BRITISH COLUMBIA
MINISTRY OF FORESTS

Tree Farm Licence 26

Issued to the Corporation of the District of Mission

Rationale for Allowable Annual Cut (AAC) Determination

Effective August 1, 2001

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 26. This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TFL

Tree Farm License 26, also known as the Mission TFL, is located north of the community of Mission, in the northern half of the District of Mission, in southwestern British Columbia. The TFL is close to Golden Ears Provincial Park and is surrounded by the Fraser TSA. The total land base consists of two main supply blocks – on either side of the southwestern arm of Stave Lake, and three small non-contiguous blocks further to the south.

The tenure has been held continuously by the Corporation of the District of Mission (the licensee), since it was first issued in 1958—one of only two such municipally-held TFLs in the province. It is administered from the British Columbia Forest Service (BCFS) Chilliwack Forest District Office in Chilliwack, within the Vancouver Forest Region. The licensee does not own a processing facility and therefore sells the timber harvested, primarily to local mills.

The total area of the TFL is 10 564 hectares, of which 7236 hectares constitute the long-term timber harvesting land base. Of the latter, the majority lies within the Coastal Western Hemlock (CWH) biogeoclimatic zone, with a small portion in the Mountain Hemlock (MH) biogeoclimatic zone.

History of the AAC

In 1958, TFL 26 then known as Forest Management Licence No. 26, was awarded to the Corporation of the District of Mission. At that time, the size of the timber harvesting land base was estimated to be 6198 hectares, and the licensee was authorized to harvest 12 035 cubic metres per year. Subsequent harvest level increases came into effect in 1964, 1969, and 1974 based on new inventory data, the conversion to close utilization standards, a reduction in the rotation age, and the use of improved yield estimates. In 1979, a 25-year replaceable tree farm license was issued, and the AAC was established at 32 281 cubic metres.

Further increases were established in 1983 and 1988 as a result of additions to the TFL land base and a reclassification of site productivity. In 1989, another 25-year replaceable tree farm licence was issued and a harvest level of 41 200 cubic metres per year was determined. The current AAC of 45 000 cubic metres, which includes a 3000 cubic metre partition attributable to deciduous-leading stands, was determined June 18, 1996. The current 25-year replaceable tree farm licence was issued in 1999.

New AAC determination

Effective August 1, 2001, the new AAC for TFL 26 will be 45 000 cubic metres.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for TFL 26 include the following:

- *Statement of Management Objectives, Options and Procedures (SMOOP) for Management Plan (MP) No. 8,* Tree Farm Licence 26, accepted May 6, 1999;
- *Information Package*: *Tree Farm Licence 26*, Management Plan No. 8, Corporation of the District of Mission, accepted July 3, 2001;
- Existing stand yield tables for TFL 26, accepted by BCFS Resources Inventory Branch, March 23, 2000;
- Managed stand yield tables and site index curves, accepted by BCFS Research Branch, March 23, 1999;
- *Timber Supply Analysis: Tree Farm Licence 26*, Management Plan No. 8 Corporation of the District of Mission, accepted July 3, 2001;
- *Draft Management Plan No. 8: TFL 26*, Corporation of the District of Mission, submitted March 1, 2001;
- *TFL 26, Twenty-Year Plan*, Corporation of the District of Mission, accepted July 3, 2001;
- *A comparison of FSOS and FSSIM results for timber supply analysis using a benchmark dataset,* Hugh Hamiliton Ltd., August 14, 1998;
- Memorandum from the Director of Timber Supply Branch of the Ministry of Forests, dated December 1, 1997, entitled *Incorporating Biodiversity and Landscape Units in the Timber Supply Review*;
- *Identified Wildlife Management Strategy*, February 1999;
- Landscape Unit Planning Guide, BCFS and MELP, March 1999;
- Higher Level Plans: Policy and Procedures, BCFS and MELP, December, 1996;
- *Forest Practices Code of British Columbia Act* (Forest Practices Code), consolidated to March 2001;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, current as of March 2001;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP, BCFS and MELP;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;

- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives with regard to visual resources;
- Technical review and evaluation of current operating conditions on TFL 26 through comprehensive discussions with BCFS and MELP staff, notably at the AAC determination meeting held in Victoria on May 2, 2001.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological, and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural, and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does; however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for TFL 26, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

In accordance with Section 23(3) of the *Interpretation Act*, the deputy chief forester is expressly authorized to carry out the functions of the chief forester, which include those required under Section 8 of the *Forest Act*.

The chief forester has expressed the importance of consistency of judgment in making AAC determinations. I also recognize the need for consistency of approach. I have observed the chief forester during a number of previous AAC determinations and am

familiar with the guiding principles that the chief forester has employed in making AAC determinations. I find these principles to be reasonable and appropriate and I have adopted them as described below in making my AAC determination for TFL 26.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. When a large number of determinations are made for many forest management units over extended periods of time, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make his approach in these matters explicit, the chief forester has compiled a set of guiding principles for AAC determinations. I have reviewed these principles and find them to be reasonable, and thus I have adopted and applied them as deputy chief forester in AAC determinations for TFLs. These principles are set out below. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

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

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge, a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of 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 of current practices. It is not appropriate to base my decision on unsupported speculation with respect either 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 to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Forest Practices Code has been fully implemented since the end of the transition period on June 15, 1997, the timber supply implications of some of its

provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination the chief forester takes this uncertainty into account to the extent possible in the context of the best available information. In making my determination for TFL 26, as deputy chief forester, I have followed the same approach.

As British Columbia progresses toward completion of strategic land-use plans, the eventual timber supply impacts associated with the land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy (PAS) and the Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be the position of the chief forester that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions that have not yet been taken by government. I consider this approach to be reasonable and appropriate. Like the chief forester, I will therefore not take into account the possible impacts of existing or anticipated recommendations made by such planning processes, nor attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impact in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are no longer considered to be part of the timber harvesting land base or to contribute to the timber supply in AAC determinations.

Forest Renewal BC funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of an AAC determination, like the chief forester, I require sound evidence before accounting for the effects of intensive silviculture on possible timber supply. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical, and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in

the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, the chief forester should immediately reduce some AACs in the interest of caution. However, any AAC determination made by the chief forester or myself must be the result of applying our individual judgment 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 have made allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I have determined should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 26.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

Overall, in making this AAC determination, as the deputy chief forester, I am mindful of the chief forester's obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of the chief forester's responsibilities under the *Forest Practices Code of British Columbia 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 program for TSAs and TFLs.

For each AAC determination for a TFL, 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 model, a series of timber supply forecasts is produced, reflecting different starting harvest levels, rates of change over time, and potential trade-offs between short– and long-term harvest levels.

From this range of forecasts, one is chosen that attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TFL 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. In some cases, an AAC is determined that coincides with the base case starting point. In other cases, an AAC is determined which differs significantly from the modelled starting point.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which I believe the assumptions made in generating the base case forecast are accurate, current, and complete and the degree to which I believe the base case predictions of timber supply should be adjusted.

Adjustments are made on the basis of informed judgment, using current available information about forest management, which may have changed since the original information package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Forest Practices Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but rather is a synthesis of judgment and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgments that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis

The timber supply analysis for TFL 26 was prepared by the forestry consulting firm Forest Ecosystems Solutions Limited (formerly known as Hugh Hamilton Limited) in conjunction with staff of the Corporation of the District of Mission. Forest Ecosystems Solution Limited used the timber supply model Forest Simulation and Optimization System (FSOS) to conduct the analysis and develop the associated 20-year plan.

FSOS is a spatially-explicit computer model that can operate either as a *simulation* model or an *optimization* model. Spatially explicit in this case means that the implications of rules governing the harvesting of adjacent stands can be explicitly tracked and evaluated over the forecast period. While simulation and optimization approaches both have comparable information requirements, there are some significant differences.

Simulation models project the outcome of a specific schedule of management activities, constraints and assumptions. During the analysis process, model outputs such as harvest

level, the volume of growing stock, and age-class distribution are examined to determine the extent to which a specific harvest projection meets the specified management objectives. This process is repeated by the analyst to gain an understanding of how specific management, land base and yield parameters affect outcomes. Forest Ecosystems Solution Limited used the simulation function of FSOS to generate the base case harvest forecast.

In a simulation approach to timber supply modelling, the timber supply analyst determines an acceptable harvest forecast by trial and evaluation. When used as an optimization model, FSOS employs a mathematical algorithm to find a near optimal harvest forecast based on specific objectives, constraints and data. The approach uses a series of resource weightings of various target objectives and indicators to evaluate the relative success of each potential solution generated by the model. Each optimization harvest forecast consists of numerous iterations; one iteration representing one of many possible solutions. The best solution is one that produces the highest *objective function* value over the entire forecast period. In the timber supply analysis for TFL 26, Forest Ecosystems Solutions Limited used the optimization function of FSOS to develop the 20-year plan.

