BRITISH COLUMBIA
MINISTRY OF FORESTS AND RANGE

Kispiox Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective January 1, 2008

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Chief Forester

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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 Kispiox Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Acknowledgement

For preparation of the information I have considered in this determination, I am indebted to staff of the BC Ministry of Forests and Range (MFR) in the Skeena-Stikine Forest District, the Northern Interior Forest Region, and the ministry's Forest Analysis and Inventory Branch. I am also grateful to the Defined Forest Area Management licensee group (the DFAM Group) for the timber supply analysis and to the individuals, companies and First Nations who contributed to the public input stage of the process.

Description of the Kispiox Timber Supply Area

The Kispiox TSA covers approximately 1.22 million hectares in the northwest interior of British Columbia. The TSA is bordered to the north by the Nass and Prince George TSAs, to the west by the Kalum and Cranberry TSA, and to the south and east by the Bulkley TSA. The Kispiox TSA is administered by the MFR Skeena-Stikine Forest District office located in Smithers.

The general topography of the Kispiox TSA consists of mountain ranges with wide intervening river valleys. The TSA surrounds the confluence of the Skeena and Bulkley rivers and the Babine and Kispiox rivers are also major features. To the south, the TSA is bounded by the Rocher Deboule and Seven Sisters ranges, and to the north, by the Sicintine watershed and Kispiox river headwaters. To the west are the Hazelton mountains, and to the east is the North Babine mountain range.

The overall climate in the TSA is transitional across its location between coast and interior ecosystems, with generally cool summers and winters. Portions of six zones of the BC Biogeoclimatic Ecosystem Classification (BEC) system occur in the TSA, which is representative of diverse variations in climate and vegetation with varied ecological features that contribute to high biodiversity values in the TSA.

The six BEC zones in the TSA are as follows. The Interior Cedar-Hemlock (ICH) zone occurs in low to mid elevations in valley bottoms throughout most of the TSA and includes the highest diversity of tree species of any zone in the province. Mature forests in this zone are dominated by western hemlock, subalpine fir, western redcedar, amabilis fir and a spruce hybrid known as Roche spruce. Other species in the zone include lodgepole pine, Engelmann spruce, white spruce, trembling aspen, black cottonwood and birch. In the Sub-Boreal Spruce (SBS) zone, which occurs in the valley bottom of the Babine river in the eastern part of the TSA, the most common tree species are hybrid spruce, subalpine fir, lodgepole pine and trembling aspen. The Engelmann Spruce-Subalpine Fir (ESSF) zone is the uppermost forested zone in most of the Kispiox TSA, occurring above the ICH and SBS zones. At higher elevations this zone is comprised of parkland, and at lower elevations, continuous forests dominated by subalpine fir with components of hybrid spruce and lodgepole pine. The Coastal Western Hemlock (CWH) zone is limited to low-to-mid elevations in the western part of the TSA, with western hemlock, amabilis fir, mountain hemlock, lodgepole pine, trembling aspen and subalpine fir as dominant tree species. The Mountain Hemlock (MH) zone occurs above the CWH zone in the western portion of the TSA, with mountain hemlock and amabilis fir as dominant tree species. The Alpine

Tundra (AT) zone occurs at high elevations above the ESSF and MH zones and is essentially treeless although trees in stunted form do occur at lower elevations. Vegetation in this zone is generally dominated by shrubs, herbs, mosses and lichens, with much of the alpine landscape lacking vegetation altogether, being comprised of rock, ice and snow.

Of the total land base of the Kispiox TSA, 697 736 hectares or 57 percent are considered productive forest land managed by the MFR. Currently, 327 837 hectares or about 47 percent of this forested land base (i.e. 27 percent of the total TSA land base) are considered to be suitable and available for timber harvesting. Commercially harvestable tree species include hemlock, subalpine fir, spruce (Engelmann, white and hybrid), lodgepole pine, western redcedar, amabilis fir and cottonwood.

The diverse forests of the Kispiox TSA are home to an abundance of wildlife species including grizzly bear, moose, mule deer and mountain goat, as well as songbirds, raptors, owls, and many other smaller mammal species. Black bears are common and widespread, and a population of the Kermode colour variant of black bears extends into the western half of the TSA. Many wildlife species are dependent on the mature and old forest ecosystems within the TSA. The Skeena River and its tributaries are a highly productive system for many fish species, providing important spawning habitat and migration routes for chinook, coho, sockeye and pink salmon. Other rivers and lakes in the TSA provide habitat for steelhead, bull trout, Dolly Varden and lake trout.

The BC Ministry of Environment (MOE) Conservation Data Centre (CDC) lists a number of species and ecosystems which are red listed (extirpated, endangered or threatened) or blue listed (of special concern) within the Kispiox TSA. Several of the species are 'Identified Wildlife' under the *Forest and Range Practices Act*.

From the 2001 Census of Canada, the population of the Kispiox TSA is 6,071, a 4-percent decrease from the population figures reported in the 1996 census. Estimates suggest that the population has increased again slightly since 2001. In 2001, 3028 people were identified as living on First Nations reserves in the TSA, a number relatively unchanged from 1996. The District of New Hazelton, with a 2001 population of 750 is the principal commercial, administrative and retail centre for the area. Other smaller communities include Hazelton, South Hazelton, Kitwanga, Cedarvale, Kispiox, Gitsegukla, Gitwangak, Gitanyow, Moricetown, Hagwilget, Glen Vowell, and Gitanmaax.

In sum, the varied forests of the Kispiox TSA provide a broad range of forest land resources, including timber and other forest products such as pine mushrooms, as well as outdoor recreation and tourism amenities, minerals and a variety of fish and wildlife habitats. The scenic mountain landscapes and numerous rivers and lakes provide a variety of opportunities for outdoor recreation, including climbing and mountaineering, hiking, mountain biking, wildlife viewing, rafting, canoeing, cross-country skiing, snowmobiling, dog-sledding and trapping. Hunting and fishing have been popular for many years in this area and these activities have important cultural significance for First Nations. The three primary economic factors in the area are forestry, the public sector, and pensions and other benefits, with additional employment in mining, agriculture and fishing, tourism, and the provision of services. The region is well served by highway and rail links to offshore and North American destinations.

History of the AAC for the Kispiox TSA

In 1981, the AAC for the Kispiox TSA was set at 1 100 000 cubic metres. Effective December 30, 1996, the AAC was determined at 1 092 611 cubic metres; this included an adjustment to account for issued woodlot licences which are administered separately under the *Forest Act*. Effective January 1, 2003, the AAC was determined at 977 000 cubic metres.

Following the 2003 determination of 977 000 cubic metres, owing to the already low volume commitments to licences under the previous AAC, to the persistent presence of large unharvested volumes (the 2002-2007 five-year average actual annual harvest was 253 954 cubic metres), and to the consequently low risk of over-cutting in the TSA, the Minister of Forests and Range did not reapportion the AAC, which currently remains apportioned under the previous (1996) AAC of 1 092 611 cubic metres, with the following licence commitments:

Apportionment	1996 Apportioned Volume (cubic metres per year)	After 2005 reallocation volume (Bill 28)	Current (2007) commitment (cubic metres per year)
Forest Licences Replaceable	788,065	627,970	606,369
Forest Licences Non-Replaceable	30,435	30,435	30,435
Timber Sale Licence	17,034	17,034	0
BCTS Timber Sale License	242,466	242,466	242,466
Forest Service Reserve	11,000	11,000	11,000
Woodlots	3,611	3,611	0
Reallocation volume (Bill 28, 2005) from A16831, reserved for First Nations and small tenures (e.g. Woodlots and Community Forest Agreement)*	-------	160,095	[Unallocated 202,341]
Total	1,092,611	1,092,611	1,092,611

* 1,763 cubic metres of the apportioned reallocation volume are reserved for BC Timber Sales

New AAC determination

Effective January 1, 2008, the new AAC for the Kispiox TSA will be 977 000 cubic metres. This effectively maintains the previous AAC; however, to avoid over-harvesting in the more readily accessible areas, of this total AAC for the TSA, 177 000 cubic metres or roughly 18 percent are partitioned as attributable to harvesting exclusively in 'remote areas' of the TSA as defined by the Skeena-Stikine Forest District Manager. This AAC, which excludes all volumes allocated to woodlot licences, 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

- Timberline Forest Inventory Consultants Ltd. January 2007. *Kispiox Timber Supply Area Timber Supply Review III Timber supply Analysis Data package Version 4.1.* Prepared for Kispiox TSA DFAM Group.
- Timberline Forest Inventory Consultants Ltd. March 2007. *Kispiox Timber Supply Area Timber Supply Review III Timber supply Analysis, Analysis Report Version 5.0.* Prepared for Kispiox TSA DFAM Group.
- Robinson Consulting and Associates Ltd., and Timberline Forest Inventory Consultants Ltd. December 2006. *Kispiox Timber Supply Area Timber Supply Review III Socio-Economic Analysis Version 3.2.*
- Kispiox Timber Supply Review (TSR) 3 Analysis Dataset (kispiox_tsr3.mdb)
- Columbia Wet Belt Group. August, 2005. *Verification of the Interior Hemlock Partition Algorithm, Phase II, Field Verification Study Destructive Sampling.*

- Corstanje, Jacques. April 2004. Harvest Method Mapping Operability for Kispiox TSA. Forest Investment Account Project #2237001.
- Cushon, Geoff. March 2004. *Ecological Research and Timber Supply Analysis in the Bulkley Timber Supply Area, 1999 to 2004.*
- Integrated Land Management Bureau. Kispiox Land and Resource Management Plan – April 1996, amended March 2001.
- Integrated Land Management Bureau. January 2006. *Kispiox LRMP* [Land and Resources Management Plan] *Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife.*
- Mahon, T.; MacHutchon, G.A.; Reid, D.; Morgan, D. and Alan Edie. 2004. *Predictive Habitat Mapping with Grizzly Bear Habitat Suitability Ratings for the Kispiox and Cranberry TSA's.* Draft Report.
- Ministry of Forests and Range. February 1999. *Managing Identified Wildlife: Procedures and Measures. Volume 1*.
- Tika Consulting Services and Kingfisher Forest Sciences Co. 2005. Dothistroma Needle Blight Strategic Plan 2005/2006. FIA Project # 2352010.
- Xsu gwin lik'l'inswx: West Babine Sustainable Resource Management Plan – March 2004
- BC Ministry of Forests, Forest Analysis Branch. 2003. *Modeling Options for Disturbance outside the THLB* (Draft Working Paper). Victoria: Province of British Columbia.
- BC Ministry of Forests and Ministry of Environment, Lands and Parks 2000. *Landscape Unit Planning Guide*. Forest Practices Code of British Columbia. Victoria: Province of British Columbia.
- BC Ministry of Forests. 1999. *Mapping and Assessing Terrain Stability Guidebook 2nd Edition*. Victoria: Province of British Columbia.
- BC Ministry of Forests. 1998. *Northern Interior Region Timber Tenure Administrative Guideline*. Victoria: Province of British Columbia.
- BC Ministry of Forests. 1998. *Procedures for Factoring Visual Resources into Timber Supply Analyses*. Victoria: Province of British Columbia.
- BC Ministry of Forests. 1976. *Metric Diameter Class Decay, Waste and Breakage Factors.* Victoria: Province of British Columbia.
- BC Ministry of Forests and Range 2005. *DFAM Interim Standards for Public and First Nations Review*.
- BC Ministry of Forest and Range 2003. *Ministry of Forests Consultation Guidelines*.
- Letter from the Minister of Forests and Range to the chief forester stating the economic and social objectives of the Crown. July 4, 2006.
- *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 MFR staff, including the AAC determination meeting held in the Skeena-Stikine Forest District office in Smithers on September 11-12, 2007.
- Input received from First Nations through the consultation process.
- Information received at a meeting in Smithers on September 10, 2007 with representatives of the Gitanyow Hereditary Chiefs' Office.
- Information received at a meeting in Smithers on September 10, 2007 with representatives of the Gitxsan Treaty Society.

- British Columbia Ministry of Forests and Ministry of Environment, Land and Parks. 1995. *Biodiversity Guidebook*. Government of British Columbia, Victoria, BC. 99 pp.
- British Columbia Ministry of Forests. 2003. *Defined Forest Area Management (DFAM) Timber Supply Review Technical Information Sheet*. Government of British Columbia, Victoria, BC. 7 pp.
- British Columbia Ministry of Forests Forest Analysis Branch. 2004. *Interim Standards for Data Package Preparation and Timber Supply Analysis; Defined Forest Area Management Initiative*. Government of British Columbia, Victoria, BC. 21 pp.
- British Columbia Ministry of Forests Forest Practices Branch. 1999. *Interior Watershed Assessment Procedure Guidebook (IWAP); Second Edition Version 2.1*. Government of British Columbia, Victoria, BC. 40 pp.
- British Columbia Ministry of Forests. 2003. *Kispiox Timber Supply Area Analysis Report*. Government of British Columbia, Victoria, BC. x + 138 pp.
- British Columbia Ministry of Forests. 2002. *Kispiox Timber Supply Area Public Discussion Paper*. Government of British Columbia, Victoria, BC. 11 pp.
- British Columbia Ministry of Forests. 2003. *Kispiox Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination*. Government of British Columbia, Victoria, BC. 51 pp + app.
- British Columbia Ministry of Forests. 2002. *Kispiox Timber Supply Area Timber Supply Review Summary of Public Input*. Government of British Columbia, Victoria, BC. 9 pp + app.
- British Columbia Ministry of Forests - Forest Analysis Branch. 2003. *Supplemental Guide for Preparing Timber Supply Analysis Data Packages*. Government of British Columbia, Victoria, BC. 61 pp.
- British Columbia Ministry of Forests and Range. 2006. *Kispox FRPA Project - Watershed Objectives - Draft Version 1.2*. Government of British Columbia, Victoria, BC. 8 pp.
- Crane Management Consultants Ltd. and Enfor Consultants Ltd. 2004. *West Babine Sustainable Resource Management Plan Socio-Economic Assessment*. Prepared for Skeena Resource Management Region; British Columbia Ministry of Sustainable Resource Management. Government of British Columbia, Victoria, BC. 92 pp.
- Markus Resource Consulting. 2004. *Hardwood Inventory 2004; Nass TSA; Maps: 103P067, 103P076, 103P086.* Prepared for Northwest Loggers Association, Terrace, BC 16 pp.

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 Kispiox 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 and Range Practices Act*.

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

As British Columbia progresses toward the completion of strategic land-use plans, in some cases the eventual timber supply impacts associated with land-use decisions resulting from various regional and sub-regional planning processes remain subject to some uncertainty before formal approval by government. 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 Kispiox TSA, much clarification of land and resource use has been provided by government's Kispiox LRMP, the Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality, and Wildlife, and the West Babine Sustainable Resource Management Plan, (WBSRMP) which guide many aspects of current management as addressed in my considerations in many sections of this document.

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

Some persons have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are 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 Kispiox 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*.

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 (TSR) program for TSAs and Tree Farm Licences (TFLs).

For most AAC determinations, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer simulation model, a series of timber supply forecasts can be produced, reflecting different 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 is particularly subject to change during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines or plans. Thus it is important to remember that while the timber supply analysis with which I am provided is integral to the considerations leading to the AAC determination, the AAC is not determined by calculation but by a synthesis of judgement and analysis in which numerous risks and uncertainties must be weighed. Depending upon the outcome of these considerations, the resulting AAC may or may not coincide with the base case forecast. Moreover, because some of the risks and uncertainties considered are qualitative in nature, once an AAC has been determined, further computer analysis of the combined considerations may not confirm or add precision to the AAC.

Base case for the Kispiox TSA

The timber supply analysis used as a basis for my considerations in this determination was prepared by Timberline Forest Inventory Consultants Ltd. of Prince George, BC, for the Kispiox Defined Forest Area Management Group of licensees (the 'DFAM Group') with representatives from BC Timber Sales – Skeena Timber Sales Office, Bell Pole of Canada Ltd., Kispiox Forest Products Ltd., and the Kitwanga Lumber Company Ltd. The model used in the analysis, known as 'Woodstock', is a 'pseudo- spatial' timber supply model similar to the Forest Service Simulation Model (FSSIM) used by the MFR. This model has been reviewed by timber supply analysts in MFR's Forest Analysis and Inventory Branch and has been accepted for use and application in timber supply analyses in BC.

In addition to the Woodstock analysis, a number of spatially explicit analysis scenarios were run using the 'Patchworks' model, in order to respond to the timber supply implications of government's 2006 signing of the *Order to Establish the Kispiox Landscape Unit and Objectives.* This Order set out legal requirements to manage for objectives for 'patch' sizes. For simplicity, this refers to the configuration on the landscape of areas disturbed by either harvesting or fire that are contiguous and are within the same age class. Issues related to the sizes and distribution of patches are discussed in the section '*landscape-level biodiversity*'.

The harvest flow objective for the base case was to maintain the current AAC for as long as possible before declining to the sustainable long-term harvest level or 'LTHL'.

The base case projected an initial harvest level of 977 000 cubic metres per year, which was maintained for 50 years before declining by 10 percent to an annual rate of 903 000 cubic metres, maintained for ten years. This was followed by two further 10-percent reductions over the next two decades, first to 812 000 cubic metres per year, then to the sustainable LTHL of 729 000 cubic metres per year. The sawlog portion of the total projected harvest volume was initially 410 000 cubic metres per year, increasing to the long-term harvest level after 125 years.

In this current base case the initial harvest level is roughly 16.8 percent higher than that projected in the 2002 analysis referenced in the 2003 AAC determination. In the 2002 analysis the harvest level declined after the first decade, instead of after the fifth in the current analysis, and the long-term level in the current base case is projected to be 41 percent higher than in the 2002 forecast. The single largest contributor to these differences in the harvest levels is the change in the total area included in the 'timber harvesting land base' or 'THLB' (see below, 'Land base contributing to timber harvest'). In the current analysis, the derived THLB is nearly 25 percent larger than that derived in the 2002 analysis, primarily due to the recent re-definition of the physically accessible and economically operable land base. Changes in other factors which are identified in my considerations below and which include non-recoverable losses, green-up heights for visual quality objectives, and other factors, also contribute to the more robust timber supply projected in this analysis.

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 components; the harvest contributions from unmanaged and managed stands; the average ages of forest stands harvested over time; the volumes projected to be harvested per hectare, the total area harvested annually, and the distribution of the age-class make-up of the forests now and over the projected time horizon. Details of my assessments of particular aspects of the analysis and its projections, in some cases in relation to uncertainties in associated assumptions, are provided in the following sections.

