson West, as discussed further in '**Reasons for Decision**.'

- wildlife range burns

In the Fort Nelson TSA, range burns are used to create grassland forest complexes to provide foraging areas for large ungulates and domesticated livestock. In the timber supply analysis, these areas were excluded from the THLB but were assumed to contribute to meeting biodiversity requirements. A total area of 354 999 hectares of wildlife range burns was identified, and a net area of 27 109 hectares was removed from the THLB.

The assumptions for these areas, as modelled in the analysis, reflect current management practices, and the areas were identified from inventory maps providing the best available information. I am therefore satisfied that the base case projection adequately accounts for these areas.

- oil-and-gas-related activities, and transmission lines

Extensive activities related to oil and gas exploration and development are underway throughout the Fort Nelson TSA. These activities result in forest cover depletion, from the placement of seismic lines for exploration, from the construction of access roads to create well sites, from the development of well sites, and from the installation of pipelines for gathering the resource.

In the timber supply analysis, to account for the impacts of seismic line activities on forest cover, spatial information from Terrain Resource Information Mapping (TRIM II) data (up to and including 1995) was used to apply buffers of 7 metres to seismic lines and 15 metres to pipelines, indicating an affecting total area of 73 292 hectares. A new spatial coverage obtained from the BC Oil and Gas Commission indicated that the disturbance width for seismic features incurred during 2001-2003 was 5 metres, and this result was applied in the analysis. The approximate average area affected annually by seismic development over the past three years, 3369 hectares, was assumed to have occurred also during 1996-2000, for a total of 16 845 hectares, which figure was then applied to the eastern half of the TSA, where most of the seismic-line activity in the TSA has taken place.

In addition, approximately 210 kilometres of electricity transmission lines have been identified in the eastern portion of the TSA. In the analysis, a buffer of 25 metres was applied to these lines, to approximate one tree's length from the power line, or a 50-metre right-of-way.

The total area in the TSA associated with disturbance for seismic lines, pipelines and transmission lines was identified as 111 957 hectares, for which in the analysis a net reduction of 26 026 hectares was applied to the THLB.

District staff advise that BC Hydro has confirmed that the average transmission-line right-of-way in the TSA is in fact approximately 36 metres, which is narrower than the width applied in the base case, such that the accounting in the base case may underestimate the THLB by (210 kilometres times ((50-minus-36)) metres) or about 294 hectares, which is negligible in the scale of this TSA.

I also note with BCFS staff that areas disturbed for well sites and their access roads were not accounted for in the analysis. I am advised that about 7000 well sites exist in the TSA, and that each site occupies approximately 2 hectares, with additional disturbance for access roads, for which no digital data are currently available. For well sites alone, the related total disturbance would appear to be about 2 x 7000 = 14 000 hectares. Since the total area of the THLB amounts to about 25 percent of the forested area in the TSA, applying this same proportional representation to the well-site disturbance would indicate a net loss to the THLB of about 3500 hectares, plus an estimate of 500 hectares for access roads, for a total related unaccounted disturbance of 4000 hectares, or about a 0.3-percent overestimation in the base-case THLB.

Given that oil and gas development activities are likely to continue or increase in the foreseeable future, this overestimation will also continue to apply. Some areas may eventually be returned to forest, but this will not be until the longer term. In my determination, therefore, I have accounted for an overestimation of 0.3 percent in the THLB throughout the forecast period.

- environmentally sensitive areas

Environmentally sensitive areas (ESAs) are forested areas that are considered to be sensitive environmentally for a number of reasons or may be valuable for other resource values. The ESAs in the Fort Nelson TSA were identified and delineated during the original forest cover inventory. In the 2005 timber supply analysis, all ESA areas identified as sensitive or significantly sensitive were completely excluded from the THLB. The ESA categories included sensitivities for regeneration problems, recreation, soils, wildlife, significant caribou habitat and (overlapping) significant goat habitat. A total of 708 018 hectares of ESAs were identified, and a net exclusion of 122 878 hectares, after overlaps, was applied to the THLB in the analysis.

In the 2005 analysis for this TSA, all the ESA categories were completely excluded from the THLB, while in many other TSAs, 50-percent and 90-percent exclusions are applied in certain categories of lower sensitivity. If the same partial exclusions for these categories had been

applied the in the Fort Nelson analysis, it could be argued that the THLB would be increased by up to 20 000 hectares, or 1.4 percent of the THLB. However, these areas were also completely excluded in the 2000 analysis, and I am advised by the regional analyst that to date no harvesting in the TSA has taken place in any area identified as environmentally sensitive. From this I am satisfied that the complete exclusion of these areas from the THLB in this analysis is a reasonable and appropriate reflection of current practice, and that the timber supply as projected in the base case requires no adjustment at this time on this account. If future harvesting operations do occur in some of the less sensitive areas, indicating a potential contribution to the THLB from such areas, this potential can be incorporated in a future analysis and determination.

- *soil stability: terrain reconnaissance mapping*

By the year 2000, terrain reconnaissance mapping (Level D) had been completed for several study areas in the Fort Nelson TSA, mostly in areas of significant terrain-related concern. Since the terrain reconnaissance mapping did not identify current terrain classifications, for the 2005 analysis it was assumed that potentially unstable soils (reconnaissance class P) and unstable soils (class U) were equivalent to the terrain classes IV and V and to the categories Es2 and Es1 respectively. Areas with these classifications were completely excluded from contributing to the THLB. Accordingly, from a total identified area of 19 112 hectares, a net area of 9197 hectares was excluded from the derived THLB.

Since this constitutes the best available information to describe the implications of avoidance of harvesting on unstable and potentially unstable soils, I accept this exclusion as appropriate for incorporation in the base case analysis.

- *riparian reserve zones*

The stream inventory classification process for the Fort Nelson TSA is incomplete. Some rivers (i.e. stream classes S1 and S2) are identified by polygons in the Vegetative Resources Inventory, and, with their widths thereby available, correct buffers could be applied according to the *Riparian Management Area Guidebook*. For the analysis, information on the remaining streams was translated from single-line features in the TRIM I data. In the absence of complete field-based stream classification data for these streams, a methodology was developed to combine the results of a study by Poulin and Associates, 2001, *the Lower Dunedin Landscape Unit Riparian Analysis*, with information provided by the (then) Aquatic Information Branch of MSRM, in Prince George. The results showed a high correlation between stream orders (a measure of the relative size of a stream) 1 and 2, and stream classes 5 and 6, as well as between stream order 3+ with stream classes 1 to 4. An analysis was also completed for the Lower Dunedin area, for use in the 2005 analysis, in which the sample points of known stream classifications from the Poulin and Associates study were compared to the stream order classified using GIS processing, again with high correlation. The stream classifications used in the analysis were reviewed by the Ministry of Environment's Fisheries Information Specialist in Prince George.

Riparian areas also occur by lakes and wetlands throughout the Fort Nelson TSA. Lake and wetland locations are identified explicitly in the VRI inventory data that was 'rolled over' from the Forest Cover/Forest Inventory Program data, (see – *status of forest cover inventory* section, below) while, in the VRI Phase I inventory, the locations were identified based on the 50-percent rounding rule noted earlier in – *non-forest and non-productive sites*.

From this work, for riparian areas derived from the stream-order methodology, a total area of 184 553 hectares of riparian reserves (including weighted areas for management zones) was

identified, from which a net reduction of 86 801 hectares was applied to the THLB. For riparian areas derived from the polygon features in the VRI data, a total of 358 787 hectares of reserves (including weighted management zones) was identified, from which a net reduction of 103 866 hectares was also applied to the THLB. The total net area deducted from the THLB to account for riparian reserves and management areas was therefore 190 667 hectares.

I am satisfied that best efforts have been applied to develop methodologies to optimize the representation of riparian reserve and management areas from the various data sources available, and that the information so derived is the best available for modelling these features in the base case analysis.

- *cultural heritage resources*

Three categories of cultural heritage resources are evident within the Fort Nelson TSA: archaeological sites containing physical remains of past human activity; historical sites, often consisting of built structures or localities of events significant to living communities; and traditional use sites which sometimes lack the physical evidence of human-made artefacts or structures but maintain cultural significance for living communities.

An archaeological map, *Archaeological Overview of the Fort Nelson Land and Resource Management Plan Area, Heritage,* was completed in March 1996. The map, completed at a scale of 1:250 000, classified the planning area into zones with a low, moderate or high potential to contain archaeological sites. In 1998, the report *Archaeological Potential Mapping in the Fort Nelson Forest District Final Report,* was completed with accompanying 1:50 000 maps. This form of mapping attempts to categorize the landscape according to its suitability for human activity of the kind which leaves archaeological remains.

To date, while some early trails and evidence of activities near the confluences of rivers have been located, no specific cultural heritage resource sites requiring localized exclusions from the THLB have been identified in the TSA that would not overlap with provisions for other objectives. Accordingly, no specific exclusions on this account were modelled in the base case. District staff advise that if any such sites are found, they can be accommodated on the ground within operational planning and practices.

Since no specific requirements have been identified for managing cultural heritage resources on particular sites that could affect the extent of the timber harvesting land base, then, given the extensive undisturbed forest cover in this TSA, I am satisfied that any emerging occurrences of these resources can be managed operationally, with the licensees' cooperation, within the mix of objectives already accommodated in the assumptions incorporated in the base case projection.

Existing forest inventory

- *status of the forest cover inventory*

In British Columbia, the Vegetation Resources Inventory (VRI) is replacing the older forest cover inventory (FCI) mapping for TSAs and TFLs over time to improve inventory standards. Between 2000 and 2003, VRI Phases 1 (photo interpretation) and 2 (ground sampling) inventory projects were completed for 30 percent of the Fort Nelson Forest District. The area covered by the VRI covers 50 percent of the THLB used in the DFAM group base case analysis, or about one-third of the TSA. For the rest of the TSA, the inventory remains based on the older FCI and Forest Inventory Program (FIP) data that have been 'rolled-over' into the new VRI format. The

'roll-over' process does not generate a true VRI database, but maintains the old information in a new database format.

