BRITISH COLUMBIA
MINISTRY OF FORESTS

Tree Farm Licence 53

Issued to Dunkley Lumber Ltd.

Rationale for Allowable Annual Cut (AAC) Determination

Effective December 15, 1999

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Deputy Chief Forester

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 53. This document also identifies where new or better information is required for incorporation into future determinations.

Description of the Tree Farm Licence

TFL 53 is located south of Prince George along Highway 97 near the small communities of Hixon and Strathnaver. It is held by Dunkley Lumber Ltd. (the 'licensee') and is administered by the British Columbia Forest Service (BCFS) Prince George Forest District office (the 'district'), which forms part of the BCFS Prince George Forest Region.

The TFL's western edge is visible from Highway 97, and it is bordered by the Prince George timber supply area (TSA) as well as TFL 52 and a small portion of the Quesnel TSA. The gross area of the TFL is approximately 87 660 hectares, of which 82 780 hectares or 94 percent is forested land. The land base considered available for timber harvesting is 70 142 hectares or 85 percent of the total forested area.

The TFL area largely falls within the Sub-Boreal Spruce (SBS) biogeoclimatic zone, with approximately 10 percent of the gross area in the Engelmann Spruce Subalpine Fir (ESSF) zone. Forest stands within the SBS comprise primarily interior white spruce, lodgepole pine and coniferous mixed wood stands, with a small component of interior Douglas-fir.

The terrain is undulating with rolling hills and several small lakes and minor drainages. The forest land within the TFL is productive, with approximately 57 percent of the timber harvesting land base considered to be of good or very good growing potential for trees.

Timber harvested from TFL 53 is processed by the licensee's sawmill in Strathnaver. TFL 53 supplies approximately 30 percent of the total volume utilized by this mill.

History of the AAC

In 1987, Dunkley Lumber Ltd. applied for the award of a tree farm licence upon surrender of their Forest Licence in the Prince George TSA. The application requested that the quota which had been committed to Dunkley from the Prince George TSA (167 380 cubic metres per year) be transferred to a tree farm licence tenure to secure a supply of timber for Dunkley's sawmill in Strathnaver. A land base was delineated that would support the Dunkley quota plus a Small Business Forest Enterprise Program (SBFEP) allocation.. On May 30, 1989, the Chief Forester determined an AAC for TFL 53 of 187 630 cubic metres as proposed in Management Plan No. 1, and the tree farm licence was issued on September 1, 1989. The AAC included 28 620 cubic metres to be allocated to the SBFEP.

On December 23, 1994, a new AAC of 204 700 cubic metres was determined for TFL 53, which included the allocation of 28 620 cubic metres for the SBFEP. The 1994 determination included a partition of 4100 cubic metres per year to the residual balsam-leading stands (resulting from historic intermediate utilization (IU) logging) containing merchantable timber volumes of between 50 and 140 cubic metres per hectare.

New AAC determination

Effective December 15, 1999, the new AAC for TFL 53 will be 239 500 cubic metres, an increase of approximately 17 percent from the current AAC. This AAC includes the following partitions:

- 4100 cubic metres to residual balsam-leading stands resulting from historic intermediate utilization (IU) logging; and
- 2000 cubic metres to aspen-coniferous stands.

The AAC includes 28 620 cubic metres administered under the small business forest enterprise program.

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 53 includes the following:

- *Statement of Management Objectives, Options and Procedures (SMOOP) for draft Management Plan No. 3*, TFL 53, accepted August 7, 1998;
- *Timber Supply Analysis Information Package*: *TFL 53*, Management Plan No. 3, Dunkley Lumber Ltd., accepted February 3, 1999;
- Existing stand yield tables for TFL 53, approved by BCFS Resources Inventory Branch, February 9, 1999;
- Managed stand yield tables and site index curves, approved by BCFS Research Branch, March 19, 1999;
- *TFL 53 Inventory Audit*, BCFS Resources Inventory Branch, conducted 1997, final report released January 1999;
- *Prince George Land and Resource Management Plan (LRMP*), Province of British Columbia (B.C.), March 1999;
- *Landscape Unit Planning Guide*, B.C., March 1999;
- *Timber Supply Analysis Report: TFL 53*, Management Plan No. 3, Dunkley Lumber Ltd., accepted June 14, 1999;
- *Management Plan No. 3: TFL 53*, Dunkley Lumber Ltd., submitted June 30, 1999; approved December, 1999;
- *TFL 53, Twenty-Year Plan*, Dunkley Lumber Ltd., accepted June 30, 1999;
- Summary of public input solicited by the licensee regarding the contents of Management Plan No. 3;

- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Letter from the Deputy Ministers of Forests, and Environment, Lands and Parks (MELP), dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts on timber supply from biodiversity management;
- Technical information provided through correspondence and communication among staff from BCFS and MELP;
- Technical review and evaluation of current operating conditions through comprehensive discussions with BCFS staff, including the AAC determination meeting held in Victoria on September 16, 1999;
- Review of TFL 53 and operating conditions through discussions between Dunkley Lumber Ltd. staff and the Deputy Chief Forester on June 3, 1999;
- *Forest Practices Code of British Columbia Act*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP;
- *Biodiversity Guidebook*, B.C., 1995
- *Lake Classification and Lakeshore Management Guidebook: Prince George Forest Region*, B.C., September 1996
- *Forest Practices Code, Timber Supply Analysis*, BCFS and MELP, February 1996.

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 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 the complete answer or solution to forest management problems such as AAC determination. 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 I must consider in AAC determinations.

In making the AAC determination for TFL 53, 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*. Consistent with this provision, in a memo dated November 24, 1998, the chief forester requested that I make AAC determinations for a number of TFLs.

In this memo the chief forester 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 employed them as described below in making my AAC determination for TFL 53.

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, which I have reviewed, adopted and applied 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 intend to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect 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* (the 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 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 53, as deputy chief forester, I intend to follow the same approach.

As B.C. 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 sub-regional plans or 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 impacts on timber supply that will eventually result from land-use decisions that have not yet been taken by government. Like the chief forester, I will therefore not consider 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 deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

Forest Renewal BC (FRBC) 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 harvest levels. 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 all the AACs in the province between 1992 and 1996, many of which were outdated. 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 may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I determine 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 53.

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 his 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 this AAC determination, I am assisted by timber supply forecasts and associated harvest projections provided to me by the licensee as part of the BCFS Timber Supply Review program.

For each AAC determination 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. These include sensitivity analyses to assess the timber supply effects of uncertainties or changes in various assumptions around a baseline option, normally referred to as the 'base case' forecast.

The base case forecast may incorporate information about which there is some uncertainty. Its validity, as with all the other forecasts provided, depends on the reliability of the data and assumptions incorporated into the computer model used to generate it. Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgment, using current information available about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, 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 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 in part be based on uncertain information are essentially qualitative in nature and, as such, 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 53 was prepared by Industrial Forestry Service Limited in conjunction with Dunkley Lumber Ltd. staff. The Forest Stand Simulation Model (FSSIM) version 3.0 was used for the timber supply analysis. Given that this model is used by the BCFS during its timber supply analyses, and based on my staff's experience examining results from this model, I am satisfied that it is capable of providing a reasonable projection of timber supply.

The base case prepared on behalf of the licensee projected an initial harvest level of 249 000 cubic metres per year, approximately 22 percent higher than the current AAC of 204 700 cubic metres. The initial harvest level was maintained in the base case for five decades until period six, at which point the harvest level decreased by 3.6 percent to 240 000 cubic metres per year for ten years. It then returned to the initial harvest level again for ten years, and then increased to 328 000 cubic metres per year. It remained constant at this level until period 15, when it dropped slightly for ten years to 325 000 cubic metres per year. A final long-term sustainable harvest level of 345 000 cubic metres per year was obtained in period 17.

The base case projection in the analysis included a contribution to timber supply from the residual balsam-leading stands resulting from historic IU logging (stands which form a partition in the current AAC). The majority of the volume contributing to timber supply in the base case is assumed to be from coniferous-leading stands, which includes a small contribution from deciduous species occurring in these stands. Contribution from the white spruce and lodgepole pine component of some deciduous-leading stands is assumed in the base case, as described in detail under *deciduous stands*.

In the timber supply analysis, sensitivity analyses were provided to assess the risk to timber supply resulting from uncertainty in data assumptions and estimates, and these have assisted me in considering the factors leading to my determination. In particular, I am aware that landscape level biodiversity was not modelled to the variant level in the base case for the analysis, and sensitivity analyses have assisted me in assessing the impacts of this on timber supply. My considerations of this will be discussed in detail later in this rationale under *landscape level biodiversity*. In addition, I am mindful of the small reduction in timber supply projected in period six of the base case and the majority of the sensitivity analyses—including the variant level sensitivity analyses—provided. While this reduction is reflective of the modelling technique sometimes used in timber supply analysis to indicate that a maximum level has been attained, in light of the projected increased harvest level over the current AAC, I have considered the implications of this future reduction and have discussed this further under *harvest profile*.

As discussed and quantified throughout this rationale, and in consideration of the items described above, I am satisfied that the base case provides a suitable reference point from which to assess the timber supply 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 this section the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

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

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

Land base contributing to timber harvesting

- *general comments*

The total area of TFL 53 as estimated from the inventory data is approximately 87 660 hectares, of which 82 780 hectares are forested land. Approximately 85 percent of the forested area or 70 142 hectares are considered to be available for timber harvesting.

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 harvesting), a series of deductions are made from the forested land base. These deductions account for the factors that effectively reduce the suitability or availability of the forested area for harvest for economic or ecological reasons. 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 forested area in order to derive the timber harvesting land base. These factors are described in detail in the next sections of this rationale.

In reviewing these deductions I am also 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 within that classification; some portion of it may have been deducted earlier under another classification. For TFL 53, I acknowledge that the licensee used the above approach to appropriately derive the timber harvesting land base and I find the results to be reasonable for use in this determination.

Residual balsam-leading stands from historic IU logging occupy three percent of the forested land base of TFL 53. These stands were delineated separately for the purposes of the analysis. The stands were subjected along with all other stands on the TFL to the series of deductions applied in the derivation of the timber harvesting land base—with the exception of the reductions applied for low site productivity—which resulted in approximately 908 hectares of balsam IU stands removed from the productive forest land base.

- *non-forested areas*

Non-forested areas on TFL 53 include fresh water, rock, clearings, urban areas and classified roads. Data from the TFL forest inventory file was used to delineate and remove a total of 4881 hectares from the gross TFL area. The non-forested areas in TFL 53 represent approximately 5.5 percent of the total area, and the majority of these areas are lakes or wetlands. The remainder of the TFL land base is 82 780 hectares and is considered forested land.

An audit conducted by BCFS Resources Inventory Branch ('Resources Inventory Branch') found that the non-forested classification for the TFL did not meet provincial standards. However, the audit report stated that the issue of non-forest classification on this TFL does not impact on the forest area available for timber harvesting reported in the timber supply analysis.

I am satisfied that there is no risk posed to timber supply as a result of the inaccuracies found by this component of the audit. However, I encourage BCFS and licensee staff to work together to review the classifications for non-forest and make any necessary adjustments to the information, prior to the next determination for TFL 53.

- *non-productive forest*

The reductions applied for non-productive forest include areas of alpine forest, non-productive brush and other similarly non-productive areas. A total of 1462 hectares or approximately 1.8 percent of the total forested area was removed to account for these areas. The reductions appear reasonable and I am satisfied that they are appropriate for use in this determination.

- *non-commercial cover*

In the analysis the licensee excluded approximately 330 hectares of area occupied by non-commercial brush species from the productive forest land base. The licensee considers timber production to be unlikely on these areas. I have reviewed these deductions and consider them appropriate.

- *environmentally sensitive areas*

An environmentally sensitive area (ESA) is an area identified during a forest inventory that is sensitive to disturbance and/or is significantly valuable for fisheries, wildlife, water, recreation or other resources. ESA information is used to identify areas to exclude from the timber harvesting land base where more specific or detailed information is not available about a particular forest resource. In the analysis for TFL 53, ESA ratings were used to delineate and exclude areas with sensitive soils or steep slopes, possible regeneration problems, recreation values or some combination of these factors.

During the determination of the timber harvesting land base, approximately 1366 hectares were removed to account for environmentally sensitive areas.

i) soils considerations

The sensitive soils inventory, including the classification of soil ESAs, was completed by the licensee and approved by the district in 1993. ESA ratings for soils are defined as either Es1 (highly sensitive to disturbance) or Es2 (moderately sensitive to disturbance) for the purposes of the classification system. Approximately 612 hectares of Es1 areas and 499 hectares of Es2 areas were identified.

The ESA classification system also includes ratings for areas with both soil and regeneration sensitivity. Approximately 94 hectares of Esp1 and 37 hectares of Esp2 areas were identified. In the timber supply analysis, one hundred percent of E1 areas and none of E2 areas were removed from the productive forest land base. These assumptions were applied in the modelling with the intention of approximating operational practices, whereby approximately 20 percent of highly sensitive (E1) areas are harvested and 20 percent of moderately sensitive (E2) areas are not harvested. A total of 702 hectares were excluded during the analysis following other deductions to account for sensitive soil related ESAs.