From my review of the timber supply analysis, including detailed discussions with BCFS analysts who have reviewed the analysis in detail, I find that the analysis in general and the base case forecast in particular—the inputs, assumptions and methodology for which have all been submitted to public review—provide a workable 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. 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 the timber harvest

- general comments

The overall area of the Kispiox TSA, as estimated from inventory data reported in the 2007 timber supply analysis, is 1 224 856 hectares. This total includes both forested and non-forested lands of various ownerships that include parks, Indian and government reserves, woodlot licence areas, and private and other lands. Some of these areas do not contribute 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 considered part of 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 Kispiox TSA, after excluding all lands not managed by the MFR, as well as all non-forested areas, all areas of non-productive forest, and all areas of non-commercial brush, the total productive Crown forested land base is 697 736 hectares.

The THLB comprises those parts of the productive Crown forested land 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 Kispiox TSA, some the most significant deductions were for areas considered unsuitable for operations for economic or physical reasons—'inoperable areas'—as well as areas of low timber productivity, riparian management areas, old-growth management areas ('OGMAs'), forest stands dominated by deciduous species, and environmentally sensitive areas, as well as other areas deducted for a number of other reasons as detailed in the timber supply analysis report. 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 excluded from the THLB for twelve specific factors are given in Table 4 of the 2007 timber supply analysis. My considerations of the reasonableness of particular deductions in the table are documented in the immediately following sections. Other land base exclusions from the THLB which are required to meet management objectives for specified resource values other than timber are considered, as required, under Section 8 (8)(a)(v) below, in 'Integrated resource management objectives'. Those considerations include riparian reserve zones and management areas, wildlife habitat, and recreation areas.

- *areas of physical or economic inoperability*

In the Kispiox TSA, the quality of potentially merchantable timber ranges from relatively good quality saw log material to poor quality stands that can only be used for fibre or pulp. Consequently, the economic viability of harvesting in some parts of the TSA is subject to considerable uncertainty. In particular, high logging and hauling costs render some seemingly operable but more remote areas uneconomical to harvest, particularly in unfavourable market conditions, and yet in some areas identified in a 1988 study as inoperable, licensees have been able to harvest consistently.

In the rationale for the 2003 AAC determination for the Kispiox TSA, which relied on the 1988 study, the chief forester requested better quantification of the operable land base, particularly with respect to the merchantability of older hemlock- and balsam-leading stands. In response, Skeena-Stikine Forest District staff and licensees operating in the Kispiox TSA collaborated in developing a Geographic Information Systems (GIS)-based process to map areas by harvesting method (as an interpretation of ground-slope attributes) and forest stand quality (by interpreting forest inventory attributes), known as the Kispiox Harvest Method Mapping (HMM). The information provided by the HMM was complemented by the use of 'total chance plans' to identify and exclude known inaccessible areas and by the inclusion of additional data provided by forest district stewardship staff. The HMM work identified 188 779 hectares of inoperable Crown productive forest in the TSA, for which a specific reduction of 123 527 hectares was made to the THLB after exclusions for other objectives. The timber supply on the THLB was further classified into three quality-classes, representing opportunities for harvesting sawlogs, 'marginal' sawlogs, and pulp wood. Then in the timber supply analysis a sensitivity analysis was carried out to investigate the implications of deferring harvest in remote areas for forty years, the results of which are described below under '*remote areas'*.

In public input to the timber supply review process, the Gitanyow First Nation expressed concern that most of the harvest in the TSA has focused on higher value, lower cost stands, leaving the remaining forest less valuable. The First Nation recommended that the lower-grade timber profile be excluded from contributing to the timber supply in this AAC determination, although the First Nation licensee itself expressed a somewhat contrasting view. I have considered the question of the harvestability of lower-quality timber below, in '*harvest profile*'.

From the detailed nature of the collaborative work by MFR forest district staff and licensees, I have no doubt that the operability information incorporated in the 2007 analysis is significantly more reliable than the more general 1988 operability line relied on in the 2003 analysis. Significantly though, the currently derived THLB of 327 837 hectares is nearly 25 percent larger than the 263 046-hectare THLB derived for the 2003 analysis, which cannot help but raise questions as to the true economic viability of some of the lower-quality stands now included in the THLB in many areas of the TSA, and even some of the better quality stands in the more remote areas.

From all of this I am satisfied that the HMM has provided a reliable baseline for the definition of those stands in the TSA that are operable across a broad range of market conditions, that is, not just the most economically profitable stands. However, in view of the demonstrated history of preferential harvesting of higher-quality stands in the TSA, in my determination I have directly addressed the need to ensure that the actual harvesting in lower-quality stands, and the degree to which these stands are assumed to contribute to the timber supply forecast, remain consistent, as discussed below in '*harvest profile*' and in '**Reasons for Decision'**, and as noted in '**Implementation**'. I have also considered and directly addressed the need to ensure consistency between the level of harvesting in the more remote areas and the extent to which these areas are assumed to contribute to the timber supply, as documented in '*remote areas*' and **'Reasons for Decision'**.

- *environmentally sensitive areas*

Environmentally sensitive areas (ESAs) are forested areas that are considered to be sensitive for a variety of reasons or may be valuable for other resource values. In the analysis, areas identified as environmentally sensitive included: 42 788 hectares expected to contain areas with a high likelihood of landslide initiation following timber harvesting or road construction (i.e. terrain stability Class V, from mapping completed for most of the operable land base); 24 597 hectares for highly sensitive soils on slopes greater than 60 percent (Es1); and 128 hectares for avalanches or snow chutes. In the base case analysis, these areas were all entirely excluded from the THLB.

A further 122 161 hectares were identified as sensitive for regeneration problems, areas important to wildlife, high recreation values or water values, but specific deductions were not applied on these accounts as the affected areas were either already excluded to meet other objectives, or they were subject to the application of forest cover constraints rather than a complete exclusion, or (as for instance in the case of wildlife habitat or visually sensitive recreation areas) they were accounted for by more accurate means as described in later sections of this rationale.

Two issues require explanation. First, in the rationale for the 2003 AAC determination, the chief forester directed that harvesting on areas of Class IV (potentially unstable) terrain be monitored, to determine whether the 95-percent exclusion of these areas as applied in the 2002 timber supply analysis was justified, or whether a more appropriate proportion should be applied. A review by MFR district staff of licensees' harvested, planned and approved cutblocks revealed that harvesting is not being avoided on these areas. A study by Bell Pole indicated that such areas are frequently either harvested in full or in part, or they are avoided because of overlaps with wildlife tree patches, thus being already accounted for in deriving the THLB. The company suggested a reduction in the order of 5 percent would be more appropriate. Largely in consideration of the Bell Pole submission, in the 2007 analysis a proxy mechanism was applied to spatially represent areas of Class IV terrain, resulting in the application of roughly a 9.5-percent land base reduction to areas in this terrain class. In public input, the federal Department of Fisheries and Oceans (DFO) suggested that harvesting operations on Class IV terrain should be subject to analysis to account for potential risk to other resource values.

The second issue requiring discussion is that of the representation of fluvial fans. No specific landbase reductions were made in the analysis to account for these fans due to the unavailability of appropriate mapping except in the Cranberry Planning Unit. Based on an analysis conducted in the Cranberry Planning Unit, after accounting for reductions for riparian management areas, floodplains, and unstable terrain, mapped fans represented 0.4 percent of the operable landbase. From a sensitivity analysis showing the effect of removing 10 percent of the THLB, it may be determined that, if the associated timber supply implications are distributed evenly in all time periods, this results in an almost linear relationship in the reduction to the projected harvestable

timber volumes. For the fluvial fans, this indicates an overestimation of 0.4 percent, or 3908 cubic metres, in the harvest levels projected for all time periods.

The MFR Regional Hydrologist has advised that because fluvial fans are highly sensitive to development, in that forests on fans provide direct protection from hydrogeomorphic hazards to access roads, utility corridors and residences, the fans should be excluded from the THLB. In public input, DFO advised that timber harvesting constraints should be applied to unstable fluvial fan areas, in order to protect vulnerable fish habitat. Skeena-Stikine Forest District staff concur with both recommendations, and I have accounted for the noted 0.5-percent, or 4885-cubic-metre-per-year decrease in the projected available volume for the mid- and long-term harvest, as discussed in **'Reasons for Decision'**.

- unmerchantable and problem forest types

The productive Crown forest land in the Kispiox TSA includes an identified 4213 hectares of forest stands that are physically operable and are growing on sites with productivities high enough for inclusion in the THLB, but which are too problematic to harvest due to being either

(a) among 3938 hectares of mature conifer-leading stands in which the timber quality is reduced by very low or very high stocking density, by excessive limbiness, or by inability to reach an adequate piece size for utilization; or

(b) among 275 hectares of juvenile pine-leading stands with a fire origin that may have a stocking density of over 10 000 stems per hectare, which leads to height repression and difficulty in achieving utilizable piece sizes in maturity.

In the timber supply analysis it was assumed that stands of both of these kinds will be of no harvestable utility or at best will have only marginal merchantability. All 4213 hectares were therefore excluded in deriving the THLB. However, an analysis of blocks harvested from 2001 to 2006 revealed that, over this period, three percent of the total TSA harvest was obtained from stands of type (a), although no harvesting had occurred in stands of type (b). District staff believe that in view of the demonstrated performance in stands of type (a) these stands should properly be included in the THLB, and from the evidence before me I am in agreement with this conclusion.

District staff have also identified another problem-forest type, type (c), in the form of 3460 hectares of hemlock- and balsam-leading stands that originate from forest fires, that are currently in juvenile age classes, and that typically regenerate to very high densities. If these stands are not spaced, they are likely to take considerably longer than was assumed in the model to achieve the merchantability criteria. In practice, unless such stands are within roughly 0.2 km from existing road access, density control will not be conducted, due to treatment costs typically in excess of $2500 per hectare. At present, these types are considered to be of saw-log quality, with an assumed age to achieve merchantability criteria ranging from 65 to 95 years. A 'TIPSY' analysis (see '*volume estimates for managed stands*') showed that the criteria likely will not be achieved before 120 years. I therefore agree with district staff that in the base case analysis, the timber supply contribution from these stands should have been either excluded from the THLB or deferred for some decades.

The need to re-include the 3938 hectares of type (a) problem stands, and to temporarily or permanently exclude the 3460 hectares of type (c) problem stands, indicates a small net underestimation of approximately 500 hectares, or 0.2 percent of the THLB, equivalent to an underestimation of roughly 1954 cubic metres in the volume supporting the mid- and long-term harvest levels, and I have accounted for this in my determination as discussed in **'Reasons for Decision'**.

- *sites of low productivity*

In the timber supply analysis, 32 764 hectares of productive Crown forest with low productivities, comprising five types of forest stands, were excluded from the THLB due to having an insufficient volume per hectare to be economically feasible to harvest, or to being unlikely to achieve a harvestable volume over time, based on the site productivity information on the inventory file.

An analysis of blocks harvested from 2001to 2006 indicated that the combined harvest in all forest types in these categories represented less than one percent of the total harvest. I therefore conclude that these stands were properly excluded from the THLB and that the base case projection adequately accounts for current management in these stands.

- *deciduous forest types*

In the timber supply analysis, all stands predominated by deciduous species, whose combined volume component of cedar, spruce and pine is less than 30 percent—comprising 42 731 hectares of productive Crown forest—were entirely excluded in deriving the THLB. An analysis of blocks harvested from 2001to 2006 shows that the harvest in this forest type represents only about one percent of the total harvest, and MFR district staff agree with its full exclusion at this time from the THLB.

For mixed-wood stands in which the combined volume components of cedar, spruce and pine exceed 30 percent, the deciduous volumes were excluded from the estimates of timber volumes in existing natural stands, but the cedar, spruce and pine volumes were included.

For stands dominated by cottonwood, half of the cottonwood volume was excluded, and the other half was considered available for harvesting, with roughly 140 000 cubic metres being assumed to be harvested over the short to long term.

All other deciduous volumes were excluded from contributing to the projected timber supply.

The accuracy and reliability of any methodology for forecasting the contribution of deciduous volumes to the timber supply in the Kispiox TSA over time are subject to uncertainty from changing markets and consumer demands. I am advised that interest has been expressed by industry at various times, both in assessing the quality and quantity of the deciduous inventory in the TSA, and in exploring opportunities for securing deciduous tenures, sometimes involving significantly large volumes.

All harvested and scaled deciduous volumes are currently charged to licence AACs, although considerable volumes of deciduous species in various types of stands are excluded from contributing to the projected timber supply. At this time, I do not see evidence of a sufficiently persistent interest in the harvest of deciduous species to warrant the introduction of a partition for harvesting attributable only to these species. However, as I have noted in '**Implementation**', if the Skeena-Stikine Forest District Manager receives notice of a significant increase in interest and intention among licensees or potential licensees in utilizing substantial, identified, deciduous volumes that are currently excluded from contributing to the projected timber supply, I will be willing to discuss any proposal with him, and if necessary, to request a re-analysis of the timber supply and possibly even to revisit the AAC for the TSA to specify a harvest level attributable to deciduous species. The analysis would be required in this case to ensure the continued attainment of biodiversity and other forest management objectives under the altered level of harvest.

For the present determination, I am satisfied that the approach used in the analysis to account for deciduous volumes adequately reflects the current management approach and level of interest in the harvesting of these species.

- *roads, trails and landings*

In the timber supply analysis, 8463 hectares of Crown productive forest were excluded in deriving the THLB to account for existing roads, trails and landings. This figure was compiled in GIS from forest cover maps, from licensees' road submissions in Forest Development Plans, from Terrain Resource Information Mapping (TRIM), and from the MFR 'As-Built-Road' (ABR) reporting. Roads were buffered with right-of-way widths determined by MFR district staff for the 2002 timber supply analysis, and the areas so defined were excluded spatially from THLB.

District staff note minor differences between road source files and that the road compilation file has multiple, slightly offset road network representations, as a consequence of which the right-of-way areas may be overestimated to a small and as yet undefined extent. Staff advise that they are compiling and coding a single-layer, spatially accurate representation of the road network to improve the data for the next timber supply analysis.

For the existing landings component, district staff used silviculture records and soil conservation surveys to determine that landings occupy, on average, 1.4 percent of the gross area of each cutblock, which was the reduction applied in the analysis to all areas with a harvest history.

District staff also determined from soil conservation surveys that, on average, 4.4 percent of gross cutblock areas are occupied by roads, trails and landings. In the analysis therefore, to account for future construction of roads, trails and landings, a deduction of 4.4 percent of the productive forest was applied (aspatially) at the time of each future harvest.

From this I conclude that despite the noted potential for a slight underestimation in timber supply associated with uncertainty in the widths of rights-of-way, the reductions modelled in the analysis for existing and future roads, trails and landings rely on the best currently available information and are a generally adequate and reasonable accounting for current practice.

- *woodlot licences and other ownerships*

The *Forest Act* requires AACs determined for TSAs to be exclusive of the areas and timber volumes allocated to woodlot licences. When woodlot licences are issued from a TSA, the required volumes are first allocated from an appropriate apportionment under the AAC for the TSA, then in the next AAC determination for the TSA, the TSA land base is reduced by the area of Crown land in all the woodlot licences issued since the previous determination, and the total volume in the issued woodlot licences is excluded from contributing to the AAC for the TSA.

In the 2007 Kispiox timber supply analysis, 5451 hectares were removed from the THLB for woodlots. Since the analysis, woodlot boundaries have been refined and several 'top-ups' have occurred. Currently there are 6274 ha of 'Schedule B lands' (i.e. the Crown land portion of woodlots) which means that an additional 823 hectares should be removed from the derived THLB.

District staff also checked other Forest Cover ownership codes, in addition to woodlots—private land, Crown Grant lands, Provincial Parks, Indian reserves, UREPs (reserves for the Use, Recreation and Enjoyment of the Public), other reserves, and leases—against the daily updated '*Tantalis Gator*'—an online search and retrieval system operated by the Ministry of Agriculture and Lands' (MAL) Integrated Land Management Bureau (ILMB). This system provides details of the BC Crown Land Registry which maintains, records and tracks the sale, survey, licence, access, return and restriction of Crown land in BC. From among the various ownerships, staff determined that an additional 7423 gross hectares of the TSA (including the woodlot areas and protected areas) should have been excluded in deriving the THLB. This would have led to a reduction of 3640 hectares (inclusive of the already noted woodlot adjustment, as well as an adjustment for protected areas, discussed next) in the THLB.

From this I conclude that the THLB used in the analysis was overestimated by about one percent in these respects, equivalent to an overestimation of roughly 9770 cubic metres per year, in the volume projected to be available for harvest throughout the forecast period. I have accounted for this in my determination as discussed in **'Reasons for Decision'**.

- protected areas

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 2007 Kispiox TSA timber supply analysis, a total of 107,952 hectares of gross area were deducted for federal and provincial parks and ecological reserves, for the Babine River Corridor, Bulkley Junction, Kitwanga Mountain, Seven Sisters, Swan Lake/ Kispiox River, Catherine Creek Ecoreserve, and other small provincial parks. These areas do not contribute to THLB although the forested portions do contribute toward achieving landscape-level biodiversity targets. In comparing the protected-areas data assembled for the analysis with information from the previously noted ILMB's '*Tantalis*' system and its Land and Resource Data Warehouse (LRDW), staff noted minor differences, including the new 99-hectare Anderson Flats Provincial Park, a revised boundary for Kitwanga Mountain Park and other boundary differences, which indicate that a further total of 345 hectares should have been excluded from the THLB. For convenience, the accounting for this adjustment has been included with those for other ownership considerations as noted in the immediately preceding section. Since I am assured that the contributions of protected areas to biodiversity objectives are accounted for in the analysis, I am satisfied that, with this noted adjustment, the timber supply implications of protected areas are adequately incorporated in the base case projection.

Existing forest inventory

- status of the forest cover inventory

In British Columbia, to improve forest cover inventory standards, the older forest cover inventory (FCI) mapping for TSAs and TFLs is being replaced over time by the Integrated Corporate Spatial and Attribute Database ('INCOSADA') Vegetation Resources Inventory (VRI) which includes common database structures and a suite of tools to support file update and management.

In the Kispiox TSA, the FCI was produced in 1992 and was updated in 1997. In 2002, the data were converted ('rolled over') to the VRI format, which does not generate a true VRI database, but maintains the old information in a new database format. No VRI Phase II volume adjustment or net volume adjustment factor (NVAF) has yet been applied. The inventory data used in the timber supply analysis were updated for growth and depletions to January 1, 2005, such that current harvesting has progressed roughly two years into the first decade of the timber supply projected in the base case forecast.