The VRI Phase I (photo-interpreted) inventory projected forest stand attributes to 2003, whereas the VRI 'rolled over' portion was projected only to 2002. VRI adjustment factors were derived from VRI Phase II ground sample data, for age, height and net volume, and applied to the area covered by the VRI Phase I project.

The new VRI coverage was not used in the analysis to determine the site-index and volume-based thresholds used in the land base exclusions for stands with lower site index or with lower volumes per hectare. Instead, the old FCI was used to apply the exclusion criteria to all areas, including those with VRI coverage. This introduces uncertainty in the respective thresholds, since both site indices and volumes have been adjusted in the newer VRI data.

This uncertainty leads directly to concern that relying on the older FCI data to determine the 'cut-off' thresholds may have led to unwarranted increases in the THLB derived for the 2005 analysis. Specifically, without considering the Cassiar addition, a change in the height criterion for pine stands (from 20 metres to 16 metres) led to an increase in the THLB of 107 497 hectares; changes in the heights and volumes for mature stands of low productivity led to an increase of 62 318 hectares; and a reduction in the lower productivity site index cut-off for aspen (from 17.7 metres to 15.9 metres) led to a THLB addition of 76 772 hectares. The implications of these apparent increases for the timber supply that may reasonably be expected to be harvested in the TSA, particularly in respect of current performance and particularly in aspen stands, are very considerable; I have addressed these in the section - *mature and immature stands of low productivity, uncertainty in harvesting in the Fort Nelson West,* and in '**Reasons for Decision**.'

The inclusion of the Cassiar addition in the TSA increased the THLB by 180 868 hectares, and the same concern over threshold levels applies to this area of the TSA. Altogether, including the 61 924-hectare THLB increase due to the reduction in the area reserved in Wildlife Tree Patches (from 68 563 hectares in the 2000 analysis to 6639 hectares, as discussed in *–stand-level biodiversity*) the THLB derived for the 2005 analysis increased by 507 410 hectares over that in the 2000 analysis.

During the roll-over of the FCI inventory to the VRI format, a software problem caused the stocking class for some areas to be projected incorrectly. Consequently, in the 2005 analysis, a total of 28 183 hectares were projected with the wrong stocking class. To examine the related implications for timber supply, a sensitivity analysis was conducted, which showed that if the correct stocking class were used, the long-term timber supply would decline by about one percent, but under the harvest-flow assumptions applied, the short- and medium-term timber supply could remain unaffected.

From reviewing this information, in addition to the considerations I have applied in the noted sections regarding reasonable expectations for the timber supply contributions from lower productivity sites, in respect of the stocking class error I have accounted for a one percent overestimation in the harvest level projected in the base-case forecast, as discussed in '**Reasons for Decision**.'

- volume estimates for existing unmanaged stands

Existing unmanaged stands are those stands that have not been logged, or are not subject to forest management by planting or density control. In the Fort Nelson TSA, these include all current and future stands of deciduous species that now cover 45 percent of the THLB, as well as naturally regenerating mixed-wood stands predominated by spruce, larch and sub-alpine fir. Any stands

logged prior to 1990, though immature, are also considered and modelled as unmanaged stands, to reflect the typically lower regenerated densities, irregular tree spacing, and resulting lower volumes associated with unplanted and untended stands. In the timber supply analysis, estimates of the timber volumes in existing unmanaged immature and mature stands were projected using yield tables produced by the Variable Density Yield Prediction (VDYP) model, version 6.6d.

Based on differences noted in comparisons between the inventory, and cruise, scale and billing information, licensees have occasionally suggested that the modelled volumes in the analysis may overestimate the actual average volumes of existing conifer stands. To validate whether operations consistently under- or over-perform the assumptions in the base case, correlations should be monitored over time between inventory volumes (accounting for VRI vs. FCI), and cruise or scale volumes (allowing for retention, wildlife trees, waste and coarse woody debris) as the harvest profile may change along with the volumes in the remaining available stands.

To test that the growth and yield inputs were developed appropriately, that no errors were made in aggregation, and that no significant bias was introduced, BCFS analysts performed a check in which the existing natural stand volumes were aggregated by analysis units based on species (inventory type group), biogeoclimatic zone, and site productivity. The results showed very close agreement (a difference of 0.44 percent) with the volumes used in the analysis. BCFS Forest Analysis and Inventory Branch staff indicated that the existing natural stand yield tables had been appropriately generated.

District staff note that some mature stands in the TSA are subject to decline from non-catastrophic blowdown, disease, and other forms of mortality. A sensitivity analysis, conducted to investigate the potential implications of this and other possible sources of uncertainty in the existing stand volumes, showed that under the assumed harvest flow rules, when the estimated volumes for existing unmanaged stands were reduced by 10 percent, the base case timber supply projection could remain unaffected for about 125 years. This demonstrates the considerable robustness and flexibility accorded to the timber supply projection by the large surplus of mature growing stock in existing stands.

In considering all of this information, I acknowledge the potential incorporation in the analysis of uncertainty in the volume estimates for existing unmanaged stands. Without applicable data, however, any related overestimation in the timber supply remains anecdotal and of an unquantifiable magnitude. From the sensitivity analysis, it appears that the base case timber supply projection is in any case not directly subject to a risk specifically attributable to substantial changes in this factor. Nonetheless, in view of several other significant uncertainties and overestimations identified in my considerations, in my determination I have remained mindful of this uncertainty and have discussed the matter further in '**Reasons for Decision**'**.**

In view of the very large volumes of older timber standing in the TSA, in the interest of minimizing this particular uncertainty for future determinations, district staff and licensees should undertake formal action to resolve the noted questions regarding possible discrepancies between the volume estimates for existing natural stands as derived from the inventory and the actual volumes realized in harvesting operations, as I have noted below, in '**Implementation**'.

- *interior log grades*

On April 1, 2006, new log grades were implemented for the BC Interior. Under the previous grade system, a log was assessed according to whether the tree it came from was alive or dead at the time of the harvest. Grade 3 endemic (the 'normal' mortality observed in a mature stand) and grade 5 (a dead tree with greater than 50 percent firmwood, where the log has defects such as twists, knots and heart rot) were not charged to the AAC if harvested.

Under the new system, grades will be based on the size and quality of the log at the time it is scaled, or assessed without regard to whether it was alive or dead at harvest. Moreover, logs that were previously considered grade 3 endemic or grade 5 will now be charged to the AAC, whether or not they are harvested and brought to scale. Therefore their volume must be taken into account in this determination. Estimates of timber volumes used in the base case did not account for the dead logs that could potentially be used as sawlogs, (known as 'dead potential').

Possible sources of data for assessing the 'dead potential' include inventory audit plots, VRI phase II ground samples, permanent sample plots, temporary sample plots, and cruise data. In the Fort Nelson TSA, the best of these is considered to be the VRI data. The VRI data indicates the 'dead potential' volume in the entire forested land base of the TSA as about 10.9 percent of the 'green' or living volume on the forested land base.

However, this is not necessarily representative of the 'dead potential' volumes specific to the THLB; the past several years' harvest data show that the species composition of the timber harvesting land base is quite different from the species composition of the forested land base. Data from the harvest billing system for the period from 1995 to 2004—when taking dead logs to the mills was solely at the discretion of licensees—showed that grade 3 endemic and grade 5 logs totalled about 4.8 percent of the green volume.

Several considerations present difficulty in assessing the appropriate figure to place on the harvest contribution from dead potential volumes. In this TSA, the prospective utilization of dead potential is very different from that in more southerly areas where beetle damage is rampant; here, stands with high proportions of dead wood may be avoided for some time while better stands are harvested; the possible markets for such wood are much reduced as licensees are unlikely to try to peel dead wood for plywood or to chip it for OSB products. Smaller-volume licensees are salvaging some wood, but more than half of the wood in waste piles is not dead wood but live green tops or pieces bucked from stumps. The accounting is further complicated by the relationship between amounts of 'dead potential' left on the ground and requirements to leave coarse woody debris.

Despite the uncertainties, to the extent that these log grades are present in existing stands, they must be accounted for in the AAC whether use is made of them or not. While the VRI information undoubtedly provides the most reliable information source for the dead-potential volume on the land base of the TSA as a whole, it may less accurately reflect the volume on the particular portion of the land base on which licensees have been, are currently, and will be operating over the period of this determination, since the stands selected for harvest are likely to be in better condition than average stands. For this reason I consider it appropriate in the current determination to rely on the figure obtained from the harvest records and apply an adjustment of 4.8 percent of the green volume determined to be harvestable under the new AAC, as an underestimation of the actual wood volumes available for the duration of this AAC, as noted in my '**Reasons for Decision**'.

- *age class composition and species profile*

The TSA contains extensive areas of mature forests; currently, 85 percent of the forest cover on the THLB is between 41 and 140 years old.

Aspen and spruce stands are predominant in most of the TSA, respectively covering about 40 percent and 33 percent of the THLB area. Stands of predominantly pine, cottonwood, and balsam respectively cover 23.5 percent, 3 percent, and 0.5 percent of the THLB area.

Based on harvest billing system information (by species rather than leading species), between 2000 and 2004, approximately 50 percent of the volume harvested was aspen, 38 percent spruce, 8 percent cottonwood, 2 percent pine, 1 percent birch, and 1 percent balsam.

In total, about 71 percent of the THLB is currently at or above the minimum harvest age, while an additional 11 percent will reach harvestable age within the next 10 years. Currently, 85 percent of pine stands, 74 percent of cottonwood stands, 67 percent of aspen and spruce stands, and 58 percent of balsam stands, are above the minimum harvestable age.

In all aspects of my determination I have been mindful of the species composition and of the distribution of the ages of the forest stands in the TSA, both inside and outside the THLB.