BCFS Timber Supply Branch staff note that terrain stability mapping information is available for TFL 53 and that the updated information should have been used to identify and remove areas with soil sensitivity, rather than the ESA mapping information which was used for the analysis. District staff do not know the degree to which terrain stability mapping information differs from the ESA soils information. Observations in other units generally indicate that ESA soil ratings may overestimate terrain class V areas. I accept that the risk associated with using the ESA mapping information is likely to be small and therefore consider it to be adequate for the purposes of this determination. However, for future analyses, any better information resulting from the terrain stability mapping should be incorporated.

ii) regeneration considerations

The information from environmentally sensitive area mapping was used to identify and remove any areas sufficiently sensitive to disturbance that regeneration would be compromised. ESA ratings specific to regeneration include Ep1 (high likelihood of difficult regeneration) and Ep2 (moderate likelihood of difficult regeneration). As described under *soils considerations,* there were also areas identified with both soils and regeneration concerns, and these were also removed from the productive forest land base.

One hundred percent of the approximately 1179 hectares of Ep1 areas were removed from the productive forest land base, which resulted in 658 hectares removed following other deductions. Approximately 757 hectares of Ep2 areas were identified in total but were not removed.

In operational practice, approximately 20 percent of highly sensitive (E1) areas are harvested and 20 percent of moderately sensitive (E2) areas are not harvested. The assumptions applied in the modelling—whereby 100 percent of E1 areas, but none of the E2 areas, were removed from the productive forest land base—were intended to reflect

these operational practices. District staff have reviewed the deductions applied to account for areas with difficult regeneration and determine them to be appropriate.

For the purposes of this determination, I accept that such areas have been adequately accounted for in the timber supply analysis.

- *economic and physical operability*

Those portions of a TFL which are not physically accessible for harvesting, or which are not feasible to harvest economically, are categorized as inoperable and are excluded when deriving the timber harvesting land base.

In the analysis, economic operability was addressed through reductions for unmerchantable forest types and low productivity sites, and thus there were no additional reductions made on this account. With respect to physical operability, the licensee states that there are no areas in TFL 53 which are currently inoperable or inaccessible due to terrain, other than those areas accounted for through reductions for environmentally sensitive areas. Therefore, no additional productive forest areas were deducted to account for physical operability. District staff have reviewed and agree with the assumptions used during the analysis.

Having reviewed the criteria and approach used in the analysis for environmentally sensitive areas, merchantability, problem forest types and low sites, I accept this assessment and do not foresee any risks posed to timber supply as a result of operability assumptions.

- *sites with low timber growing potential*

In order to determine the timber harvesting land base, sites with low productivity as a result of inherent site factors such as nutrient availability, exposure, excessive moisture or that are not fully occupied by commercial tree species were removed from the productive forest land base.

i) low productivity sites

Data from the forest cover inventory file were used to identify and remove sites with low productivity. Site productivity was considered to be too low for timber growing potential if the site was unable to produce a stand with volume of at least 140 cubic metres per hectare by 250 years of age. These criteria were translated to a site index value for each species, which is expressed as metres in height at breast height age 50. The site index criterion was used to identify and remove the stands from the forested land base. In total, approximately 539 hectares of low productivity sites which were not expected to contribute to timber supply were excluded from the forested land base. District staff have reviewed the information regarding low productivity sites and believe them to be appropriate.

I am satisfied that the accounting for this factor in the base case for the analysis appropriately reflects the best available information for TFL 53.

ii) incorrectly classified plantations

During the review of low site areas, the licensee identified some stands that they believed to be incorrectly classified in the forest cover inventory file. These areas were described with low site indices in the file and yet in reality were occupied by plantations. Field review of several of these areas confirmed that the stands indeed had higher site indices than projected by the inventory, and were comprised of healthy young trees. The plantations were identified in the inventory file as white spruce, Douglas-fir or lodgepole pine stands with site indices below 5.9 metres and aged between one and forty years. The majority of the area is occupied by spruce plantations of between 11 and 20 years of age.

During the derivation of the timber harvesting land base in the analysis, the licensee labelled and removed these plantations in addition to the 539 hectares of sites with low timber growing potential described previously. The plantation areas were then added back to the timber harvesting land base after the total reductions to the productive forest. Approximately 815 hectares of areas were identified as incorrectly classified; after the various netdowns were applied, this resulted in 734 hectares added back into the timber harvesting land base in the base case for the analysis.

Although the licensee determined that these areas were incorrectly classified, they have not yet determined the amount by which the inventory file data underestimates the site productivity. To account for uncertainty in the true site indices for the plantations, the 734 hectares were added into the poor productivity analysis units, according to the leading species for each plantation. Although there is some uncertainty regarding the addition of these areas to the timber harvesting land base, I note that their inclusion in the poor productivity analysis units reduces the amount of risk that the addition poses to the timber supply for this determination.

District staff have reviewed the process used by the licensee to evaluate these areas and do not have concerns with the addition of these areas to the timber harvesting land base. Similar problems with misclassified areas have been observed on the neighbouring Prince George TSA. The results of the inventory audit, which is discussed later under 'Existing Forest Inventory' – *general comments* lend further support to the notion that there are possible issues around the classification of immature stands.

Based on the above discussion, I accept the inclusion of these areas in the timber harvesting land base as appropriate. I encourage licensee and district staff to work together to ensure that information regarding immature stands on TFL 53 is improved during the term of this determination.

- *unmerchantable forest types*

Unmerchantable (problem) forest types are typically defined as stands which are physically operable and exceed low site criteria, and yet are not utilized or have marginal merchantability. This section details the reductions applied in the timber supply analysis to account for conifer-leading unmerchantable forest types. Unmerchantable types in TFL 53 also include some deciduous-leading stands, which are discussed in detail in the next section of this rationale.

Problem forest types for exclusion were selected based on the licensee's experience in the area and field inspections, and consist of the same types of stands which were excluded during the analysis for Management Plan No. 2. Standard procedures were followed to identify and remove stands based on minimum criteria for age, height and stocking, using classes as defined in the inventory file classes. A total of 2142 hectares of Douglas-fir, balsam, balsam hemlock, balsam spruce, spruce and pine stands were removed from the productive forest land base to account for unmerchantable coniferous stands.

The licensee states that these stands are not currently targeted for harvesting on TFL 53. District staff have reviewed the criteria used to determine the unmerchantable forest types and agree with the approach used.

I accept that the assumptions used in the base case were appropriate and that the timber supply as projected in the analysis does not assume contribution from any unmerchantable stands, apart from those discussed later in the rationale under the sections relating to partitions.

- *deciduous stands*

Deciduous species form a component of conifer-leading stands on TFL 53. The base case for the analysis assumed a contribution to timber supply from the deciduous volume in conifer-leading stands, as is discussed later in this rationale under *volume estimates for existing stands*.

Deciduous-leading stands comprise approximately 3188 hectares of the gross forested area of TFL 53, consisting of approximately 1102 hectares of cottonwood, alder maple, and aspen mixed deciduous stands, 290 hectares of birch-leading stands, and 1796 hectares of aspen-coniferous stands. The majority of the aspen-coniferous stands on the TFL are aspen with a white spruce or lodgepole pine understorey.

For the purposes of the analysis, all of the cottonwood, alder maple, aspen mixed deciduous, and birch-leading stands were removed from the productive forest land base, for a net reduction of 1280 hectares. District staff confirm that these stands are not currently harvested on the TFL. I accept that it is appropriate to exclude these stands from contributing to timber supply for this determination.

The aspen-coniferous stands were not removed from the productive forest land base in the analysis. For the base case, the licensee developed a strategy for modelling these stands based on permanent sample plot data, research related to mixed wood stands, and consultations with BCFS Research Branch ('Research Branch') and district staff. Any stands less than 41 years of age were assumed in the analysis to be converted through silvicultural treatments to coniferous-leading stands. The stands 41 years of age and older were assumed to eventually convert to spruce- or pine-leading stands through seral succession, at approximately 80 years from the start of the analysis horizon. The stands were assumed to be available for harvest after 161 years of age, which would allow time for the aspen to die and the conifers to reach a merchantable size. The volumes for these stands were projected using Variable Density Yield Predictor (VDYP) curves for spruce and pine, and a volume reduction factor of 50 percent was applied to account for the reduced stocking expected to be present as a result of the aspen mortality. Applying this

reduction factor decreased the volume of these stands to approximately 140 cubic metres per hectare at 160 years of age. After the first harvest, the stands were assumed to be regenerated to pine-leading managed stands, and yields thereafter were projected using the managed stand yield tables (TIPSY).

The base case for the analysis thus assumed a volume contribution towards timber supply from the white spruce and lodgepole pine component of these stands, but did not assume contribution to timber supply from the aspen. The licensee provided a sensitivity analysis which illustrated the impact on timber supply of harvesting the deciduous volume in the aspen-coniferous stands.

In the sensitivity analysis, a minimum harvestable age of 61 years was assumed for the aspen. The stands were assumed to be harvested prior to mortality of the aspen and therefore no volume reductions were applied to the deciduous yield curves. The results of the sensitivity analysis indicated that short-term timber supply could be increased by 2000 cubic metres per year, for the first 70 years of the analysis horizon, and without a reduction in period six. Based on the results of this sensitivity analysis, the licensee has proposed a partition of 2000 cubic metres per year in the aspen-coniferous stands on TFL 53.

District staff note that the licensee has not historically harvested aspen-coniferous stands on the TFL. Over the past five year period, 50 000 cubic metres of deciduous volume has been processed through the Strathnaver sawmill. A portion of this volume has come from the conifer-leading stands on TFL 53. None of the volume has originated from deciduous-leading stands on the TFL. The licensee currently has a cutting permit issued for one area in a deciduous-leading stand on TFL 53, and two further blocks proposed in the current forest development plan.

Both Research Branch staff and district staff express uncertainty as to whether these assumptions in the base case regarding the natural succession of aspen-coniferous stands will be achieved in practice, given the limited available experience and research. However, there is less uncertainty with the assumptions applied in the sensitivity analysis described above, and this may be more consistent with operational experience.

I am mindful that the licensee does not have a history of harvesting deciduous-leading stands on the TFL, although current practice does include the harvest of aspen volume in predominantly coniferous stands. In the approval letter for Management Plan No. 3, I have instructed the licensee to provide detailed objectives and strategies for deciduous management, which consider timber and non-timber values, including biodiversity, as they relate to timber supply.

I have considered their proposal for a partitioned deciduous harvest and will account for it later in this rationale under ‘Reasons for Decision’.

- roads, trails and landings

In timber supply analysis, a percentage of the productive forest considered to be available for harvesting is removed to account for the loss of productive forest land as a result of the construction of roads, trails and landings. Separate estimates were made for existing

roads, trails and landings, and for future roads, trails and landings, to reflect both potential changes in road building practices and road network requirements over time, and the access that the existing network of roads will provide for future harvesting operations. Estimates account for the area that is permanently removed from the timber harvesting land base and are applied as percentages of the area to be excluded from specified age classes.

i) existing roads, trails and landings

Roads delineated as 'classified' on the inventory file were removed during the deductions applied for non-forest to the gross TFL area. The process described in this section applies to 'unclassified' roads.

For the purposes of the analysis, the length of existing roads was measured using the Geographic Information System (GIS) database available for the TFL, and tabulated according to the class of road (forest service road, primary operational, secondary operational, on-block or landing). Sample field measurements of road widths were taken for each class identified, and then the width was multiplied by the total length in that road class in order to identify a total area. The net area which was removed from the productive forest land base to account for existing roads was approximately 1282 hectares.

Given that the area comprising TFL 53 has a harvesting history of 40 years, the deductions for existing roads, trails and landings were applied to all stands that were less than or equal to 40 years of age.

The licensee noted that several changes to forest practices have occurred since the previous determination, which are reflected in the deductions applied for existing roads, trails and landings. These include the following:

- the implementation of roadside logging, which results in an increased area of disturbance for on-block roads but eliminates landing construction;
- the introduction of a permanent road deactivation program to restore full forest productivity to specific roads;
- the requirement to fully rehabilitate bladed and frequently used skid trails, which has resulted in fewer trails constructed.

Those permanently deactivated roads which have been planted were not included in the deductions for roads, trails and landings. Data submitted by the licensee indicates that approximately 12.5 percent of roads constructed for logging are permanently deactivated in current practice. Approximately 33 kilometres of road have been deactivated to date on TFL 53.

Research Branch staff note that some small growth reductions may be apparent over time on permanently deactivated areas. However, at the present time these observations are not supported by specific localized research results. If better information becomes

available in the future that would indicate decreased productivity on these areas, it should be incorporated into future analyses.

District staff have reviewed the information regarding the assumptions for existing roads, trails and landings and feel that they are reflective of current practice.

I accept that the deductions applied in the analysis represent the best available information and are suitable for use.

ii) future roads, trails and landings

On TFL 53, all stands less than or equal to 40 years of age were assumed to be plantations with developed road systems which were accounted for during the reductions for existing roads. However, the licensee wanted to ensure that the deductions applied for future roads accounted for the occasional new road built through a previously harvested area. Therefore, percentage reductions to account for the future construction of roads, trails and landings were applied to all stands older than 30 years of age. Given the forty years of harvesting history on TFL 53, the net result was that those stands between the ages of 30 and 40 had reductions applied for both future and existing roads.

As the frequency of road deactivation increases over time, I note that future analyses may need to account for deactivation of road networks during the application of reductions for future roads, trails and landings. For this analysis, district staff have reviewed the assumptions applied for future roads, trails and landings and believe them to be adequate.

