

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Tree Farm Licence 46

Held by TimberWest Forest Limited

**Rationale
for
Allowable Annual Cut (AAC)
Determination**

effective December 1, 1996

**Larry Pedersen
Chief Forester**

Table of Contents

Table of Contents	1
Objective of this Document	2
Description of the TFL.....	2
History of Present AAC	2
New AAC Determination	3
Information Sources Used in the AAC Determination	3
Role and limitations of the technical information used	5
Statutory framework	5
Guiding principles for AAC determinations	5
The role of the base case in AAC determinations.....	8
Timber supply analysis	9
Consideration of Factors as Required by Section 7(3) of the Forest Act.....	9
Land base description.....	9
- general comments	9
- protected areas	10
- operability.....	10
- environmentally sensitive areas (ESAs)	11
- low productivity sites.....	11
- deciduous forest types.....	11
- estimates for roads and landings.....	12
Composition of the forest.....	12
- forest cover updates / reinventories	12
- age class structure/species profile.....	13
- volume estimates for existing stands	13
Expected rate of growth of the forest.....	14
- site productivity	14
- volume estimates for regenerated stands	15
- minimum harvestable age.....	16
Not-satisfactorily-restocked areas	16
Regeneration delay.....	17
Pre-Commercial thinning, fertilization and genetically improved planting stock	17
Commercial thinning	18
Utilization standards and compliance	18
Decay, waste and breakage	18
Integrated Resource Management (IRM) objectives.....	19
- cutblock adjacency.....	19
- landscape-level biodiversity	19
- stand-level biodiversity.....	21
- watersheds	22
- wildlife.....	22
- riparian areas.....	23
- visually sensitive areas	23
20-year plan.....	24
Vancouver Island Land-use Plan	26

First Nations26

Harvest flow alternatives27

Community dependence on the forest industry.....27

Timber processing facilities27

Minister's letter and memo.....28

Local Objectives29

Non-recoverable losses29

Reasons For Decision30

Determination33

Implementation of Decision.....33

Appendix 1: Section 7 of the Forest Act.....34

Appendix 2: Section 4 of the Ministry of Forests Act36

Attachments

Appendix 3: Minister's Letter of July 28, 1994, to Chief Forester

Appendix 4: Minister's Memo of February 26, 1996, to Chief Forester.....

Objective of this Document

This document is intended to provide an accounting of the factors considered and the rationale I have employed as Chief Forester of British Columbia in making my determination, under Section 7 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 46. The document also identifies priorities where new or better information is required for incorporation into future determinations.

Description of the TFL

TFL 46, held by TimberWest Forest Ltd., is generally located between Cowichan Lake and Port Renfrew on the west coast of southern Vancouver Island. The TFL is composed of 7 different blocks that are managed as one unit. The total area of the TFL is 99 130 hectares including the Carmanah Walbran and Hitchie Creek Provincial Parks as designated within the Vancouver Island Land Use Plan. Although these areas are officially designated, they have not yet been formally deleted from TFL 46. However I have accounted for the full removal of these areas from the timber harvesting land base.

The topography of the area is variable, ranging from flat, alluvial river valleys to steep, rugged and rocky slopes. Most of the drainages in the TFL flow westward toward the broken coastline. The smaller blocks located in the Cowichan Valley drain eastward through more gentle terrain than the coastal portion. A temperate, wet climate prevails over TFL 46 with an average annual precipitation of about 380 centimetres and average daily temperatures between -8 and 27 degrees Celsius. Snowfall is limited along the coastline but reaches as much as 100 centimetres in higher elevations.

TFL 46 is dominated by Douglas-fir and hemlock stands, with smaller amounts of cedar, balsam and alder largely making up the remainder of the forested area. Because of the relatively long logging history in this area, much of the TFL is covered by young, second growth stands which have regenerated following harvest.

History of Present AAC

On May 18, 1955, British Columbia Forest Products Ltd.(BCFP) was granted Forest Management Licence (FML) 22 which became TFL 22 on July 1, 1981. On October 20, 1958, the Moore-Whittington Lumber Company Ltd. was awarded FML 27 which they assigned to BCFP on November 29, 1963. This licence was replaced as TFL 27 on October 20, 1979. On July 1, 1983, BCFP amalgamated TFLs 22 and 27 to form TFL 46. The original AAC for TFL 46 was set at 1 178 000 cubic metres. In 1988, the AAC was reduced by 76 020 cubic metres which was transferred to the Small Business Forest Enterprise Program (SBFEP). In 1989, an additional 25 340 cubic metres were allocated to the SBFEP bringing the total to 1 01 360 cubic metres. On December 19, 1991, TFL 46 was subdivided into TFLs 46 and 54. As a result of this, the new AAC for TFL 46 was set at 609 000 cubic metres. On December 9, 1992, the signing of Instrument Number 15 removed the SBFEP portion of the TFL leaving a total AAC of