Expected rate of growth

- *site productivity estimates*

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

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

Numerous studies in British Columbia, such as the MoFR Old-Growth Site Index (OGSI) project, have confirmed that site indices for stands older than 140 years and for those younger than 30 years (with a site index determined from the previous stand) are typically underestimated; when old stands are harvested and regenerated, the actual productivity realized in the new stands is generally higher than predicted in the inventory-based site index estimates. To accurately predict growth and yield in managed stands in British Columbia, site indices are needed that reflect the true potential of growing sites.

In areas where local site-index studies have been carried out to obtain definitive data, adjustments can be made and the timber supply projected from improved productivity figures. Since no such studies have yet been carried out in the Fort Nelson TSA, no site index adjustments were incorporated in the base case forecast; however, the volumes and heights in the VRI data were adjusted by VRI phase II data, and these results were used in the base case.

In view of the increases commonly seen in projected long-term harvest levels of TSAs that incorporate locally generated site index data, at some point local site index work should be performed in this TSA. However, given the robustness of the current timber supply projection, no such adjustments are indicated with urgency to fill mid-term supply gaps, and I am satisfied that the site-index values relied on in the base case forecast are the best currently available information.

- volume estimates for managed stands

In the 2005 timber supply analysis, timber volumes for managed stands were estimated using the standard BCFS growth and yield model Table Interpolation Program for Stand Yields, TIPSY (version 3.0h). Stands were considered to be managed if they have been subject to forest management by planting and density control to the degree that they would exhibit different growth characteristics and attributes in comparison with existing, natural stands. 'Existing managed stands' include stands harvested between 1990 and 2003. Since only pure spruce, spruce/pine and pure pine stands are planted, these form the majority of existing managed stands. Stands logged after 2003 are considered 'current managed stands'; once the spruce-leading, spruce/pine and pine-leading existing natural and existing managed stands are harvested they are expected to regenerate to pure, managed conifer stands. In the analysis, a genetic gain attributable to the use of select seed was applied to those stands, as discussed below in - *gains from the use of select seed*.

All TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition. However, certain operational conditions, such as a less-than-ideal distribution of trees, the presence of small non-productive areas, endemic pests and diseases, or age-dependent factors such as decay, waste and breakage, may cause yields to be reduced over time. Two operational adjustment factors (OAFs) are therefore applied to yields generated using TIPSY, to account for losses of timber volume resulting from these operational conditions. OAF 1 is designed to account for factors such as small stand openings that affect the yield curve across all ages. OAF 2 accounts for factors such as pests, disease, decay, waste and breakage, whose impacts tend to increase over time. In the Fort Nelson base case analysis, the provincial standard operational adjustment factors of 15 percent for OAF 1 and 5 percent for OAF 2 were applied.

Sensitivity analyses showed that if the regenerated stand volume estimates were increased by 10 percent, the projected harvest level was 10 percent higher than the base case, throughout the forecast period. When the estimated future stand yields were instead reduced by 10 percent, the projected short- and mid-term harvest levels remained the same, but starting about 120 years from now, the long-term level was reduced by 10.5 percent.

Staff of MoFR's Research Branch confirmed that the managed stand yield tables for this TSA were generated appropriately. I have discussed with BCFS district staff the need for monitoring an ongoing balance in the conversion of spruce-leading stands to deciduous species, and I am satisfied that the base case accounts adequately for expected rates of growth in the regenerating, managed stands in the TSA.

- minimum harvestable ages

In timber supply analysis, minimum harvestable ages are estimated as a measure of the earliest age at which a forest stand will have grown to a harvestable condition. Minimum harvestable ages affect when second-growth stands will become available for harvest, which in turn affects how quickly existing stands may be harvested while maintaining a stable flow of harvestable timber. In practice, economic considerations and constraints on harvesting that arise from managing for such values as visual quality, wildlife and water quality, may influence the actual minimum harvestable age. Minimum harvestable ages are no more than estimates of when immature or future managed stands will become available for harvest; it is not expected that all stands will be harvested at this age, but theoretically harvesting may occur at this age to meet a harvest target for a relatively short period of time or to avoid large and abrupt changes in harvest levels. In some areas, stands may not be harvested until they are much older than the minimum

harvestable age, due to extended rotations for forest cover requirements such as old forest objectives for landscape biodiversity.

For the 2005 Fort Nelson analysis, the criterion used to determine minimum harvestable ages for particular species groups in natural stands was the age at which the yield curve reached the minimum volume considered harvestable, i.e. 140 cubic metres per hectare. In an analytical comparison, it was found that the minimum harvestable ages derived in this way were typically younger than the age where 95 percent of the maximum Mean Annual Increment (rate of growth) is realized.

A sensitivity analysis was conducted to show the impact on timber supply if the minimum harvestable ages were increased or decreased by ten years; the results showed no change in the projected timber supply in either case.

BCFS district staff advise me that most current harvesting is carried out in stands of 300 cubic metres per hectare and they do not expect harvesting will need to occur at or near minimum harvest ages to maintain the projected timber supply. Since the analysis indicates considerable flexibility in the ages at which trees may be harvested in this TSA without affecting the projected timber supply, I conclude that these ages are adequately modelled in the base case projection.

- gains from the use of select seed

The use of select seed with improved genetic traits can increase the timber volumes in managed stands in the long term and shorten the time required for a forest stand to reach green-up height or the minimum harvestable age. Class B+ seed, exhibiting a genetic worth of 3 percent, has been used in the Fort Nelson TSA since 2000 for all planted pine types. Class A spruce seed is not yet planted in the TSA but will be available in the near future for certain planning units.

Two sensitivity analyses were conducted to test the respective impacts on timber supply of planting Class A spruce seed (a) in only the anticipated planning units, and (b) in *all* future managed spruce stands. These scenarios were simulated by applying, respectively: (a) a one-percent net genetic gain; and (b) a 20-percent average genetic gain, to the yield curves for all future managed spruce stands. Scenarios (a) and (b) resulted in increases in the projected harvest level of one percent and six percent, respectively.

In the base case projection, all existing managed, and future managed pine stands (potentially totalling 290 692 hectares if all natural pine stands were harvested) were modelled using a 3-percent genetic gain. After the base case was developed, BCFS district staff advised that the superior pine provenance is only suitable for use in areas of elevation between 210 and 710 metres. Currently, there are 214 966 hectares of pine stands with elevation above 710 metres in the THLB. A 3-percent reduction to the yield curve for this area, which amounts to about 15 percent of the total THLB, would decrease the base case harvest level by 0.45 percent. However, in my determination, this consideration is overwhelmed by my decision to account for the current absence of harvesting performance in pine-leading stands by excluding their contribution to the timber supply, as noted earlier in *mature and immature stands of unproven merchantability*, and in *uncertainty in harvesting in the Fort Nelson West*. Since no genetic gain was assumed for spruce, and since I have dealt separately with pine, no adjustment to the projected timber supply is indicated with respect to genetic gains.

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

Regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In the 2005 timber supply analysis, various regeneration delays were assigned to existing managed stands and stands harvested before 1990, to reflect their varying history, in that some stands have been planted, some have been brushed and others regenerated naturally, while spruce and larch and subalpine-fir stands are often associated with high water table and problematic regeneration. Delays of one or four years, as detailed in the timber supply analysis, were applied for the regeneration of unmanaged, existing stands. For all current and future managed stands, a regeneration delay of one year was applied, except for a small amount of unplanted, naturally regenerated pine, for which a delay of 4 years was assumed. The planted stock is usually one year old at planting, and is sometimes planted within six months of winter harvest.

The regeneration delays for these stands were discussed between the DFAM group and the Fort Nelson Forest District, and are considered by both parties to be representative. From my discussions with district staff and from my direct observations on the helicopter flight, I am satisfied that basic silvicultural obligations are being well taken care of in the TSA, and that the regeneration assumptions are suitably modelled in the base case analysis as representative of current practice.

Not-satisfactorily-restocked areas

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

For the 2005 analysis, NSR areas were identified from VRI data, from forest development plans, and from the previously noted depletions coverage. A total of 97 067 hectares of NSR were identified in the Crown forest land base, of which 86 106 hectares are not considered part of the THLB (as discussed earlier in – *areas burned by wildfire and not satisfactorily restocked*), while 1704 hectares were attributed to the THLB as backlog NSR and another 8095 hectares as current NSR requiring regeneration. Not-satisfactorily-restocked areas were considered part of the THLB if the land has been identified in VRI or in forest development plans as having been previously logged or managed with silvicultural activities.

Areas of backlog NSR, and current NSR with no known establishment date, are expected to regenerate naturally and to contribute to timber harvesting in the future. In the analysis, any area on the THLB in either of these conditions was assigned a regeneration delay of 10 years, to account for the uncertainty associated with natural regeneration.

I consider the assumptions as applied in the analysis to be a reasonable reflection of expectations for the potential regeneration of NSR areas under current management practices.

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

Silvicultural systems

Harvesting in the Fort Nelson TSA is dominated by the use of conventional, ground-based systems. Some areas closer to the Muskwa-Kechika Management Area are potentially operable by cable and helicopter although there has been no performance to date.

In the 2005 timber supply analysis, all harvesting was assumed to be ground based, and I am therefore satisfied that current management practices are adequately reflected on this account in the base case projection.

Incremental silviculture

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

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

Utilization standards

Utilization standards define the species, dimensions and quality of trees that are harvested and removed from an area during harvesting operations. In the 2005 timber supply analysis for the Fort Nelson TSA, a maximum stump height of 30 centimetres, and a minimum top diameter of 10 centimetres inside bark, were assumed for all species. The minimum diameter at breast height was assumed to be 17.5 centimetres for spruce, sub-alpine fir, and larch, and 12.5 centimetres for pine, cottonwood, aspen, and birch.

District staff advise that in practice the minimum top diameter inside bark for some species may be on average a little less than 10 centimetres, but staff agree that the implications of this relatively small volume difference for the projected timber supply are negligible and I am satisfied that current utilization standards were appropriately reflected in the base case projection.