I accept that the reductions were applied appropriately for the purposes of this determination.

<u>Existing forest inventory</u>

- *general comments*

The forest cover inventory information used for the timber supply analysis for TFL 53 was collected between 1991 and 1993 by the licensee. The history of disturbance is current to April 1997, and the information regarding forest age, tree height and stocking levels was projected to 1998. The starting year for the timber supply projection was 1998.

The timber harvesting land base assumed in the base case contains 13.5 million cubic metres of volume. Approximately 2.1 million cubic metres of this volume lies in stands older than 180 years of age, and 140 000 cubic metres lies in stands older than 250 years of age. In addition, approximately 77 percent of the total inventory volume is considered to lie in stands at or above the minimum harvestable age.

An inventory audit was conducted by the Ministry of Forests in 1997 to assess the accuracy of the inventory for the TFL. The audit tested three components:

- the mature (60 years of age and older) forested areas of the TFL, to test the accuracy of the mature timber volume;

- the immature forest stands (younger than 60 years of age, but older than the silviculture classification of free-growing), to test the accuracy of the site growth potential assignments for these stands; and
- the area classified as non-forest in the inventory, to test the accuracy of the photo-interpreted classification for this component.

The audit on TFL 53 found that the volumes projected by the inventory for the mature component of the TFL were accurate, and this will be discussed further under *volume estimates for existing stands*. It also found that the inventory site indices predicted for the immature stands were consistently lower than those indicated by the audit results. The implications of these findings for the purposes of the timber supply analysis will be discussed in detail later in the rationale under *site productivity estimates.*

The audit assessment of the non-forest classification for TFL 53 was discussed earlier under *non-forested areas*.

- *age-class structure*

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

The age classes present on the TFL are representative of the pattern of natural disturbance. Approximately 77 percent of the stands on the forested land base are less than 180 years of age, with a further 22 percent between 180 years of age and 250 years of age. Less than one percent of the stands on the forested land base are currently older than 250 years of age.

I have considered the information regarding the age class distribution on TFL 53 and am satisfied that it has been correctly reflected in the timber supply analysis.

- *species profile*

The main coniferous species present on TFL 53 are white spruce, lodgepole pine and balsam. Spruce-leading stands occupy approximately 57 percent of the forested land base on the TFL. Pine-leading stands occupy a further 24 percent, balsam-leading stands occupy approximately 13 percent and Douglas-fir-leading stands occupy approximately 2 percent of the forested land base.

White spruce contributes 50 percent, lodgepole pine 30 percent and balsam 11 percent toward the total mature volume on the timber harvesting land base.

Approximately 4 percent of the forested land base is covered with deciduous-leading stands, which include cottonwood, alder maple, aspen deciduous, aspen-coniferous and birch stands. By volume, aspen contributes 4 percent and cottonwood contributes 3 percent to the total mature volume on the timber harvesting land base.

I have reviewed the species profile information and am confident that the timber supply analysis has adequately represented the current species composition on TFL 53.

- *volume estimates for existing stands*

Two growth and yield models were used to estimate timber volumes for the TFL 53 analysis. The Table Interpolation Program for Stand Yields (TIPSY), developed by Research Branch, was used to estimate yields for most coniferous managed stands, which were defined as all stands harvested from 1973 to present, and all stands harvested in the future. Managed stand volume estimates will be discussed later in this rationale under *volume estimates for managed stands*.

Existing natural stand volumes were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model version 4.5, which was developed by Resources Inventory Branch. This model is typically used for estimating the volumes for older existing coniferous stands in which species and stocking have not been managed. In the analysis for TFL 53, the VDYP model was used to estimate volumes for all stands originating before 1973, as well as the balsam component of managed and regenerated stands. Once an existing natural stand was harvested for the first time during the modelling, future growth and yield of all coniferous species (except balsam) in that stand was projected using estimates from managed stand yield tables.

Some contribution from deciduous volume was included in the VDYP yield curves for the existing natural stands. The deciduous volume in these conifer-leading stands was considered to contribute towards timber supply and was included in the existing natural stand yield curves used for the analysis. District staff confirm that the deciduous volume in coniferous stands is typically harvested on the TFL and where this occurs, it contributes toward the AAC. More than 50 000 cubic metres of aspen have been processed through the licensee's sawmill over the last five years and a portion of this volume has originated from deciduous species harvested in coniferous-leading stands on TFL 53. I have considered the assumptions made in the analysis regarding the deciduous volume in coniferous leading stands on the TFL and believe that current operating conditions were appropriately reflected.

Adjustments were made in the base case to the VDYP predicted volumes for two of the analysis units, as follows:

- the balsam IU stand volumes were capped at 100 cubic metres per hectare, to better reflect the expected yields from these stands;
- the deciduous-leading stands which were expected to convert to coniferous stands through natural succession had a 50 percent volume reduction applied to the curves for spruce (as discussed under *deciduous stands* previously in this rationale).

BCFS staff noted that there is some uncertainty that volumes will continue to increase over time as predicted by the VDYP tables. The licensee provided a sensitivity analysis which capped natural spruce stand yields at 180 years of age. This sensitivity analysis shows an impact of 2 percent on the initial harvest level if natural spruce stand yields are assumed to no longer increase after the stands reach 180 years of age. The impacts of

overestimations in natural stand yields for spruce may be significant due to the high proportion of spruce volume (68 percent) in stands older than 140 years of age on TFL 53.

The existing stand volume concern was expressed at the time of the last determination for TFL 53. As mentioned under 'Existing forest inventory' – *general comments*, the audit performed by Resources Inventory Branch on the mature component of the inventory found that average volume estimates for stands older than 60 years of age—as predicted by VDYP using forest cover inventory file data—were accurate.

Sensitivity analyses were provided which illustrated the impact on timber supply of possible underestimations or overestimations in natural stand yields. When existing natural stand yields were decreased by 10 percent, the short-term level of 249 000 cubic metres per year could be maintained for only two decades before dropping by 10 percent to 226 000 cubic metres per year. Timber supply decreased again after one decade to 205 000 cubic metres per year and then to 202 700 cubic metres per year before rising in decade eight to approximately the same level as the base case. This sensitivity analysis illustrates that short-term timber supply in TFL 53 is sensitive to uncertainties in existing natural stand yields.

I am aware that timber supply has been shown in this unit to be sensitive to uncertainties in the volumes for existing stands. I am also aware that district staff still have some discomfort with the inventory volume estimates—in particular those for white spruce—despite the results of the audit, but are unable to provide any quantification on the matter. I encourage them to work with Resources Inventory Branch to attempt to isolate the concern, and note that any new information which becomes available can be incorporated for the next analysis.

Given the results of the audit, I am confident that the inventory data is the best available information on which to base assessments of existing stand volumes. The audit results indicate to me that there is a low risk associated with the projection of timber supply based on the inventory values. For the purposes of this determination, I am satisfied that the information used in the analysis represents the best available information for TFL 53.

- *aggregation procedures*

For the timber supply analysis, the inventory for TFL 53 was aggregated into 20 analysis units based on inventory type group (leading species) and site productivity. Standard procedures were used to generate existing and managed stand yield tables for each of the analysis units.

The total volume of the current inventory determined through the summation of the volumes for each polygon, was compared to the total volume of the current inventory determined through the summation of the volumes for each analysis unit. This comparison is generally made in timber supply analysis in order to confirm that the aggregation procedures were performed correctly. Resources Inventory Branch staff identified no undue concerns regarding the aggregation procedures as a result of comparison of the generated volumes.

For the purposes of this determination, I consider that the aggregation approach used has followed standard procedures and I find it acceptable for use in this determination.

Expected rate of growth

- *site productivity estimates*

Inventory data include estimates of site productivity for each forest stand, expressed in terms of a site index (SI). Timber supply analysis depends heavily on values for site index as it may be used to estimate years to green-up, size of the timber harvesting land base, yield of regenerated stands, and growth of existing stands. The impact of each of these factors on timber supply is discussed in detail in various sections within this rationale.

The site index is based on the stand's height as a function of its age and is species specific. The productivity of a site largely determines how quickly the trees on it will grow, which 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.

According to the data from the forest cover inventory file, approximately 57 percent of the sites on the timber harvesting land base for TFL 53 are rated as good or very good in site productivity (i.e. site index greater than 16 metres).

The inventory audit conducted by Resources Inventory Branch found that the inventory site indices predicted for the immature stands on TFL 53 were consistently lower than those indicated by the audit results. The average site index projected from the inventory file was more than 3 metres less than that found by the audit.

In an attempt to better refine site indices for immature stands, the licensee used information available from terrestrial ecosystem mapping (TEM), which has recently been completed for the entire area of TFL 53. The new data has allowed the licensee to improve the site index classification of the land base using the Site Index – Biogeoclimatic Ecosystem Classification (SIBEC) system. The licensee believes that this provides a much better estimate of site productivity than used in the last analysis, where existing and future stand growth potential was estimated using the VDYP model to derive a site index based on a curve relating stand age and tree height. A comparison of the results of the two methods showed much greater variability using the VDYP method. The average area-weighted SIBEC-derived site index was 19.4 metres, and the average area-weighted VDYP site index was 17.4 metres.

In the timber supply analysis, low productivity sites were identified and analysis unit aggregation was done using VDYP calculated site indices. The completion of the new site index classification for the TFL in November 1998 occurred too late in the process to make changes to the derivation of the timber harvesting land base or the analysis unit definitions. However, an area-weighted BEC calculated site index for each analysis unit was used to predict the growth of existing managed and future managed stands. As noted

previously, on TFL 53 all stands originating after 1973 are considered managed. For existing unmanaged natural stands, site indices were assigned using the current BCFS site curves from VDYP.

For balsam and Douglas-fir stands, there are no localized SIBEC equations available for TFL 53, as there are a limited number of sampling opportunities in the area. As a result, in the analysis the licensee extrapolated from the curves for white spruce and lodgepole pine to derive site index assignments for these stands. Research Branch staff note that there is some uncertainty involved in the use of this process. However, given that only 13 percent of the timber harvesting land base on TFL 53 is comprised of balsam and Douglas-fir stands, and given that the variability is not expected to be great, this is not a significant concern for this determination. For the future they note that the procedures used to assign the site indices for balsam and Douglas-fir stands require further refinement.

The procedures used to assign site indices for managed stands in the analysis for TFL 53 were accepted by Research Branch. They state that the SIBEC procedures are particularly appropriate for determining the site indices of younger stands such as the managed stands on TFL 53.

I have reviewed the information regarding site productivity for TFL 53 and note that the assumptions applied in the base case for the analysis are a reasonable attempt to refine the site productivity estimates for managed stands. I commend the work done to date to attempt to refine the information regarding site productivity on TFL 53, and note that as additional data becomes available it can be factored into future analyses. For the purposes of this determination, I am satisfied that the base case has used the best available information for site productivity on the TFL.

- *volume estimates for managed stands*

Approximately 19 259 hectares or 28 percent of the timber harvesting land base on TFL 53 is currently comprised of managed stands. To estimate regenerated stand volumes for managed stands, the Table Interpolation Program for Stand Yields (TIPSY) was used. Managed stands in TFL 53 were defined as all stands harvested from 1973 to present, and all stands harvested in the future. An exception was applied to any balsam component of managed stands. Based on observations of current conditions, approximately 5 to 10 percent of the regenerated stands for some of the analysis units were assumed to be comprised of naturally regenerated balsam stems. The yields for the balsam component of these analysis units were projected using VDYP rather than TIPSY curves.

The base case did not include a volume contribution from deciduous species for any stands originating after 1973, because it was assumed that these stands have been managed exclusively for coniferous species. In the base case, the aspen-coniferous stands on the timber harvesting land base were assumed to regenerate to pine-spruce stands following seral succession and harvest, as discussed under *deciduous stands*.

In the timber supply analysis, the licensee created two sets of TIPSY curves. Yields for all stands harvested between 1973 and 1997 were projected using the first set of curves.

The second set of curves—applied to project yields for stands harvested in 1998 and beyond—had an 18 percent genetic gain applied for white spruce, as will be discussed later in this rationale under *genetic improvement.* Approximately 54 percent of the trees planted on the TFL since 1998 have been white spruce.

Research Branch staff note that each factor used to determine managed stand yields in the analysis appears reasonable and is supported by data. However, it is difficult to assess the cumulative impact of the various assumptions used to project these yields. For instance, the yield increases as a result of genetic gain are uncertain in managed stands greater than 80 years of age, since data is not currently available to support gains in these older stands. Furthermore, the extent to which yield improvements—as a result of better site index information through SIBEC and genetic gain—overlap, is still uncertain.

I am mindful of the uncertainties with respect to the application of genetic gain to stands older than 80 years of age. The analysis projected the minimum harvestable age for most managed stands on TFL 53 to be less than 80 years. As noted under *minimum harvestable ages*, existing stands on the TFL are currently harvested at well beyond the minimum harvestable age; however, it is expected that as harvesting proceeds into managed stands over time, the ages of harvested stands may decrease accordingly. I am therefore satisfied that there is limited risk associated with the use of the genetic gain adjustments applied in the base case.