Hugh Hamilton conducted a benchmarking study in order to validate FSOS for use as a timber supply model. Using a standard data set, the consultant compared results of FSOS simulation forecasts with those generated using the BCFS timber supply model Forest Service Simulator (FSSIM).

Based on the results of the benchmarking study, a review by BCFS staff, as well as my previous experience reviewing results from similar models, I am satisfied that the simulation function of FSOS is capable of providing a reasonable projection of timber supply. Therefore, I have concluded that the licensee's base case forecast suitably reflects current management practices and therefore represents the base case as discussed above under "The role of the base case".

The base case harvest forecast maintains an initial harvest level of 43 168 cubic metres per year for 90 years, then increases by approximately 9 percent to 46 877 cubic metres per year for 80 years. The harvest forecast then increases by approximately 7 percent to the long-term harvest level of 50 186 cubic metres per year. The harvest levels presented in the base case do not include any volume contribution from deciduous trees and are net of unsalvaged losses.

In the timber supply analysis, various sensitivity analyses were conducted to assess the potential implications for timber supply arising from uncertainty in data assumptions and estimates. These sensitivity analyses have also assisted me in considering the factors leading to my determination.

As discussed throughout this rationale, and in consideration of the items described above, I am satisfied that the information presented to me provides an adequate basis from which I can assess the timber supply for TFL 26 for this determination.

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

Section 8 (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,

Land base contributing to timber harvesting

- *general comments*

The total area of TFL 26, as estimated from the licensee's inventory file, is 10 564 hectares. Approximately 9878 hectares or 94 percent of this area is classified as productive forest.

As part of the process used to define the timber harvesting land base (i.e., the land base estimated to be economically and biologically available for timber harvesting), a series of deductions was made from the gross land base. These deductions account for economic or ecological factors that operate to reduce the forest area available for harvesting. Of the forested land in TFL 26, 7236 hectares, or approximately 68 percent of the total area, is assumed to be available for timber harvesting in the long term. This is the assumed long-term timber harvesting land base.

In timber supply analysis, assumptions, and if necessary, projections, must be made about these factors prior to quantifying appropriate areas to be deducted from the productive forest area in order to derive the timber harvesting land base. In reviewing these deductions I am aware that some areas may have more than one classification—e.g., environmentally sensitive areas (ESAs) may also lie within riparian areas.

To ensure the accuracy of the timber harvesting land base calculation, it is imperative that no deduction be made more than once in respect of the same area of land, by virtue of it or of some part of it coming under more than one classification. Hence, a specific deduction for a given factor reported in the analysis or the AAC rationale does not necessarily reflect the total area with that classification; some portion of it may have been deducted earlier under another classification.

For TFL 26, I acknowledge that the above approach was used in the licensee's timber supply analysis to determine the timber harvesting land base. My consideration of each of the deductions applied in the derivation of the timber harvesting land base is presented in the following sections of this rationale.

- *non-forested and non-productive areas*

Non-forested and non-productive areas on TFL 26 include wetlands, alpine areas, lakes, rock, and other non-productive forest. To account for these areas, the licensee excluded 686 hectares from the timber harvesting land base. The licensee also identified an additional 30 hectares of non-commercial cover (brush) and appropriately excluded these

areas from contributing to timber supply.

I have considered the information presented to me respecting non-forested and non-productive areas and I am satisfied that the reductions applied were appropriate and suitable for use in this determination.

- *non-ownership*

Adjacent to TFL 26 are two areas classified in the inventory files as Use, Recreation, Enjoyment of the Public areas (UREPs). They are the Morgan Lake and Sayres Lake UREPs, totalling 290 hectares. Although they are not part of the TFL, in the analysis they will contribute to meeting the forest cover requirements for landscape level biodiversity objectives.

UREPs are mapping designations and BCFS district staff note that on the adjacent Fraser TSA there has been some harvesting activity in areas identified in the inventory files as UREPs. However, district staff inform me that the UREPs adjacent to the TFL are in beach-front areas, with a high correlation of First Nations traditional use and recreational use and are therefore, unlikely to be harvested.

While there may be some uncertainty regarding the future use of these two sites and their continued contribution to landscape-level biodiversity objectives, I accept the assumptions regarding UREPs as adequate for use in this determination.

- *economic and physical operability*

The portions of a forest management unit that are not physically accessible for harvesting, or that are not feasible to harvest economically, are categorized as inoperable and are excluded when deriving the timber harvesting land base.

Based upon the operability line that was developed for use in the 1996 timber supply analysis for TFL 26, the licensee classified a total of approximately 300 hectares as physically inoperable. After accounting for areas previously excluded under *non-forested and non-productive areas*, a total of 177 hectares were excluded from the timber harvesting land base.

BCFS staff have reviewed the operability information and concur with the licensee that there are no other significant physical limitations to harvesting on TFL 26. Therefore, for this determination, I accept the assumptions about economic and physical operability as incorporated in the timber supply analysis.

- *non-merchantable stands*

In the timber supply analysis, several classes of stands were excluded from the timber harvesting land base to account for stands that are currently uneconomic to harvest due to poor site conditions.

For the analysis, all stands greater than 200 years of age growing on poorer sites and having crown closures of less than 50 percent were excluded from the timber harvesting land base. The licensee conducted field examinations of stands classified as non-merchantable and found that the criteria were reasonable. On this basis, a total of

approximately 135 hectares of balsam and hemlock stands were excluded from the timber harvesting land base.

BCFS district staff concur that the assumptions regarding non-merchantable and low productivity stands are representative of current practice.

I have reviewed and discussed the information regarding non-merchantable stands with BCFS staff and I am satisfied that the assumptions on which the timber supply analysis was based are adequate for use in this determination.

- *environmentally sensitive areas*

An environmentally sensitive area (ESA) is an area identified during a forest inventory that is particularly sensitive to disturbance and/or is significantly valuable for resources other than timber. ESA information was originally used to identify areas to exclude in deriving the timber harvesting land base where more specific or detailed information was not available about a particular forest resource.

For the analysis, 11 hectares were excluded to account for areas where regenerating trees would be difficult and where there is a high avalanche hazard.

For this analysis, unstable terrain (class V) was considered to be relatively unharvestable, and as a result, 80 percent of these class V areas were excluded in deriving the timber harvesting land base. Potentially unstable (class IV) terrain was considered to be sensitive to road building and timber harvesting; therefore, a 30 percent area reduction was assumed. Class IV-R areas are sensitive to road building but are generally not sensitive to timber harvesting; therefore, a 10 percent area reduction was assumed. The licensee developed the reductions applied to each of the terrain stability classifications based upon operational experience and discussions with BCFS district staff. In total, 763 hectares were excluded from the timber harvesting land base to account for sensitive soils.

BCFS district staff advise me that much of the area classified as class IV and class V is also constrained due to visual quality concerns (see *visually sensitive areas*). According to district staff the licensee may be able to satisfy visual quality concerns by using small clear-cuts or non-clear cut harvesting systems. Therefore, smaller clear-cut sizes, reduced rate of harvesting, and the use of partial-harvesting systems for the management of visual quality may also satisfy some of the terrain stability concerns. In any event, district staff indicate that class V areas have been logged successfully in the past.

I have reviewed and discussed the information regarding environmentally sensitive areas with BCFS staff and I am satisfied that the assumptions regarding environmentally sensitive areas are suitable for use in this determination.

- *deciduous stands*

The licensee's base case excluded all 740 hectares of deciduous-leading stands, which otherwise would have comprised about 10 percent of the timber harvesting land base. In addition, volume reductions were applied to yield tables to account for the minor deciduous component in conifer-leading stands. The average deciduous component of

existing natural stands over the age of 40 years is approximately 1 percent.

In its previous management plan (MP No. 7), the licensee proposed to harvest 35 to 40 hectares of deciduous stands over the 5-year term of MP No. 7. Based upon this proposal and information from the BCFS district staff, the chief forester, in his 1996 AAC determination rationale, attributed 3000 cubic metres per year to deciduous forest types.

BCFS district staff advise me that harvesting of deciduous stands on TFL 26 has been negligible over the term of MP No. 7. However, district staff note that the licensee is proposing to harvest 17 hectares of deciduous stands in its current forest development plan (FDP). Whether or not deciduous timber can be utilized depends upon whether or not it can be sold in the log market. In this context I note that there is currently an approved forest licence authorizing the harvest of 10 000 cubic metres of deciduous timber in the adjacent Fraser TSA, and that there exists a small but steady market for alder logs on the South Coast of British Columbia generally.