Decay, waste and breakage

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

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

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

Integrated resource management objectives

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

In the 2005 timber supply analysis, some IRM objectives were addressed through reductions in the timber harvesting land base, and I have accounted for these factors—including wildlife range burns, environmentally sensitive areas, riparian habitat and cultural heritage resources—in 'Land base contributing to timber harvesting.' In this section, I account for IRM objectives where the affected portions of the land base continue to contribute to timber supply but are subject to various management constraints with respect to forest cover and adjacency.

- *cutblock adjacency, forest cover objectives and green-up*

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

In the Fort Nelson TSA, under current management practice, harvest openings are designed to mimic natural disturbances with large leave areas between patches. As a rough approximation of this, in the 2005 analysis—as agreed to by the BC Ministry of Environment, Lands and Parks (MELP) for the 2000 analysis—the base case modelled green-up and adjacency constraints by using a forest cover rule under which, at any time, no more than 39 percent of the THLB in each of the 84 landscape units was permitted to be covered by stands lower than three metres in height.

Sensitivity analysis indicated that increasing the required green-up height from three to eight metres did not affect the base case forecast. This lack of sensitivity is to be expected, given the very extensive areas of undeveloped THLB in the TSA, which affords a great deal of operational flexibility. I am therefore satisfied that the analysis adequately reflects the need to retain forest cover to meet green-up and adjacency objectives across the harvested landscape.

- *landscape-level biodiversity and old forest retention*

Conserving landscape-level biodiversity involves maintaining forests with a variety of patch sizes, seral stages, and forest-stand attributes and structures, across a variety of ecosystems and landscapes. Together with other forest management provisions that provide for a diversity of

forest stand conditions, the retention of old forest is a key landscape-level consideration. Old forest retention can be achieved through the location of old growth management areas (OGMAs).

In the Fort Nelson TSA, 85 landscape units are established, of which 4 are assigned a 'high' Biodiversity Emphasis Option (BEO), 45 an 'intermediate' BEO and 36 a 'low' BEO. Current management practices are consistent with these BEOs.

In the 2005 analysis, forest cover requirements were modelled aspatially, and in consistency with the *Landscape Unit Planning Guide*. The 'mature-plus-old' and 'old' seral requirements were modelled to represent the specific BEO for each landscape unit, and in landscape units with low BEO, the full target for 'old' forest cover was achieved over three rotations, using a recruitment strategy as permitted to address timber supply impacts in meeting landscape-level biodiversity objectives. Early seral stage requirements were not modelled in the base case, but the DFAM group advises that early seral patches are managed operationally through a range of cutblock sizes to achieve targets for patch sizes.

From this I conclude that, with the qualification noted in the next section, the forest cover requirements to meet landscape-level biodiversity objectives for all established landscape units according to their respective BEOs have been adequately accounted for in the base case timber supply projection.

- *natural disturbance in the non-timber harvesting land base*

Natural disturbances from fires or mortality in the forest cover on the non-harvestable land base can affect the contribution made by this land toward the retained forest cover required to meet biodiversity objectives, and this in turn can affect the projected timber supply. In the Fort Nelson TSA, where the non-harvestable land base contributes three-quarters of the total forested land base, uncertainty in the frequency and extent of disturbances in this forest has important implications for biodiversity and habitat objectives within the THLB, and thus for the timber supply. This disturbance was not accounted for in the 2000 analysis.

In the 2005 analysis, it was assumed that when a forested area in the non-harvesting land base reached an effective forest stand rotation age (calculated for each Biogeoclimatic Ecosystem Classification (BEC) unit in each landscape unit) a 'disturbance' would occur, such that the age of the trees on the area would then revert to zero. Using this method, it was found that the level of disturbance applied—23 000 hectares annually—was higher than would be expected from applying the principles of the 'natural range of variability,' in accordance with the (then) Ministry of Sustainable Resource Management's (MSRM) April 2002 paper, *Natural Disturbance Units of the Prince George Forest Region*. This document is generally considered to be the best available scientific information pertaining to management of biodiversity in northeastern BC and was recommended by the BCFS regional manager and by MSRM's regional director for use in developing landscape unit plans. BCFS analysts agreed that the effective rotation ages developed in the 2005 analysis were reasonable, but noted that assuming a reversion to age zero for all affected stands was not, as not all trees are killed in a wildfire.

Sensitivity analysis showed that if the lower disturbance levels indicated by 'natural range of variability' principles for the two natural disturbance units (NDUs) in the TSA (the Boreal Plains and the Northern Boreal Mountains) were applied instead, the projected timber supply was unaffected. However, it is clear from the modelling results that in the analysis, the non-harvestable land base was contributing to the retained forest cover requirements only to a much smaller degree than its clearly very extensive ability to do so in the real world. The

true extent of its underestimated contribution to old forest requirements remains uncertain, but inevitably in the longer term, lower amounts of old growth will be required to be retained on the THLB than were assumed in the base case. This must imply a currently unquantifiable underestimation, in the long-term harvest level projected in the base case, and I have taken this into consideration in my determination as discussed in '**Reasons for Decision**.'

To reduce this uncertainty, and to identify any associated timber supply implications for the long term, for the next analysis and AAC determination, BCFS regional and district staff, and licensees, should collaboratively examine the degree of consistency between the disturbance of stands in the non-harvesting land base as modelled in the base case, and as derived from the NDU definition, to find the true provisions necessary to meet old forest retention requirements.

- *stand-level biodiversity and wildlife tree retention*

Wildlife tree patches (WTPs) and coarse woody debris are important to the conservation of biodiversity at the forest stand level. The Code and FRPA both provide for the retention of wildlife trees in harvested areas. In the 2000 analysis for the Fort Nelson TSA, WTPs were modelled by a generalised exclusion of 10 percent overall, including a 5 percent reduction to the THLB which amounted to 68 563 hectares, in response to a provisional guideline suggested by staff of MELP prior to an opportunity to apply the correct process to each landscape unit.

In the 2005 analysis, wildlife tree retention requirements were estimated for each landscape unit by considering existing mapped wildlife tree patches and current management considerations, incorporating existing spatial WTPs identified from the DFAM licensees' forest development plans (which were excluded from harvest in the base case) and basing remaining WTP requirements on procedures identified in the *Landscape Unit Planning Guide*. In this analysis, the net area excluded was 6639 hectares.

The percentage area of the THLB currently identified as required for WTPs appears low in comparison to many TSAs, but this reflects the early stage of development here which is characterised by the very large, undisturbed areas of forest cover remaining around all cutblocks, such that the requirements to place WTPs within them are considerably reduced. As development progresses over time, with a larger overall area harvested, the WTP requirements will no doubt increase. I also note from first-hand aerial observation that in current operational practice large riparian areas are consistently left untouched, providing significant additional areas of WTPs.

For the current determination, I am satisfied that the methodology used in the analysis has provided a representation of current requirements for WTPs that is adequate and consistent with the *Landscape Unit Planning Guide*. However, in anticipation of probable evolving changes in these requirements as harvesting progresses in the TSA, BCFS district staff and licensees should review and monitor the implementation and application of WTPs with respect both to the assumptions applied in timber supply analyses and to on-the-ground practices, as I have noted below, in '**Implementation**.'

- *visually sensitive areas*

The Code and FRPA enable scenic areas to be designated, and visual quality objectives (VQOs) to be established, so that the visible evidence of forest harvesting may be kept within acceptable limits.

In the Fort Nelson TSA, the broad visual landscape inventory, which identifies the visual sensitivity ratings and the recommended visual quality classes (RVQCs) for all visually sensitive

conditions, was made known in 1997. In 2002, a partial update to this broad mapping was completed, to reflect the inclusion of the Cassiar addition in the land base of the Fort Nelson Forest District. Also released in 1997 were detailed visual landscape inventories for the Alaska Highway and Klua Lakes, for which VQOs had been established.

Within the TSA, a total of 807 877 hectares, of which 603 692 hectares are in the Crown forested land base, are assigned VQOs. About 12.2 percent or 175 005 hectares of the visually sensitive forest occurs within the THLB. Since 29 percent of the total forested area with VQOs lies within the THLB, non-harvestable forested areas contribute significantly to meeting visual management objectives. The Crown forested land base also includes 413 198 hectares with RVQCs.

'Partial retention' VQOs cover 434 812 hectares, the majority of the visually sensitive area in the Crown forested land base. This classification allows at most 12.5 percent of the visually sensitive area within a visual quality polygon to contain stands less than the 'visually-effective green-up' (VEG) height. The remainder of the visually sensitive area is classified as 'preservation' (1755 hectares), 'retention' (34 643 hectares), 'modification' (115 681 hectares) and 'maximum modification' (16 801 hectares), where at most 0.75 percent, 4 percent, 22.5 percent and 36.3 percent, respectively, of the visually sensitive area within a visual quality polygon may be covered by stands below the VEG height.

In the analysis, maximum allowable disturbances for VQO categories were modified by visual absorption capacities, and VEG heights (ranging from 3 to 8.5 metres, with an average of 3.8 metres over the entire TSA) were calculated by slope class, consistent with the minister's memo (see Appendix 4) and standard procedures (i.e. *Procedures for Factoring Visual Resources into Timber Supply Analyses*). All RVQCs were 'grandfathered' under FRPA and modelled in the base case, and I am advised that current operations within the RVQCs are expected to achieve the visual management objectives.

Sensitivity analyses were conducted to test the impact on timber supply of applying first the minimum, then the maximum, allowable disturbance. These showed that when the VQO constraints were relaxed, the projected harvest level was 1.9 percent higher than in the base case, and when the minimum percentage denudation, or the 8-metre VEG height was applied, the long-term harvest level was respectively 4 percent, or 5 percent lower than in the base case.

In reviewing this information in detail with BCFS staff, I am satisfied that the short-term timber supply is not highly sensitive to changes in the constraints for scenic areas, and that these areas have been accounted for appropriately in the base case timber supply projection.