Both Research Branch and district staff express uncertainty around whether future management practices will enable the full realization of site productivity. As mentioned under *site productivity estimates*, the results of the inventory audit conducted on TFL 53 confirmed that site indices—and hence stand yields—were underestimated for the immature stands on the TFL. Based on the results of the audit, and trends observed throughout the province, I am confident that actual second growth managed stands are growing at a faster rate than projected by the inventory file. Furthermore, past performance of the licensee indicates that an intensive level of management is practiced on the TFL, which points to most stands being fully stocked and minimal losses due to pests and competing vegetation.

The licensee provided a sensitivity analysis which illustrated the impact to timber supply of over or underestimations in managed stand yields by 10 percent. The sensitivity analysis showed that short-term timber supply is not affected by uncertainties in managed stand yield estimates. The potential impact of overestimating yields for managed stands by 10 percent is first noticed in period six, where the harvest level drops to 236 000 cubic metres per year, as compared to the base case level of 240 000 cubic metres per year for this same period. Mid-term timber supply and long-term timber supply are decreased to 299 000 cubic metres per year and 314 000 cubic metres per year respectively, or by approximately 9 percent.

Based on the above discussion, I am confident that it was appropriate to apply some adjustments to estimates of future site productivity, and thus to the managed stand yield

tables, for TFL 53. Some uncertainty remains as to whether the adjustments applied in this timber supply analysis were appropriate, or whether they were somewhat optimistic. The results of the sensitivity analysis show that short-term timber supply is insensitive to uncertainties in estimates of site productivity. I recommend that district and licensee staff monitor managed stand yields to ensure that the yield expectations projected in the base case for the analysis are being met, in particular with respect to genetic gains. Should data arising from monitoring indicate that the yields as projected for the base case are optimistic for the stands on TFL 53, adjustments will need to be made to the information for the next determination.

For the purposes of this determination, I am satisfied that reasonable procedures have been applied in the derivation of managed stand yield estimates, and have made no adjustments on this account.

- *operational adjustment factors*

Operational adjustment factors (OAFs) are applied during timber supply analysis to account for losses of timber volumes in managed stands as a result of particular operational conditions. The VDYP model used to project volumes for existing stands also incorporates estimates of volume of wood lost to decay, waste and breakage, as is discussed later in this rationale under *decay, waste and breakage.*

For managed stands, the TIPSY model incorporates OAFs that account for anticipated decay, waste and breakage. Two OAFs are applied to the yield projections for managed stands. OAF 1 is intended to account for small, unmappable openings in stands as a result of losses from endemic populations of insects and diseases, holes in stocking and unidentified risks. OAF 2 accounts for age-related losses such as decay and for waste and breakage during harvest.

Standard provincial values of 15 percent for OAF 1 and 5 percent for OAF 2 are typically applied to the managed stand yield tables. The provincial value for OAF 2 was accepted by the licensee and used in the analysis. The provincial value for OAF 1 was used for Douglas-fir, aspen and balsam-leading stands only. For pine and spruce-leading stands, a new value was calculated as described below.

The licensee has stated that the value of 15 percent for OAF 1 overestimated losses in TFL 53. The BCFS regional pathologist confirmed that the provincial value likely overestimates losses for this TFL. In an attempt to better refine the value, the licensee followed field procedures as detailed in two OAF 1 project reports, and calculated OAF 1 values of 6 percent for spruce stands and 3 percent for pine stands. However, Research Branch staff believed that these values did not adequately address all factors for which OAF 1 was intended to account, such as unidentified risk and losses to stand productivity as a result of pathogens such as blister rust. A subsequent review conducted by a consultant on behalf of the licensee confirmed some concerns with blister rust on TFL 53.

Staff from Research Branch recommended values for OAF 1 of 12 percent for spruce and 10 percent for pine. For the purposes of this analysis, these values were accepted by the licensee and were used in the base case. The licensee maintains that the adjusted values overestimate losses in the TFL, citing high planting densities to eliminate holes in

stocking and intensive management to reduce losses from pathogens. They provided a sensitivity analysis which illustrated that using the calculated values of three percent and six percent slightly decreased the size of the reduction in period six, increased mid-term harvest level by 3.7 percent and the long-term harvest level by 5.2 percent over the base case.

I note that the sensitivity analysis shows no impact to the short-term timber supply as projected in the base case. As noted elsewhere, landscape level biodiversity was not modelled to the variant level in the base case for the analysis, and whether the timber supply impacts shown by this sensitivity analysis would still apply to the adjusted forecasts is uncertain. In consideration of all of the information presented regarding operational adjustments factors, I accept that the values applied in the analysis are reasonable and represent the best available information.

- *minimum harvestable ages*

A minimum harvestable age is an estimate of the earliest age at which a forest stand has grown to a harvestable condition, that is, has met minimum merchantability criteria. The minimum harvestable age assumption affects when second growth stands will be available for harvest. This in turn affects how quickly existing stands may be harvested such that a stable flow of timber harvest may be maintained. In practice, many forest stands will be harvested at much older ages than the minimum harvestable age, 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 analysis, different values were used for minimum harvestable ages for existing natural stands and for managed stands. For existing natural stands, the minimum harvestable ages were set at the regional priority cutting ages as described by Prince George Forest Region policy. The priority cutting age is considered to be the age at which a given stand may be harvested in consideration of the seral stage distribution, susceptibility to and incidence of pests and disease, fire and biodiversity objectives. For TFL 53, cutting age is 101 years of age for spruce; 81 years of age for lodgepole pine; 111 years of age for Douglas-fir, western redcedar and hemlock; 121 years of age for balsam; and 61 years of age for deciduous species.

For all managed stands, minimum harvestable ages were set at culmination age in the timber supply analysis. Culmination age is the age at which there is a maximum mean annual increment. Following culmination age, volume increases are still obtained but average annual increases are successively less. These assumptions were consistent with management strategies to maximize fibre production on second growth stands. For both existing managed and future managed stands, culmination age was calculated using adjusted site indices based on SIBEC information, as described under *site productivity estimates*. Future managed stands also had an adjustment applied to account for genetic gain as described under *genetic improvement.* Culmination ages varied from 110 years of age for Douglas-fir to 70, 80 or 90 years of age for spruce and pine stands, depending on the specific species composition present in the stand.

Currently on TFL 53, a total of 10 334 000 cubic metres of timber, or approximately 77 percent of the total volume on the TFL is represented by stands considered merchantable, i.e. at or above the minimum harvestable age. Most stands are currently harvested at well beyond the minimum harvestable age, which is consistent with the age class distribution present at the current time on the TFL. As harvesting proceeds into managed stands over time, it is expected that the ages of harvested stands may decrease accordingly.

I have reviewed the assumptions made in the timber supply analysis regarding minimum harvestable ages and find them to be reasonable.

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

Expected time for re-establishment

- *regeneration delay*

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In timber supply analyses, regeneration delays are accounted for either within the timber supply model itself, or are applied directly to the managed stand yield tables.

In the analysis for TFL 53, the regeneration delay was applied in the FSSIM model rather than to the managed stand yield tables. A regeneration delay of one year was assumed for all regenerated stands with the exception of the balsam IU stands. Stands were assumed to be regenerated through planting of between 1800 and 2000 stems per hectare, in order to achieve an initial density of 1600 stems per hectare following regeneration delay. Douglas-fir stands were assumed to be regenerated to Douglas-fir; all other stands were regenerated to white spruce and lodgepole pine. The existing natural balsam stands were assumed to have ingress of between 5 and 10 percent from natural balsam regeneration following harvest.

For the balsam IU stands, a regeneration delay of 0 years was assumed. This modelling assumption was intended to account for the fact that approximately 10 percent of the sites are occupied by 15 to 30 year old advanced spruce regeneration, which is assumed to be retained following harvest. Following harvest, the balsam IU stands were assumed to be replanted with 100 percent spruce to the same densities as other regenerated stands on the TFL.

The licensee indicates that 1997 and 1998 data measuring the time period between commencement of harvest and completion of planting indicates that regeneration delay has on average been less than 12 months. I encourage the licensee to continue to monitor and document observed regeneration delays on the TFL. If monitoring shows a continued trend, then updated information can be incorporated into future analyses.

For the purposes of this determination, district staff have reviewed the assumptions regarding regeneration on TFL 53 and believe them to be reflective of current practice. I am satisfied that regeneration delays have been accounted for adequately in the analysis.

- *impediments to prompt regeneration*

Evaluation of the impediments to prompt regeneration provides an assessment of the uncertainty in the values used in timber supply analysis for regeneration delay and free-growing assumptions.

In the timber supply analysis, there were reductions applied to the productive forest land base to account for areas with regeneration difficulties, as described under *environmentally sensitive areas.* Approximately 101 hectares were removed from the productive forest land base to account for areas anticipated to be difficult to regenerate.

There are no significant plantation pests on TFL 53, nor any significant brush hazard which pose an impediment to regeneration. A total of approximately 2500 hectares were brushed and weeded on TFL 53 during the term of Management Plan No. 2.

District staff note that the licensee has an intensive management strategy for the TFL and that areas within the timber harvesting land base rarely have problems with regeneration.

I consider that areas which are difficult to regenerate are accounted for adequately with the deductions applied for environmentally sensitive areas, and have made no further adjustments in this regard.

- *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 forest 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.

For the purposes of the analysis, all of the backlog NSR was assumed to be treated and returned to the timber harvesting land base within the first decade, and the current NSR was assumed to be treated and regenerated within one year. At the time of the analysis there were approximately 1573 hectares of NSR on TFL 53, of which 121 hectares were in riparian reserves or environmentally sensitive areas. Of the remaining 1452 hectares, approximately 1182 hectares were backlog NSR and 270 hectares were current NSR.

The licensee has pursued an aggressive program of rehabilitation for backlog not-satisfactorily-restocked areas on TFL 53 during the term of Management Plan No. 2. Over the past five years, the area considered backlog NSR has been reduced from 2540 hectares. Since the analysis was conducted, an additional 357 hectares of the outstanding 1182 hectares of areas have been treated. However, the licensee notes that a portion of the remaining 825 hectares is considered to be uneconomical to treat, and should likely be reclassified to a lower stocking class.

As the analysis assumed all of the backlog NSR would be rehabilitated, it is apparent that there may be a slight overestimation of the size of the timber harvesting land base, and consequently of timber supply for the TFL. However, I note that these areas, while potentially not fully restocked, are likely to have some level of stocking on them which will contribute to timber supply. I encourage the licensee to work with the district to

clarify the management objectives for these areas prior to the next timber supply analysis. Better information on the anticipated forest cover for the areas would lead to a better estimation of the potential contribution to timber supply for future determinations. For the purposes of this determination, I recognize the small downward pressure on timber supply and will account for it in my 'Reasons for Decision'.

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

Silvicultural systems

The main silvicultural system used on TFL 53 is clearcut with reserves, given that wildlife tree patches are reserved within or adjacent to each opening. For the purposes of the analysis, this system was modelled as clearcut, and a separate reduction to the land base was applied to account for wildlife tree patches, as will be discussed later in this rationale under *stand level biodiversity*.

There is some use on the TFL of partial cutting systems, including the use of shelterwood systems and commercial thinning in sensitive areas. The licensee commits in Management Plan No. 3 to continue to manage visual quality through these means as well as through block design and adjacency considerations.

However, given the small area associated with partial cutting, district staff state that the modelling assumptions used in the analysis appropriately reflect current practice.

For the purposes of this determination, I accept that current practice has been appropriately reflected in the analysis.

Incremental Silviculture

Incremental silviculture includes activities such as commercial thinning, juvenile spacing, pruning, fertilization and genetic improvement that are beyond the silviculture activities required to establish a free-growing forest stand.

- *genetic improvement*

Requirements under the Forest Practices Code include the direction to use genetically improved orchard seed (class A seed) for regeneration where available. The goal of the genetic improvement program is to breed trees with increased growth rates, improved wood properties and greater resistance to insects and diseases.

In the base case for the timber supply analysis, the licensee, following consultation with Research Branch staff, applied an 18 percent genetic gain adjustment to the managed stand yield tables for spruce. This adjustment was applied to the spruce component of all stands planted in 1998 and into the future.

Between 1993 and 1997 approximately 20 percent of all spruce planted on TFL 53 was from class A seed. The licensee intends by the year 2000 to use improved seed for all spruce planted on the TFL. The assumptions applied in the analysis for the use of improved seed—whereby the adjustment was applied to all spruce planted in 1998 and

beyond—was intended to account for the component of spruce from improved seed planted between 1993 and 1997.

Approximately 54 percent of the trees planted in the last three years on TFL 53 were white spruce. Analysis results from other units have shown a significant mid- to long-term increase in timber supply through the use of genetically improved seed. The sensitivity analysis provided by the licensee—which tested the impact of a 10 percent increase in managed stand yields—was consistent with these results.

The 18 percent genetic gain to yields for white spruce was applied as a constant across all age classes in the analysis. As mentioned under *volume estimates for managed stands*, Research Branch staff note yield increases as a result of genetic gain are uncertain in managed stands greater than 80 years of age, since data is not currently available to support gains in these older stands. Preliminary research seems to indicate that gains tend to be reduced if stands are harvested at well beyond rotation age.

I note that results from sensitivity analyses show that increasing or decreasing managed stand yields by 10 percent over the base case had no impact to short-term timber supply.

District staff have reviewed the information regarding genetically improved seed and believe that the assumptions regarding current use on the TFL are appropriate.

I accept the information presented and have made no adjustments in this regard for the purposes of this determination.