According to the licensee's draft MP No. 8, harvesting of deciduous-leading stands has been minimal because of poor markets for deciduous species, generally low volume per hectare, unfavourable access and harvesting costs, and expensive reforestation due to the rapid growth of brush species. The licensee indicates that it will utilize the deciduous-component of coniferous stands and may harvest some deciduous stands when market conditions are favourable. It would prefer not to have other harvesting companies operating on the TFL and has indicated that deciduous stands that may be economically feasible to harvest would also be of interest to Mission. Furthermore, the licensee notes that it currently has a deciduous-leading cut block in its approved FDP. The licensee has requested that no deciduous partition be specified in this AAC determination, recognizing that any deciduous volume scaled would in any case be charged to the licensee's cut control.

BCFS staff estimate that deciduous stands on TFL 26 could contribute up to 3700 cubic metres per year to the long-term harvest level. This estimate is based upon an assumed mean annual increment of 10 cubic metres per year and approximately 370 hectares of deciduous stands being suitable for harvesting (i.e., assuming half of the 740 hectares of deciduous-leading stands excluded from the timber harvesting land base is in fact available for timber harvesting).

Based upon my review and discussions with BCFS district staff regarding deciduous stands, I find it reasonable to expect that a portion of the 740 hectares of deciduous-leading stands is commercially viable as evidenced by the licensee's inclusion of a proposed deciduous cutblock in its FDP and the demand for deciduous volume in the Fraser TSA. I have concluded that deciduous stands should be able to contribute at least 1000 cubic metres per year to the harvest levels throughout the forecast period, and I have accounted for this in my determination, as discussed in "Reasons for decision". I encourage the licensee to pursue the harvest of deciduous timber in the interests of fully utilizing the economic opportunity inherent in the TFL.

- roads, trails, and landings

In the timber supply analysis, a percentage of the productive forest was excluded from the timber harvesting land base to account for the losses resulting from the construction of roads, trails, and landings. Separate estimates were made for existing and for future roads, trails, and landings, to reflect both current access and anticipated road network requirements over time.

1) existing roads, trails and landings

In estimating the area occupied by existing roads and trails, the licensee used the mapped existing road network from the inventory. All roads in TFL 26 are considered unclassified, (i.e., they either do not appear on forest cover maps or occur only as single line features). Based upon its familiarity with the TFL, the licensee assumed a degraded road width of 20 metres for highways and secondary roads, 12 metres for logging roads (including landings), and 3 metres for trails. Application of these width estimates to the existing road network resulted in 172 hectares of productive forest land being excluded from the timber harvesting land base.

District staff have reviewed the reductions applied in the analysis to account for existing roads, trails, and landings, and indicate that they adequately represent current conditions on the TFL.

I have reviewed the available information, and am satisfied that the exclusions applied in the analysis adequately account for productive land base losses from existing roads, trails and landings.

2) future roads, trails and landings

For the purposes of calculating proposed road reductions, the licensee applied the same degraded road width estimates that were applied to the existing roads to the road requirements outlined in their currently approved FDP. This approach resulted in 23 hectares being excluded in deriving the timber harvesting land base.

For estimating future access requirements beyond those proposed in the FDP, the licensee used a geographic information system (GIS) to apply a 400-metre wide buffer to the current and proposed road network. The area represented by the existing and proposed road network was expressed as a percentage of the total area calculated by applying the 400-metre wide buffer to the existing and proposed road network. This approach resulted in a value of 3.8 percent. Based upon the extrapolation of this percentage to areas outside of the 400-metre wide access buffer, 98 hectares were excluded from the timber harvesting land base (after the first rotation) to account for future road requirements. The licensee has indicated that it is are committed to rehabilitating all temporary access structures (i.e., roads and trails); therefore, no further road reductions were applied on this account in the analysis.

BCFS district staff have accepted the methodology used to estimate the area required for future road development. I have reviewed and discussed the information regarding future

roads, trails, and landings, and I am satisfied that the assumptions are suitable for use in this determination.

Existing forest inventory

A complete re-inventory was undertaken in 1988 and 1989 incorporating aerial photography and extensive ground sampling. In addition, 1200 hectares of land added to the TFL in 1991 were re-inventoried in 1992 using the 1988 aerial photographs and 1992 field data. The inventory file was updated to the end of 1997 for depletions and to the end of 1999 for growth projections. Information from the licensee's FDPs were used in the analysis to account for the discrepancy between depletion and growth projection. BCFS staff have reviewed the inventory and have not identified any areas of concern.

I have considered the information regarding the current forest inventory used in the timber supply analysis, and I am satisfied that it forms an acceptable basis for this determination.

- *age-class structure*

Age-class structure data from the inventory file is used in the analysis to project forest stand conditions over time. Assumptions about age classes can impact timber supply at any point in the forecast period since they form the basis against which minimum harvestable ages, green-up requirements, and other forest cover constraints are applied.

Due to the extensive harvesting and disturbance history in TFL 26, the timber harvesting land base is occupied by predominantly younger stands, with approximately 15 percent of stands less than 20 years of age, 68 percent between 21 and 80 years of age, and 17 percent of stands older than 80 years of age. Of the stands older than 80 years, only 1.45 percent are older than 250 years of age.

I have reviewed the age class distribution present on TFL 26 and I am not aware of any issues that would impact this determination.

- *species profile*

Western hemlock and amabilis fir-leading stands are the dominant forest type on the timber harvesting land base of TFL 26 (55 percent). Other forest types include coastal Douglas-fir (24 percent), western redcedar (13 percent) and high elevation western hemlock and amabilis fir (5 percent) stands.

Deciduous-leading stands, which represent about 7.5 percent of the total productive forest, were excluded from the base case timber harvesting land base (see *deciduous stands*).

I have reviewed the information regarding species profile and am satisfied that the timber supply analysis has adequately represented the current species composition on TFL 26.

- *volume estimates for existing stands*

In the timber supply analysis, existing natural stand volumes were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model (version 6.4a), developed by the BCFS Resources Inventory Branch. The volumes for existing natural stands in which species and stocking have not been managed—defined in this analysis as those stands that resulted from natural regeneration and that had not been spaced—were projected using this model. All deciduous volume in existing stands was excluded from the yield tables. Once a stand was harvested for the first time in the modelling, its future growth and yield was projected using estimates from the managed stand yield tables. The natural stand yield tables were reviewed and accepted by the BCFS Resources Inventory Branch as appropriate for use in the analysis.

The licensee provided a comparison of the total volume of stands in the timber harvesting land base, as estimated from the inventory files, to the total volume of all the stands based upon the yield assigned to each analysis unit in the model. The results indicate that the total volume based on the inventory was 1.7 percent higher than the total volume based on the analysis unit yield table projections at the start of the analysis. BCFS staff have reviewed the approach taken in stand aggregation and accept that the stand yields used in the analysis are suitable for use in the analysis.

I have reviewed the information regarding existing stand yields and am satisfied that acceptable procedures were used and that the yields projected in the analysis are reflective of current stand conditions on TFL 26, and are appropriate for use in this determination.

Expected rate of growth

- *site productivity estimates*

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

In general, in British Columbia, it has been found that site indices determined from younger stands (i.e., less than 31 years old), and older stands (i.e., over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification System (SIBEC) suggest that actual site indices may be higher

than those indicated by existing data from old-growth forests. In recent years it has been concluded from such studies that site productivity has generally been underestimated by older inventories; managed stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

No local information was available to provide for the adjustment of the old growth site indices for TFL 26; therefore, the licensee used unadjusted site indices for regenerating stands in the base case. A sensitivity analysis was provided by the licensee, to examine the effect on timber supply of applying (OGSI) site index adjustments to stands older than 140 years of age after they were harvested in the model. The results of this analysis indicated that the timber supply projected in the base case was insensitive to OGSI adjustments. The licensee believes that this lack of sensitivity is due to the small proportion (about 4 percent) of stands on the timber harvesting land base that are currently older than 140 years of age and are therefore eligible for a site index adjustment.

The licensee also provided an analysis to examine the sensitivity of the base case to adjusting the site indices of managed stands using provincial SIBEC results. By applying the SIBEC-revised site indices the short-term timber supply increased to 53 256 cubic metres per year (an increase of 23 percent) and the long-term harvest level increased to 57 069 cubic metres per year (an increase of 22 percent).