558 860 cubic metres, which was apportioned entirely to TimberWest Forest Ltd. The AAC history for TFL 46 is reflected in the table below:

Management Plan	Period	Total AAC (m ³)	Total Licensee AAC (m ³)	SBFEP AAC (m ³)	Comments
1	1985 - 1987	1 178 000	1 178 000	---	7.5 percent of Schedule B AAC
1	1988	1 178 000	1 101 980	76 020	7.5 percent transfer to SBFEP
1	1989 - 1990	1 178 000	1 076 640	101 360	2.5 percent transfer to SBFEP
2	1991	840 000	738 640	101 360	
2	Jan. 1, 1992 - Dec. 8, 1992	609 000	558 860	50 140	Subdivision into TFLs 46 & 54
2	Dec. 9, 1992 - present	558 860	558 860	0	Land deletion

New AAC Determination

Effective December 1, 1996, the new AAC for TFL 46 will be 535 000 cubic metres, a reduction of 23 860 cubic metres or about 4.3 percent below the current AAC. 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 46 includes the following:

- *TFL 46: Statement of Management Objectives, Options and Procedures*, TimberWest Forest Ltd., September 1, 1995;
- *TFL 46: Existing Stand Yields*, TFL 46 - TimberWest Forest Ltd., April 11, 1996;
- *TFL 46: Managed Stand Yields*, TFL 46 - TimberWest Forest Ltd., April 9, 1996;
- *TFL 46: Timber Supply Review Information Package*, TFL 46 - TimberWest Forest Ltd., April 26, 1996;
- *TFL 46: Timber Supply Analysis*, - TimberWest Forest Ltd., July 10, 1996;
- *TFL 46: Draft Management Plan 3*, TimberWest Forest Ltd., October, 30, 1996.
- *TFL 46: Twenty-Year Plan*, - TimberWest Forest Ltd., July 12, 1996;
- Technical review and evaluation of current operating conditions through comprehensive discussions with British Columbia Forest Service and Ministry of Environment, Lands and Parks staff, July 10, 1996.
- *Forest Practices Code of British Columbia Act*, July 1995; and
- *Forest Practices Code of British Columbia Regulations*, April 1995.
- *Forest Practices Code Timber Supply Analysis*, BCFS, February 1996

Role and limitations of the technical information used

The *Forest Act* requires me as 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 formed the major body of technical information used in my AAC determination for TFL 46. The timber supply analysis is 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 variation 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 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 46, 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 7 of the *Forest Act* requires the Chief Forester to consider various factors in determining AACs for timber supply areas and tree farm licences. Section 7 is reproduced in full as Appendix 1.

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. 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 up-to-date 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 7 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect 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 impact of the Forest Practices Code on timber supply is a matter of considerable public concern. In determinations made before the Code was brought into force, no final standards or regulations were available at the time the timber supply analyses were conducted. Accordingly, the analyses were unable to assess the impacts of any new constraints on timber production which might be imposed under the Code. In those determinations I did not consider any more stringent restrictions or additional impacts upon timber supply beyond those anticipated to occur due to the application of guidelines current at the time of determination. However, I assumed that the Code would at least entrench the standards exemplified by those guidelines as statutory requirements.

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. Studies in selected TSAs (*Forest Practices Code Timber Supply Analysis*, BCFS, and BC Environment, February 1996) indicate that under the Code there will be some impacts on timber supply additional to those expected under previous guidelines. In AAC determinations made since the coming into force of the Code, I have viewed with some caution the timber supply projections in timber supply analyses that pre-date the Code, or that are based on information packages that largely pre-date the Code, as is the case in TFL 46. At the same time, I am mindful that the full force of the Code may not be felt during the transition phase of its implementation, and the impacts of specific factors on timber supply may not yet have been assessed on a local basis.