- *fertilization*

Fertilization is a silvicultural treatment that can be effectively used to increase the merchantable yield and value of established forests. Through the addition of nutrients which are limited on a site, fertilization can improve the growth of individual stands, and can also be used to strategically accelerate the development of specific age classes and timber types to facilitate more stable timber supplies. Fertilization reduces rotation length but does not significantly alter a forest stand from its potential growth over a longer rotation.

In 1993, some long-term, intensive fertilization trials were established on TFL 53 in cooperation with the BCFS. The trials have targeted stands between 9 and 15 years of age, and in 1997 approximately 300 hectares of plantations were treated with fertilizer. Results observed to date have been promising, although more work is required to quantify the impacts of fertilization on stand yield.

Given the uncertainties around the exact impact on yields of applying fertilizer to stands on TFL 53, no yield increases were assumed in the base case for the analysis. Sensitivity analysis which was used to test the impact of an increased fertilization program assumed 2100 hectares of spruce and pine plantations treated at between 15 and 25 years of age. The impact of fertilization was modelled by applying a five percent gain in yield to the volume curves for these stands. The sensitivity analysis results found that the minimum harvestable age for the medium/poor pine stands could be reduced from 70 years of age to 60 years of age. However, timber supply was relatively insensitive to this change, with

the net result being a small increase in timber supply in period six (from 240 000 cubic metres per year to 241 700 cubic metres per year), a 1000 cubic metre per year increase in the mid-term and no impact to long-term harvest levels.

The licensee and district staff confirm that fertilization on TFL 53 is unlikely outside of trials in the short-term. Intensive silviculture activities such as fertilization need to be subjected to rigorous economic analysis to evaluate the benefits possible, given the associated costs. I encourage the licensee to continue to monitor the effects of fertilization of stands on the TFL.

I am satisfied that the assumptions made in the base case of the analysis regarding fertilization appropriately reflect current practice on TFL 53.

- *juvenile spacing*

Juvenile spacing is the removal of undesirable trees within a young stand to reduce competition among the residual trees for water, nutrients and sunlight. Trees harvested during juvenile spacing are not usually removed from the site. Spacing can be used as a management tool to meet biodiversity or wildlife habitat objectives, maintain or enhance forest health, manage species composition and stand structure, increase stand value or offer employment opportunities.

There is no specific juvenile spacing activity on TFL 53 and none was assumed in the timber supply analysis. Some stocking control is conducted by the licensee where appropriate during brushing and weeding treatments. I am satisfied that current practice was appropriately reflected during the timber supply analysis.

- *commercial thinning*

Commercial thinning is a partial cutting silvicultural system where some volume is removed from an immature stand after components of the stand have reached a merchantable size. Timber removed during commercial thinning is usually sold and can therefore contribute to timber supply.

While I note that single-entry commercial thinning regimes do not generally increase the yield of specific stands, they can provide opportunities to harvest timber in areas where harvesting would otherwise be limited as a result of meeting constraints for other resource objectives.

The base case for the analysis did not assume any commercial thinning on the TFL. Operationally, commercial thinning is an ongoing but small scale activity on TFL 53. During the term of Management Plan No. 2, approximately 80 hectares of shelterwood overstorey removal and 29 hectares of commercial thinning have been completed.

The licensee conducted a sensitivity analysis to evaluate the impacts on timber supply of an expanded commercial thinning program. In the sensitivity analysis, 3330 hectares of pine-leading, good-site stands between the ages of 41 and 80 years were selected for thinning. In these stands, thirty percent of the volume was removed, and it was assumed that after 40 years the stands would have recovered the thinned volume and be suitable for conventional harvesting. The results showed a small increase in timber supply in

period six, a larger decline in period 15 and otherwise the same mid- and long-term levels as projected by the base case.

Although the base case for the analysis did not assume any contribution from commercial thinning, I note that the area actually involved in current practice is very small. Furthermore, the sensitivity analysis conducted by the licensee showed that short-term timber supply is not sensitive to the presence or absence of even a more significant amount of commercial thinning. I encourage the licensee to continue to investigate the potential application of commercial thinning on TFL 53 where it may be shown to create harvesting flexibility, create employment or meet integrated resource management objectives. For the purposes of this determination I accept that current practice has been adequately reflected in the analysis.

(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. These standards were incorporated into the timber supply analysis to estimate minimum merchantable stand volume for existing and regenerated stands.

In the timber supply analysis, the utilization standards assumed in the base case for all species—other than lodgepole pine—occurring in existing unmanaged stands were a minimum 17.5-centimetre diameter at breast height (dbh), with a 30-centimetre maximum stump and 10-centimetre minimum top inside bark. For existing unmanaged lodgepole pine stands, the minimum dbh standard used was 12.5-centimetres. For all species in managed stands the minimum dbh assumed was 12.5-centimetres.

These utilization standards were accepted by BCFS staff as reflective of current practice on TFL 53.

I note that the standards used are consistent with provincial standards and consider that they were appropriately applied in the analysis.

- *decay, waste and breakage*

As described under *operational adjustment factors*, a percentage reduction is applied during timber supply analysis to managed stand yield curves to account for volume losses from decay, waste and breakage.

For existing stand yield curves, the VDYP model used to project the volumes incorporates estimates of volumes of wood lost to decay, waste and breakage. Decay losses are built into the volume estimates, while standard waste and breakage factors are incorporated into the analysis when developing VDYP curves. These estimates of losses

have been developed for different areas of the province based on field samples. In the analysis for TFL 53, the factors provided were from Forest Inventory Zone (FIZ) I and Public Sustained Yield Unit (PSYU) 121 (Naver) and were accepted by the Resources Inventory Branch for use in the analysis.

I note that a province-wide study into decay estimates is being conducted in response to some concern in other management units regarding the soundness of the current estimates. When the results of this study become available, they may have relevance for future determinations for TFL 53.

I am satisfied that the assumptions applied in the base case for the analysis represent the best information available for TFL 53.

(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.

- *recreation*

A variety of recreational opportunities are available to the public on TFL 53, including camping, fishing, hunting and winter activities such as skiing and snowmobiling. There are also several guide outfitter operations active on the TFL.

There are five recreation sites on TFL 53 and two additional sites which have been permanently closed since the time of the previous determination. Timber around recreation sites is excluded from contributing to timber supply. In the timber supply analysis, data from maps of gazetted recreation sites were used to determine the reductions to apply to the productive forest land base, resulting in the exclusion of approximately 160 hectares. An additional 6.5 hectares of area was identified in the ESA mapping as sensitive for both recreation and regeneration (Epr1) and these areas were excluded. There were no environmentally sensitive areas identified as Er1—having a high risk of disruption to recreation values as a result of timber harvesting—and no other reductions to account for recreational use were made in the timber supply analysis.

District staff indicate that the assumptions applied in the base case adequately represent the values associated with recreation, other than what is discussed later under *visually sensitive areas*.

I accept that there has been an adequate accounting for recreation values on TFL 53 in the analysis.

- *range*

Although there are two small range tenures on TFL 53, range is not considered a major use on the TFL lands. No specific reductions were applied to the timber harvesting land base to account for range values. The licensee has a good relationship with the range tenure holders and maintains communication regarding planned activities at the operational planning level.

I am satisfied that there are no implications to timber supply as a result of not explicitly factoring any range requirements into the base case.

- *cultural heritage resources*

Cultural heritage resources 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 sites, archaeological overview mapping is conducted to assign high, moderate or low ratings for archaeological potential within an area.

An archaeological overview assessment (AOA) was conducted by the district for TFL 53, and identified six moderate to high potential archaeological areas within the TFL. Archaeological impact assessments were subsequently conducted on the six moderate to high potential areas but no resource features were identified.

Data from the Provincial Heritage Register identifies a historical trail in the TFL as well as one archaeological site. The significance of the trail is unknown at this time. District staff note that if it is determined to be significant, it may require some special management at the operational level. Although it is not possible to know with certainty what the impact would be to timber supply, it is expected to be small.

The timber supply analysis did not include any explicit accounting for cultural heritage values, as it was anticipated that the reductions applied to the productive forest land base to account for wildlife tree patches and riparian areas would account for any as yet unidentified resource values present on the TFL.

For this determination, I will make no adjustments to the base case timber supply projection for this factor. Any new information which becomes evident through further operational experience can be incorporated into future timber supply analyses.I am satisfied that there has been adequate accounting for known cultural heritage resources in the timber supply analysis.

- *wildlife habitat*

Identified wildlife refers to species at risk (red and blue listed) and to regionally significant species which have not been adequately accounted for with existing management strategies, such as those for biodiversity, riparian management, ungulate winter range, or through the application of other forest cover requirements.

The Identified Wildlife Management Strategy (IWMS) was released in February 1999 and details several species which may require further consideration for the Quesnel Lowland and Bowron Valley ecosections in which TFL 53 lies, including bull trout, American bittern, trumpeter swan, northern goshawk, sandhill crane, fisher and grizzly bear. Under the strategy, species are to be managed through the establishment of wildlife habitat areas and implementation of general wildlife measures, or through other management practices specified in higher level plans. No specific wildlife habitat areas or general wildlife measures have yet been established in the Prince George Forest District.

The Prince George Land and Resource Management Plan, discussed under *land and resource management plans*, identifies some specific wildlife habitat requirements for TFL 53, including the maintenance of moose, marten and grizzly bear habitat.

In the base case for the analysis, no specific reductions were made to the land base to account for wildlife habitat, as it was assumed that these values could be largely accounted for in the short-term by applying the riparian management area and other forest cover constraints.

MELP requires the protection of eagle and osprey nest sites during operational planning. The licensee notes that the protection of eagle and osprey nests, where they are identified, is managed at the operational level through their inclusion in wildlife tree patches and riparian reserves. District staff have considered the reductions applied to the land base to account for wildlife tree patches and riparian habitat and conclude that these should be sufficient to meet the needs for eagle and osprey nests.

Given that wildlife habitat areas have yet to be established in the district, it would have been inappropriate to account for identified wildlife in the base case for the analysis. I note that when wildlife habitat areas are established, and general wildlife measures are implemented, the impacts of management for identified wildlife will be much clearer.

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 of this unit to implement the IWMS. Given the province's commitment to implement the IWMS, and given the policy decisions and projected one-percent impact, it is necessary and appropriate to account for an expected but not fully quantified impact on the timber supply.

I am satisfied that it is reasonable to expect a future downward pressure to timber supply in the district as a result of the establishment of wildlife habitat areas. However, the extent of the impact to the timber harvesting land base for TFL 53 is uncertain and is anticipated to be relatively small.

I recognize the downward pressure as a result of this factor and will discuss it further under 'Reasons for Decision' later in this rationale.

- *riparian habitat*

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones that exclude timber harvesting, and riparian management zones that restrict timber harvesting in order to protect riparian and aquatic habitats. For each stream, lake or wetland, the riparian management zone and riparian reserve zone make up the entire riparian management area. Stream classes such as S1 described in the *Riparian Management Area Guidebook* are determined for each stream based on presence of fish, occurrence in a community watershed and average channel width criteria. The stream class is used to determine the area needed in riparian reserve zones and riparian management zones.

A stream classification inventory was completed for the Ahbau Creek and Willow River portions of the TFL, and the inventory data was extrapolated to the remainder of the TFL. For the purposes of the analysis the proportion of stream types identified in the inventory was assumed to apply to the entire TFL. The riparian inventory covered 95 501 metres of stream length, or approximately 7.3 percent of the total stream length in the TFL.

The length of streams in each stream class was calculated and the riparian reserve zone and riparian management zone widths were applied to obtain a total area to account for riparian areas. Approximately 1857 hectares of riparian reserve zones and 1363 hectares of riparian management zones were removed from the productive forest land during the determination of the timber harvesting land base.

Lakes are classified according to criteria defining requirements for the protection of values for fisheries, water quality, wildlife/biodiversity or recreation/visual quality. Wetlands are classified according to their size, complexity and the biogeoclimatic zone in which they lie.

Following the process outlined in the *Lake Classification and Lakeshore Management Guidebook* for the Prince George Forest Region, all lakes greater than 5 hectares in size in the Prince George Forest District were classified by BCFS and MELP staff in 1995. Lakes were given an A – E classification, and were assigned riparian reserve zones and lakeshore management zones, according to the methodology outlined in the guidebook. TFL 53 contains a number of lakes, all of which were given either an A or C rating during the classification. The guidebook recommends riparian reserve zones of 200 metres and lakeshore management zones of 50 metres for class A lakes, and reserve zones of 30 metres and management zones of 70 metres for class C lakes. These recommended widths build on the minimum reserve zone widths of 10 metres and management zone widths of 20 to 30 metres described in the *Riparian Management Area Guidebook.*

During the determination of the timber harvesting land base, separate reductions were applied to account for the various reserve and management zones around the lakes in TFL 53. In total, approximately 304 hectares were removed from the productive forest land base following other deductions to account for lakeshore reserves and management areas.

TFL 53 also contains several wetland areas, which also have reserve and management zone requirements under the Forest Practices Code. Wetlands are required to have a 10 metre reserve zone, and an additional management zone of 20 to 40 metres depending on the classification of the wetland. Some harvesting is permitted in the management zone areas. An estimated buffer width of 8.4 metres was used to quantify the area occupied by wetland management zones for the purposes of the analysis. Approximately 322 hectares of wetland reserve zones and 229 hectares of wetland management zones were removed from the productive forest land base.

District staff have reviewed the information regarding riparian values and consider that the values have been adequately represented in the base case for the analysis.