According to the licensee, the site index was only adjusted upwards. If applying the SIBEC methodology resulted in a reduced site index compared to the inventory site index, the inventory site index was used. As a result, for about 1240 hectares or 17 percent of the timber harvesting land base, site productivity for this sensitivity analysis was based upon the original inventory site index. BCFS Research Branch staff have reviewed this approach and indicate that all SIBEC adjustments should have been applied and as a consequence the true site productivity for stands on TFL 26 likely falls between the productivity that results from the OGSI and SIBEC adjustments.

I have reviewed and discussed the information regarding site productivity estimates with BCFS Timber Supply Branch and district staff. I am mindful that the sensitivity analysis that examined the effect on timber supply of adjusting the site productivity for managed stands may represent an overestimation of timber supply for TFL 26 and that there is a lack of local site index data for this unit. I have concluded that the actual site productivity probably lies between that represented by the base case analysis and the sensitivity analysis that examined the impacts of using SIBEC to adjust managed stand yields. Therefore, I have concluded that the base case timber supply has probably been underestimated by an unquantified amount across the entire forecast period and I have accounted for this in my determination, as discussed in "Reasons for decision". In view of the potential impact this factor may have on the long-term productivity of this TFL, I encourage the licensee to collect localized site productivity information for consideration at the time of the next determination.

- *volume estimates for managed stands*

Managed stands for TFL 26 were defined as all stands 10 years of age or less, all hemlock stands 20 years of age or less, and all Douglas-fir stands 40 years of age or less, and all

stands regenerated in the future. The definitions for managed stands were the same as those used in the timber supply analysis for the Fraser TSA.

The licensee has indicated that it is in the process of reviewing the definitions for managed immature stands and this may lead to an increase in the area defined as managed immature stands. The Table Interpolation Program for Stand Yields (TIPSY) model, developed by the BCFS Research Branch was used to estimate volumes for managed stands. The managed stand yield tables were reviewed and accepted by Research Branch staff for use in the analysis.

A sensitivity analysis prepared by the licensee to assess the impact on timber supply of increasing or decreasing the managed stand yields by 10 percent indicated that there was no impact on the initial harvest level modelled for 10 decades.

I have reviewed the volume estimates for managed stands and discussed these with BCFS staff and I am satisfied that they are suitable for use in this determination. I acknowledge that the area covered by existing managed stands may have been underestimated in the base case and I encourage the licensee to ensure the review of these areas is completed in time for the next determination.

- *operational adjustment factors*

TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases, and significant brush competition in the stand. Certain operational conditions, such as less than ideal tree distribution, small non-productive areas, endemic pests and diseases, or age dependent factors such as decay, waste, and breakage cause actual yields to be less than the theoretical TIPSY yields over time. Operational adjustment factors (OAFs) are applied to yields generated using TIPSY to account for losses of timber volume resulting from these operational conditions. OAF 1 accounts for factors affecting the yield curve across all ages, including small stand openings, tree distribution, endemic pests, and other factors. OAF 2 accounts for decay, waste, and breakage.

In the analysis, the standard provincial reductions of 15 percent for OAF 1 and 5 percent for OAF 2 were applied.

The licensee believes that the OAFs, which are based upon the values used in the timber supply analysis for the Fraser TSA, are too high. It maintains that TFL 26 has a higher proportion of good growing sites, fewer rocky outcrops, lower incidences of pests and disease, and better stocking densities than the Fraser TSA. A sensitivity analysis was prepared that examined the effect of increasing and decreasing the OAF 1 values by 3 percent and the OAF 2 values by 2 percent. The results indicate that timber supply is insensitive to changes in the OAF 1 and 2 values for the first 10 decades of the forecast period.

BCFS district staff advise me that they are unaware of any empirical evidence to suggest that the OAFs for TFL 26 are lower than the OAFs used for the Fraser TSA. Therefore, until more detailed information suggests otherwise, I accept the assumptions regarding the OAFs used in the base case as being based upon the best available information and as

suitable for use in this determination.

- *minimum merchantability standards*

In timber supply analysis, estimates are made of the earliest age at which a forest stand has reached a harvestable condition or has met minimum merchantability criteria. The assumptions largely affect when second growth stands will be available for harvest in the model. In practice, many forest stands will be harvested at older ages than the age at which they reach minimum merchantability, due to economic considerations and constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife and water quality.

In the TFL 26 timber supply analysis, minimum harvestable age estimates were based on a stand either attaining mean annual increment (MAI) culmination age (the age at which a stand's volume increment to date is at a maximum), or attaining a volume of 600 cubic metres per hectare, 500 cubic metres per hectare, and 400 cubic metres per hectare for good, medium, and poor sites respectively, whichever was attained at the youngest age.

BCFS district staff were concerned that the volume per hectare at minimum harvestable age for some of the analysis units used in the analysis is less than the 350 cubic metres per hectare used in the timber supply analysis for the adjacent Fraser TSA. The licensee provided a sensitivity analysis that examined the effect on timber supply of reducing the minimum harvest ages based upon a minimum stand volume of 350 cubic metres per hectare. The results indicated that there was no impact on the short-term harvest level and that the long-term harvest level was reduced by 300 cubic metres per year.

The licensee provided a sensitivity analysis in which it increased the minimum harvestable age by 10 years, resulting in a 9 percent reduction in the mid-term timber supply. Decreasing the minimum harvestable age by 10 years resulted in a 1.6- percent increase in the short-term timber supply.

I accept the assumptions regarding minimum harvestable age, noting that this factor is subject to some uncertainty. I observe that the mid-term timber supply is sensitive to increases in minimum harvest age; therefore, I request that the licensee review its procedures for defining minimum harvestable ages prior to the next determination.

- *harvest profile/harvest sequencing*

The licensee used the *oldest first* harvest rule in the base case, requiring that the oldest stands are selected for harvest once they satisfy the minimum merchantability requirements. The harvest profile used for the first five years of the analysis was based upon the current FDP for TFL 26. The harvest profile, as outlined in the FDP, is similar to the species profile reflected in the inventory.

For this determination, I accept that the harvest profile and sequencing modelled in the analysis is reflective of current practice on TFL 26, and make no adjustments in this regard.

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

Expected time for forest to be re-established following harvest

- *regeneration*

In the base case the licensee assumed that 60 percent of redcedar-leading stands would be regenerated to redcedar-leading stands and 40 percent to Douglas-fir leading stands. The licensee also assumed that 60 percent of hemlock/balsam stands would be regenerated to Douglas-fir leading mixed stands and 40 percent to hemlock/balsam stands. All other stands were assumed to regenerate to the original leading species. In instances where species conversion was assumed, the BCFS site index conversion equations were applied. These regeneration assumptions were only applied to the first rotation; subsequent rotations did not result in species conversion.

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 timber supply analysis, regeneration delay is used to determine the starting point of tree growth for the yield curves that project volumes over time.

According to the licensee's draft Management Plan No. 8 the licensee remains committed to re-planting all harvested sites within one year of harvesting. As one-year old stock is usually planted on TFL 26, a regeneration delay of zero years was assumed in the analysis.

BCFS district staff advise me that the assumptions made in the analysis regarding regeneration and regeneration delay are consistent with current practice and I am satisfied that the assumptions made in the analysis are appropriate for use in this determination.

- *not-satisfactorily-restocked areas*

Not-satisfactorily-restocked (NSR) areas are those areas where timber has been removed, either by harvesting or by natural causes, and a stand of suitable tree species and stocking has yet to be established. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is 'backlog' NSR. All other NSR is considered 'current' NSR.

According to the licensee, all harvested areas are regenerated within one year; therefore, at any point in time there is only a small area that is current NSR and there is no backlog NSR. For the TFL 26 analysis, 53 hectares of current NSR were identified on the inventory file. BCFS district staff accept the information on NSR provided by the licensee.

I have reviewed the assumptions regarding not-satisfactorily-restocked areas, and am satisfied that the base case reflected the current situation on TFL 26 and I do not need to make any adjustment in my determination on account of this factor.

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

Silvicultural treatments to be applied

- *silvicultural systems*

On TFL 26, there has been a recent shift to clearcutting with reserves, with varying amounts of tree retention. The licensee estimates that between 2.5 percent and 5 percent of the merchantable volume is left in reserves on harvested blocks, in addition to permanent reserves for wildlife tree patches.

In the timber supply analysis, a 3.5 percent volume reduction was applied to managed stand yield tables to account for reserves and was applied to those stands that had received less than a 10 percent area net down to account for the management of other resource values.

District staff confirm that the analysis assumptions regarding the use of clearcutting with reserves are consistent with current practice on the TFL.

I have reviewed the information regarding silvicultural systems, and I am satisfied that the analysis assumptions appropriately reflect current management on TFL 26. I therefore accept the information for use in this determination.