I am satisfied that the inventory, as currently projected, provides the best available information on forest cover and is suitable for use in the timber supply analysis supporting this determination.

- volume estimates for existing, natural, unmanaged stands

Existing natural, unmanaged stands are stands that have not been logged, or are not subject to forest management by planting or density control. In the 2007 timber supply analysis for the Kispiox TSA, all stands established before 1979 were considered to be unmanaged stands, as in the 2002 analysis. The estimates of the timber volumes in existing unmanaged stands, both

immature and mature, were projected using yield tables produced by the Variable Density Yield Prediction (VDYP) model, version 6.6d4.

An inventory audit conducted for the Kispiox TSA in 1996 suggested that the volumes in existing mature stands (older than 60 years) on the operable landbase are overestimated by 13 percent. The overestimation was considered to be attributable both to the classification of the forest cover attributes and to the VDYP volume projections, but the number of audit plots did not permit exact identification of the sources of the overestimation. In the rationale statement for the 2003 AAC determination, the chief forester noted the consequent uncertainty in the projected timber supply projection and allowed for a 'reasonable quantification' of the impact as about the mid point of the range of the uncertainty from zero to 13 percent.

I have discussed this issue in detail with staff of the Skeena-Stikine Forest District, in respect of possible contributions to the discrepancy from inventory volumes for balsam and spruce, from losses to bark beetles, and losses to *tomentosus* root rot (as further discussed below in 'Non-recoverable losses'). However, having no more reliable information on the origin of this discrepancy, for the purposes of this AAC determination I have assumed, in consistency with the treatment of the related uncertainty in the previous AAC determination, that the volume estimates for existing unmanaged stands are at significant risk of having been overestimated in the base case analysis, by an amount approximating the mid-range value of approximately 6.5 percent. This corresponds to an overestimation of 63 505 cubic metres per year in the volume projected to be available for harvest in the short and mid terms, and I have accounted for this in my determination as discussed in **'Reasons for Decision'**. Completing the VRI for this TSA to current standards would be an important step toward resolving this significant uncertainty.

- *interior log grades*

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

The VDYP model used in the 2007 timber supply analysis for the Kispiox TSA to estimate timber volumes in existing unmanaged stands does not account for the ongoing component of endemic dead trees that could potentially be used as sawlogs (known as 'dead-potential'). Possible sources of data for 'dead-potential' volumes include inventory audit plots, VRI phase II ground samples, permanent sample plots, and temporary sample plots, and at this time, for the Kispiox TSA, the inventory audit is considered the best such source. The audit data indicate that the dead-potential volume is about 16.3 percent of the green volume for the forested land base over 60 years of age in this TSA. In comparison, for the period 1995 to 2004, when taking dead logs to the mills was solely at the discretion of licensees, data from the harvest billing system shows that grade 3 endemic and grade 5 logs totalled about 11.4 percent of the cut-accountable volume.

MFR analysts therefore submit, and I concur, that in respect of the need to account for the dead-potential volume, the harvest projection in the base case analysis has underestimated the timber supply, throughout the forecast period, by an amount somewhere in the range of 11.4 percent to

16.3 percent. I have taken a mid-point value from this range into account in my determination, as discussed in '**Reasons for Decision**'.

Expected rate of growth

- *site productivity estimates*

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

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 Ministry of Forests Old-Growth Site Index (OGSI) project, have confirmed that site indices for stands older than 140 years and for those younger than 30 years (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, site indices are needed that reflect the true potential of growing sites. In areas where local site-index studies have been carried out to obtain definitive data, adjustments can be made and the timber supply projected from the improved productivity figures.

In the Kispiox TSA, more than 73 percent of the forest cover on the THLB is over 140 years old, such that factors including forest health, height repression, and tree form commonly impair accurate determination of a site index from the stand's attributes. In the timber supply analysis, the site indices assumed for regenerating managed stands after the harvesting of natural, unmanaged stands were the indices derived from the natural stands, which strongly suggests that the site productivities for managed stands used in the base case projection are underestimated.

Under appropriate circumstances, site indices may be correlated with the provincial Biogeoclimatic Ecosystem Classification (BEC) system, to develop what are called 'SIBEC' site productivity estimates. Site productivity data collected in the Bulkley, Kispiox, and Kalum TSAs since the previous round of AAC determinations have improved the reliability of SIBEC estimates, but site productivities derived from SIBEC information are not typically relied upon unless correlated with approved, local Predictive Ecosystem Mapping (PEM) or Terrestrial Ecosystem Mapping (TEM). Since the Kispiox TSA does not have PEM or TEM mapping approved for timber supply analysis purposes, the improved site index values could not be spatially applied across the TSA, and SIBEC adjustments were not incorporated in the base case. However, a less rigorous version of PEM, Predictive Habitat Mapping or PHM, has been carried out for the Kispiox TSA. While not approved for timber supply analysis, PHM gives an adequate approximation of the distribution of site series by BEC variant across the TSA for use in sensitivity analyses. Sensitivity analyses showed that when area-weighted average SIBEC site index values for each BEC variant were applied to each managed stand analysis unit, based on the distribution of BEC variants within the AU and the calculated SIBEC site index for each BEC

variant, an even-flow harvest level slightly higher than the current AAC could be maintained throughout the forecast period. The projected long-term harvest level was 35 percent higher than in the base case.

While the site index adjustments await localized verification by correlation with approved PEM or TEM mapping, the results of the sensitivity analysis indicate the *potential* for a very significant increase, up to 35 percent in the volume projected available for harvest in the late-mid and long term. This is equivalent to a volume increase of 341 950 cubic metres, and I have given some weight to this significant potential in my determination as discussed in **'Reasons for Decision'**.

In view of the importance of accurate site productivity estimates to the reliability of timber supply projections, in '**Implementation**' below I have emphasized the need to complete the work on correlating site indices with PEM or TEM mapping.

- volume estimates for managed stands

In the Kispiox TSA, forest stands that have been harvested and planted since 1979 are considered to be managed stands. In the 2007 timber supply analysis, managed stand yields were used for stands that have already been harvested and planted as well as for those stands that will be harvested and planted in the future. The standard MFR growth and yield program, Table Interpolation Program for Stand Yields, or 'TIPSY' (Batch Version 3.2b), was used to estimate the timber volumes for all regenerated, managed stands.

All TIPSY projections of volume yields for managed stands are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition. However, certain operational conditions, such as a less than ideal distribution of trees, the presence of small non-productive areas, endemic pests and diseases, or age dependent factors such as decay, waste and breakage, may cause yields to be reduced over time. Two operational adjustment factors (OAFs) are therefore applied to yields generated using TIPSY, to account for losses of timber volume resulting from these operational conditions. OAF 1 is designed to account for factors affecting the yield curve across all ages, including small stand openings, uneven tree distribution, endemic pests and other factors. OAF 2 accounts for factors whose impacts tend to increase over time such as decay, and waste and breakage. Standard or 'default' provincial reductions of 15 percent for OAF 1 and five percent for OAF 2 are often applied in timber supply analysis but these may be adjusted, based on local conditions. In the base case analysis for the Kispiox TSA, these standard OAF values were applied.

Based on sampling studies conducted in the adjacent Bulkley TSA on site series that are also present in the Kispiox TSA, refinements have been proposed to the OAF 1 values which could have implications for the projected timber supply. These implications were reviewed through sensitivity analysis, and indicated a potential increase of up to 3.5 percent in the long-term harvest level. However, before such implications derived from adjustments to OAF 1 values may be given weight in an AAC determination, localized data must be obtained by a direct and comprehensive review of appropriate factors for the Kispiox TSA, and must then be approved by staff of MFR's Forest Analysis and Inventory Branch.

With respect to OAF 2, as also discussed in 'Decay, waste and breakage' and 'Non-recoverable losses', MFR district staff are concerned that losses to *tomentosus* root rot are not fully accounted for in the 5-percent value, and have collected supporting data. However, these data have not yet been adequately analysed and I cannot make any related adjustment in this determination. If full analysis of the data confirms quantitatively that the OAF 2 value is underestimated in the Kispiox TSA, this can be properly reflected in the next analysis and AAC determination.

Since the reduction of uncertainty in operational adjustment factors is an important component in the continuing improvement of timber supply analysis and projection, in '**Implementation**' below I have noted the need to complete the full analysis and appropriate approvals of any changes potentially indicated for OAF values based on locally obtained information.

- *volume 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 a green-up height or the minimum harvestable age. The quantity and quality of select seed available in the province have increased in the past decade, and are projected to increase further. Licensees are required to use select seed when available.

In the Kispiox TSA, the Seedling Planning and Registry (SPAR) system has shown that the use of Class A seed, which was restricted to lodgepole pine, ranged from 3 percent in 1998 to 32 percent in 2002. A review of the SPAR sowing requests for 2003 to 2005, and partial requests for 2006, showed a reduced level of use of Class A seed, averaging one percent, primarily due to a lack of available seed.

In the 2007 timber supply analysis, no volume gains associated with genetically improved stock were modelled due to the low level of use of Class A seed and I concur that this modelling accurately reflects current practice.

- *Dothistroma in early seral lodgepole pine stands*

The needle blight caused by *Dothistroma septosporum* continues to affect lodgepole pine in plantations in the ICH BEC zone, causing recurrent needle defoliation that can reduce the growth of individual pine trees and can even result in the complete failure of a pine plantation.

In the 2003 AAC determination for the Kispiox TSA, the chief forester estimated the possible timber supply impact from the *dothistroma* needle blight to be as high as 6.5 percent, and directed district staff to monitor and quantify the associated volume implications for consideration in this next AAC determination. Since that time an ongoing *dothistroma* management program has been underway, funded by the Forest Investment Account, 'FIA'. In the current timber supply analysis, the modelling approach to incorporate impacts from *dothistroma* in the base case included reference to strategic plans for this program, and a spatial file of openings affected by *dothistroma*, obtained from aerial surveys from 2003 to 2005, was incorporated into the analysis.

I have reviewed in detail the modeling approach as set out in the data package, by which 16 436 hectares of openings on the THLB were identified as likely to be affected, to which a range of assumptions was applied in respect of varying extents of losses of the pine components of forest stands over time, with assumed consequences for the achievement of minimum stocking standards, based on threshold levels. The resulting implications for timber supply, arising from associated extended regeneration delays, were applied in the model through age adjustments to affected stands. The assumed extended delays in establishing regenerated plantations affected the timber supply projection in the long term, but not in the short or medium term. This is consistent with operational experience, since if 100 percent of the pine is lost from a forest stand, the opening will either receive sufficient alternative stocking to maintain the minimum stocking standard, or the stocking will drop below this level, necessitating fill-planting or replanting. I note that in recognition of *dothistroma*-needle-blight issues, MFR regional stocking standard guidelines were recently revised, such that planted forest stands with pine components of less than 20 percent composition are now permitted.

In general I am satisfied from the foregoing that good care was taken to reflect the operational implications of the damage by *dothistroma* in the timber supply analysis. Significantly, however, as part of the input to the timber supply review process, an MFR district staff specialist noted that in his experience as much as 5 percent of the plantations affected by *dothistroma* are likely to become non-productive, due to the competitive growth of brush and to damage from small mammals, which seriously affect reforestation. If in fact 5 percent of the 16 436 hectares identified as affected do become non-productive, the THLB will become about 822 hectares or 0.2 percent smaller. This equates to losing roughly 1954 cubic metres of the volume projected to be available for harvest in the mid and long terms. I have taken this probable risk into account in my determination as discussed in '**Reasons for Decision**'. The completion of ecological mapping, PEM or TEM, for the Kispiox TSA, which I have requested below in '**Implementation**', will prove an important means of reducing associated uncertainties in regeneration assumptions.

- *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 2007 Kispiox TSA analysis, minimum harvestable age was defined as the youngest age at which stands achieve both a merchantable volume of at least 200 cubic metres per hectare and an average diameter of 20 centimetres at breast height. Minimum harvestable ages ranged from 50 to 170 years for natural stands, and 40 to 155 years for managed stands. In the model, the age at which a stand was assumed to be harvested was governed not by harvest queuing rules such as 'oldest first' or 'relative oldest first', but by how combined objectives were best achieved.

Skeena-Stikine Forest District staff were concerned that the model may be selecting a substantial volume for harvest from stands less than 60 years old, to avoid compromising objectives in certain periods; this would not match operational reality since a review of harvest data for 2001 to 2006 shows that 95 percent of the harvest came from stands greater than 100 years of age. However, a review of mean harvest ages in the base case showed that for the first 130 years of the projection, the average age of stands selected for harvest by the model was never less than 200 years.

From my review of this factor in discussion with district staff, I am satisfied that minimum harvestable ages were adequately modelled in the base case projection.

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

Regeneration assumptions

After due consideration by the DFAM licensees and by MFR staff, most of the regeneration assumptions applied in the 2002 analysis were considered appropriate for use in the 2007 analysis. Notable particulars follow.

- *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 2007 timber supply analysis base case for the Kispiox TSA, regeneration delay was modelled at 2 years for all analysis units. A review of silviculture records for openings planted between 2000 and 2005 showed regeneration delays ranging from 2.0 to 2.2 years, depending on BEC subzone, indicating that the assumption of 2 years in the analysis is adequately consistent with current practice.

- *species composition*

Regeneration by planting is standard in the TSA, although significant natural ingress by hemlock and advanced-growth balsam are anticipated where these species were part of the original stand. Commonly, a planting mix of spruce, pine and hemlock is prescribed, but where competition from brush and other species is expected, pine may be omitted in favour of hemlock, balsam or occasionally, cedar. Due to problems with *dothistroma*, which I have addressed earlier in '*Dothistroma in early seral lodgepole pine stands*', pine is allowed to comprise no more than 50 percent of any regenerated stand.

District staff advise me that for the future they would like to see a stronger cedar component established in the TSA, particularly in view of First Nations' cedar requirements, which I have addressed below, in '*cedar sustainability*', along with related issues, for the resolution of which I have recommended development of a comprehensive strategy to be modelled in the next analysis to allow a full accounting, in the next AAC determination, of actual levels and locations of cedar harvesting. For the present determination, I am satisfied that the regeneration assumptions for cedar in the base case analysis adequately reflect current operational practice.

- *initial density*

In the analysis, an initial density of 3000 stems per hectare was modelled, based on the usual practice of planting to 1200 to 1600 stems per hectare plus the expected contribution from natural ingress or advanced regeneration. District staff have reviewed silviculture records for the TSA and these were found to support this figure.

- *operational adjustment factors (OAFs)*

I have addressed the application of the OAFs in current and future analyses earlier, in '*volume estimates for managed stands*', and below, in 'Decay, waste and breakage'. In the former section I noted, as I have reiterated in '**Implementation**', that more local information and analysis of collected data are required before approved changes to the values of these adjustments may be reliably used in timber supply projections for the Kispiox TSA.

From all of the above, I conclude that the regeneration assumptions as applied in the base case projection are a reasonable reflection of current operational practices.

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.

I have reviewed in detail with MFR district staff the contributing areal components of the 12 656 hectares of gross forested area currently classified under various categories of NSR as described in the data package. From this, I am satisfied that these areas have been incorporated in the analysis with restocking assumptions that are a reasonable reflection of expectations for the potential regeneration of NSR areas under current management practices, and that any minor discrepancies between these assumptions and operational practice are negligible.

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

Silvicultural systems

In the 2002 timber supply analysis for the Kispiox TSA, several alternate systems were modelled, with 22 percent of the THLB, which supply 11 percent of the harvested volume, being designated as harvested by systems other than clear-cutting. At that time, BC Timber Sales was the only major licensee using non-clear-cutting silviculture systems in the TSA.

In the past 5 years, BCTS has continued to carry out limited amounts of partial cutting, but most of the blocks planned for partial cutting have been subsequently changed to 'clear-cut with reserves', due to defaults on timber sale licences or to a lack of bids. This means the main silviculture systems in the TSA are now 'clearcut' and 'clearcut-with-reserves'.

In the 2007 analysis, only clear-cut silviculture systems were modelled. The timber supply implications from the proportional areas of cutblocks retained in reserves or in wildlife tree patches ('WTPs') are addressed under '*stand-level-biodiversity*', where I have noted the somewhat higher level of retention of WTPs than is strictly required to meet stand-level biodiversity objectives. From this, I am satisfied that any operational deviations from the general base-case assumption for silviculture systems as modelled are adequately accounted for in the analysis.

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 Kispiox TSA, no incremental silviculture or commercial thinning has been carried out in the past five years. In the analysis, 1200 hectares of productive forest in the TSA were identified in the HMM process as stocked with densities greater than 10 000 stems per hectare, and these areas were excluded in deriving the THLB. The possibility that these stands could be spaced and brought back into the THLB has been considered by district staff, but the expense of such an exercise coupled with the potential for health issues in pine stands and the probability that, over time, the overstocked stands will in any case prove self-thinning to some extent, reduces the likelihood of a directly effective outcome from such a treatment. Possibly some area may become suitable for re-inclusion in the THLB in the next or a subsequent analysis, but any consequence

for the timber supply would not be realized until the mid term. For the purposes of the current AAC determination, I do not see any need for any adjustment to the projected harvest levels in the base case in respect of incremental silviculture as contemplated in 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. I have reviewed the information describing utilization standards as implemented in practice and as incorporated in the analysis. The standard provincial Interior Utilization Specifications were used, and district staff advise that the utilization standards as applied are reflective of current licence requirements. I am therefore satisfied with the reliability of the base case projection in this regard.

Decay, waste and breakage

In projecting timber volumes for existing, natural, unmanaged stands, the VDYP model used in the timber supply analysis incorporates estimates of the volumes lost to decay, waste and breakage, which have been developed for various areas of the province based on field samples. For volume estimates in regenerated, managed stands, operational adjustment factors (OAFs) are used with the TIPSY program to account for decay, waste and breakage. As noted earlier, in '*volume estimates for managed stands*', district staff are concerned that losses to *tomentosus* root rot are not fully accounted for in the 5-percent figure applied in the analysis for the value of OAF 2, and have collected, but not yet fully analyzed, supporting data. As noted in that section, without such analysis and subsequent approval by MFR branch staff, I cannot make any related adjustment in this determination. However, if full analysis of the data confirms and quantifies an underestimation in the OAF 2 value, this can be properly reflected in the next analysis and AAC determination. In '**Implementation**' below, I have therefore requested that staff complete the necessary analysis, and obtain the appropriate approvals, for any changes potentially indicated for OAF values based on locally obtained information.