I concur with their assessment and do not identify any issues which give me concern for this determination.

- *water quality*

There are no community or domestic watersheds in TFL 53. Considerations for water quality relate mainly to fish habitat. The Naver watershed—which comprises approximately 70 percent of TFL 53—has been studied using the Interior Watershed Assessment Procedures (IWAP) to determine the health of the watershed. An Interior Watershed Restoration Plan has also been completed to direct water quality management within the Naver watershed. These studies help to plan forest management activities such as harvest scheduling and watershed restoration projects to maintain water quality and fish habitat on the TFL.

There was no explicit accounting for watersheds or water quality during the timber supply analysis. Forest cover constraints relating to adjacency and green-up, as well as reserve and management zone requirements for riparian areas, are assumed to provide accounting for water quality.

District staff are satisfied that the assumptions used in the base case for the analysis adequately account for water quality, and note that the licensee has conducted appropriate resource inventories and assessments in an effort to ensure management for water quality on the TFL. Requirements under the Forest Practices Code include management of water quality.

I accept that the base case has adequately accounted for water resources through other reductions and constraints, and have made no adjustments on this account.

- *green-up and adjacency*

Objectives for forest cover and adjacency guide harvesting practices in order to address resource values such as wildlife, water quality 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 less than the minimum green-up height.

Green-up time refers to the period following harvest necessary for a regenerating stand to attain a specified condition, here expressed in terms of stand height and stocking. Current

harvesting practices limit the size and shape of cutblocks, and establish minimum green-up conditions as a means of moderating the effect of additional harvesting in adjacent stands. 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.

The FSSIM timber supply analysis model does not represent adjacency constraints explicitly. Rather, in the analysis these constraints are modelled implicitly by limiting the amount of area on which trees may be below a specified green-up height. In the base case for the analysis, adjacency constraints were modelled as a maximum of 33 percent of the timber harvesting land base allowed to be less than 3 metres in height for the integrated resource management zone.

District staff note that a maximum of 25 percent, rather than the modelled 33 percent may be more appropriate for TFL 53, based on their review of the licensee's twenty-year-plan. A sensitivity analysis showed the impact of increasing forest cover constraints by 10 percent—that is, to a maximum of 23 percent of the area to be covered with stands of trees less than three metres in height—in the integrated resource management zone and found no sensitivity in the short-term. The only impact to timber supply was a one period delay in reaching the 328 000 cubic metre per year level which was reached in period eight in the base case.

I have considered the assumptions regarding green-up and cutblock adjacency and find them to be reasonable. I am confident that any uncertainties regarding the assumptions pose no risk to timber supply in TFL 53.

In visually sensitive areas, the restrictions for green-up were applied to the entire productive forest, as the restrictions on development in visual areas include visible disturbance in the entire viewscape, regardless of operability. Green-up height in those areas is discussed separately in the next section of this rationale.

- *visually sensitive areas*

Careful management of scenic areas near recreational sites, highways and lakes is an important IRM 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). To achieve objectives for managing visual resources, visual landscape inventories are carried out to identify, classify and record those areas of the landscape that are visually sensitive.

To achieve VQOs, limits are placed on the amount of visible disturbance that is acceptable in visually sensitive areas. Guidelines to meet VQOs include setting a maximum percentage of a landform allowed to be in a disturbed state at any one time, and setting visually effective green-up targets that must be achieved before additional harvesting is permitted. Visually effective green-up refers to the stage at which a stand of forested timber is perceived by the public to be satisfactorily greened-up from a visual standpoint. The green-up height and associated age within visually sensitive areas might therefore be different than the green-up height applied to non-visually sensitive areas.

In the analysis, the constraints were applied as a maximum percentage of the area in the forested land base that could be occupied by stands less than a specified height. These restrictions to green-up were applied to the entire forested land base, since restrictions on development in visual areas include visible disturbance in the entire viewscape regardless of operability. The percentages applied were as follows:

- For the preservation VQO zone, no more than one percent of the forested land base could be less than 5.4 metres in height;
- For the retention VQO zone, no more than five percent of the forested land base could be less than 4.4 metres in height;
- For the partial retention VQO zone, no more than 15 percent of the forested land base could be less than 4.6 metres in height;
- For the modification zone, no more than 25 percent of the forested land base could be less than 4.6 metres in height; and
- For the maximum modification zone, no more than 33 percent of the forested land base could be less than 5.3 metres in height.

A total of 5.6 percent of the timber harvesting land base on TFL 53 lies in VQO zones. Approximately five hectares lie in the preservation zone, 21 hectares in the retention zone, 1600 hectares in the partial retention zone, 2300 hectares in the modification zone, and 15 hectares in the maximum modification zone. The remainder of the timber harvesting land base—approximately 66 036 hectares—lies in the integrated resource management zone.

There have been discussions in the past between the licensee and district and regional staff on the management of visually sensitive areas on TFL 53. Revised visual resource inventories based on the expected VQOs for the scenic areas have recently been completed for the area of the TFL, but were not explicitly modelled in the base case because the scenic areas have not yet been officially made known by the district manager. The visual landscape inventory information from 1994 was therefore used in the analysis.

For the purposes of the timber supply analysis, the district manager provided direction to the licensee regarding visual quality management on the TFL. Specifically, the viewshed along Highway 97 was to be modelled in accordance with the VQOs in place prior to the enactment of the Forest Practices Code. The watershed around Ahbau Lake and the viewsheds around the recreation sites on the TFL were to be modelled as scenic areas without established VQOs. The district manager gave permission for the licensee to use the maximum percent alterations for forest cover requirements—rather than the recommended Visual Absorption Capability ratings weighted by area to define percentages—provided that a sensitivity analysis showing the mid-range percent alterations was submitted, and provided that the licensee submit a rationale for using the maximum percentages.

The sensitivity analysis submitted by the licensee showed that applying the mid-range percentages for allowable alteration had no impact to timber supply until period four, when the base case harvest level dropped by 13 000 cubic metres per year—or 5.2 percent—to 236 000 cubic metres per year before rising to the same levels as the base

case after period eight. The licensee's rationale for using the maximum percentages—which was accepted by the district—included the following points:

- all new harvesting proposed in visually sensitive areas has to be planned using the principles of landscape design;
- the licensee addresses visual landscape management through block layout, high initial planting density, road and trail deactivation, and increased planting of pine where ecologically appropriate to facilitate faster green-up.

Other sensitivity analyses conducted by the licensee showed short-term timber supply could be slightly increased over the levels projected in the base case by the use of partial cutting systems in the preservation, retention and partial retention VQO zones, and by using increased planting densities to speed green-up in these zones. These analyses do not reflect current practice on the TFL but were intended to project possible outcomes for planning purposes.

The licensee also submitted a sensitivity analysis which showed that the use of the new visual inventory information would have the impact of slightly increasing the short-term timber supply projected in the base case by 500 cubic metres per year, and decreasing the timber supply reduction in period six by two percent.

District staff note that current practice is likely best reflected by this sensitivity analysis. However, no scenic areas have officially been made known by the district manager for the area of TFL 53.

Until such time as these areas are made known, the assumptions made in the base case regarding visually sensitive areas are the best available information. I am satisfied that the accounting for visually sensitive areas on TFL 53 was satisfactory.

- *stand level biodiversity*

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

Stand-level biodiversity management includes 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 *Biodiversity Guidebook* makes recommendations for percentages of areas to be retained in wildlife tree patches, based on specific assumptions about the land base. Timber supply analysis typically interprets information from this guidebook to model stand level biodiversity requirements, and reduces the net land base or the yield curves to account for the reserves. For TFL 53, the licensee developed an alternate methodology which was accepted by both district and MELP staff.

In preparation for the timber supply analysis, the licensee conducted a review of silviculture prescription data and data from the Major Licence Silviculture Information System (MLSIS) to determine percentage retention of wildlife tree patches in current practice. This review showed that an average of two percent of merchantable stems in each harvested area were reserved for wildlife tree patch requirements, in addition to the areas reserved for riparian values or deducted as a result of merchantability constraints. The licensee states that the initial wildlife tree patch will be removed when the second growth stand is harvested in the future, and two percent of the second growth stems would be retained instead.

For modelling purposes, the licensee applied a set of assumptions and a methodology to represent wildlife tree patch requirements. In the analysis, four percent of the total timber harvesting land base—approximately 2805 hectares—was assumed to be retained in wildlife tree patches. It was assumed that half of this area was currently in a wildlife tree patch, and the remainder was growing in a plantation to become a wildlife tree patch in the future. In response to concern from MELP staff that an 80 year old stand would not have all of the desirable attributes of a wildlife tree patch, the licensee applied a forest cover constraint to the zone whereby a maximum of 50 percent of the area could be covered with stands less than 160 years of age.

District staff note that this methodology was accepted by themselves and MELP as a reasonable—although arguably not the preferred—method of modelling wildlife tree patch requirements. It is difficult to know with certainty whether it is realistic to assume that the initial wildlife tree patches will indeed be harvested with the second growth stands. However, in the context of greater uncertainties around how the requirements for wildlife tree patches will play out over time—even as modelled conventionally—I accept the methodology employed by the licensee as reasonable. It is supported by data on current practice on the TFL and has been accepted by both district and MELP staff.

- *landscape-level biodiversity*

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

A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests. Although some general forest management practices can broadly accommodate the needs of most species, more often a variety of practices is needed to represent the different natural disturbance patterns under which specific ecosystems have evolved.

Natural disturbance types (NDTs) are defined according to the frequency of natural disturbance, ranging from recurrent wildfires in the dry interior regions to rare stand-

initiating events such as windstorms in the wetter coastal regions. On TFL 53, natural disturbance regimes are described by NDT 1 (ecosystems with rare stand-initiating events occurring approximately every 250 years), NDT 2 (ecosystems with infrequent stand initiating events occurring approximately every 200 years), and NDT 3 (ecosystems with frequent stand-initiating events occurring approximately every 125 years). Of the timber harvesting land base for TFL 53, approximately 11 percent is classified as NDT 1, while 34 percent is NDT 2 and the majority (55 percent) is NDT 3.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A range of biodiversity emphasis options (BEOs) may be employed when establishing biodiversity management objectives for a landscape unit. The *Biodiversity Guidebook* outlines three biodiversity emphasis options—lower, intermediate and higher. If a reasonable distribution of options is maintained across the land base, it is generally considered that biodiversity can be maintained in conjunction with harvesting options.

The current provincial policy direction provided by the chief forester for assignment of BEOs is to follow guidance provided in the *Biodiversity Guidebook.* The guidebook outlines the proportions of each subregional planning area that should be assigned to each of the three BEOs. The average is approximately 45 percent of the area in lower, 45 percent in intermediate, and 10 percent in the higher BEO. This distribution is believed to provide a balance between social and economic impacts and risk to biodiversity. The policy followed for timber supply analyses when landscape units and BEOs have not been established is to model the distribution of BEOs using a weighted average forest cover requirement which is applied at the biogeoclimatic variant level.

In the base case, the licensee modelled old-seral forest cover requirements at the natural disturbance type level within the landscape unit. The entirety of TFL 53 is currently recommended through the landscape unit planning process as one landscape unit, and this was applied as an assumption in the analysis. A minimum percentage of the productive forest land base was required to be retained in stands at least 250 years of age or 140 years of age, depending on the NDT. An overall average forest cover requirement for each NDT within the landscape unit was derived by combining the percentages that would be applicable to lower and intermediate BEO areas (9 to 19 percent) and to higher BEO areas (13 to 28 percent) based on the assumed 45-45-10 distribution of biodiversity emphasis.

Current direction provided by the chief forester indicates that landscape level biodiversity should have been modelled to the variant level, rather than to the NDT level presented in the base case. Sensitivity analysis shows that applying the biodiversity requirements at the variant level reduces the initial harvest level by 11 500 cubic metres per year, or approximately 4.6 percent from the base case to 237 500 cubic metres per year. The licensee and BCFS staff provided several sensitivity analyses with the application of BEOs to the variant level, and I have considered these in assessing the impacts of the analysis assumptions regarding landscape level biodiversity. I recognize this quantified downward pressure on the timber supply presented by the base case, and will account for it under 'Reasons for Decision'.

For landscape units subject to lower biodiversity emphasis, where retention of the full old-seral requirement would reduce timber supply, the *Landscape Unit Planning Guide* allows for flexibility in implementing biodiversity requirements. In such areas, a minimum of one third of the old-seral forest retention objective described in the guidebook must be retained, and the full requirement phased-in over time so that the intended old-seral forest retention objective is in place within three rotations (approximately 210 years).

In the timber supply analysis for TFL 53, the forest cover constraints for old-seral forest were applied in accordance with the *Biodiversity Guidebook* and the *Landscape Unit Planning Guide*. For that portion of the TFL to which lower biodiversity emphasis was applied (45 percent), the phase-in of the landscape level biodiversity requirements over three rotations was modelled according to the allowances in these guidelines.

A sensitivity analysis provided showed that full application of the old-seral requirements for the lower biodiversity emphasis areas—in conjunction with the 45-45-10 application of BEOs, and to the variant level—did not impact short-term timber supply, but did lead to larger reductions in period six and period 15.