- *use of select seed*

The Forest Practices Code requires the use of the best genetic quality (seed and vegetative material) source available for regeneration. Select seed produced from seed orchards is the product of British Columbia's forest gene resource management program, which uses traditional tree breeding techniques to select naturally-occurring, well-adapted, healthy, and vigorous trees.

According to the licensee, genetically-improved Douglas-fir and western hemlock seedlings are being used for stand regeneration on the TFL. For the base case, managed stand yields for Douglas-fir and western hemlock were increased by 4 percent and 2 percent respectively, based on current estimates of genetic gain.

A sensitivity analysis in which managed stand yields for Douglas-fir were adjusted to account for a 12 percent genetic gain and all other stands were adjusted for a 6 percent genetic gain was provided by the licensee. The results of this analysis indicate that an increase in genetic gain in the future would not affect short-term timber supply, but would increase the long-term timber supply by about 3 percent.

Based upon my review of the information regarding the use of select seed and my discussions with BCFS staff, I am satisfied that the assumptions used in the base case are reflective of current practice and I make no further adjustments on this account.

Incremental Silviculture

Incremental silviculture includes activities such as commercial thinning, juvenile spacing,

pruning and fertilization that are beyond the silviculture activities required to establish a free-growing forest stand.

- *juvenile spacing*

Juvenile spacing involves cutting less desirable trees within a young stand to reduce competition among the residual trees for water, nutrients and sunlight. Trees cut during juvenile spacing are not usually removed from the site, and their volume does not contribute to timber supply. Spacing can have many potential benefits, including meeting biodiversity or wildlife habitat objectives, maintaining or enhancing forest health, managing species composition and stand structure, increasing stand value and offering employment opportunities for small operators. According to the licensee's draft MP No. 8, about 750 hectares of stands have been spaced on TFL 26.

Due to the application of the assumptions from the Fraser TSA for defining managed immature stands in the analysis for TFL 26, only 172 hectares of existing stands were assumed to be spaced in the base case. The licensee assumed that regenerating pure Douglas-fir, mixed Douglas-fir, and hemlock/balsam stands will be spaced. The licensee has indicated in its draft MP No. 8 that further juvenile spacing on TFL 26 is contingent upon external funding sources.

I have considered the information regarding juvenile spacing and I observe that there is uncertainty regarding the continuance of juvenile spacing on TFL 26; however, as juvenile spacing does not affect stand volume, I am not aware of any concerns that would impact on this determination.

- *commercial thinning*

Commercial thinning is a partial cutting silvicultural system in which some volume is removed from an immature stand after components of the stand have reached a merchantable size. The volume removed by commercial thinning is economically useable and can therefore contribute to timber supply. Commercial thinning activity may not significantly affect total timber supply but can offer increased flexibility for the timing and location of harvest.

The licensee has indicated that about 53 hectares of stands on TFL 26 have been thinned over the past 6 years. In the analysis, commercially- thinned stands were represented as clearcuts with a 3.5 percent volume retention. BCFS staff accept the assumptions regarding commercial thinning and note that the licensee has proposed commercial thinning in its recent FDP.

I note there is evidence of significant commercial thinning on TFL 26 over the last 6 years. However, as commercial thinning does not affect total timber supply and there does not appear to be a need to augment timber supply in the short to mid term, I accept the assumptions used in the base case and will make no adjustments on this account for this determination.

(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,

Timber harvesting

- *utilization standards*

Utilization standards define the species, dimensions, and quality of trees that must be harvested and removed from an area during harvesting operations. In the timber supply analysis, the utilization standards assumed in the base case for all species were a minimum 17.5-centimetre diameter at breast height (dbh) with a 30-centimetre maximum stump height and a 10-centimetre minimum top diameter inside bark. BCFS district staff indicate that the licensee is harvesting trees with a dbh as low as 12.5 centimetres.

I have reviewed and discussed the information regarding utilization standards with BCFS staff and I conclude that the assumption of a 17.5-centimetre dbh limit in the base case, rather than the 12.5–centimetre dbh limit that represents current practice on TFL 26, leads to a small underestimation of timber supply across the entire forecast period. I have accounted for this in my determination, as discussed in "Reasons for decisions".

- *decay, waste and breakage*

For managed stand yield curves, as previously discussed (see *volume estimates for managed stands*), the TIPSY model incorporates OAFs that account for anticipated decay, waste, and breakage.

For existing stand yield curves, the VDYP model used to project volume incorporates estimates of the volume of wood lost to decay, waste, and breakage. These loss estimates have been developed for different areas of the province based on field samples.

Standard procedures were used to develop the existing stand yield tables and these incorporate the appropriate decay, waste, and breakage factors for TFL 26.

I have reviewed the information regarding the decay, waste, and breakage in existing stands on TFL 26, and am satisfied that the best available information was used. These factors were appropriately accounted for in the analysis, and I accept them as suitable for this determination.

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

to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

- *cutblock adjacency/green-up*

Specific resource values are managed by limiting the size and shape of cutblocks and maximum disturbances (areas covered by stands of less than a specified height), and prescribing minimum time to green-up. Green-up time refers to the period following harvest necessary for a regenerating stand to attain a specified condition, often expressed in terms of stand height. Objectives for forest cover and cutblock adjacency guide harvesting practices in order to address resource values such as wildlife habitat and visual quality. The adjacency objectives modelled in the analysis address minimum green-up height required before an adjacent area may be harvested, and the maximum area permitted to be covered with stands that are less than the minimum green-up height. Adjacency and green-up requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

In the base case, the licensee assumed that 33 percent of the timber harvesting land base, not subject to constraints for non-timber resources, could be covered in stands less than 3 metres in height. A sensitivity analysis provided by the licensee examined the effect on timber supply of increasing and decreasing the age at which stands achieved green-up. Varying the green-up age by 5 years resulted in a negligible impact on timber supply.

BCFS district staff confirm that the assumptions for cutblock adjacency and green-up used in the base case are reflective of current harvesting practices on TFL 26.

I have reviewed the information regarding cutblock adjacency and green-up and am satisfied that the assumptions applied in the analysis are appropriate for use in this determination.

- *recreation resources*

TFL 26 is located close to the communities of Mission, Maple Ridge, and Abbotsford. The population of Mission is about 33 000 people, while the total population of Maple Ridge and Abbotsford is about 150 000 people. The population of the Lower Mainland/Fraser Valley is more than one and a half million people.

There are no official recreation sites on TFL 26; however, the TFL is close to an expanding urban population and recreation areas and landscape features are regarded as having a growing importance on the TFL. The main recreational activities on or adjacent to the TFL include hiking, hunting, mountain biking, horseback riding, and boating and to a lesser extent cross-country skiing, snowmobiling, and fishing.

A total of about 75 hectares of productive forest have been identified from forest cover maps as having high recreation value, of which 57 hectares were excluded in deriving the timber harvesting land base assumed in the base case. BCFS district staff concur with the assumptions regarding recreation resources used in the analysis.

I have considered the information regarding recreation resources and for this determination, I accept that the assumptions used in the base case appropriately reflect current practice and are suitable for use in this determination.

- *cultural heritage resources*

Cultural heritage resources generally include archaeological and traditional use sites. Archaeological sites contain physical evidence of past human activity, whereas traditional use sites may not necessarily contain historical physical evidence but may indicate current use by a First Nation. To help manage for unrecorded archaeological sites, archaeological overview mapping may be conducted to assign high, moderate or low ratings for archaeological potential within an area.

Cultural and heritage values which may be present on TFL 26 are those associated with the activities of First Nations as well as the early exploration and settlement by Europeans. To date, no archaeological overview mapping has been completed and no archaeological or cultural heritage sites have been identified on TFL 26. As a result, no explicit accounting for cultural heritage resources was included in the analysis. District staff indicate that the analysis assumptions appropriately reflect current practice. The licensee has committed in its draft Management Plan No. 8 to manage any cultural heritage resources in consultation with First Nations.

I have reviewed the information regarding cultural heritage resources, and note the licensee's commitment to manage for these resources at the operational planning level. As sites are identified, the information can be incorporated into future determinations for TFL 26. I am satisfied that the assumptions used in the base case appropriately reflect current practice, and are suitable for use in this determination.

- *riparian habitat*

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats. For each stream, lake or wetland, the RRZ and RMZ make up the entire riparian management area. Stream riparian classes are described in the *Riparian Management Area Guidebook* and are determined based on presence of fish, occurrence in a community watershed, and average channel-width criteria. The stream class is used to estimate the area required to be retained in the RRZ and the area or volume to be retained in the RMZ. Specific criteria were also developed to classify lakes and wetlands and develop necessary reserve and management strategies to protect these areas.