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

Some of the forest management objectives in the Kispiox TSA for values other than timber were accounted for by reductions to the THLB which I have considered in 'Land base contributing to the timber harvest.' In this IRM section I further account for objectives where some portions of

the affected land base may continue to contribute to timber supply but are subject to various management constraints with respect to forest cover and adjacency.

- *forest cover requirements for cutblock adjacency and green-up*

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

Formerly, in the Kispiox TSA, in all areas not subject to more stringent forest cover constraints such as those applied to meet objectives for visual quality, community watersheds, pine mushroom habitat, or wildlife habitat, management practice required the approval of harvesting activities to be contingent on previously harvested stands reaching a default green-up condition of three metres in height before an adjacent stand could be harvested. However, since the coming into effect of the Kispiox Higher Level Plan Order (1996, amended 2002) the default three-metre green-up requirement for these areas no longer applies, and is replaced throughout the TSA by landscape-level seral stage and patch-size biodiversity objectives (except in the Cranberry Landscape Unit, as noted below in '*landscape-level biodiversity*').

In the 2007 timber supply analysis, to approximate the effect of the earlier default cutblock adjacency requirements, at least 67 percent of the area in each landscape unit in the IRM portion of the Crown productive forested land base throughout the TSA was required to be above the three-metre green-up condition at all times. While this requirement typically provides a reasonable approximation to operational conditions in many areas of the province, and is commonly applied in timber supply analyses for both TSAs and TFLs, for the Kispiox TSA at this time, the application of this adjacency constraint, in conjunction with the requirements in the HLP Order for biodiversity objectives, which were also modelled, represents the application of two overlapping constraints for the same purpose, although the impact on timber supply was negligible, as I have noted below, in '*landscape-level biodiversity*'.

I also note that a sensitivity analysis showed that increasing the assumed time to reach the IRM green-up height by five years had negligible effect on the base-case timber supply projection. From this I conclude that the projected timber supply in the Kispiox TSA is not directly constrained by the adjacency requirement, and I have been mindful of this in my conclusions from considering landscape-level biodiversity, below.

- *visually sensitive areas*

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

In the Kispiox TSA, scenic areas were established by the MAL through the February, 2006 *Scenic Areas Order* filed under section 7(1) of the Government Actions Regulation (GAR); VQOs are in place for many of the scenic areas. In the WBSRMP, VQOs were established under the March, 2004 West Babine Order by the former Ministry of Sustainable Resource Management. Scenic areas were made known to licensees in a 1999 District Operating Procedure

on 'Known Scenic Areas' directing the use of recommended VQOs from the Visual Landscape Inventory. In 2005, the MFR grand-parented these recommended VQOs to existing VQO status via FPPR sections 180 and 181.

Established scenic areas without VQOs in the TSA include those in the Upper Skeena River, the Bulkley River, several major recreational trails, and views from the Cedarvale back-road, which were specifically referenced in the District Operating Procedure or the Kispiox LRMP but were not captured by the Visual Landscape Inventory. For each of these areas, the general extent was identified by GIS modelling, and a VQO and Visual Sensitivity Class was recommended. At a future date, as provided for by the ILMB, the MFR will initiate a public process to more formally establish VQOs under section 7(2) of the GAR.

In the timber supply analysis, in the aspatial base case (using 'Woodstock', see 'Base case for the Kispiox TSA), both existing and recommended VQOs were modelled. Two sensitivity analyses showed that significant changes (detailed in section 6.18 of the 2007 *Analysis Report*) in VQOs produced less than a two-percent change in timber supply between all three options, due in large part to the flexibility afforded by the comparatively large THLB used in the analysis.

The base case spatial scenario (using 'Patchworks') also used existing and recommended VQOs. The results of this analysis showed periods where VQO limits and patch-size distribution targets could not both be achieved at the same time. However, district staff advise that this does not indicate the presence of error in the 'Woodstock' projection, for the following reason. In current practice in the TSA, provided VQO objectives are fully met operationally, the requirement to meet the exact percentage alteration limits that correspond to these objectives is applied in flexible correlation with the meeting of other, compatible objectives. For instance, the 'Retention' VQO requires licensees to 'manage viewscapes so that alterations are not visually apparent'. By careful management, licensees are able to accomplish the meeting of this objective by the strategic placement of WTPs or by small-patch clearcutting. Current practice results in an average of 10.9 percent of the area of each cutblock being retained in WTPs; while this is considerably higher than the FRPA requirement, it can be used to simultaneously incorporate the achievement of the VQO objective.

District staff consider that, by this means, more flexibility may be applied in meeting VQO objectives than was modeled. I agree, and I note that this flexibility offsets potential concern with the results of the spatial analysis. In context of the adaptive management applied operationally to meet the VQO objectives, the strict percentage alteration targets as applied in timber supply analysis may be seen as providing essentially a proxy for modelling a more complex and interactive means of achieving a range of objectives, practically, in the field, in combination.

From all of this, and noting the low demonstrated sensitivity to changes in VQOs, I conclude that the timber supply as projected both in the aspatial and spatial base cases adequately reflects current practice in the TSA with respect to the management of visually sensitive areas.

- recreation areas

Recreationally significant areas in the Kispiox TSA are extensive and include: provincial parks and ecological reserves; MFR recreation sites; sites of educational, cultural or historical significance such as archaeological sites, the Dominion Telegraph Trail, cultural trails and cultural features; viewscapes from major roads, rivers and lakes; recreational trails; and wilderness lakes.

In the 2007 timber supply analysis, all provincial parks and ecological reserves were spatially identified and excluded from the THLB. The MFR recreation sites are included within the UREPs, all of which were excluded from the THLB. For the Dominion Telegraph Trail, a 100-

metre buffer was applied to both sides, in respect of which 1346 hectares were spatially excluded from the THLB. Viewscapes from major roads, rivers and lakes were addressed as discussed in '*visually sensitive areas*'. Major recreational trail values are also maintained through VQO management, in respect of which a foreground 'Retention' VQO, and a background 'Modification' VQO were applied in the base case. For the only designated wilderness lake in the TSA, Gunanoot Lake, a 200-metre no-harvest buffer, encompassing 300 hectares gross area, was excluded from the THLB, with a 'Retention' VQO modelled for its foreground and a 'Partial Retention' VQO for the background.

From considering these measures I conclude that adequate exclusions and management objectives were applied in the base-case analysis to address known recreational features.

- cultural heritage resources

Cultural heritage features in the Kispiox TSA include traditional use sites and archaeological features. The locations of known features and of areas with cultural heritage resource potential have been compiled into a Cultural Heritage and Archaeological Resources Inventory (CHARI), which is an ongoing inventory that will be updated periodically as new information becomes available. The information was collected from archival research, First Nations elders, evidence presented in court cases such as Delgamuukw, traditional use studies, archaeological assessments, and reports by MFR field crews. The inventory information is recorded on maps which are used by district staff in reviewing forest development proposals.

Information on cultural heritage resources helps licensees and BCTS contractors to design, locate and time forest management activities to protect cultural heritage resources. Modifications to management activities include avoiding certain areas, incorporating features into buffered reserves, excluding areas from block boundaries, and deferring or ceasing harvesting. In this way, most cultural heritage resource values are able to be accommodated without incurring specific additional reductions to the THLB. Licensees are now also committing to a post-Forest-Stewardship-Plan process of reviewing blocks and roads with First Nations, to verify the locations of cultural heritage resources and to develop protection measures. The MFR is committed to reviewing the CHARI with First Nations, in order to develop appropriate management and protection strategies. Once these strategies are established, district staff will be better able to assess any potential for impacts to the timber supply.

In input to the timber supply review process, the Gitxsan and Gitanyow First Nations both advised that the base-case analysis does not adequately consider their cultural heritage resources. They noted that their interests go well beyond individual features and include maintaining landscape-level values for biodiversity, wildlife, fish and water, such that collaborative landscape-level planning is required.

Skeena-Stikine Forest District staff consider that both operationally and in timber supply analysis, some aspects of cultural heritage resources are better addressed than others. Staff note the successful work with the Gitanyow in producing the Gitanyow land use plan, which led to the incorporation of significant elements of the plan, including the extent of the operable landbase, in the base case. On the other hand, the Gitanyow have advised that clear-cut harvesting has resulted in the 'loss of numerous traditional use sites including 65 cabins, damaging or altering many areas where traditional uses were conducted', which indicates a need for the Gitanyow, MFR staff, and licensees to collaborate actively to identify areas and features of particular concern, so that specific preventive or mitigative measures can be designed.

District staff also note in respect of the Gitxsan input that the MFR is proceeding with joint watershed planning in the Gitsegukla watershed over the next year, and is hoping to commence similar planning for other watersheds once a process is piloted and agreed to. As a first step in

this landscape level planning, MFR is producing watershed atlases for the nine administrative units defined by the Gitxsan. One of the maps in each atlas identifies known cultural heritage resources and is expected to provide a basis for communication during watershed planning on other features that can be added to the CHARI for consideration in future timber supply reviews.

Ideally, emerging information on aboriginal interests will be considered operationally by licensees and by BCTS planners, and all such information will then contribute to AAC determinations through the ongoing, iterative, timber supply review process. My assessment of progress toward this situation at present is as follows. Up to the present date, managing for cultural heritage resources has not required specific exclusions from the THLB, since adequate protection has been provided by overlap with areas already removed to meet other objectives, such as riparian management, and the 10.9 percent of each cutblock area set aside for WTP management. These provisions are already accounted for in the base case projection. However, other First Nations interests have also been identified, notably with respect to the maintenance of Forest Ecosystem Networks, and known Goshawk habitat. From this it is reasonable to expect that when the CHARI management strategies are fully established, some reductions to the THLB may be required to meet the evolving identification of cultural heritage resource values.

An indication of the related implications may be drawn from the following. Representatives of the Gitanyow First Nation have affirmed to me personally, in a meeting on September 10, 2007, that the protection of the Forest Ecosystem Networks (FENs) on their traditional territory in the TSA, as identified for the significant water courses in the Gitanyow land use plan, would effectively cover their concerns for cultural heritage values. Further, they have formally requested that this be taken into account in the current AAC determination. This landscape-level planning has been an important part of the ongoing consultation and accommodation of Gitanyow interests by MFR and will also form an important component of the SRMP process for the whole traditional territory of the Gitanyow, toward which they are currently working with the ILMB. The SRMP includes consideration of the establishment of legal objectives derived from the already completed landscape-level planning. I note that licensees are already beginning to include elements of the Gitanyow land use plan in their own operational planning and current practice. For all of these reasons, I consider the request by the Gitanyow for the current AAC to account for the identified FENs, and thereby also for the cultural heritage resources, to be a reasonable extension of the productive ongoing collaboration between all parties.

The quantified implications of this consideration for timber supply are as follows. The Gitanyow plan identifies 6761 hectares of ‘no-harvest’ core area in their traditional territory on the THLBs of the Kispiox and Cranberry TSAs associated with the identified ecosystem networks. A further 4193 hectares of THLB in the two TSAs are identified as a special management zone requiring low-impact harvest in which at least 75 percent of the forest cover must be older than 50 years at all times, effectively equivalent to a 200-year rotation. Since about 50 percent of the Gitanyow plan area overlaps the Kispiox TSA, a general accounting for the impact to Kispiox THLB requires a reduction of ½ x (6761 + 4193) hectares, about 5500 hectares or roughly 1.7 percent of the THLB. In combination with areas for which cultural heritage concerns were also expressed in association with known Goshawk habitat and the Alice Goode Water Catchment Area, this amounts to a total of roughly 2 percent of the THLB, net of overlaps, equivalent to an overall overestimation on these accounts of 19 540 cubic metres per year in the volume of timber projected in the base case to be available for harvest throughout the forecast period. This is consistent with my understanding of the expressed requirements for cultural heritage resources, and I have accounted for this overestimation in my determination as discussed in ‘**Reasons for Decision**’. Further references to cultural heritage resources, and to the Gitanyow Treaty Selection Lands, are included below in ‘*First Nations’ considerations*’.]

- botanical forest products

For the north-west portion of the TSA, the WBSRMP includes a legal objective to maintain sites that are of high-value for growing pine mushrooms. Mushroom sites greater than three hectares in size are mapped, and in the analysis at least 60 percent of the forested area in each mushroom site in the WBSRMP area was maintained at over 80 years of age.

The Kispiox LRMP also has a legal objective, to 'maintain mushroom resources and provide opportunities for sustainable harvesting of mushrooms'. Since inventories and strategies for managing pine mushroom habitat under the LRMP are still being developed, the related potential implications for timber supply were investigated through sensitivity analysis. In the sensitivity analysis, consistent with the Gitanyow land use plan, for all mapped mushroom habitat outside the WBSRMP, at least 50 percent of the forested area in each mapped site of over three hectares was maintained at a minimum of 80 years of age. For areas where mapping was unavailable, a spatial 'proxy' was developed and applied to forested polygons predicted as likely to contain pine mushroom habitat. This 'proxy' accounting included recognition that, since licensees in the Kispiox TSA are committed through Forest Stewardship Plans to mapping and protecting pine mushroom habitat, up to one-third of the needed area would be captured by WTP placement and was therefore already accommodated in the base case. Of the remaining two-thirds, which amounted to 17 709 hectares of potential pine mushroom habitat, 6 588 hectares or two percent were identified as being in the THLB. In the sensitivity analysis, to keep the required proportion of trees in this area at the higher indicated age, the area was placed on an extended harvest rotation—that is, the trees were not excluded from harvesting, but could only be harvested over a longer period of time than under the otherwise applicable management. The analysis showed that the application of the extended harvest rotation to the indicated area did not affect the timber supply projected in the base case.

I have carefully reviewed the assumptions applied in the analysis to account for management to maintain pine mushroom habitat in the TSA as required under approved planning, with respect both to the base case and to the sensitivity analysis. It is logical to expect that much of the mushroom habitat will be present outside the THLB, and that licensees will protect a significant portion of the mushroom habitat within WTPs and reserves when this habitat is encountered and mapped at the cutblock level. From all of this I conclude that, while the true, overall extent of pine mushroom habitat will only become known when comprehensive mapping is complete, for the purposes of the current AAC determination, each component of the accounting in the analysis has provided a reasonable representation of current management practice for this habitat, and the timber supply as projected in the base case forecast is therefore reliable in this respect.

- riparian management

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

For the 2007 Kispiox TSA timber supply analysis, riparian reserve zones and management zones for streams, lakes and wetlands were spatially mapped from 1999 GIS data using TRIM data for water features and slopes. Separate floodplain mapping projects identified high-, mid- and low-bench floodplain areas. In the 2002 analysis, high bench floodplains were 25-percent excluded, but in view of demonstrated harvest performance in these areas and new direction from the Kispiox Higher Level Plan Order, this constraint was removed for the current analysis. Thus low- and mid-bench areas were excluded from the THLB, while high- bench areas were assumed to contribute to the timber supply.

In the analysis, with the assumed zone widths and percentage reductions to RMZs adjusted for consistency with the FRPA, for RRZs, a total of 24 924 hectares were fully excluded from the THLB, and for RMAs, appropriate portions of 131 137 hectares were excluded, as detailed in Tables 24 and 25 of the analysis data package.

I have reviewed the assumptions applied in the analysis with respect to RMZs and RMAs, with district staff and the regional timber supply analyst, and I am satisfied that these assumptions are based on the best available information and are an adequate representation of current practice.

- *community watersheds*

The Kispiox TSA includes nine formally designated Community Watersheds: Chicago Creek; Dale Creek; Juniper Creek; Kits Creek; Quirmas Creek; Sikedakh Creek; Station Creek; Ten Link Creek; and Two Mile Creek.

In the 2007 timber supply analysis, based on the hydrologic stability concepts in the 1999 *Watershed Assessment Procedures Guidebook*, the modelled disturbance in community watersheds was not allowed to exceed a maximum equivalent clear-cut area (ECA) proportion of 30 percent, and a minimum hydrological green-up height of 6 metres was applied.

I am satisfied that modelling the permitted disturbance in consistency with this guidebook has ensured that adequate provision for the maintenance of water quality in community watersheds was incorporated in the base case timber supply projection.

- *hydrological integrity and water quality*

The Kispiox LRMP includes a legal objective to protect the hydrological integrity of watersheds and to maintain water quality and quantity for users, including fisheries. A 2006 Level-1 Interior Watershed Assessment Procedure (IWAP), prepared for the Kispiox Expert Water Panel, identified maximum ECA levels in 127 watershed sub-basins, ranging from 20 to 30 percent of the total sub-basin areas. The IWAP also identified threshold values for other indicators of hydrological integrity. A recent inventory of critical fish stream reaches for spawning and rearing indicated a large number of critical streams in the TSA which may become identified by MOE as Fish Sensitive Watersheds or as Critical Fish Streams. The WBSRMP sets legal objectives and maximum ECA levels in several watersheds, ranging from 15 to 30 percent of the total watershed area.

In the 2007 timber supply analysis base case, except for the constraints that were applied to riparian areas and community watersheds (as discussed earlier), no constraints were modelled to protect the hydrological integrity or water quality in watersheds in the TSA. Instead, an aspatial sensitivity analysis was performed in which maximum permissible ECA levels were enforced across the TSA. In this analysis, for the sub-basins in the WBSRMP area, the ECA levels specified in the plan were used, and for the remaining sub-basins in the TSA, the levels identified in the IWAP were applied. This sensitivity analysis showed that enforcing the maximum permissible ECA levels had no impact on the timber supply projection. A spatial water quality scenario was also analysed in which the maximum permissible ECA levels were enforced spatially in combination with the patch size distribution targets (see below, '*landscape-level biodiversity and old-forest retention*'. The results showed that adding the maximum permissible ECA levels also had very little effect in this analysis.

District staff acknowledged that these results may be due in part to the flexibility in the short-term harvest schedule resulting from high levels of mature growing stock in the TSA, and in part to the extent of non-THLB forest cover in many watersheds. However, staff also expressed concern that the results of the analysis appear inconsistent with the presence of numerous risk factors to

hydrological integrity as determined through the IWAP process, for instance in the form of landslides, the density of roads and stream crossings, and the fact that disturbance in a number of watersheds now exceeds the ECA levels.

From this I conclude that, while the base case analysis appears to show that the timber supply is not directly constrained by the amounts of forest cover required to be retained in watersheds to maintain appropriate levels of hydrological integrity and water quality, in which case the modelling is adequate, nonetheless some uncertainty remains, and requires resolution, with respect to the noted risks and to the potential for the identification by MOE of Fish Sensitive Watersheds and Critical Fish Streams in the TSA.