- *community watersheds and domestic intakes*

The water resources within the Fort Nelson TSA include a large part of BC's portion of the Arctic watershed. The area is drained by the Liard River and its major tributaries, the Fort Nelson, Prophet, Muskwa, Toad, Petitot and Kechika rivers. A minor portion of the area near the Alberta border is drained by the Hay River, which flows toward the Mackenzie River. The town of Fort Nelson and the Fort Nelson Indian Band draw their water supply from the Muskwa River. The community at Prophet River and the Indian Band draw water from Adsett Creek, and the community of Toad River draws its water from the Toad River.

In total, in the Fort Nelson TSA, there are 20 domestic water source intakes, or points of diversion (POD). Each POD has been given a buffer width of 100 metres, within which no harvest is planned, to recognize the special consideration to maintain water resources. The PODs affect a total area of 48 hectares, of which 36 hectares lie in the Crown forested land base, and for which a net exclusion of 16 hectares was applied in the analysis.

No community watersheds have been designated under the Forest Practices Code within the Fort Nelson TSA, and none were modelled in the analysis.

I am satisfied from the land base reductions applied in the base case that the modelling has accounted appropriately for the identified domestic water source intakes.

- *identified wildlife*

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

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

The Fort Nelson TSA provides habitat for a significant wildlife presence. At the time of preparing the data package for the 2005 analysis, these included:

Twelve endangered or threatened (red-listed) species:

> Wood Bison, Eastern Pine Elfin, Cisco, Arctic Cisco, Bay-breasted Warbler, Cape May Warbler, Plains Forktail, Emerald Shiner, Spottail Shiner, Connecticut Warbler, Hotwater Physa, and Ninespine Stickleback,

and twenty-five vulnerable (blue-listed) species:

> American Bittern, Broad-winged Hawk, Black-throated Green Warbler, Red-disked Alpine, Beringian Alpine, Sandhill Crane, Wolverine, luscus subspecies, Goldeye, Bronze Copper, Fisher, Surf Scoter, Northern Long-eared Myotis, Rosov's Arctic, Polixenes Arctic (yukonensis subspecies), Thicklip Rams-horn, Cranberry Blue, Crestless Column, Checkered Skipper, Caribou (boreal population), Caribou (northern mountain population), Bull Trout, Kennedy's Emerald, Inconnu, Grizzly Bear, and Canada Warbler.

In the northeastern portion of the TSA, where most timber harvesting operations are located to date, Identified Wildlife species currently include Caribou, Wolverine, Grizzly Bear, and Short-eared Owl. In this area the BC Ministry of Environment (MoE) is currently addressing Northern and Boreal Caribou in partnership with the licensee Canfor.

The MoE has also prepared a draft list of Regionally Important Wildlife (RIW) for the Peace Region, which includes: Arctic Grayling, Lake Trout, Walleye, Mountain Goat, Stone's Sheep, Trumpeter Swan, Northern Goshawk, and the American Bittern. I note that the species on this list have not been legally established as RIW and the MoE is currently refining the criteria used to identify a species as regionally important.

Procedures are underway to develop ungulate winter range in the TSA; in December 2004 the MoE identified attributes defining ungulate winter range characteristics for Rocky Mountain Elk, Mountain Goat, Stone's Sheep, Boreal Caribou, Northern Caribou and Moose, under Section 7 of the Forest Planning and Practices Regulation.

I am aware that the MoE's species of priority for developing ungulate winter range are: Stone's Sheep, Elk, Mountain Goat, Wood Bison, Moose, and Mule Deer. Additional species of priority for implementing the IWMS are: Northern and Boreal Caribou, Bull Trout, Fisher, Wolverine, Sandhill Crane, Bay-Breasted Warbler, Cape May Warbler, Connecticut Warbler, Black-Throated Green Warbler, Nelson's Sharp-Tailed Sparrow, Grizzly Bear, and Short-Eared Owl.

No WHAs have yet been established in the Fort Nelson TSA. However, where Identified Wildlife have been sighted on areas planned for operations, licensees currently manage in consistency with *Managing Identified Wildlife: Procedures and Measures, Volume 2* (May 3, 2004).

General Wildlife Measures have been established in Version 2 of the Identified Wildlife Management Strategy (May 3, 2004) for the following Identified Wildlife in the TSA: Short-Eared Owl, Boreal Caribou, Grizzly Bear, Northern Caribou and Wolverine.

The caribou populations found within the Fort Nelson TSA are currently listed federally as either Vulnerable, or Not at Risk. Areas of Caribou winter habitat have been identified in the western portion of the TSA, but no management plans or strategies have yet been developed: these will be developed when plans are complete for endangered and threatened populations elsewhere in the province.

Recovery strategies are also being developed for specific Boreal Caribou populations in the central and eastern portions of the district, but these strategies are not expected to affect future timber supplies. Since forest management practices for Caribou winter habitat have not yet been formally established in the TSA, no specific related reductions to the THLB or forest cover requirements were applied in the analysis. The Ungulate Winter Range attributes and General Wildlife Measures were approved by the Ministry of Environment (formerly MWLAP) for Boreal and Northern caribou in 2004.

Having reviewed this information in detail with regional and district staff, I conclude as follows.

It is clear from

(a) the numbers of red- and blue-listed species and of approved or proposed Identified Wildlife in the TSA,
(b) the fact that procedures are already underway to develop ungulate winter range in the TSA,
(c) the fact that the characteristics for identifying areas of ungulate winter range have already been identified,
(d) the fact that General Wildlife Measures are already identified for species present in the TSA, and
(e) the fact that licensees are already managing to address observed Identified Wildlife operationally,

that managing for Identified Wildlife in this TSA can be expected to constrain the projected timber supply to the full extent of the one percent impact currently assigned to meeting this objective. Given the operational flexibility in this TSA afforded by the very extensive areas of Crown forest outside the THLB, at this time I do not anticipate the impact to exceed this level.

The timber supply implications of managing for approved or proposed Identified Wildlife and species at risk were not modelled in the base case. In my determination I have therefore accounted for a one-percent overestimation in the harvest level projected in the base case, as discussed further in '**Reasons for Decision**.'

I understand that some changes, of which I do not have details, have been made to the species lists since completion of the information in the data package. From general discussion with staff, I do not anticipate that these changes will significantly affect the applicability of my conclusion.

I also understand that work by MoE and the licensee to identify Caribou habitat is already advanced. As I have noted below, in '**Implementation**,' I urge BCFS district staff to collaborate with other agencies and licensees as required to spatially identify the necessary Wildlife Habitat Areas and Ungulate Winter Range areas, as early as possible, in order that these may be modelled appropriately in the next timber supply analysis.

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

Other information

- *First Nations considerations*

Eight First Nations are resident in or have traditional territory within the Fort Nelson TSA. Four of the First Nations—the Fort Nelson First Nation, the Dene Tsaa Tse K'Nai (Prophet River) First Nation, the Dena Tha' First Nation, and the Halfway River First Nation—are signatories to Treaty 8, which covers the TSA.

The Kaska Dena First Nations—the Daylu Dena (Lower Post) First Nation, the Dease River First Nation, the Tahltan First Nation, and the Fort Liard First Nation—all have traditional territory in the TSA. The MoFR has no legal duty of consultation with the Fort Liard First Nation which is part of Treaty 11 in the Northwest Territories, since the boundary for this treaty is the provincial boundary. The Lower Post First Nation is currently not a signatory to any treaty process. I am aware that the Kaska Council, Liard First Nation and Ross River Dena Council are negotiating together at the Kaska Nation table. The Kaska Dena are currently in stage 4 Agreement–in–Principle stage of the B.C. treaty process.

The history of consultation with First Nations in the matter of this determination is as follows.

On February 1, 2004, the DFAM Group wrote to three of the four Treaty 8 First Nations, the Fort Nelson First Nation, the Dena Tha' First Nation and the Prophet River First Nation, as well as the Fort Liard First Nation, the Lower Post First Nation, and the Kaska Dena Council, describing the purpose of the timber supply review, detailing the participants involved in the process, offering to meet for discussion, and inviting the First Nations to participate by reviewing the data package and providing any comments by mail, fax or email. A copy of the *DFAM Timber Supply Review Technical Information Sheet* (April 8, 2003) was also provided to each group, and a web link was provided to the data package.

On March 17, 2004, the licensee Canfor made a presentation on the data package to the Daylu Dena at Lower Post, with representatives from MoFR's Fort Nelson District, but no questions were asked about the data package.

On November 16, 2005, the DFAM Group offered to discuss the analysis report with the Fort Nelson First Nation, a signatory to Treaty 8.

On November 18, 2005, the DFAM Group sent more information letters, with the analysis report and an invitation to an Open House, to all of the Treaty 8 First Nations—the Halfway River First Nation, Dene Tha' First Nation, the Prophet River First Nation, and the Fort Nelson First Nation, as well as the Kaska Dena Council, the Daylu Dena Council and the Fort Liard First Nation.

The analysis report was available for review and comments by the public and First Nations for the 60-day period of November 17, 2005 to January 16, 2006.

On November 22, 2005, the DFAM Group met and offered to discuss the analysis report with the Prophet River First Nation, and were advised that the First Nation would contact the DFAM Group if any comments were forthcoming.

On December 12, 2005, the DFAM Group offered to discuss the process with the Fort Liard First Nation and invited comments on the analysis report. The opportunity was declined.

On December 14, 2005, the DFAM Group discussed the analysis report with the Kaska Dena Council, who requested a specific sensitivity analysis to ascertain a sustainable harvest level for their stated traditional territory. This analysis was carried out, and was discussed between the DFAM Group and the Kaska Dena at a meeting on January 10, 2006. Kaska Dena representatives indicated they would comment directly to the MoFR. I received related correspondence from the Kaska Dena on February 28, 2006, regarding their wish to obtain a licence to harvest 450 000 to 500 000 cubic metres of timber for processing mostly in Watson Lake, and also in Fort Nelson, from the 967 000 cubic metres which the DFAM Group's analysis had shown could be available from their traditional territory. A further letter was sent to MoFR's Regional Executive Director, from the Kaska Dena, on May 4, 2006, after my April 19-20, 2006 AAC determination meeting in Fort Nelson, requesting a Forest Licence.