In addition, the licensee believes that stands in NDT 1 and NDT 2 actually achieve the desired stand characteristics of old-seral forests at 180 years of age rather than the 250 years of age listed in the *Biodiversity Guidebook.* They note that few stands in these natural disturbance types on TFL 53 currently meet the age requirements for old-seral retention as outlined in the *Biodiversity Guidebook.* In NDT 1 and NDT 2—which cover 45 percent of the land base—less than one percent of the area in each disturbance type is currently older than 250 years of age. A sensitivity analysis provided by the licensee in which the age of old-seral forest was reduced to 180 years showed the initial harvest level could be increased by two percent compared to the base case harvest level. However, BEOs were not modelled to the variant level in this sensitivity analysis, which likely would have reduced the upward impact of the change in the old-seral age. Furthermore, Research Branch staff note that current research results do not provide clear support of the changes in old-seral ages as suggested by the licensee.

Based on the work that has gone into the *Biodiversity Guidebook*, and the low sensitivity of short-term timber supply to reductions in the old-seral age, for this determination I accept that the definitions for old-seral forests were satisfactory as modelled in the base case.

The initial phase of landscape unit planning—the delineation of recommended landscape unit boundaries, and identification of draft biodiversity emphasis options (lower, intermediate, higher) for each landscape unit—has been completed in the Prince George Forest Region. The next phase involves formal establishment of landscape units as well as establishment of the objectives for each landscape unit. Current draft information from the landscape unit planning process indicates that TFL 53 will be designated as one landscape unit with a lower biodiversity emphasis. Sensitivity analysis provided by the licensee illustrated that modelling to the variant level and the lower BEO assignment—with the three rotation phase-in of the old-seral requirement—increased the initial harvest level to 249 500 cubic metres per year, slightly above the level shown in base case.

District staff note that current operational planning does not consider landscape level biodiversity requirements because the landscape unit objectives have not yet been officially established. It is expected that objectives will be established in the Prince George Forest District within the next two years.

I have considered all of the information presented regarding the management of landscape level biodiversity for TFL 53. As mentioned previously, the direction of the chief forester indicates that the requirements for landscape level biodiversity must be modelled to the variant level and I have accounted for this in my 'Reasons for Decision'. With respect to the possibility that the entire TFL 53 area will be assigned a lower biodiversity emphasis through the eventual completion of the landscape unit planning process, I note that—in accordance with my guiding principles—I cannot speculate on the outcome of an incomplete process. However, the analysis results and preliminary indications of biodiversity emphasis give me optimism about the stability of future timber supply for TFL 53.

Regarding the application of the old-seral requirements in areas with lower biodiversity emphasis, I note that the direction in the *Landscape Unit Planning Guide* does not provide differentiation between units where timber supply is expected to increase, or decrease.

MELP staff have raised concerns about the phase-in over three rotations of the old-seral requirements in these lower biodiversity emphasis areas, and in particular question the application of the phase-in for areas where timber supply is projected to increase over current harvest levels.

The licensee has expressed concern that the application of the full old-seral requirement immediately for the lower biodiversity emphasis portion of TFL 53—rather than the three rotation phase-in—would be inconsistent with the application of the policy to all other units in the province. They note that they have made a significant effort over the past five years to improve their land base information and manage the TFL more intensively so as to improve projected timber supply. They state that if full old-seral requirements were applied to the lower BEO portion of TFL 53, it would be penalizing them unfairly, and would act as a disincentive for licensees to invest in strategies to improve timber supply.

In consideration of the information discussed above, and in the absence of concrete evidence to the contrary, I accept that the application of the old-seral requirements in the lower biodiversity emphasis areas for TFL 53—over the three rotation phase-in, and as was done in the analysis—was consistent with the direction given in the *Landscape Unit Planning Guide.* I have therefore made no adjustments on this account for this determination.

The sensitivity analyses provided which show that the application of full old-seral requirements do not have timber supply impacts until six decades from now give me confidence that there is time to clarify our objectives in this regard without risking timber supply disruptions in TFL 53.

(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*

The purpose of the twenty-year plan is to illustrate if the harvest volume projected in the base case over the next 20 years can be appropriately configured in specific areas on the landscape.

As noted under *green-up and adjacency*, review of the twenty-year plan has led district staff to believe that adjacency constraints should possibly have been modelled at 25 percent rather than 33 percent below three metres in height in the base case for the analysis. However, there is no impact to short-term timber supply of modelling the more constraining requirement.

The twenty-year plan contains estimates of volume for each five year period covered by the plan, and these estimates are consistent with the harvest levels projected by the base case. District staff confirm that during review of the twenty-year plan they have identified no concerns with respect to the ability of the licensee to obtain the harvestable volume on the TFL.

I accept the twenty-year plan as feasible for TFL 53.

- *partition in residual balsam-leading stands*

TFL 53 contains approximately 2728 hectares of residual balsam-leading stands resulting from historic intermediate utilization (IU) logging. During the 1950s and 1960s, timber harvesting activities included intermediate utilization standards, whereby smaller, suppressed trees in a stand were not harvested and were left to develop into a future merchantable stand. It was assumed that the areas would fill in naturally with coniferous species, and that the regeneration, in combination with the residual balsam and spruce stems would constitute a merchantable future crop. However, the residual stems remained suppressed and grew poorly, the areas filled in with brush species and the openings remain poorly stocked, with residual poor quality balsam and spruce stems.

In the timber supply analysis approximately 1820 hectares, or 2.5 percent of the timber harvesting land base, is occupied by these balsam IU stands. The remaining 908 hectares were removed during the various reductions applied to the productive forest land base.

As a result of improved data from surveys, more balsam IU stands were included in the timber harvesting land base than for the last analysis (1365 hectares). In the previous determination for TFL 53, the chief forester specified a partition of 4100 cubic metres per year in the balsam IU stands, based on his assessment that approximately 30 percent of these areas would have sufficient minimum volumes—between 50 and 140 cubic metres per hectare—to enable harvesting and subsequent rehabilitation. The remainder of the stands included in the timber harvesting land base were assumed to be rehabilitated through site preparation and planting.

In the analysis for this determination, a target volume equivalent to the current partitioned volume was set to be harvested from the balsam IU stands. The stands were assumed to be converted to managed spruce stands following harvest. In the modelling, stand age data from the forest cover inventory file was used to locate stands meeting minimum harvestable age criteria for harvest. However, the stand age data in the file reflected the ages of the understorey stems in these balsam IU stands, and not the age of the older residual balsam trees. As a result, the target volume was rarely achieved during the analysis as the many of the stands were assumed to be below the minimum harvestable age and therefore not available for harvest.

In summary, the harvest levels projected in the base case were not dependent on the full contribution from the current partitioned volume in the balsam IU stands. Additionally, if these stands had been harvested at the rate required to support the full partitioned volume, the areas would be converted more quickly to managed spruce plantations than assumed in the analysis.

During the term of Management Plan No. 2, the total volume harvested from the balsam IU stands was 8134 cubic metres, or approximately 40 percent of the partitioned volume for that period (20 500 cubic metres). In total, the licensee treated 152 hectares of balsam IU stands. Approximately 114 hectares have been successfully converted to young spruce and pine stands, and a further 38 hectares were mechanically site prepared and planted this past year.

I have considered the information presented regarding the balsam IU stands and am mindful of the fact that the licensee has not been able to harvest the full partition in these stands during the term of Management Plan No. 2. However, both the licensee and district staff are confident that 4100 cubic metres per year of volume is available from the balsam IU stands on TFL 53. In consideration of the information provided, I am satisfied that this is the case. Although the analysis did not model the full volume contribution from the current partition in the balsam IU stands, I note that the timber supply projected in the base case is supported by the assumption that some amount of the balsam IU stands within the timber harvesting land base will be converted over time to more productive stands.

Given that timber supply was shown in the analysis to not be dependent on the full contribution from the partitioned volume, I am confident that there is little risk to the harvest levels projected by the base case associated with uncertainties around operational performance in these stands. Additionally, I note that earlier conversion of these stands to more productive managed stands will bring greater stability to the timber supply projected in the base case.

The licensee has made an effort over the past five years to convert some of these stands to a level of stocking and species composition which better reflects the potential of the sites, and I encourage the licensee to continue their efforts in this regard. For the purposes of this determination, I have considered the contribution to timber supply from the balsam IU stands and will discuss it further under ‘Reasons for Decision’.

- *harvest profile*

Harvest rules are used in timber supply analysis to define parameters to direct the model—when presented with a number of stands meeting the criteria for harvest—as to which stands should be selected first for harvest. Setting an absolute oldest first harvest rule directs the model to harvest first in those stands with the oldest ages. A relative oldest first harvest rule, on the other hand, tells the model to choose those stands furthest past their minimum harvestable ages as a first priority.

In the base case for TFL 53, the harvest rule assumed was that absolute oldest stands would be harvested first, as the licensee believes that the absolute oldest first harvest rule best reflects intended operational practices.

Sensitivity analyses provided by the licensee illustrated the impacts on timber supply of using the relative oldest first harvest rule. This sensitivity analysis, in conjunction with the modelling of landscape level biodiversity to the variant level projected an initial harvest level of 244 500 cubic metres per year, which could be maintained without reductions until period eight, when the harvest level increased to 327 000 cubic metres per year (nearly the same level as the base case). As discussed under *landscape level biodiversity*, the sensitivity analysis in which landscape level biodiversity was modelled to the variant level in conjunction with the absolute oldest first harvest rule, projected an initial harvest level of 237 500 cubic metres per year, with a reduction to 229 000 cubic metres per year in period six. I conclude from these sensitivity analyses that the use of the relative oldest first rule increases the stability of the timber supply on TFL 53.

BCFS staff indicate that the harvest rule that best reflects current practice is uncertain. It is not clear that either harvest rule definitively represents operational practices; likely some combination of the two is more reflective.

For this determination, and as discussed in 'Reasons for Decision', I have considered that a significant likelihood exists that a combination of the two harvest rules reflects actual operational practice on TFL 53, and that this serves to ameliorate somewhat, if not entirely, the timber supply deficit projected in period six.

- *land and resource management plans*

The Prince George Land and Resource Management Plan (LRMP) is one of many strategic land use planning processes in British Columbia. The LRMP was approved in January 1999 by the Ministers of Energy and Mines; Environment, Lands and Parks; and Forests. An Interagency Planning Team is now in the implementation phase, and is awaiting order-in-council approval of the protected areas. The LRMP developed recommendations for a number of resources including energy, forestry, recreation, agriculture, range, minerals, fish, wildlife, transportation, heritage, culture and water resources. The plan provides direction to land and resource planning, management and development for a ten year period. The government may declare portions of the Prince George LRMP as a higher level plan under the Forest Practices Code. Forest management activities are subject to any land use designations and management objectives included in a higher level plan.

The LRMP recommends the division of the planning area into five broad land use categories: agriculture/settlement, enhanced resource management, general resource management, special management and protected areas. Fifty-four resource management zones are delineated based on geographic location, resource values, existing uses and environmental interests. Each of these resource management zones has a specific management intent with a corresponding set of management objectives and strategies.

Under the LRMP, the entire area of TFL 53 falls within the Enhanced Resource Management category. The management intent defined by the plan for this zone is to develop and enhance the timber resource, consistent with the objectives defined for the zone. These objectives include maintenance of fish habitat and habitat for grizzly bear, marten and moose. As discussed under *wildlife habitat* and *riparian habitat*, the assumptions applied in the analysis are consistent with the objectives defined by the LRMP.

For the purposes of the analysis, the LRMP recommendations do not require adjustments to the assumptions regarding the assessment of timber supply for TFL 53. The designation of TFL 53 as an enhanced resource management area is consistent with the current management practices on the TFL. District staff are confident that the analysis adequately accounted for the LRMP recommendations.

I am satisfied for the purposes of this determination that there are no risks posed to timber supply.

- *First Nations*

District staff note that the area of TFL 53 is included in the Lheidli T'enneh (Lheit-Lit'en) First Nation statement of intent area.

Negotiations between government and this First Nation are ongoing. In accordance with my guiding principles, it would be inappropriate for me to attempt to speculate on the impacts on timber supply resulting from any decisions which have not yet been taken by government. If and when an agreement is reached, it can be appropriately reflected in a future determination.

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

Alternative harvest rates

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In 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 mid-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 the base case for the analysis for TFL 53, the timber supply is shown to be relatively stable and the initial harvest level is in fact 22 percent greater than the current AAC. The final long-term harvest level, which is reached in period 16, is projected at 345 000 cubic metres per year or approximately 69 percent greater than the current AAC for the TFL.

The licensee provided two alternative harvest forecasts for TFL 53. The first, which projected an initial harvest level of 282 000 cubic metres per year, showed that timber supply could be maintained at this level for two decades before declining to a level lower than the base case initial harvest level. Timber supply dropped in period two by 10 percent to 256 000 cubic metres per year, followed by two additional steps down of 10 percent to 212 000 cubic metres per year. In this alternative, the mid- and long-term levels were the same as the base case.

Another alternative illustrated that an even-flow non-declining harvest level was obtainable at 247 500 cubic metres per year, or 1500 cubic metres per year lower than the initial level in the base case. This alternative eliminated the small reduction in period six and forecast the same mid- and long-term levels as the base case.

Both of the alternative harvest flows presented used the same assumptions about landbase, growth and yield and management practices as the base case. As noted elsewhere in this rationale, and accounted for under 'Reasons for Decision', landscape level biodiversity was not modelled appropriately in the base case. However, even given this omission, I am satisfied that harvest levels for TFL 53 can be greater than the current AAC would indicate. Indeed, the base case and the harvest flow alternatives demonstrate that the initial harvest level can be increased—as will be discussed under 'Reasons for Decision'—without risk of unacceptable declines in the future.