For the purposes of this determination I will therefore provisionally accept the reliability of the base case with respect to issues of hydrological integrity, but as I have noted below in '**Implementation**', I also strongly recommend the continuation of work to identify the fisheries-sensitive watersheds in the TSA, and to comprehensively correlate the findings of the IWAP procedure with the modelling assumptions. In respect of this, I urge district staff to liaise with staff of MOE to enable the completion of related work, before the next timber supply analysis, to permit incorporation in the next AAC determination.

- *wildlife habitat and identified wildlife*

- *grizzly bears and ungulates*

The Kispiox LRMP (approved in 1996 and amended in 2001) and the 2004 WBSRMP which is designed to implement the objectives of the Kispiox LRMP and the 1995 Babine Interim Local Resource Use Plan within the area of the Kispiox Timber Supply Area, both require management to maintain grizzly bear habitat. Specifically, both require the provision of forest cover for security and bedding for grizzly bears, and prohibit or restrict logging in high value grizzly bear habitat.

In the 2007 timber supply analysis, 100-metre, forested buffers were placed spatially around all non-forested critical habitats greater than two hectares in high-value grizzly bear habitat complexes. In deriving the THLB, habitat provision resulted in the full exclusion of 9362 hectares of productive forest specifically for grizzly bears in the WBSRMP area, and the further removal of 12 253 hectares in respect of combined objectives for grizzly bears and mountain goats, under the Kispiox LRMP, in the rest of the TSA. Further constraints were also applied; of the 3037 forested hectares of the Big Slide Access Management Zone, 70 percent of the forest cover was required to be maintained at 70 years or older, and of the 5340 forested hectares of the Sperry/Rosenthal Shenismike West Access Management Zone, 50 percent of the forest cover was required to be maintained at 50 years or older.

For mountain goats in the WBSRMP area, the mapping of ungulate winter range (UWR) proceeding from the Kispiox Higher Level Plan Order (1996, amended 2002) did not take account of the overlap of 255 hectares (of the gross identified total 8173 hectares) of mountain goat habitat with the THLB, as now required by the subsequent (2004) UWR Order. For the rest of the TSA, the mapped goat habitat was correctly excluded from the THLB in the base case.

Mule deer winter range is being managed as mapped in the TSA, in which 40 percent of the forest cover is required to be maintained at older than 150 years, and this was reflected in the base case. No specific management constraints were applied in respect of the 49 502 hectares of moose winter range mapped in the TSA, which is consistent with the higher level plan.

I have accounted for the noted 255 hectares needed for mountain goats, jointly in the following section on Identified Wildlife.

- Identified Wildlife Management Strategy

'Identified wildlife' refers to two categories of wildlife designated by the Minister of Environment under FRPA. These categories are: (1) species at risk (i.e., species that are endangered, threatened, or vulnerable); and (2) regionally important species that rely on habitat that may be adversely impacted by forest or range practices on Crown land and that may not be adequately protected by other management strategies, such as those for biodiversity or riparian management. The establishment of these categories of species enables a number of provisions under FRPA to be used to manage habitat for identified wildlife; including Wildlife Habitat Areas (WHAs) and objectives, and General Wildlife Measures and objectives.

The provincial government announced its Identified Wildlife Management Strategy (IWMS) Volume I in February 1999. The IWMS Version 2004 contains an updated list of identified wildlife, updated species accounts, and updated procedures for implementing the IWMS. Government has limited the impact of management for identified wildlife to a maximum of one percent of the short term harvest level for the province.

The Kispiox TSA provides habitat for numerous red- and blue-listed species, as well as for the following Identified Wildlife species: Bull Trout; Sandhill Crane; Sharp-Tailed Grouse; Wolverine; Fisher; Grizzly Bear; and Northern Mountain Caribou.

The Ministry of Environment has proposed a WHA for grizzly bears for the Grizzly Drop rapids within the WBSRMP area, and district staff anticipate the ministry will bring forward further proposals for WHAs. Critical stream reach mapping is also underway to identify concentration areas for bull trout. It is just for these kinds of foreseeable habitat needs, beyond those already specified in higher level plans, that the one-percent accommodation for IWMS is intended to provide.

Having discussed this with district staff, and noting the numbers of red- and blue-listed species present in the TSA as well as the Identified Wildlife, and the fact that WHAs are already beginning to be identified the TSA, I conclude that managing for Identified Wildlife here can be expected to constrain the projected timber supply to the full extent of the one percent impact currently assigned to meeting this objective. I encourage staff of MFR and MOE, as I have noted below in '**Implementation**', to collaborate, with other agencies and licensees as necessary, to complete the work necessary to identify and spatially locate WHAs and other habitat requirements necessary to meet IWMS objectives, so that these may be modelled appropriately in the next timber supply analysis. The timber supply implications of managing for approved or proposed Identified Wildlife and species at risk were not modeled in the base case. For the Kispiox TSA, a one-percent reduction amounts to an overestimation of 3278 hectares to the THLB, which I have accounted for as noted below.

In public input, one First Nation expressed concern that timber harvesting has converted structurally diverse mature forests into simple young forests, such that large areas of the habitat required to support plants, birds, fish and animals that were traditionally used for sustenance and cultural purposes, have been lost, and will not be available for decades. In readily acknowledging the validity of this concern, I note that it is in good part to address these and related problems that strategic land use plans have been developed, which require the mapping of high-value habitat, ungulate winter ranges, WHAs, and sensitive areas, with the provision of legal objectives, indicators and targets.

In this determination, to properly account for the meeting of objectives for wildlife, the noted overestimations in the THLB used in the base case must be remedied, in the amounts of 255 hectares for mountain goats, and 3278 hectares for identified wildlife. This amounts to a total overestimation of 1.1 percent or 3533 hectares in the THLB, which corresponds roughly to a

10 747-cubic-metre-per-year overestimation in the volume of timber available to support the harvest levels projected in the base case for all time periods. I have accounted for this overestimation as discussed in '**Reasons for Decision**'.

- stand-level biodiversity and wildlife tree retention

Wildlife tree patches (WTPs) and coarse woody debris are important to the conservation of biodiversity at the forest stand level. The FRPA provides for the retention of wildlife trees in harvested areas.

The WBSRMP and the Kispiox LRMP Higher Level Plan Objective for biodiversity specify legislated targets for WTPs. Based on these targets, the required weighted average retention of WTPs is 3.5 percent of each cutblock area.

To account for WTP retention in the 2007 timber supply analysis, all the volume estimates for all forest stands on the THLB were reduced by 10.9 percent. This reduction was based on a silviculture review of operational practices conducted by MFR district staff in preparation for the 2002 analysis. MFR staff asked the DFAM licensees to research their recent harvest records and provide comment on current practices regarding the retention of WTPs. The licensees' internal review showed that the 10.9 percent figure more closely reflects operational reality than the figure derived from the legislated WTP retention targets.

As I have noted earlier, the somewhat higher level of retention of WTPs than that which is strictly required to meet stand-level biodiversity objectives, simultaneously contributes to the achievement of other important objectives including those for visual quality, for cultural heritage resource values, and for known and predicted pine mushroom habitat. For these reasons, I consider the percentage reduction applied in the analysis to be appropriately reflective of operational realities, and I conclude that in these respects the timber supply is adequately projected in the base case forecast.

- 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).

I will consider the adequacy of the modelling of landscape-level biodiversity objectives in the following five sub-sections, and conclude my findings at the end of the section.

1. <u>Cutblock adjacency and biodiversity objectives in the 'IRM area':</u>

   Those portions of the Kispiox TSA to which constraints for other objectives are not explicitly applied (e.g. for VQOs, wildlife habitat or community watersheds) are sometimes referred to as the 'IRM' zone. For the IRM areas, as I noted in '*forest cover requirements for cutblock adjacency and green –up*', the coming into effect of the Kispiox Higher Level Plan Order has replaced the former legislated defaults for maximum block size, adjacency and green-up, with landscape-level seral stage and patch size biodiversity objectives. These are now applied both in the WBSRMP area and the remainder of Kispiox TSA, except in the Cranberry Landscape Unit, where licensees currently manage to meet seral stage and patch size objectives. As I also noted in the 'adjacency' section, in the 2007 timber supply analysis, for the IRM areas, both the biodiversity objectives under the HLP Order, and the former, default, three-metre green-up rule for adjacency, were applied, leading to two overlapping constraints being applied

for the same purpose in these respects. Since a sensitivity analysis showed that increasing the adjacency constraint to five metres had negligible effect on the timber supply when modelled aspatially, I conclude that the adjacency constraint as modelled is not directly constraining on the projection. Therefore, while acknowledging the implicit potential for a small, related underestimation in timber supply, I am satisfied that the biodiversity objectives applicable to areas not otherwise explicitly constrained are adequately reflected in the base case.

2. The West Babine Sustainable Resource Management Plan

   The WBSRMP provides direction for landscape-level biodiversity management in the plan area. This includes direction for seral stage distribution targets, for preservation of old forest in Core Ecosystems, for landscape connectivity in Landscape Riparian Corridors, and for patch size distribution targets.

   For this area, in the timber supply analysis, specific seral stage distribution requirements were applied as listed in Table 45 of the analysis data package. In applying these requirements, the Core Ecosystems were correctly excluded from the THLB as required. However, legal constraints for Landscape Riparian Corridors were not addressed in the base case. These constraints require at least 70 percent of 6265 hectares of the THLB to be maintained in forest older than 80 years. Part of this constraint would be met in any case by areas excluded to meet riparian reserve requirements, and the likely concentration in this corridor area of contributions toward meeting old seral forest requirements would further offset any discrepancy in accounting. From my discussions with MFR district staff and the regional timber supply analyst, I am satisfied that any remaining overestimation in the timber supply from this oversight is very small, and is also offset by the small potential underestimation discussed in the immediately preceding factor, such that it does not introduce any significant error in the projected timber supply.

3. The Kispiox LRMP Higher Level Plan Order

   Old Growth Management Areas—'OGMAS': The Kispiox LRMP HLP Order of June, 2006 established nine landscape units in the TSA, all located outside the WBSRMP area. Each landscape unit includes spatially explicit OGMAS which, in the 2007 timber supply analysis, were appropriately excluded in deriving the THLB.

   'Early', and 'Mature-Plus-Old' seral requirements: The Kispiox HLP Order includes requirements for 'early' and for 'mature-plus-old' seral forest for each combination of landscape unit and BEC variant, as listed in Table 46 of the analysis data package, all of which were modelled, as listed, in the base case.

   Having reviewed the seral stage and OGMA requirements as listed in the data package, and having discussed the requirements with MFR district staff, I conclude that the base case accounts appropriately for these requirements.

4. Patch size distribution throughout the TSA

   In timber harvesting in BC as modelled in the 2007 Kispiox TSA timber supply analysis, a 'cut block' refers to the area from which timber is extracted, that is, the 'opening' made by a single harvest entry within a five-year planning period. A 'patch' is the opening that results from harvest activities in one or more planning periods and leads to the establishment of a contiguous stand, or group of stands, all being of the same natural disturbance type (NDT) and with no more than 15 years' difference in age. If a suitable distribution of patch sizes is created by harvesting, and maintained in the young regenerating stands, the same patch-size distribution will persist in the patches as they

grow through time and will eventually result in a distribution of older patches of various sizes suitable for meeting biodiversity objectives at the landscape level. This form of management is a requirement of both the Kispiox HLP Order, and the WBSRMP.

In the Kispiox TSA, operational management to create an appropriate distribution of patch sizes suitable for achieving biodiversity objectives in this way has been in effect since it was first required by District Manager Policy in 1998. The licensees in the TSA must manage patch sizes in conformity with the higher level plans, and have proposed working as a consortium to define what constitutes a patch operationally and to establish a tracking methodology to show over time how the patch targets are being met. The regional director of ILMB has stated that if patch size management impacts the timber supply to a greater extent than was contemplated at the time the HLP Order was made, then the order may be amended.

In the Kispiox HLP Order, and in the WBSRMP, patch targets are specified for combinations of landscape-unit-NDT, and watershed-NDT respectively. In analysing the related implications for the timber supply, the analyst was concerned that applying the patch distribution by combination in this way would lead to an apparent splitting of whole patches into discontiguous fragments across the boundaries of landscape units or watershed boundaries, with an implied underestimation in the true proportion of large patches available to meet the patch distribution targets. In the analysis, the targets were therefore applied only by NDT. District staff reported that, in operational reality, patch sizes are tracked for 40 years, instead of 15 years as in the model and that, in the case of patches crossing boundaries, the grouping of patches to the landscape unit-NDT combination in which most of the patch occurs, avoids any artificial splitting of patches.

The complexity of the problems that this factor presents for attempts to accurately project the timber supply is greater than space in this document permits me to describe in full. What is clear is that under the methodology used, which is not precisely reflective of operational practice, the analysis showed that patch distribution targets for NDT1 and NDT2 were projected to be achieved in almost all decades, while for NDT3, in two separate decadal periods, no large patches younger than fifteen years old would be present on the landscape. Reducing the harvest level in the NDT 3 would compound this problem, by reducing the opportunity to amalgamate young patches.

Having reviewed related issues in detail with MFR district and analysis staff, it is also clear that overlapping or interacting objectives between patch size distribution and, for example, VQOs and habitat requirements, create further uncertainties that must be resolved before timber supply projections can be expected to accurately reflect the operational realities of patch-size management. To help resolve these uncertainties, in the '**Implementation**' section below, I have recommended the following:

(i) before the next analysis, work should be undertaken to permit the incorporation of patch-size distribution targets based on landscape unit-NDT combinations;

(ii) analysis should be undertaken to assess patch-size distribution targets in relation to objectives for other values such as visual quality; and

(iii) more patch-size analysis work in general should be carried out, to increase understanding of the causal relationships between current conditions and harvest practices and the creation of desired future forest conditions.

For the present determination, I understand that current operational practice does include cooperative efforts by licensees to create a variety of patch sizes distributed across the landscape, and the best available analytical information indicates that an adequate

distribution of patch sizes is being achieved in NDT1 and NDT2 areas. For NDT3, the projected temporary absences of large patches of younger forest can theoretically be addressed by appropriate amounts of harvesting in suitable areas, but in any case, before any such corrective actions may be applied with confidence, the noted uncertainties in the modelling must be addressed by the work recommended above. At this time, I have no improved information or analytical output beyond the work of the base case analysis from which to presume an under- or over-estimation in the base case.

5. Disturbance in the non-harvestable land base

Natural disturbances in the forest cover on the non-harvestable land base, from fires, wind or insects, can affect the contribution made by this land toward the retained forest cover that is required to meet biodiversity objectives, and this in turn can affect the projected timber supply.

In the 2007 analysis for the Kispiox TSA, no attempt was made to represent the timber supply implications of disturbances on the non-harvestable forested land base. Instead, by default, all forest stands outside the THLB were assumed to continue to age indefinitely, eventually becoming included in the stands classified as older than 250 years.

In fact, on the landscape of the TSA today, the current age-class distribution of the forest as a whole is indeed heavily weighted to stands older than 250 years. This suggests that natural disturbances either do not occur on a large scale in the TSA—at least in part due to effective fire prevention programs—or the outcomes are not captured in the inventory.

A sensitivity analysis was performed to examine the potential impacts of introducing natural disturbance in the non-THLB portion of the Crown forested land base, including provincial parks. To achieve this, natural disturbances levels were applied randomly by BEC zone, based on the mean disturbance return intervals specified in the Biodiversity Guidebook. The results of this analysis showed that, when these levels of disturbance were applied to the non-THLB portion of the land base in the TSA, the initial harvest level in the base case could only be maintained for 40 years, instead of 50 years in the base case, the overall projected timber supply volumes were reduced by 13 percent in the mid and long terms, and the projected sawlog harvest volumes were reduced by five percent in the short and mid terms, and by 17 percent in the long term.

These results are indicative of the implications for the projected timber supply if the natural disturbance levels predicted for the NDTs in the TSA were to occur as indicated in the *Biodiversity Guidebook*. The significant impacts indicate how in modelling the timber supply, old forest cover must be sought more often on the THLB, to make up for the now disturbed cover outside the THLB that would otherwise have contributed to meeting biodiversity requirements.

In current operational reality, the non-THLB landscape in the TSA shows much lower levels of disturbance than assumed in this modelling scenario. Evolving forest management policies may include less exhaustive application of the fire prevention programs that historically have prevented disturbance on non-THLB lands, such that patterns of disturbance may again emerge on the landscape, notably in parks. This would indicate that the level of disturbance to be expected outside the THLB is likely to be higher in operational reality than the zero disturbance modelled, although the actual future extent of course remains uncertain. In assessing the related overestimation in the base case projection, therefore, I have been guided by the outcome of the sensitivity analysis as follows. With the help of analysis staff I have determined that if the implications of the disturbance in the non-THLB are accounted for equally in all time

periods, the maximum reduction in the volume of timber available to support the harvest in the short term is reduced by roughly 10 percent. Recognizing the noted uncertainty, I have decided to account in my determination for a mid-range value of 5 percent, which corresponds to an overestimation of roughly 48 850 cubic metres per year in all time periods.

From my considerations for the above six sub-sections on landscape-level biodiversity I conclude as follows. (1) A potential but essentially negligible underestimation from the application of two overlapping adjacency constraints to the 'IRM' areas of the TSA is offset by (2) the required but omitted modelling of constraints for Landscape Riparian Corridors in the WBSRMP. (3) The OGMAS and the 'Early' and 'Mature-Plus-Old' seral requirements were correctly modelled to reflect the Kispiox LRMP HLP Order, requiring no further adjustment. (4) Patch-size distribution targets appear achievable in NDT1 and NDT2 areas, but are questionable in NDT3 areas, although at present I do not have evidence of any quantifiable under- or overestimation in the base case. In respect of related uncertainties I have recommended that specific work be done as noted in the '**Implementation**' section. I have also noted that if patch size management proves to impact the timber supply to a greater extent than was contemplated at the time the HLP Order was made, the Regional Director of ILMB may amend the order. (5) The lack of modelling of disturbance in the non-operable land base has led to an overestimation in the base case projection of the timber supply in the amount of approximately 48 850 cubic metres per year, in all time periods, as accounted for in '**Reasons for Decision**'.

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

Other information

- strategic land use planning and objectives

Forest management in the Kispiox TSA must be consistent with legislative direction and objectives specified in a number of higher level plans.