I have acknowledged the Kaska Dena's request to obtain harvestable timber volume under a Forest Licence, but I am unable to address directly, in my considerations under Section 8 of the *Forest Act*, any request that pertains to apportionment of timber volumes. Under BC statutes this is a matter for consideration and decision by the Minister of Forests and Range. I am aware that Tsa Cho Timber Limited, a Kaska Nation company, currently holds a non-replaceable forest license of 18,000 cubic metres per year. The Lower Post First Nation have also held 3 small scale salvage permits although no harvesting has occurred to date.

On December 18, 2005, another copy of the analysis report was delivered to the Fort Nelson First Nation, with an offer to provide more information.

On January 17, 2006, a letter was sent from MoFR to all First Nations in the TSA, explaining the current status of the timber supply review and offering to meet to discuss any concerns or impacts.

On January 25, 2006, the DFAM group met again with the Prophet River First Nation, a signatory to Treaty 8, to ask whether they had any concerns. Prophet River First Nation representatives indicated they would comment directly to the MoFR but no comments have been received to date.

On February 7, 2006, MoFR received a letter from the Fort Nelson First Nation inquiring how their Treaty 8 rights had been accommodated. This was responded to by MoFR on February 16, 2006, with an explanation of the timber supply review process and a request for input from the Fort Nelson First Nation on practices with respect to treaty rights, with an offer to meet. No response was received.

On March 1, 2006, a letter was received from the Deputy Chief of the Treaty 8 Tribal Association expressing concerns that Treaty 8 First Nations had had no meaningful involvement in the AAC determination process and that the timber supply analysis report did not address the protection of Treaty 8 rights or the cumulative impacts from forestry, oil and gas, mining, and other developments. I am advised that MoFR district staff tried to meet with the Treaty 8 Tribal Council during the week prior to my AAC determination in Fort Nelson and that representatives from the Council were unavailable. On April 20, 2006, a letter was received from the Chief of the Fort Nelson First Nation expressing concerns over the limited opportunity for consultation with government as distinct from industry, and the cumulative impacts of industrial forestry, road building, and oil and gas activities on First Nations Treaty rights. The letter included requests for

related information, and for a meeting with the chief forester. Over the next two months, several attempts by MoFR Northern Interior Forest Region staff to arrange for me to meet with the Fort Nelson First Nation proved unsuccessful. Then effective July 11, 2006, the Fort Nelson First Nations Chief and Council resigned, leading to an election of a new chief and council.

Following the elections, at my request, the MoFR Aboriginal Affairs Manager of the Northern Interior Forest Region communicated my willingness to meet with the Fort Nelson and Prophet River First Nations on September 20, 2006, prior to concluding my determination. However, the First Nations were unable to attend this meeting.

I am aware of my obligations to determine the AAC once every five years and consider it necessary and appropriate that I conclude this determination in a timely fashion. By direct correspondence I have reiterated my continued willingness to meet with the Fort Nelson First Nation, if necessary after the AAC is released, to discuss any broader issues the First Nation may identify in relation to forest stewardship and the timber supply review process.

I am aware that the division of responsibilities for providing information to and consulting with First Nations during the timber supply review process for the Fort Nelson TSA involved both DFAM licensees and representatives of the MoFR. Although the processes of information sharing and consultation were not always completely integrated, many reasonable efforts were made to provide information to First Nations and to consult with them to incorporate any concerns about the analysis and about matters directly related to this AAC determination.

Clearly some issues remain outstanding respecting the disposition of the benefits from the harvesting of the volume of timber determined, under this AAC, to be suitable and available for harvest on the land base of the TSA. These issues, which are beyond my mandate for consideration in AAC determinations under Section 8 of the *Forest Act*, are matters for consideration by government and First Nations, since they concern their respective interests in the resolution of differences in interpreting the terms and conditions of Treaty 8. As noted in '**Guiding Principles**', my AAC determination does not imply any particular pattern of activity on the ground, and I understand that licensees are taking information from the traditional use studies into account in their planning operations. As I noted earlier, in *cultural heritage resources*, I am satisfied that with licensees' cooperation, any emerging occurrences of these resources can be managed operationally. At this time, therefore, I find no reason to question the reliability of the base case projection with respect to consideration of the First Nations' interests which I am authorised to consider in this determination.

- harvest sequencing

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

In the 2005 analysis base case projection, the 'relative oldest first' rule was applied, whereby stands with the greatest number of years above their minimum harvestable age were assumed to be harvested first. However, because harvesting the oldest stands first may not always reflect operational practice, a sensitivity analysis was conducted to show the impact on timber supply if 'random harvest' rules were applied—i.e. the random harvest of any stand above the minimum harvestable age—instead of the relative oldest first. This analysis showed no change in the base case forecast, indicating that the timber supply is not critically dependent upon the ages of the stands harvested in practice. I am therefore satisfied that the harvest scheduling assumption used in the base case is an adequate reflection of average operational practice over time.

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

Alternative harvest flows

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

In addition to the base case harvest projection for the Fort Nelson TSA, described earlier, two alternative harvest flows were provided that also resulted in a stable long-term harvest level.

In the first alternative forecast, the initial harvest level was increased to 3 904 000 cubic metres per year, 23 percent above the base case. This level could be maintained for 55 years, after which the harvest declined by 10 percent per decade to a sustainable, long-term harvest of 3 162 000 cubic metres, reached 75 years from now. In this scenario, almost 50 million cubic metres more would be harvested over the first 75 years than under the base case forecast.

In the second alternative forecast, the initial harvest level was increased to 3 941 000 cubic metres per year, 24.6 percent above the base case, for the first 60 years, followed by a decline of 10 percent per decade to a sustainable, long-term harvest of 3 161 000 cubic metres per year, reached 85 years from now. In this scenario, almost 60 million cubic metres more would be harvested over the first 85 years than under the base case forecast.

In reviewing these alternative harvest forecasts, I note that both forecasts show that existing stands could be harvested more rapidly in the short and medium terms than indicated in the base case, while still achieving the same long-term harvest level and avoiding future timber supply disruptions. However, both forecasts also incur significant, progressive reductions in the mid term. If a large infrastructure of processing plants and associated services and communities had been built by that time to support the achievement of the elevated harvest, these reductions would most probably result in significant social dislocations in a ‘boom-and-bust’ scenario. Choosing an even-flow forecast for the base case avoids this outcome, and is much more consistent with providing a predictable level of economic stability.

Many other complex considerations bear on the choice of a suitable base case forecast. For instance, the currently somewhat uncertain rates of natural disturbance in the forest outside the THLB have a considerable influence on the sustainable long-term level, which is integral to defining the even-flow level itself. The combination of the deciduous and coniferous components into one base case may not fully disclose a ‘pinch-point’ where one or the other component may run into an adjacency or other constraint that could limit the practical attainability of an elevated harvest. The significantly elevated harvest rates illustrated in the two alternative forecasts imply greatly increased rates of development across previously undisturbed landscapes and habitats; this could rapidly reduce the current level of flexibility in managing biodiversity while some of the retained areas and constraints necessary for managing wildlife are still being defined.

Harvesting the TSA to capacity now could also preclude needed flexibility for increasing the harvest rate in the future, in response to a potential beetle infestation, if monitoring were to

indicate a possibility of a migration when the more southerly stands in the province are largely consumed. Currently, the large amounts of pine that remain in the TSA represent a potential opportunity that may become more valuable in future when healthy pine stands to the south are scarce; their inclusion in an elevated harvest today—if they were in demand, which they currently are not—could simply add to an already large oversupply in the province. The associated need to continue to monitor forest health issues and impacts in this TSA, not just in pine but in all species, for consideration in future determinations, is sufficiently compelling that I have included a recommendation to this effect in '**Implementation**' below.

In making my AAC determination I have considered the implications of both of the alternative forecasts described above, as well as those of the base case forecast and the many sensitivity analyses provided in the analysis report. As noted earlier, in Base case for the Fort Nelson TSA, I am satisfied that the base case projection provides an acceptable basis of reference for my considerations in this determination.

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

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

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

Minister's letter

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

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

The Minister's letter also highlights the severity of the current mountain pine beetle infestation and makes reference to government's related objectives as contained in B.C.'s Mountain Pine Beetle Action Plan. The letter also asks the chief forester to examine factors that affect demand for beetle-killed timber and products manufactured from it, the time period over which it is utilized, and ways to maintain or enhance the mid-term timber supply.

In respect of these objectives, I have noted previously that while the mountain pine beetle is currently causing widespread damage and forest health problems further south, it is not known to exist in significantly damaging populations in this TSA at this time. However, I am aware that substantial beetle-related increases in harvest levels in some TSAs to the south are of current significance in this TSA, as the increased harvests and additional milling capacity negatively affects the economics of harvesting and milling dimension lumber in the Fort Nelson TSA. I have also considered that the large volume of pine that exists in the TSA represents a potential

opportunity that may become more valuable in future when the growing stock of pine to the south is reduced as a result of the beetle infestation.

The Minister's letter also identifies the changes and transition in the coastal forest industry and requests consideration of the nature of the timber supply that can contribute to a sustainable coast forest industry while reflecting decisions in land and resource management plans. While these objectives are not directly applicable to this TSA, I note that the conservation of long-term forest values identified in land-use plans, are addressed in respect of the Fort Nelson LRMP in many of the considerations documented in this rationale document.

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

Local objectives

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

I note that during the timber supply review process, the DFAM licensee group was responsible for making the data package and the timber supply analysis available to the public and First Nations during two 60-day review periods. The review period was completed for the data package on March 31, 2004 and that for the analysis report on January 16, 2006.

I have discussed the communications with First Nations inviting their input and the input submitted by First Nations earlier, in First Nations' Considerations.

For the general public, advertisements were placed in the *Fort Nelson News* on Wednesday February 4, 2004, and on Wednesday February 11, 2004, giving notice that the data package was available for public review and comment, and on November 16, November 23, and November 30, 2005, giving notice that the analysis report was available for public review and comment. The latter included notice of a public open house to be held on December 6, 2005.