For the timber supply analysis, the licensee used GIS-based techniques to estimate the area of RRZs and RMZs associated with streams, lakes, and wetlands on TFL 26. One hundred percent of the area in RRZs was excluded from the timber harvesting land base in the base case. In addition, the licensee excluded the area of the RMZs equal to the maximum recommended percent volume reduction assumed for a given stream, lake, or

wetland classification. This resulted in the exclusion of approximately 154 hectares for streams, 4 hectares for classified lakes, and 16 hectares for classified wetlands from the timber harvesting land base. Stands growing on areas associated with RRZs and RMZs that were excluded from the timber harvesting land base were assumed to contribute to landscape-level forest cover requirements.

BCFS district staff have reviewed the information and assumptions for riparian areas and support the methodology and deductions applied in the analysis to account for RRZs and RMZs on TFL 26.

I have reviewed the information regarding riparian areas and I am satisfied that this factor has been modelled appropriately and, for this determination, have made no adjustments on this account.

- *water resources*

TFL 26 includes a network of streams, lakes and wetlands, and most notably the Kenworthy Creek Community Watershed and the Cannell Lake watershed. Maintaining water quality and quantity are important to the health of aquatic and terrestrial ecosystems. Current management of water resources also recognizes downstream agricultural uses including the provision of water for irrigation and livestock.

The Kenworthy Creek Community Watershed occupies approximately 277 hectares within TFL 26 and supplies drinking water to Hatzic Prairie, east of the District of Mission. Kenworthy Creek drains into the Hatzic Valley and Hatzic Lake. Hatzic Valley residents have expressed significant concerns with flooding and domestic water issues.

According to the licensee, MELP staff have accepted a 30 percent equivalent clearcut area (ECA)—a measure for assessing hydrologic impact—for the Kenworthy Creek Community Watershed. The ECA was represented in the analysis by means of a forest cover constraint, which specified that a maximum of 30 percent of the stands within the watershed area was allowed to be less than the green-up height of 7 metres.

The Cannell Lake watershed, which encompasses Cannell Lake and its tributaries, is located in the eastern portion of TFL 26. The watershed area overlaps with areas, primarily on the western side of Cannell Lake, that have been assigned partial retention (PR) and retention (R) recommended visual quality classes (RVQCs) (see *visually sensitive areas*). The Cannell Lake watershed is a primary source of water for numerous Mission and Abbotsford water users and is managed by the Fraser Valley Regional District (FVRD).

The licensee has indicated in its draft MP No. 8 that it does not plan to operate in a 156-hectare area surrounding Cannell Lake. In its base case the licensee excluded about 138 hectares of productive forest land from the timber harvesting land base. BCFS district staff confirm that the Cannell Lake watershed augments low water supply to the communities of Mission and Abbotsford; however, they indicate that the watershed has not been legally designated as a Community Watershed under the Forest Practices Code. They note entirely excluding the Cannell Lake watershed from contributing to timber supply is not consistent with the management and analysis approach in the Kenworthy

Creek Community Watershed.

I note that the Cannell Lake watershed has no legal status under the Forest Practices Code. I also note that legally established Community Watersheds (such as the Kenworthy Creek Community Watershed) continue to contribute to timber supply throughout the province. I am not aware of any reason over the long term why the Cannell Lake watershed area could not contribute to timber supply provided that timber harvesting is done carefully to ensure no harm to water quality. If in the future, government chooses to exclude Community Watersheds from contributing to the timber harvesting land base or designates the Cannell Lake watershed as a Community Watershed, this can be addressed in a subsequent determination.

From this I conclude that the timber harvesting land base assumed in the base case may well have been underestimated by about two percent because of the exclusion of the Cannell Lake watershed. This would affect timber supply throughout the forecast period, and I have accounted for it in my determination, as discussed in "Reasons for decision".

- *visually sensitive areas*

Careful management of scenic areas visible from communities, public use areas, and travel corridors is an important forest management objective. The Forest Practices Code enables the management of visual resources by providing for scenic areas to be identified and made known, and by providing for the establishment of visual quality objectives (VQOs) that guide the management practices on a scenic area. To achieve this, visual landscape inventories are carried out to identify, classify, and record visually sensitive areas. On completion of such an inventory, a specialist may derive recommended visual quality objectives (RVQOs) of preservation, retention, partial retention, modification or maximum modification to identify levels of alteration that would be appropriate for particular areas. Visually sensitive areas can be identified by the district manager or in a higher level plan, and can be made known to licensees. The district manager or a higher level plan may also establish VQOs or recommended visual quality classes (RVQCs) to manage and conserve the visual resources in the scenic areas. For TFL 26, scenic areas with RVQCs have been made known by the BCFS district manager.

To manage for visual quality, constraints are placed on timber harvesting, road building, and other forest practices. The constraints, which are based on experience, research findings, and public preferences, are expressed in terms of forest cover requirements that relate to the maximum percentage of a viewshed that may be harvested at any one time, and to 'visually effective green-up' (VEG)—the stage at which a stand of reforested timber is perceived by the public to be satisfactorily greened-up from a visual standpoint.

In the base case for TFL 26, the VEG height for regenerated stands was assumed to be 4.0 metres. BCFS district staff inform me that this VEG height is less than the 5-metre VEG height used in the timber supply analysis for the adjacent Fraser TSA. The licensee provided a sensitivity analysis that examined the effects on the base case of increasing and decreasing the green-up age in visually sensitive areas. Increasing the green-up age of stands resulted in a decrease in the initial harvest level of 43 168 cubic metres per year to 37 037 cubic metres per year after 4 decades and reduced the long-term harvest level to

47 595 cubic metres per year. Decreasing the green-up age of stands resulted in an increase in the initial harvest level to 46 907 cubic metres per year and increased the long-term harvest level to 55 734 cubic metres per year.

BCFS staff have reviewed the information regarding visually sensitive areas. In the base case, the first five years of the harvest forecast incorporated the licensee's approved FDP. In the short term, harvesting proposed in each of the visually sensitive areas exceeds the maximum allowable disturbance level. The licensee has indicated that exceeding the maximum allowable disturbance level is due to the difference between the assumptions used in the base case and the operational application of visual quality requirements. In the base case, visually sensitive areas were modelled without allowing for the effect of topography and viewing conditions (i.e. on a planimetric basis rather than a perspective basis). However, district staff indicate that it is uncertain how much of an effect modelling visually sensitive areas on a perspective basis would have on visual disturbance levels.

The licensee provided a sensitivity analysis that examined the effect on timber supply of increasing and decreasing the percentage of alteration for each RVQC by 5 percent. The results indicate that increasing the allowable disturbance levels increased the initial harvest level to 49 183 cubic metres per year and increased the long-term harvest level to 56 375 cubic metres per year. Decreasing the allowable disturbance level resulted in a harvest level of 31 895 cubic metres per year after 4 decades, rising to a long-term harvest level to 44 893 cubic metres per year.

I have reviewed the information regarding visually sensitive areas on TFL 26. For this determination, I recognize that there is some uncertainty as to the green-up height and levels of disturbance that will be allowed in these stands over time. However, until more detailed information suggests otherwise, I will accept that the assumptions used in the analysis were based upon the best available information. In view of the sensitivity of short-term timber supply to changes in visual management assumptions, I believe it is very important that the licensee undertake a study of visual quality management on TFL 26 for consideration at the time of the next determination.

- *wildlife habitat*

No wildlife inventory has been conducted on TFL 26 to date. However, BCFS district staff expect that the occurrence of wildlife on the TFL is limited due to the prevalence of second-growth stands, an extensive road net-work, and proximity to human habitation.

For wildlife species considered to be at risk, the Conservation Data Centre of British Columbia maintains forest district tracking lists. These lists name those species and plant associations considered to be at risk (e.g., endangered, threatened, vulnerable or sensitive) and which are known to occur, strongly expected to occur, or which have occurred in the past within a given forest district. The Identified Wildlife Management Strategy (IWMS) addresses habitat management for specific species considered to be at risk, as described in the next section.

1) identified wildlife

'Identified wildlife' refers to species 'at risk' (red- and blue-listed) and to regionally significant species which may be impacted by forest management activities, and which may not be adequately protected by existing management strategies such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover constraints. Species at risk as defined under the Forest Practices Code also include species that are not considered at risk provincially but which have regional populations that may be threatened. The intent is to address the habitat needs of regionally significant wildlife early on, in order to lessen the chance that they will become threatened or endangered provincially.