Specifically, for the TSA in general, the preparation of Forest Stewardship Plans (FSP) must be consistent with:

1) The Kispiox Land and Resource Management Plan, April 1996, Amended March 2001, under which Forest Stewardship Plans must address the objectives identified in the District Manager's clarification letter of February 20, 2006. The Kispiox LRMP was one of the first strategic land use plans in the province. With more initial emphasis on higher level strategic direction than on operational direction, preparations for the 2002 analysis included implications of the LRMP that were subject to differences of interpretation; however, District staff advise that from subsequent work with licensees and other agencies, the practical direction proceeding from what are now higher level plan legal objectives is generally well understood.
2) The Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality, and Wildlife, January 2006.
3) The Dominion Telegraph Trail Management Plan, May 2000.
4) The Botrychium Basin Sensitive Area Plan, March 2002—this area was never legally established as a sensitive area, but has been included and effectively protected within an OGMA.

For the West Babine Landscape Unit:

1) Xsu gwin lik'l'inswx, the West Babine Sustainable Resource Management Plan, 2004. The WBSRMP guides land and resource use and is intended to provide for long-term sustainability of natural resources, jobs, and communities in the West Babine area. The plan is an ecosystem-based management plan which is intended to implement the objectives of the Kispiox Land and Resource Management Plan and the Babine Interim Local Resource Use Plan in the Kispiox TSA through adaptive management. The best available knowledge was used to create the plan, and as more information, or better inventories become available, the plan may be modified as required.
2) An Order to Establish the West Babine Landscape Unit and Objectives and to vary the Atna/Shelagyote and Babine River Special Management Zone Boundaries, August 1, 2004.

For the Cranberry Landscape Unit:

1) Draft 'Landscape Unit Plan for all Gitanyow Traditional Territories within the Kispiox and Cranberry Timber Supply Areas'.
2) Order to Establish a Sensitive Area and Objectives for the Mill Creek watershed (117 hectares), effective June 15, 1999.

A new Mountain Goat Ungulate Winter Range Order came into effect for the Kispiox TSA (and Cranberry TSA) on July 23, 2007.

In various sections of this document I have considered the extents to which objectives and requirements proceeding from higher level plans have been represented in the timber supply analysis. A list of specific, geographically defined areas excluded from the THLB as a result of changes to special management zones in particular plans is provided in Table 26 of the timber supply analysis data package, which I have reviewed with MFR district staff.

From my review and discussions with MFR district staff, I am satisfied that the strategic planning initiatives governing aspects of forest operations in the TSA are, in general, as qualified by considerations elsewhere in this document, adequately represented in the base case.

- *First Nations' considerations*

As chief forester of British Columbia, I must consider information from First Nations respecting aboriginal interests and treaty rights that may be affected by AAC determinations.

- *consultation*

Five First Nations have asserted traditional territories within the Kispiox TSA. These are the Gitxsan First Nation, which asserts a territory covering the entire TSA; the Gitanyow First Nation; the Office of the Wet'suwet'en (and the Moricetown Band); the Lake Babine Nation (and the Fort Babine Band); and the Kitselas First Nation. All of these First Nations are at Stage four of the Six-Stage Treaty Process. I have reviewed the forms of agreement currently in place between the Province of British Columbia and each of these First Nations, and the associated required consultation protocols. From my review of, and from my personal participation in, the process of consultation, which is described next, I consider that the activities required to fulfil consultation commitments under these agreements were engaged in appropriately, as were additional activities to accommodate specific requests by First Nations.

The process for engaging First Nations in consultation in the Timber Supply Review process leading to this AAC determination was as follows. On September 28, 2005, Timberline Forest Inventory Consultants, acting on behalf of the Kispiox Defined Forest Area Management (DFAM) Committee, mailed a letter to the Gitxsan Chief's Office; the Gitanyow Chief's Office;

the Office of the Wet'suwet'en; the Lake Babine Nation; and the Fort Babine Band Council. Included with the letter were a printed hard copy of the draft data package, a copy of MFR's *Timber Supply Backgrounder*, a copy of MFR's *DFAM TSR Information Sheet*, and a copy of MFR's *DFAM and TSR Frequently Asked Questions*. The letter also notified recipients of a website for downloading a digital version of the data package as well as related maps and background documents, offered a meeting including appropriate government staff to discuss related interests and concerns, and encouraged the submission of written comments by November 30, 2005.

An advertisement was placed in the September 28, 2005 issue of the *Smithers Interior News* newspaper, announcing the commencement of the 60-day Timber Supply Review (TSR) review period for First Nations (and for the general public). As part of the review period, on November 28, 2005, an open house was held in Hazelton, with invitations sent by mail and e-mail to all First Nations and to individuals and groups of the general public, on the MFR contact list. In attendance were representatives of the MFR Skeena-Stikine Forest District and the Northern Interior Forest Region, as well as a representative from the MAL.

On March 28, 2007, letters developed in coordination with the Skeena-Stikine Forest District First Nations Officer, were mailed to a broad list of First Nations and public stakeholders including, municipalities, environmental groups and recreation groups, together with printed hard copies of the timber supply analysis report and other related attachments. Follow-up reminder letters were sent on May 8, 2007 to the Gitxsan Treaty Office; the Gitanyow Chief's Office; the Chief at the Kitselas Band Office; the Chief of the Lake Babine Nation; and the Chief of the Wet'suwet'en. The letters requested feedback by May 28, 2007, although comments beyond May 28 were subsequently allowed. Further letters with TSR background materials were mailed to the 41 Gitxsan House Chiefs identified by the Skeena-Stikine Forest District Office and the Gitxsan Treaty Office, directing recipients to the Gitxsan Treaty Office for a copy of the analysis report.

An advertisement was placed in the *Smithers Interior News* on March 28, 2007, announcing the commencement of the 60-day review period and the April 23, 2007 open house. A representative of Gitxsan Forest Enterprises attended the open house.

Additional consultation measures included the following. On May 9, 2007, the DFAM analyst and MFR staff provided a presentation on the TSR process at a Gimlitkwit forum with the Gitxsan Treaty Society. On May 17, 2007, MFR district staff provided a presentation at a meeting held with the Gitanyow Resource Council. On July 2, 2007, the Gitanyow Hereditary Chiefs sent a response to the TSR information to MFR. On July 25, 2007 in the Gitxsan Treaty Office in Hazelton, MFR district staff provided presentations on the TSR process to the following Watershed Facilitators: Gitsegukla, Lower Skeena, Babine/Sustut, Suskwa, Nass, Mid-Skeena, Upper-Skeena, and Kispiox, for use in discussions with the house chiefs. On August 15, 2007, MFR district staff also made similar presentations to the Kispiox and Mid-Skeena Watershed Facilitators and Chiefs, again at the Gitxsan Treaty Office in Hazelton. On August 22, 2007, the Gitxsan Treaty Society sent a letter to the chief forester outlining positions and concerns. On September 10, 2007, as chief forester I met with the Gitanyow Hereditary Chiefs, who provided me with a written brief, and further input during direct discussions. On that day I also received a package of information from and engaged in discussions with representatives from the Gitxsan Treaty Society.

The main points arising from all of the consultations with First Nations, and the manner in which I have addressed them in my determination, are as follows.

- *jurisdiction*

First Nations disputed the jurisdiction of the Province to determine AACs in territories where claims have been asserted, since the Delgamuukw decision interprets aboriginal title as encompassing the right to *exclusive* use and occupation of the land, and the right to *choose* to what uses the land may be put.

In response, Section 8 of the provincial *Forest Act* requires the chief forester to determine an AAC every five years, for this and every TSA in the province. The Supreme Court of Canada decision in *Haida* outlined obligations for consultation with First Nations prior to establishment of aboriginal rights and title. In determining each AAC I must consider relevant information from First Nations respecting aboriginal interests and treaty rights that may be affected by my decision. In this determination I have carried this out to the best of my ability; nonetheless, I have no authority under which to avoid making the determination itself.

- *participation in Timber Supply Review*

Concern was expressed that consultation provides only for involvement *after* preparation of the data package and analysis, and not for involvement in *designing* the TSR process itself.

While acknowledging that it is likely always possible to improve processes for engagement, I am advised that opportunities were provided to local First Nations for early involvement in the TSR, such as in the preparation of the data package, which would have provided opportunity for designing the analysis. However, there was little response in 2005 to those opportunities. During consultation at the data analysis stage, district staff responded to First Nations' concerns about making the TSR process and information more meaningful by tailoring the information provided to First Nations' requests. District staff are ready to engage in an ongoing review of the timber supply information and other forest management information with First Nations, and this will be facilitated through the watershed planning activities and other elements of the TSR implementation plan which will involve First Nations. A number of First Nations, including those with signed agreements in the Kispiox TSA , have agreed to participate in the TSR process in a timely way. At the provincial level, representatives of the MFR Forest Analysis and Inventory Branch have met with the First Nations Leadership Council in an effort to design acceptable participation roles for TSRs.

- *administrative boundaries*

Some First Nations feel unable to evaluate the TSR analysis adequately because its information is applicable to the TSA as a whole rather than to specific house territories and watersheds. Requests were made for resources to complete further analysis within traditional territories, and for the creation of a territory-specific Timber Supply Area and Forest District.

In response, MFR district staff note that the reorganization of landscape units within the TSA over the past few years to coincide with watersheds with administrative boundaries defined by the Gitxsan and Gitanyow has already enabled some prediction of the harvest levels within individual First Nations' watersheds. The MFR will work with First Nations to procure resources to support analysis of timber supply on specific areas identified as traditional territories. While recognizing the desire of First Nations for timber supply information on their traditional territories, the *Forest Act* provides me with the responsibility for determining AACs for entire TSAs. If management units are altered or treaty settlements are reached that change boundaries of the TSA, such changes can be incorporated into future timber supply reviews.

- loss of diverse forest structure

First Nations are concerned that structurally diverse mature forests have been converted to simpler young forests, resulting in the loss of large areas of habitat required to support plants, birds, fish and animals that were traditionally used for sustenance and cultural purposes, as well as the loss of traditionally used medicinal plants and berries .

I have noted this concern also in '*wildlife habitat and identified wildlife*' where I responded that it is in good part to address these and related problems that strategic land use plans have been developed, which require the mapping of high-value habitat, ungulate winter ranges, WHAs, and sensitive areas, with the provision of legal objectives, indicators and targets. Significant accommodations have been made for habitat for Grizzly Bear, Mountain Goat, and Identified Wildlife, as well as exclusions for riparian areas, wildlife tree patches and more; related considerations are presented in '*landscape-level biodiversity and old-forest retention*'. The maintenance of suitable local conditions for berries and medicinal plants will require collaboration between First Nations, MFR staff and licensees in watershed planning.

- over-harvest of sawlogs

First Nations expressed concern that the inclusion of all merchantable volumes in one AAC while the actual harvest has focussed on stands of higher value and lower cost has left the remaining forest less valuable. It was recommended—although as noted earlier a First Nations' licensee expressed a contrasting view—that the low grade timber profile should be partitioned for a separate harvest or excluded from the AAC determination.

I have addressed this and related issues in the section '*harvest profile*'.

- uncertain socio-economic benefits and impacts

First Nations are concerned that the benefits associated with timber allocation and harvest within their traditional territories are unknown, since the Socio-Economic Report is produced for the TSA as a whole.

Similar to the analysis problems noted above, this issue is also attributable at least in part to differences in administrative boundaries. The MFR has offered access to timber resources through forestry agreements with some local First Nations, and it is hoped that this will result in successful participation in the industry with corresponding employment and economic benefits.

Socioeconomic concerns: First Nations also point to bankruptcies, high unemployment, and the difficult general economic status of the area as reasons to keep opportunities and benefits local, and as evidence of a need for changes in forest legislation and policy to develop a sustainable forest industry in the Kispiox TSA.

In my experience these issues have been a challenge in the northwest sector of the province for many years. My authority in considerations under section 8 of the *Forest Act* does not extend to apportionment or allocation of the harvested volumes, which are the responsibility of the Minister of Forests and Range. The ministry is well aware of the problems and continues to work with the local forest industry, which includes increasing participation by First Nations, toward achieving and maintaining profitability. Through the forestry agreements, the MFR, the Gitxsan and the Gitanyow have engaged in collaborative delivery of silviculture and watershed enhancement activities, resulting in increased employment.

First Nations asserted that maintaining the highest value of forest stands for future generations should include, as well as good fibre utilization and waste reduction, other, innovative ways to gain more benefits per hectare from the forest, through such means as bio-energy, carbon credits, specialty products, and non-timber forest products. In fact, all of these opportunities for

diversification in products from forests are currently under consideration within government and with stakeholder groups as options for future forests in BC. Suggestions from First Nations for implementation would be welcome.

The Gitxsan First Nation provided me with a copy of its 2005 Sbagayt Gan policy statement which includes 88 separate statements indicating how the Gitxsan would manage forests. Some aspects of this policy statement are expressed and addressed in the above paragraphs. Others—such as watershed planning, and protecting riparian areas, cultural heritage resources and recreation features, for example, as well as avoiding pesticides—overlap current MFR policy and management practices as already applied in the Kipsiox TSA to various extents, and as such have been taken into account as documented in this AAC determination. Along with the current process for allocating harvesting rights, a short-term forestry agreement exists between the Province and the Gitxsan, in relation to which I expect the Gitxsan policy statement to continue to be a subject of ongoing discussion between the Gitxsan and MFR. I also expect that the outcomes of these discussions will manifest in more detailed watershed planning, and any implications of the results of such planning for timber supply will be taken into account in a subsequent AAC determination.

Gitxsan Forest Enterprises advocated in particular not reducing the level of timber harvest at this time, until the company has a better sense of economic factors affecting the viability of the forest industry in the area. I have also noted this in 'Local Objectives', below.

- *domestic wood—the 'Sappier' decision*

The December 7, 2006 decision in the Supreme Court of Canada confirmed the aboriginal right to the harvesting of wood for domestic purposes on Crown land traditionally used for that purpose by specified First Nations. The MFR and the Gitanyow First Nation have formed a working group under the Joint Resource Council to analyse options for sustaining domestic timber needs for the Gitanyow, in anticipation of developing a related agreement. Staff are also working on an agreement with the Gitxsan to provide for analysis of domestic needs and sustainable access to cedar and other timber. (First Nations' cedar requirements are considered below, in the section '*cedar sustainability'*.)

The implications for timber supply of the relatively recent Sappier decision, and the related studies and activities, are currently unquantifiable pending conclusion of the noted work. Nonetheless, to reflect the requirements of the Sappier decision, domestic-use requirements will need to be taken into account when deriving the THLB for consideration in future AAC determinations for the TSA. For the current determination, I have assumed that domestic use requirements result in a currently unquantifiable overestimation in the volume of timber supporting the base case projection, and that this is accounted for in the short term in my consideration of the Gitanyow Treaty Selection Lands, which follows next, with further accounting to follow in future determinations in respect of other First Nations, as information becomes available. As in the situation with First Nations cedar requirements, discussed below in '*cedar sustainability*', I anticipate that domestic timber requirements should be manageable operationally until information on spatially identified areas becomes available for incorporation in the next timber supply analysis.

- *Gitanyow Treaty Selection Lands*

Licensees, MFR district staff, and BC Timber Sales are all currently avoiding locating any harvesting activities in any area within what are identified as the 'Gitanyow Treaty Selection Lands'. These areas have not yet been officially withdrawn from the TSA, but they have been identified and formally offered to the First Nation in treaty negotiations with Canada and the province. The current 'log-around' is essentially informal, pending definition of the legal status

of the lands, and under strict application of my 'Guiding Principles' as set out earlier in this document I might not account for a reduction in the timber supply contribution to the TSA from the lands, prior to an official change in their designation. However, in this particular case, since the land selection offer has already been formally made, and since it is now current practice to avoid all harvesting in these areas, I have concluded that it is now most reasonable to expect that these areas will no longer contribute to the timber supply in the TSA.

In the base case analysis, these lands were assumed to contribute in full to the timber supply. The lands cover 4238 hectares or 1.2 percent of the THLB, none of which overlaps with any area already excluded from contributing to the THLB for other objectives. In my determination, therefore, as noted in '**Reasons for Decision**' I have accounted for an overestimation to this extent in the THLB, which is equivalent to an overestimation of 11 724 cubic metres per year in the volume of timber supporting the base case harvest projection in all time periods.

- *concentration of harvest*

First Nations submitted that the rate of harvest should be reduced in watersheds which they consider to be currently over-harvested. I have noted throughout this document the range of operational constraints in place which limit harvesting to meet various objectives. In particular I have addressed concerns related to the hydrological integrity in watersheds, in '*hydrological integrity and water quality*', above, where I noted that ECAs (equivalent clear-cut areas) have been established for 127, almost all, of the watersheds in the THLB. In that section, I strongly recommended the continuation of work to identify sensitive watersheds and to correlate the findings of the IWAP procedure with the modeling assumptions for future timber supply reviews. I have also urged district staff to liaise with staff of MOE to complete related work before the next timber supply review analysis, to permit incorporation in the next AAC determination. The concentration of harvest in particular areas in the TSA is further addressed below, in '*harvesting in remote areas*'.

- *cedar sustainability*

First Nations depend on the use of cedar for many aspects of cultural tradition and sustenance. Cedar is used for totem poles, log homes, traditional clothing, masks, bent boxes, and baskets. Some of the products require that trees grow to over 150 years of age. MFR District staff are attempting to determine the amount of cedar necessary to meet the traditional needs for the Gitanyow First Nation of 369 people. A preliminary estimate of 1000 cubic metres per year has been derived to date, and by this measure, the Gitxsan, with roughly nine times as many people, could require an estimated 9000 cubic metres per year, for a total of 10 000 cubic metres per year. These figures are provided as a rough estimate of the volumes which may be required for domestic and cultural purposes; further work will be required to refine them in future with the First Nations involved.

Industrially, cedar wood is currently a very valuable commodity, on which many local Kispiox TSA mills depend for survival during poor markets for other species. Between 1995 and 2006, cedar maintained a value more than double that of hemlock and balsam. Billed volumes from that period indicate the average industrial use of 35 057 cubic metres of cedar per year in the Kispiox TSA. This indicates a total potential demand for cedar in the TSA, by industry and First Nations, of about 45 000 cubic metres per year. Inventory figures show that the maximum sustainable production of cedar in the TSA (based on the LRSY, or long-run-sustained-yield with no accounting for constraints for other management objectives) is only 22 350 cubic metres per year, and that, at current harvest rates, mature cedar volumes in the TSA will be depleted in 60 years.

In the timber supply analysis, no specific measures were taken to allow for either uninterrupted traditional use or a sustainable even flow supply of cedar for industrial harvest.