I have been mindful of the results of the alternative harvest flow projections in relation to the timber supply projection presented in the base case, and of the implications for this determination.

Community dependence

The information provided by the licensee indicates that the communities which neighbour TFL 53 have strong dependencies on the timber supply. The licensee's operations in Strathnaver employ a total of 102 people in the forestry sector and 164 people in manufacturing. Approximately 50 percent of these people reside in Hixon or the surrounding area—where the licensee is the only major employer in the community—and the remainder live in Prince George or Quesnel.

Given the economic dependence of these communities on the licensee's operations, it is clear that any reductions to timber supply would have a negative impact, just as any

increases to timber supply would have a positive benefit. I am mindful of the dependence of the local communities and note that the level of community dependency has been considered in my determination.

Difference between AAC and actual harvest

Most licensees have flexibility in their annual rate of cut during a five year period known as the cut control period. The volume harvested from the TFL must be within 50 percent of the allowable annual volume in each year, and also within 10 percent of the allowable volume for the five year period.

The licensee for TFL 53 is performing within the legislated cut control limits. The licensee carried over an overcut of approximately 62 000 cubic metres from the 1989 to 1993 cut control period, which was reduced to approximately 3000 cubic metres for the 1994 to 1998 cut control period.

The information presented regarding current harvesting in relation to the AAC for TFL 53 indicates that there is a strong demand for the harvested volume on the TFL. Despite the rather depressed economic conditions affecting many operations during recent years, the licensee appears to be well able to harvest the entire AAC for the TFL. Upon review of this information, I conclude that nothing has been identified which would cause me to have concern about the ability of the licensee to meet their AAC requirements.

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

Timber processing facilities

The timber harvested from TFL 53 is utilized by the licensee's sawmill in Strathnaver. This facility has been in operation since 1951 and currently has an annual requirement of 600 000 cubic metres of timber which produces approximately 190 million board feet of dimensional lumber.

Approximately 30 percent of the total volume utilized by this mill comes from the operations on TFL 53. The remainder of the mill's volume requirements are obtained from the licensee's non-replaceable forest licences in the Prince George TSA, from the small business forest enterprise program, or from purchases on the open market. The licensee currently holds approximately 41 percent of the mill's fibre requirements under tenure.

I have reviewed the information regarding timber processing facilities and conclude that there is a strong demand for the products originating on TFL 53. I do not foresee any issues for which I need to account in this determination.

(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

Minister's letters 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).

I understand both documents to apply to TFL 53. This letter and memorandum include 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.

I have reviewed the opportunities for commercial thinning, and as discussed under *commercial thinning* the licensee currently has no specific plans to include this in its operations in the near future. Given the information presented to me, I am satisfied that commercial thinning has limited utility on TFL 53 at the present time.

Insofar as partitioned cuts are concerned, I have reviewed the information presented regarding both the existing balsam intermediate utilization partition as well as the proposed deciduous partition, and I am prepared to further consider their applicability on TFL 53, as discussed previously in this rationale and in my 'Reasons for Decision'.

The Minister's February 26, 1996 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 note that the discussion presented under *visually sensitive areas* illustrates that adjustment of VQO requirements on TFL 53 is occurring, and that in any event it is not constraining to timber supply.

Local objectives

The Minister's letter of July 28, 1994, states 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 for TFL 53 advises that it actively solicited public input on Management Plan No. 3. This included advertising in local newspapers and the Gazette of the availability of the draft statement of management objectives, options and procedures (SMOOP) and of the draft Management Plan, which included the timber supply analysis report. Known users of TFL 53 were also notified in writing of the availability of these

documents. No one viewed either the SMOOP or draft Management Plan No. 3 at the public viewings and no comments were received by the licensee.

In reviewing this information, I note that the licensee has carried out their public involvement obligations satisfactorily and I do not have any concerns for the purposes of this determination.

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

Unsalvaged losses

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

Estimates for unsalvaged losses account for epidemic (abnormal) infestations that are not incorporated into yield estimates used in the analysis. The majority of timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or through other methods. Losses associated with second growth stands are addressed by the application of operational adjustment factors as noted previously in this rationale.

At the time of the previous determination for TFL 53, the chief forester requested further analysis to be undertaken to better quantify estimates for non-recoverable losses. In preparation for this analysis, the licensee assembled data regarding unsalvaged losses, including:

- an actual forty year average (from insects, windthrow and fire) of 1639 cubic metres per year;
- a reduction in broadcast burning;
- no losses to wildfires over the past 10 years;
- an aggressive insect and windthrow salvage program on the part of the licensee.

The above information was used to apply a reduction factor of 678 cubic metres per year in the timber supply analysis. This equates to approximately two hectares per year, and is believed by the licensee to be reflective of current conditions as confirmed by overview flights. District staff have reviewed the estimates applied by the licensee in the analysis, and believe them to be adequate.

I note that although the estimates for non-recoverable losses applied in the analysis are lower than in adjacent areas, they are supported with data provided by the licensee and seem reasonable. I accept that there is little risk posed to this determination by the estimates for unsalvaged losses.

Reasons for decision

In reaching my decision on an AAC for TFL 53, I have considered all of the factors presented above and have reasoned as follows.

I have considered all of the factors discussed in this rationale and conclude that—with the exception of the factors discussed in this section—even though there is always some uncertainty, the remainder of the base case assumptions appropriately reflect current management or contain such small uncertainties as to require no adjustments.

Some of the factors discussed previously in the rationale can be grouped into those which indicate the timber supply as projected in the base case is overestimated and those which indicate it is underestimated. Further, I have grouped them according to whether these factors can be quantified (i.e. I know an area, volume or percentage value with reasonable certainty), or are currently unquantifiable (i.e. I am aware of only the approximate order of magnitude for the impact).

There is one factor which has been identified as indicative of potential underestimations of the timber supply projected in the base case. An additional volume of 2000 cubic metres per year, above the harvest level projected in the base case, is projected to be available from deciduous (specifically aspen-coniferous) stands on TFL 53.

There are three factors which have been identified in my considerations as reasons why the timber supply as projected in the base case may have been overestimated. One factor provides an estimation to a degree that may be quantified:

- *Landscape level biodiversity*: In the base case for the analysis, landscape level biodiversity requirements and assignments of BEOs were not modelled to the variant level. Modelling the requirements to the variant level has the impact of decreasing the initial harvest level by 11 500 cubic metres per year from the level projected in the base case.

Two factors provide estimations to degrees that currently cannot be quantified with accuracy:

- *Identified Wildlife*: To account for the impact of implementation of the Identified Wildlife Management Strategy, in accordance with provincial direction I have accepted an overestimation of up to one percent of the timber supply throughout the forecast period in the analysis. This factor is unquantified because wildlife habitat areas and associated practices have not been implemented, and I cannot know with certainty their exact impact.
- *Backlog NSR*: the entire area of backlog NSR was assumed to be returned to the timber harvesting land base in the analysis. In reality, some proportion of the 826 hectares of this area will remain not-satisfactorily-restocked, or be reclassified to a lower stocking level.

In reaching my determination for the AAC for TFL 53, I have considered all of the factors presented above, and have reasoned as follows.

The base case initial harvest level projected in the analysis was 249 000 cubic metres per

year. I am satisfied that landscape level biodiversity requirements should have been modelled to the variant level Therefore, the sensitivity analysis in which these biodiversity requirements were modelled to the variant level provides a better reflection of an appropriate initial harvest forecast for TFL 53 at 237 500 cubic metres per year.

Although no sensitivity analyses were conducted explicitly to model the impacts of either the expected identified wildlife considerations or the reduced stocking on the backlog NSR areas, each factor alone is expected to have a slight downward pressure on timber supply. However, I note that the reduced stocking on the backlog NSR area is expected to act in the long-term only, and in any event is a very small area. I have considered both of these factors in the context of the stability of the timber supply for TFL 53, and do not anticipate that either will impact significantly on timber supply. I believe that the timber supply has sufficient stability to absorb the impact of these small adjustments over time without needing to account for them explicitly in this determination.

In the absence of specific forest management objectives for that purpose, I believe that it would be difficult to justify an increase in the AAC for TFL 53 if I anticipated that a future reduction would be required as a result of the increase. In particular, I am mindful of the reduction in timber supply projected in period six of the variant level sensitivity analysis. Nevertheless, I consider the timber supply as projected by this sensitivity analysis for TFL 53 to be relatively stable. None of the uncertainties discussed in this rationale give me cause to believe that unacceptable reductions will be required in the future if I base my decision on the initial harvest level projected in the variant level sensitivity analysis. In particular, I note that I have not made any adjustments in this determination to account for the possibility that operational practices may be—at least in part—reflected by the relative oldest first harvest rule. However, if some combination of this, and the absolute oldest first harvest rule applied in the analysis, better reflects harvest practices on TFL 53—as I consider to be quite likely—then timber supply is even more stable than I have assumed in this determination. There is a likelihood that the initial harvest level can be maintained without reduction for seventy years before increasing to higher mid- and long-term levels than projected by the variant level sensitivity analysis on which I have based this determination.

I further note that the results of the sensitivity analyses which assessed the potential impact of the expected assignment of lower biodiversity emphasis to the entire TFL—although not specifically accounted for in this determination—gives me greater optimism about the stability of the timber supply for TFL 53.

The licensee presented a sensitivity analysis which indicated that an additional volume of 2000 cubic metres per year—over and above the harvest level projected in the base case—is available in the short-term from the aspen-coniferous stands on TFL 53. I note that this volume is not projected to be available for the entire analysis horizon, and further that the licensee does not have a history of harvesting the deciduous-leading stands on TFL 53. Given this information, I have thus determined it appropriate to include a partition to the aspen-coniferous stands on the TFL. I determine a suitable partition in these stands to be 2000 cubic metres per year.

The current AAC for TFL 53 includes a partition of 4100 cubic metres per year to residual balsam-leading stands resulting from historic IU logging. The licensee has been harvesting a portion of the partitioned volume during the past five year period. However, full performance in this partition has not been realized. In consideration of the information discussed throughout this rationale, I see no reason to remove the partition at this time, and have included in my determination the partition of 4100 cubic metres per year to these stands.

With respect to both partitions, I request that district staff monitor the harvesting performance in these stands during the period for which this determination is in effect, and in particular whether the partitioned volume is attained. I note that in a future determination, I may consider it more appropriate to exclude these stands from contributing to the timber supply for TFL 53—and adjust the projected harvest levels on this account—if the partitioned volume does not appear to be operationally attainable.

In consideration of all of this information, I am satisfied that 239 500 cubic metres per year —which includes a partition of 2000 cubic metres to aspen-coniferous stands, and 4100 cubic metres to residual balsam-leading stands—is an appropriate annual harvest level for TFL 53.

Determination

It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects the socio-economic objectives of the Crown for the area, that ensures longer-term integrated resource management objectives can be met, and that reflects current management practices, can best be achieved on TFL 53 at this time by establishing an AAC of 239 500 cubic metres.

This AAC includes two partitions:

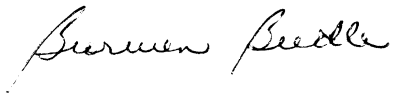
- 4100 cubic metres to residual balsam-leading stands resulting from historic IU logging; and
- 2000 cubic metres to aspen-coniferous stands.

This determination comes into effect on December 15, 1999 and will remain in effect until a new AAC is determined, which must take place within five years of the effective date of this determination.

Implementation

In the period following this 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 of staff to undertake these projects is dependent on available staff resource time and funding. However, these projects are important to help reduce the risk and uncertainty associated with key factors that affect timber supply on TFL 53. I recommend the following:

- that licensee staff obtain better information on the expected forest cover for the backlog NSR areas;
- that BCFS staff monitor performance in the residual balsam-leading stand partition;
- that BCFS staff monitor performance in the aspen-coniferous stand partition;
- that the licensee work with BCFS staff to monitor managed stand yields, in particular with regard to the yields attributed to genetic gain and site productivity estimates as projected in the analysis;
- that the licensee work with BCFS and MELP staff to prepare a detailed set of objectives and strategies for deciduous management on the TFL.



Bronwen Beedle
Deputy Chief Forester

December 14, 1999

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1996, reads as follows:

8. Allowable annual cut

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

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

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or
(b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (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,
(b) different types of timber and terrain in different parts of private land within a tree farm licence area, and
(c) gains in timber production on Crown land that are attributable to silviculture treatments funded by the government of British Columbia, the federal government, or both.

(6) The regional manager or district manager must determine a volume of timber to be harvested from each woodlot licence area during each year or other period of the term of the woodlot licence, according to the licence.

(7) The regional manager or the regional manager's designate must determine a volume of timber to be harvested from each community forest agreement area during each year or other period, 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 the Province;
(b) manage, protect and conserve the forest and range resources of the Crown, having regard to the immediate and long term economic and social benefits they may confer on the Province;
(c) plan the use of the forest and range resources of the Crown, 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 Crown and with the private sector;
(d) encourage a vigorous, efficient and world competitive timber processing industry in the Province; and
(e) assert the financial interest of the Crown 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

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

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

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

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

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

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

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

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

.../2

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

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

Andrew Petter
Minister of Forests