Volume I of the IWMS was released in February 1999 and details several species that potentially occur within TFL 26 and that require future consideration when planning timber harvesting activities. The following species, which are identified in Volume 1 of the IWMS and will be included in identified wildlife when designated, occur within the adjacent Fraser TSA: American Bittern, Bull Trout, Fisher, Grizzly Bear, Keen's Long-eared Myotis, Marbled Murrelet, Mountain Beaver (both subspecies), Mountain Goat, Northern Goshawk, Pacific Water Shrew, Rubber Boa, Sandhill Crane, Tailed Frog, and Turkey Vulture. A list of the red- and blue-listed species at risk in the Chilliwack Forest District is available in the *Fraser Timber Supply Area Analysis Report*.

In general, identified wildlife species will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in higher level plans. Specific WHAs or management strategies for identified wildlife species have not yet been established on TFL 26. As a result, no specific exclusions were applied in the base case.

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. When WHAs are identified or established, and GWMs are implemented, the impacts on timber supply of management for identified wildlife will be more quantifiable. In addition, measures will be assessed over time to determine if those measures are sufficient to adequately protect the identified wildlife species. The identified wildlife strategy and associated timber supply impact thresholds may be changed after such an evaluation, but I cannot speculate on the outcome of this process. In addition, I cannot speculate about decisions that may be made during future land and resource management planning processes with respect to identified wildlife. Any future changes to the required measures for identified wildlife species which result in impacts to timber supply, either under the IWMS or according to approved plans, will be incorporated into future determinations.

For this determination, it is not possible to specify the exact location or precise amount of habitat area that will be required within the timber harvesting land base to implement the IWMS. However, given the commitment made by government discussed above, it has been appropriate in the majority of AAC determinations to account for an expected but not fully quantified impact on the timber supply. In consideration of the information regarding identified wildlife, and relative to the base case, I believe it appropriate to

expect a reduction to timber supply of up to one percent across the entire forecast period as a result of the implementation of the IWMS. I will discuss this further under 'Reasons for decision'.

- *stand-level biodiversity*

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code, biodiversity in a given management unit is assessed and managed at both the stand and landscape levels.

Stand-level biodiversity is managed by retaining reserves of mature timber, or wildlife tree patches, within cutblocks and in adjacent inoperable and other retained areas to provide structural diversity and wildlife habitat. The *Landscape Unit Planning Guide* outlines procedures and makes recommendations on the proportion of a cutblock that is required in wildlife tree retention.

Table 20(a) from the guidebook was used to derive the WTP deductions required for each biogeoclimatic variant in TFL 26. This approach led to a total requirement of 194 hectares of productive forest from the timber harvesting land base, of which 51 hectares is reserved from harvesting in the licensee's current FDP. Areas excluded in the analysis for WTPs were classified as non-contributing to harvest but were still considered to contribute to landscape level biodiversity requirements. BCFS district staff support the method used in the analysis.

I am satisfied that the assumptions used in the base case for stand level biodiversity reflect current practice and are appropriate for use in this determination.

- *landscape-level biodiversity*

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on or are strongly associated with old-growth forests. Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices are needed to represent the different natural disturbance patterns under which ecosystems have evolved.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A landscape unit is an area established by the district manager, generally up to 100 000 hectares in size, based on topographic or geographic features such as a watershed, or series of watersheds, to manage biodiversity and other forest resource values.

The *Biodiversity Guidebook,* the *Landscape Unit Planning Guide* and *Higher Level Plans: Policy and Procedures* all provide policy and guidance on management for

landscape-level biodiversity. The *Landscape Unit Planning Guide* provides guidance on which components of the full range of recommendations included in the *Biodiversity Guidebook* should be implemented to achieve a balance of forest management objectives. The *Landscape Unit Planning Guide* contains forest cover requirements for old seral forest that are to be applied at the biogeoclimatic variant level within each landscape unit. The requirements are stated as a minimum percentage of the productive forest to be retained in stands above a specified age that varies by ecosystem type. The guide also allows the old-seral requirement to be phased in over time in landscape units with a lower biodiversity emphasis.

The 1996 Higher Level Plans: Policy and Procedures guide provides further policy guidance. It outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—that may be employed when establishing biodiversity management objectives for a landscape unit. To achieve a balance between biodiversity and timber supply objectives, this guide recommends the application of a mix of BEOs in each subregional planning area. The proportions of a planning area subject to lower and intermediate biodiversity emphasis should range from 30 to 55 percent, with the average at approximately 45 percent of the area subject to lower, 45 percent to intermediate, and 10 percent to a higher BEO (45-45-10). In the base case, the licensee used the provincial distribution of 45-45-10 to calculate the percentages of the land base in each variant that needed to be retained in old seral forest over time.

TFL 26 falls within the Hatzic and Alouette draft landscape units, which have low and intermediate draft biodiversity emphasis objectives (BEOs) respectively. The Alouette landscape unit covers a small area within TFL 26 and includes Golden Ears Provincial Park. For its timber supply analysis, the licensee combined the areas of the TFL within the Alouette and Hatzic landscape units. Landscape-level biodiversity requirements for the Alouette landscape unit were assumed to be within the Golden Ears Provincial Park, while the Hatzic landscape-level biodiversity requirements were assumed to be met solely within the boundaries of TFL 26.

BCFS district staff indicate that implementation of landscape-level biodiversity requirements on TFL 26 will result in the application of a low BEO requirement, allowing old growth targets to be phased in over time.

In a sensitivity analysis provided by the licensee, application of a low BEO with old growth requirements being met over a 210-year period, resulted in an increase in the short- to mid-term timber supply from 43 168 cubic metres per year in the base case to 44 998 cubic metres per year, a 4 percent increase.

I have reviewed the information regarding landscape-level biodiversity on TFL 26 and conclude that the landscape-level biodiversity assumptions incorporated in the base case were overly conservative and not reflective of current practice on the TFL. Therefore, for this determination, as noted in "Reasons for decision", I have accounted for an underestimation of approximately 4 percent in the short- to mid-term timber supply.

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

Other information

Twenty-year plan

Forest Ecosystems Solutions Limited, on behalf of the licensee, used the optimization function of FSOS (see "Timber supply analysis") to develop its twenty-year plan (TYP). For the first 5 years of the analysis period, the licensee used cutblock information from its current FDP. Other information, such as forest cover constraints, were similar to those used in the base case.

BCFS district staff have reviewed the twenty-year plan submitted by the licensee and are satisfied that the harvest level proposed in the base case can be achieved for a period of 20 years with some visual quality constraints being violated. They note that the TYP highlights the sensitivity of timber supply to visual constraints.

The district manager accepted the licensee's twenty-year plan on July 3, 2001.

I have reviewed and discussed the information regarding the TYP with BCFS staff and I am satisfied that the first two decades of the base case harvest projection is operationally obtainable. I have been mindful of this information in my consideration of an appropriate harvest level for TFL 26.

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

Alternative rates of harvest

- *harvest flow/socio-economic implications*

The nature of the transition from harvesting old growth forests to harvesting second growth forests is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large timber volumes in older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be 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 forecast, the licensee used the simulation function of FSOS to prepare several alternative harvest flow projections. In one alternative, the licensee increased the initial harvest level represented in the base case (43 168 cubic metres per year) by approximately 8 percent. In this alternative, a harvest

level of 46 706 cubic metres per year was maintained for 2 decades before declining approximately 10 percent to a mid-term harvest level of 41 927 cubic metres per year. This mid-term harvest level was maintained for 85 years before increasing to the long-term harvest level of 46 877 cubic metres per year— approximately 3000 cubic metres per year lower than the long-term harvest level attained in the base case.

In a second alternative, a short-term harvest level of 43 168 cubic metres per year was maintained for 9 decades before increasing approximately 9 percent to a long-term harvest level of 46 877 cubic metres per year.

A third alternative projected a non-declining harvest forecast of 43 280 cubic metres per year for the entire forecast period.

The results of these alternative harvest flows provide me with a useful assessment of the timber supply dynamics over the term of the analysis horizon. In particular, the results indicate to me that there is some flexibility in the short and mid-term for the timber supply on TFL 26.

- *community dependence on the forest industry*

The licensee currently employs eight people in full-time positions, while most of the harvesting on TFL 26 is done under contract. The majority of the licensee's staff and harvesting contractors live in or near Mission. Based upon information provided by the Council of Forest Industries, the licensee estimates that forestry operations on TFL 26 account for 78 direct jobs and 152 indirect jobs. Based upon the information used for the timber supply analysis for the Fraser TSA, BCFS staff estimate that forestry operations on TFL 26 account for 55 direct jobs and 65 indirect jobs.

I have reviewed the information and am mindful that the volume harvested from TFL 26 provides a significant contribution to the employment in the local area.

- *difference between AAC and actual harvest*

As a normal standard, most licensees have some flexibility in their annual rate of cut during a five-year period referred to as the cut control period. The volume harvested must be within 50 percent of the allowable annual volume in each year (annual cut control), and also within 10 percent of the allowable volume for the five-year period (periodic cut control).