For district staff, the management of cedar in the TSA has emerged as a priority for which three options have been identified. Option 1, the 'status quo', is to continue to allow the harvesting of cedar at an uncontrolled and unsustainable rate, subject to the overall AAC which controls the harvest rate of all species combined. Option 2, the 'status quo plus', permits the harvesting of cedar to continue at an uncontrolled rate while: (1) carrying out a VRI and PEM to improve inventory and related information for incorporation in cedar supply projections in the next timber supply analysis, which would also potentially incorporate climate change models; (2) continuing the MFR Research Ecosystem Recovery Program; (3) developing a cedar silviculture strategy with First Nations and licensees; and (4) better determining First Nations' needs for cedar as well as establishing a mechanism for them to obtain the cedar. Option 3, the 'partition', would be to attribute in this AAC determination a volume no higher than the even-flow sustainable level of 22 350 cubic metres per year to the harvest of cedar. This option would include establishing a minimum stocking level for cedar at the free-growing stage and would take into consideration the potential implications for cedar availability from climate change models.

In public input, both Gitanyow and Gitxsan First Nations expressed belief that cedar has been harvested at an unsustainable level historically, and the current high prices are likely to allow the over-harvest to continue into the future. The Gitanyow requested development of a cedar strategy, and that time and resources be provided to develop a Gitanyow harvest level and regulatory framework. The Gitxsan recommended that the AAC determination take protection measures for cedar into consideration.

British Columbia Timber Sales, noting that parts of the milling industry depend heavily on cedar, questioned the information used in analyzing the sustainable cedar harvest, and the practicality of partitioning the harvest for one species, suggesting that the inventory contains enough cedar to meet First Nations' needs. Suggesting that a silviculture strategy be implemented, BCTS noted that its current practice is to protect cedar during silviculture treatments in managed stands and to use alternative harvesting methods to maintain cedar. BCTS stated that these practices should be reflected in analysis, and also noted that lengthening the rotation of cedar to achieve the requirements for First Nations and for quality cedar sawlogs would increase silviculture costs and reduce the AAC.

In response, it seems clear that the proportionate contribution of cedar to harvests in the TSA is now greater than the cedar content in inventory. I agree with First Nations and BCTS that a silviculture strategy is required to evaluate the sustainability of cedar. More work is needed to improve the cedar inventory, particularly since cedar is seldom the predominant species in a forest stand in this TSA. While the current estimate of cedar volumes is as accurate as the current inventory permits, the sustainable harvest rate may in fact be somewhat lower than indicated above by the theoretical figure for the LRSY, which does not account for constraints imposed on the harvest by management for multiple forest values.

Clearly further action is needed to ensure cedar is sustained in the TSA both as an economically valuable species and for First Nations' cultural uses. This action must address the fact that cedar harvests are currently above cedar contribution to the inventory, and must provide for the adequate regeneration of cedar in new or existing forests, to sustain or increase the harvest over the longer term. Cedar has been and remains a cornerstone in the economic viability of local industry, maintaining its high value through poor markets for other species. However, growing in the Interior Cedar Hemlock and Coastal Western Hemlock forests as a less predominant species, cedar does require special management, particularly in view of the importance of certain characteristics to First Nations. I therefore fully agree with the need to develop a strategy for its

management in this TSA. With the goal of maintaining cedar as a sustainable resource in the TSA, this strategy should incorporate and address considerations of ecological diversity; silviculture, including regeneration and harvesting methods; economic factors; geographic location; and First Nations' cultural heritage.

For the short term, to address the disproportionate harvesting of the cedar profile, I have examined and discussed with district staff the possibility of attributing a specific portion of the AAC to the harvest of cedar alone. This immediately raises a number of very difficult administrative issues beyond my purview whose outcomes may significantly affect the success of this approach toward remedying the problem. Access to certain areas must be guaranteed for some licensees while potentially being denied to others, while certain areas may possess desired characteristics and some not. Legal instruments would need to be drawn up to define and provide selective access to given areas, perhaps even to particular forest polygons comprising for instance a defined fraction of the cedar component to satisfy requirements under the Sappier decision. A defined area may need to be identified for the Gitanyow, and also for the Gitxsan. Such areas can be identified to some extent at present, but reflecting them meaningfully, now, in an enforceable partition within this AAC determination, prior to a legal basis for the land use, is less readily achieved. The cedar harvest could be planned and accounted for at the cruise level, before cutting permits are issued to licensees, but it is the Gitxsan people, as distinct from the Gitxsan licensee, the tenure holder, to whom the Sappier decision pertains.

In this complex situation, a workable path may be to take an evolving approach that provides for management options for the short term while progress is made in identifying the geographical areas needed to accommodate the Sappier requirements, which can then be spatially identified in the timber supply analysis. This could be followed, if appropriate, by the partitioning of the remainder of the cedar component, for apportionment among the licensees by the Minister of Forests and Range. Meanwhile, since the inventory indicates a standing volume of roughly two million cubic metres of mature cedar on the THLB, a further five years of harvesting could reasonably be achieved at the projected level of 45 000 cubic metres per year without incurring significant additional overall risk, while work proceeds on the development of a comprehensive strategy to resolve operationally all of the issues identified in these considerations. The strategy would then be modelled in the next analysis, along with the spatial location of any areas specifically excluded for use by First Nations, to achieve a full accounting, including consideration of detailed information on the actual levels and locations of cedar harvesting, in the next AAC determination.

To that end, as noted in '**Implementation**', I have instructed MFR district staff to work with First Nations and licensees to develop a comprehensive cedar management strategy for the Kispiox TSA, to be completed in time for incorporation in the data package for the next timber supply review.

- harvest location and timber quality

- remote areas

Many parts of the Kispiox TSA are too remote for timber harvesting to be economically viable in today's markets. The costs of constructing access to these areas through sometimes difficult terrain, in combination with the costs of maintaining remote harvesting operations and the rising costs of transporting often less-than-optimal quality timber over long distances to production facilities, outweigh the potential gain to be realized from the sale of the timber. For this reason, although favourable prices were obtained for pulp logs up to about ten years ago, a decade of depressed markets has now rendered large, remote areas in the TSA uneconomic for harvest. Current markets show no indication of significant or sustained improvement.

If it is assumed that these economically unattractive areas will continue to contribute to the timber supply for the TSA, when in fact they are unlikely to be harvested, maintaining the AAC at historic levels could result in a higher overall level of harvest being concentrated on those areas that *are* economically accessible than is supportable by the timber on those accessible areas alone. In this situation, at some point, difficulty could occur in meeting objectives for the range of forest values.

Areas currently identified in the TSA as unlikely to be economically harvestable include: the Sicintine drainage north of Tommy Jack pass; the THLB north of the confluence of the Sicintine and Skeena rivers; the areas north of the Babine River supporting timber primarily suitable for pulp logs (unless other harvestable cut blocks are located nearby); isolated drainages supporting primarily pulp quality timber; and portions of the THLB which have no current access and where any new road must be developed through terrain that is expected to contain areas with a high likelihood of landslide following timber harvesting or road construction.

In the 2007 Kispiox TSA timber supply analysis, remote areas were assumed to contribute fully to the timber supply and this assumption is reflected in the base case projection. A sensitivity analysis was performed to examine the implications for timber supply of assuming that remote areas in which harvesting has never occurred are not able to contribute to the harvest in the TSA for a substantial period of time. In this analysis, a total of 57 990 hectares, 18 percent of the THLB, were excluded from contributing to the timber supply for 40 years.

This deferral had no impact on the timber supply projected in the base case when it was assumed that the whole harvest profile of sawlogs, marginal sawlogs and pulp logs would continue to be harvested from the remaining area. However, when the remote areas were deferred and it was also assumed that no pulp stands would be harvested, the initial harvest level was reduced by 22 percent from that in the base case, with a further decrease after one decade and a reduction of 39 percent in the sustainable long-term harvest level from that in the base case.

In public input, licensees expressed belief that the assumed 40-year deferral is too long and the remote areas so excluded are too large, since the forest damage and increased harvest levels associated with the mountain pine beetle, as well as increased activity in the bio-energy sector, will lead to increased demand for timber from the Kispiox TSA. My response, in agreement with district MFR staff, is that with no previous indication of licensee interest in operating in the remote, deferred areas, and with no sign of improvement in economic conditions, there is no basis for assuming an ongoing, sustainable harvest from these locations, particularly when economically unharvestable areas in other TSAs in the surrounding region have already been not just deferred but indefinitely excluded from contributing to the timber supply.

The timber supply implications of harvesting or not harvesting in these remote areas are shown by the sensitivity analyses noted above to be interrelated with considerations of wood quality— the degree to which the profile of the stands harvested in the TSA matches the full profile of sawlog stands, marginal-sawlog stands, and pulpwood stands as present on the TSA landscape and as recorded in the forest inventory. I have therefore considered and concluded on these two factors, the location and the quality of the wood harvested, jointly, as follows.

- *harvest profile*

In today's unfavourable forest product market conditions, licensees survive best by harvesting the best quality, most valuable stands and avoiding less valuable ones. District MFR staff have reviewed and tabulated the quantities of logs of the various grades that have been harvested and scaled in the TSA since 2002. From this tabulation it is evident that not all timber quality classes are being harvested in proportion to their availability on the landscape. From 2002 to 2005, 78 percent of the wood scaled in the TSA was in the form of sawlogs, with just 22 percent in the

form of pulpwood. Although the pulpwood figure increased to 30 percent in 2006, it must be noted that the classification of a ‘sawlog’ stand can include up to 40 percent pulpwood by volume, so it is likely that much if not all of the ‘pulp’ logs actually originated as an incidental harvest in ‘sawlog’ stands, and that the pulpwood stands per se are being avoided rather than targeted for harvest.

Staff of the Skeena-Stikine Forest District compared the actual areas harvested with stands identified in the HMM (Harvest Method Mapping) exercise as ‘sawlog’ or ‘pulp’ and discovered that the HMM showed that 50 percent of the pulp wood did in fact come from pulp stands. However, staff considered this to be an anomaly in the HMM, as most of the wood scaled was actually in the form of sawlogs. From the study, staff also noted that 13 types of stands, making up 7 percent of the THLB, showed no harvest at all; these were most likely the stands of lowest quality in the TSA and presumably, therefore, pulpwood stands.

In the 1990s, when pulp fibre was often more valuable than sawlogs, the inclusion of pulp stands in the THLB made good, practical, economic sense. Today, with little evident prospect for reliable markets for pulpwood stands, to continue indefinitely to include these stands in an allowable harvest that is operationally obtained only from sawlog stands would be to permit an inflated level of cut that is not sustainable from the sawlog profile alone, which risks conflict with other management objectives .

For these reasons, I have considered specifying a portion or portions of the AAC for the Kispiox TSA as attributable, under a ‘partition’, to particular types of timber, or to particular locations.

In public input, a BCTS representative suggested that some older hemlock-balsam stands currently coded as ‘pulp’ may in fact be ‘sawlog’ stands, which highlighted just one of the many difficulties that would attend the administration of an AAC partitioned by wood quality. Staff of MFR’s Resource Tenures and Engineering Branch advised that timber quality issues not be addressed by partitioning the AAC; suggesting rather that if some stands were not being harvested they should be removed from the THLB altogether and not regarded as a potential opportunity. As noted earlier, First Nations have expressed varying opinions on whether the low grade timber profile should be partitioned or excluded from the AAC determination.

Having reviewed all of this, I find as follows. In the Kispiox TSA, when there is a viable market for pulpwood, pulp stands are harvested, but at all other times, practically the only pulpwood harvested is as a ‘by-catch’ in the harvest of sawlog stands. The higher-than-expected fraction of the harvest appearing to come from pulp stands is most likely due to the attempted use of inventory information at a local level and scale for which this primarily strategic tool is not statistically designed. It is quite conceivable that some of the best wood in the TSA could be located in fact, as BCTS suggests, in mis-labelled ‘pulp’ stands. In this situation, attempting to remedy a potential over-harvest in accessible, high quality stands by demarcating between, and specifying harvests to, timber types of particular qualities is very difficult.

Another way to prevent the over-harvesting of readily accessible, good quality stands, is to partition off the remote areas already identified as economically inaccessible under foreseeable market conditions. The specification of a geographically separated component of the AAC in the remote areas, which may in fact contain some high quality sawlogs, will not prevent licensees from going there and accessing that wood, if favourable conditions return. But in also specifying a proportionately smaller, complementary component of the overall AAC as attributable to the more easily accessible areas currently targeted for harvest, the risk of over-harvesting in these areas will be reduced or eliminated, permitting better management for all forest values throughout the TSA. With the current level of harvesting in the TSA being well below the AAC, this margin of safety is further increased.

Accordingly, as discussed in '**Reasons for Decision**', I have established a partition specifying that 18 percent of the AAC, the fraction by which the THLB was reduced in the sensitivity analysis, is attributable to harvesting only in the remote areas as noted in brief in this rationale, and as identified in detail on mapping available at the Skeena-Stikine Forest District office.

To deal with any remaining risk of over-harvesting, as noted in below in '**Implementation**' I have directed district staff to monitor continually during the effective period of this AAC the relative proportions of the sawlog and non-sawlog components of the harvest, and to inform me of any related problem that may develop prior to the next statutorily required AAC determination. Depending on the results of this monitoring, in the next determination I may decide to specify particular volumes as attributable to each of the various quality components of the harvest. By that time, MFR staff and interested stakeholders will have had opportunities to discuss and evaluate workable options for administering such a partition.

(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 Kispiox TSA, described earlier, four alternative harvest flows were provided that also resulted in a stable long-term harvest level. I have examined these projections, their objectives, and their associated projected growing stocks over time.

In the first alternative forecast, the harvest objective was to establish the maximum level that could be sustained throughout the forecast horizon without increase or decrease other than an immediate adjustment. This projection showed that to achieve this maximum non-declining even flow, the total TSA harvest would have to drop immediately to just below 800 000 cubic metres per year. The maximum even flow so achieved was slightly higher than the long-term sustainable harvest level projected in the base case. However, imposing the substantial initial reduction would not be consistent with the social and economic objectives of the government as expressed by the Minister of Forests and Range (see below, 'Economic and Social Objectives'), particularly in regard to retaining the flexibility to provide timber for the mid term from this TSA when less beetle-damaged wood is available from other management units.

The objective in the second alternative forecast was to achieve the highest possible initial harvest level consistent with a controlled decline in harvest level of 10 percent per decade to a sustainable long-term level. This forecast showed that, under these conditions, an initial level of almost 1.4 million cubic metres could be achieved for one decade, although the sustainable long-term level was slightly lower than in the base case. If implemented, this forecast would accommodate the potential for substantial increases in economic activity in the short term, markets permitting. However, much additional industrial plant, infrastructure and services would be at first required, then later progressively discarded as the harvest level declined through a much greater range than

in the base case, with proportionally heightened social dislocation and destabilization in this essentially 'boom-and-bust' scenario. Under this scenario, the pressure on the cedar component would also be unacceptably increased.

The third alternative harvest forecast showed the projected consequences of allowing the rate of decline in harvest levels to increase to 15 percent per decade, starting at the base case initial harvest level. This permitted the initial harvest level to be maintained for one decade longer than in the base case, while still reaching the same long-term harvest level and at the same time as projected in the base case. As a general rule, the rates of decline in harvest projections that are selected for referent base cases are not permitted to exceed roughly ten percent per decade, due to the generally proportional higher levels of associated social dislocation. In this case, the long-term sustainable harvest level was also slightly reduced.

The fourth alternative harvest forecast showed the projected consequences of restricting the permitted decline in harvest levels to only five percent per decade. In this case, the initial harvest level could only be maintained for two decades—three decades less than in the base case—with the rest of the projection being only slightly changed from the base case. Imposing the five-percent constraint thus reduces the magnitude of future social adjustments, but is not consistent with maintaining the stability of the harvest-and related socio-economic activity in the near term for as long as is possible without compromising the long-term supply.

In making my AAC determination I have considered the implications of all of the alternative forecasts described above, as well as those of the base case forecast and the sensitivity analyses provided in the analysis report. As noted earlier, in Base case for the Kispiox TSA, I am satisfied that the base case projection forms a satisfactory basis of reference for my considerations in this determination.

- community dependence on harvest level

From the 2001 Census, the population in the Kispiox TSA is roughly 6000 persons, of whom 3000 live on First Nations reserves, 2000 are rural residents, and 1000 live in the Hazelton communities. The total population declined by 4 percent between 1996 and 2001, due to reduced forestry activity and closures of public service offices. Of the two major sources of employment, forestry accounts for 30 percent of the jobs, and the public sector for 45 percent. The area ranks low in the provincial Local Health Area index, indicating the presence of difficult economic and social conditions.

The average overall timber harvest level in the TSA currently remains at less than one-third of the AAC, primarily due to the prevailing unfavourable market conditions. I have reviewed the findings of the socio-economic analysis accompanying the timber supply analysis, and I am aware that if viable markets for lower-quality logs could be found, such that harvesting could increase to the full AAC, and if all the sawlogs so generated were processed in the TSA (there is no capacity in the TSA for processing whole logs chips for pulp) then an additional 550 person-years of employment would be created provincially, with about 250 person-years of this—225 in woodlands and 25 in milling—being in the TSA. From discussions with local staff and from my own experience as former MFR Regional Manager for this area, I am aware that unless and until general market conditions improve, the full AAC in the TSA is unlikely to be harvested.

First Nations have stressed a need for forest policy and legislation to develop a sustainable forest industry in the TSA, the associated opportunities and benefits of which they suggest should remain in the local area. As I noted earlier in '*uncertain socio-economic benefits and impacts*', they recommend innovative ways be found to gain more benefits per hectare from the forest, through such means as bio-energy, carbon credits, specialty products, and non-timber forest products.

My conclusion here is that the implication for the province from establishing an allowable harvest at the initial harvest level in the base case (maintaining the current AAC) would be little change from the current reduced levels of economic activity resulting from external market forces, unless a change in the markets rendered additional harvesting activities economically viable, in which case the noted employment benefits would arise. The disposition of these benefits is beyond my mandate for consideration in determining this AAC. For the reasons noted above, in 'Alternative harvest flows', I have considered the implications of the four alternative flows discussed there to be less favourable to community stability than the rates of harvest projected in the base case for the short, medium and long terms.