The impact on the timber supply of land-use decisions resulting from planning processes such as the Commission on Resources and Environment (C.O.R.E.) process or the Land and Resource Management Planning (LRMP) process is a matter often raised in discussions of AAC determinations. In determining AACs it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from land-use decisions that have not yet been taken by government. Thus I do not consider the possible impacts of existing or anticipated

recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made land-use decisions such as the Vancouver Island Land Use Plan, it may not always be possible to analyze the full timber supply impact in AAC determinations. In most cases, government's land-use decision must be followed by 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 is impossible to properly assess the overall impact of the land-use decision. Where specific protected areas have been designated by legislation or by order in council, these areas are no longer considered to contribute to timber supply. The legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

The Forest Renewal Plan will fund a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. In general, it is too early for me to assess the consequences of these activities, but wherever feasible I will take their effects into account. The next AAC determination will be better positioned to determine how the Plan may affect timber supply.

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 has created the extensive delays that have resulted in the current urgency to redetermine many outdated AACs. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

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

With respect to First Nations issues, I am aware of the Crown's legal obligations resulting from the June 1993 Delgamuukw decision of the B.C. Court of Appeal regarding aboriginal rights. The AAC I determine should not in any way be construed as limiting the Crown's obligation under the Delgamuukw decision, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the TFL. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply. Aboriginal rights will be taken into account as far as possible under Section 7(3) of the *Forest Act* and will be respected in the administration of the AAC determined.

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

The role of the base case in AAC determinations

In considering the factors required under Section 7 to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review project for TSAs and, for TFLs, by the licensees.

For each AAC determination a timber supply analysis is carried out, using a data package of information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of data, and a computer simulation model, timber supply forecasts are produced. These include sensitivity analyses of changes in various assumptions around a baseline option, normally referred to as the "base case" forecast, which forms the basis for comparison when assessing the effects of uncertainty on timber supply.

The base case forecast represents only one of a number of theoretical forecasts, and may incorporate information about which there is some uncertainty. Its validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it. Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which 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 judgement, using current information available about forest management, which—particularly during the period leading up to, and now during, the implementation of the Forest Practices Code—may well have changed since the original data package was assembled.

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 judgement 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. But once an AAC has been determined that reflects appropriate assessment of all the factors required to be considered, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined—it would be impossible for any such analysis to fully incorporate the subtleties of the judgement involved.

Timber supply analysis

The licensee's analysis base case was created using Timber Increment and Management Evaluation (a computer simulation model) which uses 5 year period lengths for the first 20 years of the projection and ten year periods thereafter. The licensee's base case indicated an initial harvest level of 535 000 cubic metres per year, about 4.3 percent below the current AAC of 558 860 cubic metres, for the first 170 years.

Consideration of Factors as Required by Section 7(3) of the *Forest Act*

Section 7 of the *Forest Act* requires the Chief Forester to consider various factors in determining AACs for TSAs and TFLs. These factors are listed by subsection and considered immediately below, and Section 7 is appended in full as Appendix 1.

Section 7 (3)

In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 10, shall 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 description

- general comments

The total area of TFL 46 is 99 130 hectares. In the licensee's analysis, 88 792 hectares, or about 90 percent of the total area, is classified as productive forest that is not within designated parks. The land base considered available for timber harvesting (the "timber harvesting land base") is limited by inoperability, environmental sensitivity, sites having low productivity, unstable soils, non-commercial forest cover types and the use of areas for purposes other than timber production. Reasonable assumptions, and if necessary, projections, must be made about these factors and appropriate areas must be deducted from the productive forest area to determine the timber harvesting land base. In the licensee's analysis, the timber harvesting land base is 67 667 hectares, about 76 percent of the productive forest or approximately 68 percent of the total TFL area.

- protected areas

The Carmanah Walbran Provincial Park was officially designated by order in council in July of 1995. The Hitchie Creek Park was officially designated by order in council in April 1996. Although formal deletion of these areas from the TFL has not been finalized, I fully acknowledge their designation. The full area of the Carmanah Walbran Provincial Park is excluded from the timber harvesting land base in the licensee's analysis. While the Hitchie Creek Park was not explicitly removed in the licensee's analysis owing to its

recent formal designation, I am aware that about 40 hectares should have been excluded in recognition of the area. I have considered this in my determination and have fully accounted for the exclusion of this area from the timber harvesting land base. However, given that the area is very small, the magnitude of any impacts on timber supply resulting from its removal will not affect harvest flow options for the TFL. I am fully excluding any contribution to timber supply from these parks in this decision.