I note that the licensee has met its cut control requirements on TFL 26 over the last full cut control period, and is expected to meet the requirements when the current period is complete. I am satisfied from review of the information that there are no issues relating to the ability of the licensee to conduct operations on the TFL.

<u>Partitioned component of the harvest</u>

In his previous AAC determination for TFL 26, the chief forester included a partition of 3000 cubic metres per year to deciduous-leading stands.

Since the 1996 AAC determination, there has been very little harvesting of

deciduous-leading stands. The licensee excluded all deciduous-leading stands and deciduous volume from the base case and expressed concern regarding the harvesting of deciduous stands on TFL 26. As discussed under *deciduous stands*, BCFS staff indicate that there is demand for deciduous volume on the adjacent Fraser TSA and believe that deciduous-leading stands could contribute to timber supply across the planning horizon. District staff also note that the licensee has proposed a 17-hectare cutblock in its approved FDP.

I have reviewed the information presented to me by the licensee and BCFS district staff regarding the potential utilization of deciduous timber I am satisfied that limited potential does exist, but probably not at the level anticipated when the last AAC was determined. Because the likely contribution of deciduous timber is relatively small, I will not continue with a partition for deciduous-leading stands in this determination, as discussed in "Reasons for decision".

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

Timber processing facilities

- *existing mills*

The licensee does not own a processing facility and currently sells all of its harvested timber in open market arrangements to other companies. Hence, the timber may be milled in a number of mills in different communities. I have no information to indicate how dependent those plants are upon this source, but the relatively small contribution that TFL 26 makes to the south coast log market suggests few facilities are likely to be exclusively or predominantly reliant upon it.

(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 and memorandum*

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). These economic and social objectives are an important consideration in my determination of an AAC for TFL 26.

This letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at

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

The Minister's memorandum addressed the effects of visual resource management on timber supply. It asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. I have discussed this above under v*isually sensitive areas*, where I requested that the licensee undertake a study on TFL 26 to provide a better assessment of the potential impacts on timber supply of the RVQCs for the next determination.

I have considered the contents of the letter and memorandum in my determination of an AAC for TFL 26. As discussed earlier under *incremental silviculture*, I noted that there is evidence of significant commercial thinning on TFL 26 over the last 6 years and that there appear to be opportunities for further commercial thinning over time. In addition, as discussed earlier under *economic and physical operability*, I am satisfied that there are no further significant opportunities at this time for harvesting in previously uneconomical areas, beyond what was incorporated into the base case assumptions. As discussed under Partitioned component of the harvest, I have decided to discontinue the partition for deciduous-leading stands.

- *local objectives*

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

The licensee indicates in its draft Management Plan No. 8 that it actively solicited input on the statement of management objectives, options and procedures (SMOOP) and the draft management plan. District staff confirm that the licensee met its public input obligations satisfactorily, and that no written responses were received.

I am satisfied that the licensee has carried out its public involvement obligations satisfactorily, and that no specific issues were identified in public review which would impact this determination.

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

Abnormal infestations and salvage

- *unsalvaged losses*

Numerous parasites, fungi or plants can kill trees or degrade the quality and value of logs. Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire and disease that are not recovered through salvage operations.

Estimates for unsalvaged losses account for epidemic infestations that are not incorporated into yield estimates used in the analysis. 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 though other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted previously in this rationale.

In the rationale for the 1996 AAC determination, the chief forester instructed the licensee to further examine the unsalvaged loss estimates for the licence area as the previous analysis did not account for unsalvaged losses.

In response to this request, the licensee undertook a review of unsalvaged losses on TFL 26. The licensee indicates that the extensive road system on TFL 26 allows for considerable salvage of insect, disease, and fire-affected stands. The licensee estimates that annual losses due to fire average 3 cubic metres per year and unsalvaged losses due to windthrow average 112 cubic metres per year. Therefore, for this analysis the total unsalvaged loss for the licence area was assumed to be 115 cubic metres per year. BCFS district staff concur with the licensee's estimates for unsalvaged losses.

I am satisfied that the assumptions on which the timber supply analysis was based represent the best available information; therefore, I accept the estimates for unsalvaged losses as used in the base case forecast as appropriate for use in this determination.

Reasons for Decision

I have considered the information discussed throughout this document, and I have reasoned as follows.

For the reasons stated in 'Timber Supply Analysis' and from reviewing the considerations as recorded above, I accept the licensee's base case as an adequate basis from which to assess timber supply for this AAC determination.

In determining this AAC, I have identified factors which, considered separately, indicate that the timber supply may be either greater or less than that projected in the base case. Generally some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be reliably quantified at this time. These latter

factors are accounted for in determinations in more general terms.

In this rationale, I have identified several factors for which I believe the base case assumptions differ from current operational practices or conditions. These factors are summarized below.

For this determination, I believe there is one factor that will act to decrease timber supply as compared to the base case projection:

- *identified wildlife management strategy*– I have concluded that the eventual establishment of WHAs and other measures to manage for identified wildlife may result in a decrease of up to one percent in timber supply over the entire forecast period;

For this determination, there are five factors that will act to increase timber supply as compared to the base case projections:

- *deciduous stands* – In the base case, the licensee excluded all 740 hectares of deciduous-leading stands, and the deciduous component of conifer-leading stands. I believe that is overly conservative in light of the market that exists for deciduous timber, particularly red alder, in the Fraser Valley and other parts of the south Coast. In this context, I note that the licensee's current FDP anticipates harvesting of about 1000 cubic metres per year of deciduous-leading stands. I have concluded that there is indeed a reasonable prospect for deciduous timber to contribute to overall timber supply across the planning horizon.
- *site productivity estimates* – Based on provincial OGSI and SIBEC studies and their effect on timber supply as projected in the sensitivity analyses, I have concluded that future yields of regenerating stands and hence timber supply may be greater than the base case projection by an unquantified amount across the entire forecast period.
- *utilization standards* – I have concluded that actual utilization of timber down to 12.5-centimetre dbh will support a harvest that is higher than the base case projection across the entire forecast period. This is because the base case assumed utilization down to a 17.5-centimetre dbh.
- *landscape-level biodiversity* –In the base case the licensee used the provincial distribution of 45-45-10 to estimate the proportion of the planning area subject to lower, intermediate, and higher BEOs. Based upon my review of the sensitivity analysis that examined the impact of implementing the draft low BEO with gradual implementation of old growth requirements, I have concluded that the short- to mid-term timber supply is probably about 4 percent higher than estimated in the base case.
- *water resources* – I have concluded that the timber harvesting land base was probably underestimated by approximately 2 percent due to the complete exclusion of stands in the Cannell Lake watershed.

In combination, the above six factors indicate that the accessible timber supply is likely to be about three thousand cubic metres per year higher than modelled in the base case, and that supply will rise over time. However, I believe that this is at least partially

counteracted by significant uncertainty concerning the management of visual quality on about half of the TFL landbase. Although this uncertainty is not presently quantifiable, it causes me to set the new AAC at a lower level than I otherwise would.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that 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, can best be achieved by establishing an AAC of 45 000 cubic metres, which is the same as the AAC for the most recent five-year period. Within the limits of the new AAC I am not concerned about undue exploitation of coniferous-leading stands over the coming five years. Therefore, I believe it is unnecessary to formally attribute any portion of the AAC to deciduous-leading stands.

This determination is effective August 1, 2001 and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this determination and leading to the subsequent determination, I encourage BCFS and licensee staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability to undertake these projects is dependent on the availability of staff time and funding. However, this work will be important to help reduce the risk and uncertainty associated with key factors that affect timber supply on TFL 26. I recommend that the licensee:

- closely monitor and document utilization of deciduous timber;
- collect localized site productivity information;
- review its procedures for defining minimum harvestable ages; and
- determine the extent of the area to which managed stand yield tables should be applied.

Furthermore, I especially encourage the licensee and BCFS staff to clarify and bring closure to the operating practices related to managing visually sensitive areas.

Ken Baker

Ken Baker
Deputy Chief Forester
July 5, 2001

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, 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 (1) (a) to (d),

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).

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

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

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

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

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

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

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

(a) the community forest agreement, and

(b) any directions of the chief forester.

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

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

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

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

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

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

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

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

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

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

(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.

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

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

Purposes and functions of ministry

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

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

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

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

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

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

Documents attached:

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

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

File: 10100-01

JUL 28 1994

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

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

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

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

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

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

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

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

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

Yours truly,

Andrew Petter
Minister

Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

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

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

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

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

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

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

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

Andrew Petter
Minister of Forests