(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;

Economic and Social Objectives

- *Minister's letter*

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

The letter stresses the importance of a stable timber supply to maintain a competitive and sustainable forest industry while being mindful of other forest values. In respect of this, in the base case projection and in all of the alternative harvest flow projections with which I have been provided for reference in this determination, a primary objective in the harvest flow has been to attain a stable, long-term harvest level, the growing stock in support of which becomes stable, neither increasing nor decreasing over time. Other objectives include avoiding declines of more than ten percent per decade, to avoid socio-economic dislocation in the nearer term. In my determination, I have been mindful of the need for the allowable harvest in the short term to remain consistent with maintaining the integrity of the timber supply projection throughout the planning horizon. I have also considered with care the adequacy of the provisions made both in current practice, and assumed in the analyses, for maintaining a range of forest values. I am therefore satisfied that this determination accords with these objectives of government.

- *local objectives*

The Minister's letter of July 4, 2006 suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. The DFAM licensee group is responsible for conducting public and First Nation reviews of the data package and the timber supply analysis during two periods of 60 days each.

I have discussed the communications with First Nations inviting their input, and the input submitted by First Nations, earlier, in *'First Nations' Considerations'*, and where appropriate I have also addressed the issues raised, in the appropriate sections of this rationale. Of note here is the recommendation by Gitxsan Forest Enterprises that the AAC not be reduced at this time, until the company has a better sense of economic factors affecting the viability of the forest industry in

the area. The Gitxsan Treaty Society also recommended that the AAC determination take protection measures for cedar into consideration; I have addressed this in '*cedar sustainability*'.

For the general public, in addition to the newspaper advertisement and open house noted in that section, letters were sent to a list of 35 public stakeholders, on September 28, 2005, with additional e-mails where feasible, announcing the data package, review period, and website, and inviting feedback by November 30, 2005. A similar process, including newspaper advertisement and open house was used for the review period for the analysis report, with letters sent out to public stakeholders on March 28, 2007, inviting feedback by May 28, 2007. I am satisfied that the DFAM licensee group followed prescribed standards in conducting the public review process.

Specific issues raised by the federal Department of Fisheries and Oceans are addressed in '*environmentally sensitive areas*'.

In respect of overall statements of local objectives for the use of land and resources in the Kispiox TSA, these are provided by the approved higher-level plans covering the TSA, discussed earlier, in '*strategic land use planning and objectives*'. 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.

Non-recoverable losses

Non-recoverable losses (NRLs) 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 managed stands'*.

In the Kispiox TSA, NRLs are attributable to five causes: the mountain pine beetle; the spruce beetle; the balsam bark beetle; wind-throw; root rot; and wildfire. In the analysis, beyond the values already factored into the VDYP model, no specific additional accounting was made for losses to the mountain pine beetle, the spruce beetle, the balsam bark beetle, or *tomentosus* root rot. I have discussed with district staff the low levels of operationally experienced losses attributable to each of these factors and, with the possible exception of *tomentosus*, the impacts of which should be clarified in the study and approvals I have recommended in '**Implementation**', in order to discover and apply in analysis any changes potentially indicated for OAF values, based on locally obtained information.

For wind-throw, based on data collected for the THLB from 1971 to 1991, losses of 735 cubic metres per year were accounted for in the analysis. Since these were the best, most recent data available, I accept that these losses were adequately modelled. For wildfire, based on data from the forest inventory, from MFR Fire Centre records, and from records of the area salvage-logged, and using an average volume per hectare of 387 cubic metres per hectare, an averaged annual loss of 12 105 cubic metres was assumed in the base case. This represents the best available information, which I accept as an adequate accounting in the analysis for these losses.

Reasons for Decision

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

The DFAM licensee group found in its 2007 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 977 000 cubic metres per year, which could be maintained for 50 years before declining by 10 percent to an annual rate of 903 000 cubic metres, maintained for ten years, followed by two further 10-percent reductions over the next two decades, first to 812 000 cubic metres per year, then to the sustainable LTHL of 729 000 cubic metres per year. The sawlog portion of the total projected harvest volume was initially 410 000 cubic metres per year, increasing to the long-term harvest level after 125 years.

The 50-year duration of the projected initial harvest level in the base case would appear to indicate a significant robustness in the timber supply. However, in determining AACs, my considerations typically identify a number of factors that, considered separately, indicate reasons why the timber supply may be either overestimated or underestimated in the harvest levels projected for the 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.

The following factors have been identified in my considerations as reasons why the actual timber supply may have been overestimated in the base case to degrees that can be quantified with reasonable reliability.

- *Fluvial fans:* Fluvial fans are typically highly sensitive to development and should be excluded from the THLB. However, this was not done in the base case, and on this account the projected available volume for the mid- and long-term harvest has been overestimated by 0.4 percent, or about 3908 cubic metres per year in all time periods.
- *Ownership adjustments:* MFR district staff determined an additional 7423 gross hectares of the TSA (including extra woodlot areas) that should have been excluded, which would have led to a reduction of 3640 hectares in the derived THLB. Thus the THLB used in the analysis was overestimated by about one percent on this account, equivalent to an overestimation of about 9770 cubic metres per year, in the volume projected to be available for harvest throughout the forecast period.
- *Dothistroma:* As much as 5 percent of the 16 436 hectares of plantations affected by *dothistroma*, representing 0.2 percent of the THLB, are likely to become non-productive due to reforestation problems. In this way the volume projected to be available for harvest in the mid and long terms has been overestimated by 1954 cubic metres per year.
- *Volume estimates for unmanaged stands/decay, waste and breakage:* As previously identified and accounted for in the 2002 AAC determination, the volume estimates for existing unmanaged stands are at significant risk of having been overestimated in the base case analysis to a mid-range extent of roughly 6.5 percent. This has introduced a probable overestimation of 63 505 cubic metres per year in the volume projected to be available for harvest in the short and mid terms.
- *Cultural heritage resources:* In not accounting for cultural heritage resources in the Gitanyow Plan related to FENS, the Alice Goode Water Catchment Area, and known Goshawk habitat, the base case projection overestimates the volume of timber projected to be available for harvest by about 2 percent, or 19 540 cubic metres per year in all time periods.

- *Wildlife:* To properly account for meeting objectives for wildlife, the THLB must be reduced by 255 hectares for mountain goats, and 3278 hectares for identified wildlife. This total overestimation of 3533 hectares corresponds to roughly a 10 747-cubic-metre-per-year overestimation in the volume of timber available to support the harvest levels projected in the base case for all time periods..
- *Landscape-level biodiversity—natural disturbance in non-THLB areas:* The lack of modelling of natural disturbance in areas outside the THLB has led to an overestimation of the timber supply in the base case amounting to 48 850 cubic metres per year throughout all time periods.
- *Gitanyow Treaty Selection Lands:* In the base case analysis, these lands were assumed to contribute in full to the timber supply. Since these lands have already been offered to the First Nation in negotiations, then although the current 'log-around' is essentially informal pending legal definition of the status of the lands, it is most reasonable to expect that these areas will no longer contribute to the timber supply in the TSA. The lands cover 4238 hectares or 1.2 percent of the THLB and do not overlap other excluded areas. On this account the volume of timber supporting the base case harvest projection has been overestimated by 11 724 cubic metres per year in all time periods.

The following factors have been identified as reasons why the actual timber supply may have been underestimated in the base case to degrees that can be quantified with some reliability:

- *Unmerchantable and problem forest types:* The need to re-include in the THLB roughly 500 hectares of problem forest types indicates an underestimation of 0.2 percent in the THLB, equivalent to an underestimation of roughly 1954 cubic metres per year in the volume supporting the mid- and long-term harvest levels.
- *Interior log grades:* By not specifically accounting for the volume of harvestable 'dead-potential' timber, the harvest projection in the base case analysis underestimates the timber supply throughout the forecast period by an amount in the range from 11.4 percent and 16.3 percent, that is, by between 111 378 and 159 251 cubic metres per year. The mid-range value of this underestimation is 135 315 cubic metres per year.

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

- *Site productivity estimates:* Site index adjustments which await localized verification by correlation with PEM or TEM mapping provisionally indicate through sensitivity analysis the potential for a very significant increase, of up to as much as 35 percent in the volume projected to be available for harvest in the mid and long term, or up to a potential equivalent volume increase of 341 950 cubic metres per year.

The list of overestimations in the projected timber supply for the short term, omitting the *dothistroma* result which acts only in the mid and long terms, totals to approximately 168 044 cubic metres per year. Against this, taking the mid-range value for the log-grade factor and ignoring the effect of reintroducing the contribution from problem forest types which acts only in the mid and long terms, the total reasonably quantifiable underestimation amounts to about 135 315 cubic metres per year. The net result of combining these two figures indicates an overestimation of roughly 32 729 cubic metres per year, about 3.3 percent of the volume of timber supporting the projected harvest level in the base case.

The land base sensitivity test in the 2007 analysis showed that when the THLB was reduced by 10 percent, the duration for which the initial harvest level could be maintained was reduced by one decade. In this projection, while the short-term harvest level was still maintained for

forty years, the mid-term and long-term harvest levels were reduced by 13 percent. Analysis staff have demonstrated that if the timber supply implications of removing 10 percent of the THLB were to be distributed evenly throughout all time periods, the resulting reduction in harvest levels would be approximately 10.8 percent throughout, indicating essentially a linear relationship between land base and volume reductions.

Thus, with a 3.3-percent volume reduction—roughly equivalent to a 3.3-percent reduction in the THLB (less than one third of the reduction in the sensitivity analysis) the projected short-term harvest level could still be maintained for several decades if some of the impact were deferred to the mid and long terms, as in that analysis.

In this situation I have taken guidance from the sensitivity analysis showing the results of applying the area-weighted average SIBEC site index values based on the PHM mapping. This analysis showed that with these site-index adjustments, an even-flow harvest level slightly higher than the current AAC could be maintained throughout the forecast period, producing a projected long-term harvest level 35 percent higher than that in the base case. While the site indices and associated yield volumes used in this analysis are insufficiently reliable for incorporation in a base case forecast, nonetheless they are based on a form of mapping that shows the approximate area distribution of site series within each BEC variant in the TSA, and as such are entirely appropriate as a basis for a sensitivity analysis.

The additional volume suggested by this sensitivity analysis to be available in the mid and long terms is many times greater than the volume overestimation indicated through my considerations in this determination. It is therefore reasonable to assume in general terms that, if this underestimation is confirmed by approved PEM mapping, which should be determined as soon as possible as I have recommended in '**Implementation**', any potential risk to the longer-term timber supply from maintaining the current AAC at the initial harvest level, for the next five years only, will be more than compensated for by the additional volume that will become available in the mid and longer terms from the faster-growing stands. However, in order to ensure that this extra volume does materialize, harvesting and regeneration of sufficient growing sites must take place to permit an adequate number of new stands to take advantage of the higher growing potential of the sites. This can be best achieved by continuing to allow harvesting to proceed in the short term at the rate projected both in the base case and in the site-index even-flow sensitivity analysis, that is, at the current AAC.

Harvesting at the current AAC, however, is only sustainable—as I have discussed in my considerations in respect of harvest location and timber quality—as long as it is not based on the over-harvest of good-quality, readily accessible stands at rates that depend on an assessment of the timber supply that includes stands that are unlikely to be harvested, due to their inferior quality or remote location. For this reason, while I am satisfied that the HMM process has provided a reliable baseline for the definition of those stands in the TSA that are operable across a broad range of market conditions, in view of the demonstrated history of preferential harvesting of higher-quality stands in the TSA, I have considered in particular the need to ensure consistency between the level of harvesting in the more remote areas and the extent to which these areas are assumed to contribute to the timber supply. From these considerations, which are detailed earlier in '*harvest location and timber quality*', I have concluded that it is advisable to establish a partition specifying that 18 percent of the AAC is attributable to harvesting only in the remote areas as defined in brief in this rationale, and as identified in detail on mapping available at the Skeena-Stikine Forest District office.

In view of the projected initial harvest level of just 410 000 cubic metres per year for sawlog-quality timber, to reduce any remaining risk of over-harvesting related to wood quality, I am hereby directing district staff to monitor continually during the effective period of this AAC

the relative proportions of the sawlog, and non-sawlog components of the harvest, and to inform me of any related problem that may develop prior to the next statutorily required AAC determination. As I have noted, depending on the results of this monitoring, in the next AAC determination I may decide to specify particular volumes as attributable to each of the various quality components of the harvest. By that time, MFR staff and interested stakeholders will have had opportunities to discuss and evaluate workable options for administering such a partition.

During the effective period of this AAC, there is an opportunity to manage the actual harvest level within the AAC in context of a number of factors that permit a further reduction of any risk in maintaining the present harvest level. The inventory database updated to 2005 for the Kispiox TSA includes a significant component of stands contributed by former undercut harvest volumes. A further undercut volume has been accumulated since 2005 and, under present conditions, is likely to continue to grow. Moreover, a total of 160 000 cubic metres of the AAC remain unallocated. In this situation, I recommend that licence apportionment in the TSA be balanced within the AAC in such a way as to take advantage of these underutilized volumes for purposes of actual allocations, rather than for separate sales of undercut volumes, to help in reducing potential harvesting pressure on sawlog volumes.

In conclusion, and importantly, if the early completion and approval of PEM/TEM mapping and subsequent correlation with SIBEC values do not confirm the availability of additional timber volumes in the general order of magnitude indicated in the sensitivity analysis discussed earlier, it may be necessary for me to revisit this determination, which depends in some measure for its sustainability on the reliability of this particular analysis, earlier than required by statute.

Finally, I would like to acknowledge the Kispiox DFAM licensee group for the timber supply analysis used in support of this determination, and the assistance given by the Skeena-Stikine Forest District, the Northern Interior Forest Region, the Forest Analysis and Inventory Branch and other BCFS 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 977 000 cubic metres, of which 177 000 cubic metres are specified as attributable to harvesting only in remote areas of the TSA as listed in this rationale and as mapped in detail in the Skeena-Stikine Forest District office.

This determination, which excludes all woodlot licence volumes, becomes effective on January 1, 2008, 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, the particular benefits of which are described in appropriate sections of this rationale document. I recognize that the ability of staff and licensees to undertake these projects is dependent on available resources including funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Kispiox TSA.

1. **Sawlog/non-sawlog harvest:** During the effective period of this AAC, district staff should monitor continually the relative proportions of the sawlog and non-sawlog harvest, and should inform me of any related developing problem at the earliest opportunity. Depending on the results of this monitoring, in the next determination I may decide to specify particular volumes as attributable to each of the various quality components of the harvest.

2. **Site productivity:** Work should be completed as soon as possible to complete and receive approval for PEM or TEM mapping throughout the TSA, to correlate the data with SIBEC values, and to use the adjusted site indices in analysis to verify magnitude of the additional volumes projected to become available in the mid and long terms.

3. **OAFs 1 and 2:** Any changes potentially indicated for OAF values based on locally obtained information should be identified, submitted for approval, and analysed.

4. **Deciduous volumes:** If the Skeena-Stikine Forest District Manager receives indications of significantly increased levels of interest and intent among licensees or potential licensees in utilizing substantial, identified deciduous volumes currently excluded from the projected timber supply, I encourage him to advise me at an early date, so I may consider requesting a timely re-analysis of the timber supply. If necessary I may revisit the AAC determination for the TSA early, to specify a harvestable volume attributable to deciduous species.

5. **Hydrological integrity of watersheds**: I strongly recommend the continuation of work by MOE to identify Fish Sensitive Watersheds and Critical Fish Streams in the TSA, and by MFR staff to comprehensively correlate the findings of the IWAP procedure with the timber supply modelling assumptions. In respect of this, I urge district staff to liaise with staff of MOE to enable the completion of related work, before the next timber supply analysis, to permit incorporation in the next AAC determination.

6. **Wildlife**: I encourage staff of MFR and MOE to collaborate with other agencies and licensees as necessary to complete the work to identify and spatially locate **WHA**s and other habitat requirements necessary to meet **IWMS** objectives, so that these may be modelled appropriately in the next timber supply analysis.

7. **Patch size distribution for landscape-level biodiversity objectives:** To help resolve the uncertainties described in my considerations for this section, I recommend that:

   (i) before the next analysis, work should be undertaken to permit the incorporation of patch-size distribution targets based on landscape unit-NDT combinations;

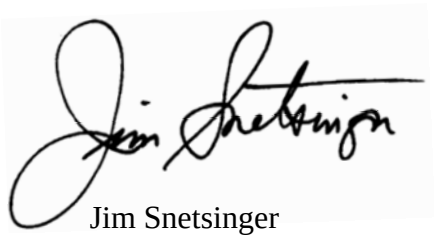
   (ii) analysis should be undertaken to assess patch-size distribution targets in relation to objectives for other values such as visual quality and habitats; and

   (iii) more patch-size analysis work in general should be carried out, to increase understanding of the causal relationships between current conditions and harvest practices and the creation of desired future forest conditions.

8. **Cedar Strategy:** District staff should work with First Nations and licensees to develop a **c**edar management strategy for the Kispiox TSA, to be completed in time for incorporation in the data package for the next timber supply analysis.

9. **Unallocated volume:** I recommend that during the effective period of this AAC, efforts be made to use the unallocated volume in the TSA to balance the licence apportionment.

10. **Cultural Heritage Resources inventory**: District staff should work with licensees and First Nations to reach agreement on methods for collecting and sharing information related to cultural heritage resource features, to allow these to be appropriately reflected in operational planning and incorporated in timber supply analysis.



Jim Snetsinger
Chief Forester

December 18, 2007

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 of Forests and Range's letter of July 4, 2006

Appendix 4: Public responses received

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

BRITISH COLUMBIA

JUL 0 4 2006

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

Dear Jim:

Re: Economic and Social Objectives of the Crown

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

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

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

Minister of Forests and Range and Minister Responsible for Housing

Office of the Minister

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

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

Jim Snetsinger

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

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

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

Sincerely yours,

Rich Coleman
Minister

Page 2 of 2

Appendix 4: Public responses received

Data package: The November 28, 2005 Open House in Hazelton, hosted by Timberline Forest Industry Consultants Ltd. and attended by representatives from MFR Skeena-Stikine Forest District and the Northern Interior Forest Region, as well as a representative from the Ministry of Agriculture and Lands, was also attended by six individuals representing the general public, local government, and a representative from the Upper Kispiox Watershed Protection Coalition. Written comments on the data package were received by fax on December 9, 2005, from the Department of Fisheries and Oceans.

Analysis report: The April 23, 2007 Open House in Hazelton, hosted by the DFAM Group, was attended by representatives of Silvicon Services Inc., Timberline Forest Industry Consultants Ltd., MFR Region and District staff, BC Timber Sales, Gitxsan Forest Enterprises, and the Bell Pole Company.

Written comments were received from:

Gitxsan Forest Enterprises Inc.

Klee' Yuu (Beatrice A. Raboez)

Gitxsan Treaty Office

Kitwanga Mills Ltd.