- operability

Stands in TFL 46 were evaluated by the licensee to determine if they would support economically viable harvest operations. The licensee timber supply analysis assumes that stands are economically operable if they contain a timber volume greater than 250 cubic metres per hectare or are adjacent to a higher-volume stand. In addition, the majority of the trees in the stand must be of sufficient size and timber value to allow milling of relatively knot- and twist-free lumber. Some stands which did not meet these criteria were also considered economically operable by the licensee on the basis of an individual evaluation of the amount of area the stand covers, its timber volume, species composition, timber value and associated logging costs. Stands that were considered economically operable on the basis of this evaluation were included in the timber harvesting land base. In addition to economic criteria based on timber characteristics, some areas were deemed inoperable due to inaccessibility based on aerial reconnaissance. In total, 3137 hectares were deducted because of inoperability (inaccessibility or low timber quality).

These criteria and their application to TFL 46 were reviewed and accepted by district staff. I am also familiar with these criteria and understand them to be part of a larger strategy held by the licensee regarding harvest ages, stand management practices and expectations of future merchantable forest products.

I consider operability to be appropriately accounted for in the licensee's analysis for the purposes of this determination.

- environmentally sensitive areas (ESAs)

An inventory of ESAs was completed in 1993 according to BCFS standards and these classifications were approved by district staff at that time. ESAs were categorized by management emphasis which included recreation, wildlife, soils, watersheds, areas susceptible to avalanches, sites that are difficult to regenerate and areas adjacent to high value fish habitat. In the licensee's analysis, reduction factors were applied removing the ESAs, in whole or in part from the timber harvesting land base. A total of 8325 hectares or about 9 percent of the total productive forest area was excluded.

Reductions accounting for ESA requirements in the licensee's analysis were confirmed by BCFS staff as appropriate. Although the licensee has indicated that past performance shows higher levels of harvesting may have occurred in some of these types of areas, for the purposes of this determination, I agree with the BCFS assessment and consider the allowances made in the licensee's analysis to be a reasonable representation of current practice in TFL 46.

- low productivity sites

In determining the timber harvesting land base, sites with low timber growing potential were not considered to contribute to the timber harvesting land base. Coniferous dominated stands were deducted if the volume at the culmination age (the age at which average annual growth is maximized) was projected to be less than 250 cubic metres per hectare. Deciduous dominated stands having a site index (the height of a stand as a function of the stand age) of 15 metres or less were excluded from the timber harvesting land base. A total of 1428 hectares, about 2 percent of the total productive forest area, were identified as having low productivity.

As discussed below, under *- site productivity*, the licensee has indicated that there is some uncertainty regarding the productivity estimates used in the analysis. For this determination, however, no conclusive evidence has been provided to demonstrate that the deduction of areas identified as low productivity sites in the licensee's analysis is not appropriate. Given this, and the fact that I consider the deductions reasonable and representative of current practice on TFL 46, I consider low productivity sites to be appropriately accounted for in the licensee's analysis.

- deciduous forest types

In the licensee's analysis, sites supporting deciduous (broadleaf species in this area) dominated stands totaling 1515 hectares were included in the timber harvesting land base and considered available for harvesting.

I recognize that there is an increasing demand for, and marketability of, deciduous timber and consider it to be reasonable to include these types in the timber harvesting land base. I note that the licensee has demonstrated some performance in deciduous types and the

licensee's performance in deciduous stands over the next 5 year period and the appropriateness of including deciduous sites in the timber harvesting land base will be reviewed at the next determination.. I expect that the licensee will continue to harvest in these stands as appropriate, in concert with their Management Plan commitments. Any deciduous harvest will be charged against the AAC.

I observe some uncertainty regarding the regeneration of these stands. There is a possibility that these sites will become naturally dominated by coniferous species following harvest. While I recognize that any such variance could have implications for regenerated stand volume projections, it remains unclear at this time what the impacts on timber supply might be. In addition, any uncertainty applies to a small portion of the timber harvesting land base and does not impose a significant risk to the attainment of the AAC over the next 5 years or introduce further risk of unacceptable mid- or long-term outcomes.

- estimates for roads and landings

In the licensee's analysis, 2967 hectares, or about 5.7 percent of the area of stands less than 60 years old, were deducted from the productive forest to account for areas now occupied by roads and landings. To account for productive forest area losses from the future construction of roads and landings, 1068 hectares, about 5.7 percent of stands 60 years of age or older were deducted following the projected harvest of these stands.

Given my experience with respect to this factor and noting deductions made for similar areas in the province, I consider the licensee's analysis to be a reasonable representation of current practice with respect to the productivity impacts of constructing roads and landings in TFL 46. I have determined that no further adjustments to account for roads and landings are required.