Further advertisements were placed on December 7 and 14, 2005, including notice of another open house held in the Fort Nelson Recreation Centre on December 17, 2005. The mayor and town council of Fort Nelson were notified of the analysis and the public review period by letter on November 18, 2005. A website was set up to provide up-to-date information on the timber supply review process for the Fort Nelson TSA, and both the data package and analysis report were available for downloading from the DFAM website.

One well-informed submission raised three general areas of concern (among others that did not pertain directly to the AAC determination process per se) that I have paraphrased and addressed as follows.

1) *Difficulties related to the physical and economic operability and to the utilization of low-grade timber and of timber in the western area of the TSA—including distance to markets—may not be fully recognized in the analysis.* I have noted my own concern in this regard, and my related discussion is documented in *mature and immature stands of unproven merchantability* and in *uncertainty in harvesting in the Fort Nelson West*.

2) *There is a need for better forest policy and management practices in dealing with unsalvaged losses due to spruce budworm and fire*. In '**Implementation**', below, I have noted the need for better estimates of these losses for incorporation in future analyses. In a related matter, this

submission noted difficulties in obtaining reliable volumes for small-scale salvage operations; I have attempted to address this issue in my determination as noted in '**Reasons for Decision**.'

3) *Mixed-wood stands disturbed naturally or by harvesting regenerate differently in respect of the timing of deciduous and coniferous succession. Mixed-wood stands may be harvested prior to the realization of the coniferous volume component*. Typically in this TSA, after harvesting in mixed-wood stands, the deciduous components are naturally regenerated and the coniferous components are planted to ensure a rapid regeneration of conifers. However, I do acknowledge limitations in the data available on the growth dynamics of mixed-wood stands.

One submission asserted the belief in a 'positive, economic and social long-term demand for smaller forest licences in the Fort Nelson District' and in the ability of small operations to utilise 'the district's timber profile'. While Section 8 of the *Forest Act* does not provide for me to address matters related to licensing, in my determination I have accounted for the timber supply aspects of this information as discussed in '**Reasons for Decision**.'

Another submission addressed historical licensing matters that are not within my mandate to consider under Section 8. This submission was also addressed to the Minister of Forests and Range, the appropriate authority for considering the matters submitted.

In respect of an overall statement of local objectives for the use of land and resources in the Fort Nelson TSA, this is provided in the government-approved 1997 Fort Nelson LRMP, which guides the planning and practices in the TSA. In the Muskwa-Kechika Management Area, the *Muskwa-Kechika Management Area Act* and the Muskwa-Kechika Management Plan Regulation provide direction for local management, planning and practices. To the extent of my knowledge, the current forest management planning and practices in the TSA, the assumptions in the data package, the methodologies applied in the analysis, and my considerations and reasoning in this determination, are all consistent with the objectives and requirements of these plans.

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

Unsalvaged losses

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

In the Fort Nelson TSA, the gross volumes in cubic metres lost annually to insects and disease were estimated by the DFAM Group to be 52 852 to Spruce Budworm, 346 to Spruce Beetle, and 112 520 to fire, for a total of 165 718 cubic metres per year.

Of this total, the amounts estimated to be salvaged were 1190 cubic metres from the Spruce Budworm and Spruce Beetle losses combined, and 58 173 cubic metres from the fire losses, for a total annual salvaged volume of 59 363 cubic metres. This leaves estimated annual unsalvaged losses of 52 008 cubic metres to the beetle and budworm, and 54 347 cubic metres to fire, for a total annual unsalvaged loss in the TSA of 106 355 cubic metres. This is comparable to loss levels in other TSAs.

Since the figures derived by the DFAM Group and used in the analysis are the best currently available information, and since they do lead to a reasonable conclusion, I will rely on them for this determination. However, two notable anomalies are present. The figures include a significant increase of 21 309 cubic metres per year in the gross losses to Spruce Budworm, over those considered in the 2000 analysis, at a time when the budworm population has been and continues to be in a very marked decline, and the assumed net losses to fire are almost identical to those in the previous analysis, although the THLB has since increased by 55 percent.

These figures suggest the budworm losses may be overstated, and the fire losses understated, which would minimise any overall net discrepancy between them and provide for an apparently reasonable result. However, the figures also suggest there may be potentially significant accuracy problems in the derivation of some aspects of the loss-related information. I understand that the licensee Canfor provided salvage data in its operating area for the period from 1990 to 2003 and that the data showed for this period a yearly average of 595 cubic metres salvaged from damage by insects and disease. Since no salvage data were provided by BC Timber Sales, the DFAM group analysts then assigned similar salvage totals to those provided by Canfor, for a total annual salvaged volume in the TSA for damage from insects and disease of 1190 cubic metres per year. This is a reasonable assumption under the circumstances, but in view of the need to maintain a valid, current perspective on forest health, I have noted in '**Implementation**' a recommendation that MoFR staff work with licensees to obtain updated information on unsalvaged losses, to provide more reliable information for use in the next analysis and AAC determination.

Reasons for Decision

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

The DFAM licensee group found in its 2005 timber supply analysis for the TSA that all specified harvest flow objectives could be met in a base case forecast with an initial harvest rate set at 3 163 000 cubic metres per year and maintained indefinitely with a stabilized growing stock projected for 550 years. This projected even-flow harvest rate consisted of an average annual harvest of 1 719 500 cubic metres from coniferous species and 1 443 500 cubic metres from deciduous species, including minor components in mixed stands. The proportions of deciduous and coniferous species comprising the harvest varied significantly year by year, and in the base case, deciduous species, being already generally older than their minimum harvestable ages, supplied most of the harvest for the first 35 years.

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

In my considerations, the following factors have been identified as reasons why the actual timber supply may have been overestimated in the base case to degrees that may be quantified with reasonable reliability. Sensitivity analysis shows that, considered individually, some of the listed land-base changes could be small enough to be absorbed negligibly into the robustness of the short-term timber supply, thus affecting the longer-term only. However, when the aggregate timber supply implications of the several significantly constraining factors are considered in combination, the need for a more direct accounting throughout the forecast period is indicated.

- *Stands predominated by black spruce*: Due to being based on inventory information developed prior to VRI refinements, the land base exclusion for black-spruce-leading stands was underestimated by 24 000 hectares, or about 1.7 percent of the THLB.
- *Mature and immature stands of unproven merchantability:*
  - *balsam fir:* The DFAM Group's depletion data indicate that forests predominated by balsam fir are not harvested. Their inclusion in the THLB used in the analysis indicates a potential overestimation of 0.5 percent in the base case forecast.
  - *cottonwood*: The DFAM Group's depletion data show that the inclusion of cottonwood-leading stands in the THLB for the analysis does not represent current operational practice. This has introduced a likely overestimation of about 3 percent in the base case forecast.
  - *aspen*: Depletion and harvest-billing data show that the contribution to the base case by aspen stands was overestimated in the analysis by 300 000 hectares or about 50 percent of their aggregate contribution to the THLB. Aspen stands form 40 percent of the THLB and essentially all of the deciduous THLB. Over the 250-year forecast period, the average projected harvest from deciduous species is 1 443 500 cubic metres per year. Since the 300 000 hectares of aspen THLB being removed from the THLB are of lower productivity than the 275 000 hectares of aspen remaining, the removal of 50 percent of the aspen stands reduces the achievable average deciduous harvest by a little less than half, or by about 600 000 cubic metres per year, indicating an overestimation in the base case forecast harvest level of about 19 percent.
- *Oil- and gas-related activities*: While seismic lines, pipelines and transmission lines were accounted for in the analysis, areas disturbed for well sites and their access roads were not. Oil and gas development is likely to continue or increase in the foreseeable future, indicating an ongoing associated overestimation of 0.3 percent in the base case forecast.
- *The Fort Nelson West*: In the analysis, it was assumed that the Fort Nelson West would provide 25.8 percent of the total THLB area in the TSA. The extent to which this area can contribute to the timber supply in the TSA in practice is subject to considerable uncertainty, due to its remoteness, the nature of many of the forest stands it contains, and the consequent questionable economic viability of developing and harvesting the area. For the reasons discussed in my considerations, I have concluded that, until viable plans are produced demonstrating the economic operability of the stands in the Fort Nelson West, it is not reasonable to expect the majority, or even any of these stands, to contribute to the timber supply. The inclusion of the entirety of the Fort Nelson West has induced an overestimation of 23 percent of the THLB for the TSA, net of overlaps for overestimations accounted for in *mature and immature stands of unproven merchantability*.
- *Stocking class error:* During the roll-over of the FCI inventory to the VRI format, a software problem caused the stocking class for some areas to be projected incorrectly. Consequently, in the 2005 analysis, a total of 28 183 hectares were projected with the wrong stocking class, producing a one percent overestimation in the base case forecast.
- *Identified Wildlife Management Strategy*: The timber supply implications of managing for approved or proposed Identified Wildlife and species at risk were not modelled in the base case. From my considerations it is clear that managing for Identified Wildlife in this TSA can be expected to constrain the projected timber supply to the full extent of the one percent impact currently assigned to meeting this objective.

- *Pine stands on the east side of the TSA:* Pine stands are not currently harvested in the TSA. When the pine on the eastern side of the TSA is considered separately from the pine stands already accounted for in the exclusion of the Fort Nelson West area, the overestimation attributable to the inclusion of east-side pine stands in the base case is 6.5 percent of the harvest volume.

The following factor has been identified as a reason why the actual timber supply may have been overestimated in the base case to a degree that currently cannot be quantified:

- *volume estimates for existing unmanaged stands*: Anecdotal evidence suggests the possibility of an overestimation in the projected timber supply due to uncertainty in the volume estimates for existing unmanaged stands. While sensitivity analysis shows relatively low sensitivity to this factor specifically, its effect in combination with the other identified overestimations is unknown and is not necessarily zero.

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

- *Interior log grade changes*: New log grades implemented for the BC Interior now require that I account for harvested volumes of 'dead potential' timber (formerly known as grade 3 endemic and grade 5 logs) which commenced being charged to AACs in British Columbia on April 1, 2006. Noting the uncertainties and complexities in any assessment of the appropriate figure to place on this commodity, I have decided to apply an adjustment of 4.8 percent of the green volume determined to be harvestable under the new AAC, as an underestimation of the actual wood volumes available for the duration of this AAC.
- *Natural disturbance in the non-timber-harvesting land base*: The rates of natural disturbance assumed in the analysis for areas outside the THLB exceed what may reasonably be expected, such that in the longer term, lower amounts of old growth will be required to be retained on the THLB than were assumed in the base case. This implies a currently unquantifiable underestimation in the base case harvest level.

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

The potential over- and underestimations associated respectively with the uncertainties in (a) the volume estimates for existing unmanaged stands and (b) the natural disturbance pattern outside the THLB, are currently unquantifiable. They are mutually offsetting, but to an unknown extent. When these two factors are considered in relation to the several already quantified, very substantial overestimations I have also identified, in my judgement it is reasonable to assume the implications of these two factors may be set against each other and discounted without introducing significant further uncertainty in the overall dynamics of the timber supply in the TSA.

In summing the remaining, quantified overestimations, related to black spruce-leading stands, balsam fir, cottonwood, aspen, oil and gas activities, Fort Nelson West, the stocking class error, identified wildlife, and east-side pine, I have confirmed with MoFR analysts that the combined related total overestimation in the timber supply amounts to approximately 55 percent of the harvest level indicated in the base case projection. With this overestimation accounted for, the timber supply actually available in the TSA therefore amounts to about 45 percent of the level projected in the base case, which approximates the current AAC of 1.5 million cubic metres for the TSA. From this it may be seen that my considerations and reasoning to this point have confirmed that, when current harvesting practices and performance in the various timber types in this TSA are accounted for, together with a realistic

appraisal of the prospective economic operability of stands in the Fort Nelson West based on current indicators, the current AAC of 1.5 million cubic metres for the TSA remains a close reflection of the harvestable volume in the TSA.

This is corroborated on the one hand by harvest billing figures which show that from 2000 to 2004 the average volume of timber actually harvested annually in the TSA was 1.36 million cubic metres, and in 2004 the figure was 1.44 million cubic metres, up from 1.39 million cubic metres in 2003, while on the other hand, a major sawmill in Fort Nelson has recently closed, suggesting there is no great demand at this time for the additional processing of at least some components of the current harvest.

As noted earlier, in determining this AAC I must add, to the allowable harvest of 'green' volume, the volumes of the 'dead potential' component, previously considered grade 3 endemic and grade 5 logs, expected to be present in harvested stands. Since I have determined this volume to be approximately 4.8 percent of the green volume, the total harvestable volume under the new AAC, to this point in my considerations, will be in the order of the old AAC of 1 500 000 cubic metres increased by a factor of 1.048, or about 1 572 000 cubic metres.

To this volume I will add a further 50 000 cubic metres in recognition of the need to provide a reliable volume for small scale salvage operations in the TSA, and for other small operations which are claimed to be able to utilise the profile of the timber supply, and also to accommodate the charging of incidental volumes related to harvesting in connection with oil and gas operations or transmission lines. The AAC for the TSA for the next five years will therefore be 1 622 000 cubic metres, which I will round to 1 625 000 cubic metres.

In my judgement, an AAC at this level provides a more practically realizable representation of the timber supply available in the TSA under current conditions than does the higher level investigated in the base case projection, when the noted very considerable uncertainties—in the economic readiness for harvest of aspen stands on lower productivity sites on the east side, pine stands on the east side, and the whole land base of the west side of the TSA—are appropriately accounted for in recognition of the lack of harvest performance in these stands. A harvest level in this range is also more appropriate for the current phase of development in the TSA when landscape unit objectives are still to be established; a lower harvest rate will allow more time and flexibility to better locate and secure areas of habitat in the TSA that are most valuable and suitable for WHAs and for General Wildlife Measures and OGMAs, to ensure optimal, lasting benefits for the abundant and identified wildlife.

At the same time, my accounting in this way for the very large uncertainties identified in my considerations does not mean I have concluded that these stands or these portions of the land base may never be expected to contribute to the timber supply. On the contrary, the areas in question in fact represent a potential opportunity of no small significance, pending appropriate economic conditions and market demands. As the base case analysis has shown, at the right time and under the right conditions, these large areas of the TSA, which contain considerable amounts of fibre, could readily support additional socio-economic activity in consistency with responsible achievement of biodiversity objectives. For instance, some of the pine now remaining in the TSA may represent a potential opportunity that could greatly increase in value at some point in the fairly near future when healthy mature pine stands have become more scarce further south. If studies can be completed to show a sustainable economic viability for significant volumes in particular stands in this TSA, in relation to their delivered wood costs, these studies should be presented to the district manager for consideration and potential validation. If such findings are realized and validated before the next statutorily required determination of the AAC for this TSA, I will be prepared to re-visit this determination before the completion of the statutory period.

At this time, having reviewed the respective deciduous and coniferous volumes projected to be available for harvest in relation to the currently harvested volumes of these components, and noting that the billed deciduous and coniferous volumes are mixed, such that some deciduous volumes may come from coniferous-leading stands, and some coniferous volumes may come from deciduous-leading stands, the partition defining the harvestable volume attributable to deciduous-leading stands is no longer suited to the current billing system. I therefore do not see any utility in continuing to specify the harvestable volume attributable to each component, and the quantified partition between them is therefore discontinued.

In conclusion, I would like acknowledge the Fort Nelson DFAM group for preparing the timber supply analysis used in support of this determination. The base case and alternative flow projections, as well as the sensitivity analyses, provided much helpful information for assessing the potential implications of uncertainties.

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

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties in the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, and that includes the adjustment in respect of the change in accounting for interior log grades, can be best achieved in the TSA by establishing an AAC of 1 625 000 cubic metres. The partition specifying separate harvest volumes attributable to deciduous-leading and to coniferous-leading stands is discontinued.

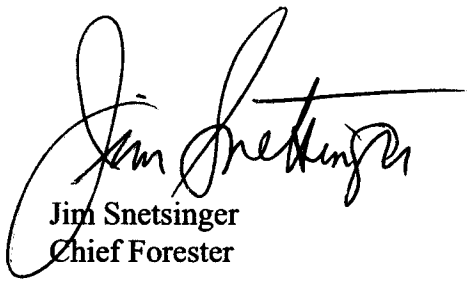
This determination is effective November 10, 2006 and will remain in effect until a new AAC is determined, which must take place within five years of the effective date of this determination.

Implementation

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

1. BCFS district staff and licensees should take formal action to address the discrepancy between the volume estimates for existing natural stands as derived from the inventory and the actual volumes realized in harvesting operations.
2. BCFS regional and district staff, and licensees, should collaboratively examine the degree of consistency between the disturbance of stands in the non-harvesting land base as modelled in the base case, and as derived from the Natural Disturbance Unit definition, respecting the true provisions necessary to meet old forest retention requirements.
3. BCFS district staff and licensees should review and monitor the implementation and application of Wildlife Tree Patches to ensure consistency between operational practices and the assumptions incorporated in the next timber supply analysis.

4. I encourage BCFS district staff, other agencies—particularly the BC Ministry of Environment—and licensees to work collaboratively to identify Wildlife Habitat Areas and Ungulate Winter Ranges spatially, to provide for a more accurate representation in the next timber supply analysis.
5. BCFS district staff and licensees should continue to monitor forest health issues and impacts, in all species, for consideration in future timber supply analyses and AAC determinations.
6. BCFS district staff and licensees should produce better estimates of Non-Recoverable Losses for use in the next timber supply analysis and AAC determination.
7. BCFS district staff and licensees should monitor harvesting performance across all profiles to better refine the potential contributions from all species to the timber supply in the TSA.



Jim Snetsinger
Chief Forester

November 9, 2006

Appendix 1: Section 8 of the *Forest Act*

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

Allowable annual cut

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

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (2) or (3),

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

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(3.1) If, in respect of the allowable annual cut for a timber supply area or tree farm licence area, the chief forester considers that the allowable annual cut that was determined under subsection (1) is not likely to be changed significantly with a new determination, then, despite subsections (1) to (3), the chief forester

(a) by written order may postpone the next determination under subsection (1) to a date that is up to 10 years after the date of the relevant last determination, and

(b) must give written reasons for the postponement.

(3.2) If the chief forester, having made an order under subsection (3.1), considers that because of changed circumstances the allowable annual cut that was determined under subsection (1) for a timber supply area or tree farm licence area is likely to be changed significantly with a new determination, he or she

(a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and

(b) must give written reasons for setting the earlier date.

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area,

(c) [Repealed 1999-10-1.]

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

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

(a) the community forest agreement, and

(b) any directions of the chief forester.

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

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

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

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

(iii) silviculture treatments to be applied to the area,

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

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

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

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

(c) Repealed [2003-31-02]

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

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

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

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

Purposes and functions of ministry

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

(a) encourage maximum productivity of the forest and range resources in British Columbia;
(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;
(d) encourage a vigorous, efficient and world competitive
    i. timber processing industry, and
    ii. ranching sector
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's letter of July 4, 2006

BRITISH COLUMBIA

JUL 0 4 2006

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

Dear Jim:

Re: Economic and Social Objectives of the Crown

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

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

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

Minister of Forests and Range and Minister Responsible for Housing

Office of the Minister

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

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

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

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

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

Sincerely yours,

Rich Coleman
Minister

Appendix 4: List of Submissions Received

Forest Industry
Canadian Forest Products Ltd.
Trans North Timber, Fort Nelson, B.C.
Omineca Enterprises Ltd.
Soles Salvage Ltd.

First Nations
Kaska Dena First Nation
Treaty 8 Tribal Association
Fort Nelson First Nation

Consultants
Geoterra Integrated Resource Systems Ltd.