Composition of the forest

- forest cover updates / reinventories

The most recent inventory, which was conducted between 1965 and 1973, was used in the licensee's analysis. The base maps for the TFL were redone using Terrain Resource Information Management photography in 1989 and 1990. The information was updated and projected to 1994 to reflect stand growth, harvesting and silviculture activities that have occurred since the inventory data was collected.

I accept that the best information available at the time was used in completing the licensee's analysis. An inventory audit is expected to be completed for TFL 46 in 1997 which is expected to provide additional information regarding this factor for the next determination.

- age class structure/species profile

As a consequence of the long harvesting history on this unit, the majority of the timber harvesting land base, about 78 percent, is covered by stands younger than 120 years of age. Approximately 22 percent of the timber harvesting land base is dominated by stands older than 200 years. There are almost no stands currently between the ages of 120 and 200 years on the timber harvesting land base.

Due in part to historical planting efforts, approximately 48 percent of the timber harvesting land base is covered by Douglas-fir stands. Hemlock stands occupy a further 36 percent with lesser amounts of cedar, balsam and deciduous species making up the remainder of the timber harvesting land base.

- volume estimates for existing stands

Existing stand volume estimates for stands older than 200 years were derived using stratum averages developed from TFL inventory data. The licensee's analysis used the Variable Density Yield Projection (VDYP) growth and yield model to estimate volumes for all existing stands older than 40 years and 200 years of age or less. VDYP is generally accepted as an appropriate model for these types of stands since it is based upon information from sample plots throughout the province. Mixed species stand yields were derived by pro-rating pure species VDYP curves by the species components in a stand. In approving the existing stand yield tables as appropriate for this analysis, the BCFS Resources Inventory Branch noted that the pro-rating method used for deriving mixed species volume estimates may be slightly conservative compared with using the mixed species predictions from VDYP. While I recognize this possibility, I note that there is no conclusive evidence to indicate that the method used for mixed species in the licensee's analysis was inappropriate and I do not consider its use to pose a significant risk to this determination.

A study conducted by the licensee indicates that the operational cruise volumes over a 5 year period were higher than the volumes indicated in the inventory. However, I do not consider the study to constitute a sufficiently large, representative sample of TFL 46 to convince me that the timber volumes used in the licensee's analysis in fact underestimate existing stand volumes by a particular magnitude. The operational cruise and planning information compared with the volumes used in the analysis is taken from a limited time frame and area. Because of this, the results could be influenced by other factors such as actual versus assumed utilization and differences in the sampled and overall average mix of species and sites.

While I remain mindful of the volume comparison differences, I am also aware that there are a number of reasons why these estimates can differ. As I discussed above, under *- forest cover updates / reinventories*, an inventory audit is expected to be completed in 1997 that should help reduce some of the uncertainties noted here for the next determination. For the purposes of this determination, given that the estimates used were approved by the BCFS for use in this analysis, and that there is no conclusive evidence to

suggest their use is inappropriate, I have determined that no adjustments to the base case projection are necessary to account for volume estimates of existing stands, and I am satisfied with the existing stand volume estimates used in the licensee's analysis. This acceptance does not introduce unacceptable risk to the attainment of the base case harvest level.

Expected rate of growth of the forest

- site productivity

Inventory data include estimates of site productivity, which is the ability of a particular site to grow trees, and is usually expressed in terms of site index. Site index is based on the height of a stand as a function of the stand age. The productivity of a site largely determines how quickly trees will grow, and therefore affects expectations of the time seedlings will take to reach green-up conditions, the volumes of timber that will grow in stands, and the age at which those stands will reach merchantable size or minimum harvestable age.

Accurately estimating site productivity in both young and old stands is difficult. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In older stands, which have not been subject to the management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site.

The licensee has indicated some uncertainty may exist regarding the site productivity estimates used in their analysis. Based upon studies completed in the province, I consider it possible that the productivity of some sites may be underestimated in the licensee's analysis. However, the magnitude of any underestimation is unclear at this time but I note that this uncertainty applies to up to 71 percent of the timber harvesting land base based on a review of the distribution of age classes and the age of the inventory.

While no conclusive evidence has been presented regarding any potential underestimation of site productivity in TFL 46 at this time, I recognize that trends and directions observed in recent studies support the likelihood of such an underestimation. For now, I observe that site indexes may be somewhat underestimated and consider this to add further stability to the base case harvest forecast as I discuss below under "Reasons for Decision". In the event that more refined estimates of site productivity are available, they will be considered in the next determination.

- volume estimates for regenerated stands

The Table Interpolation Program for Stand Yields (TIPS Y) which was developed and approved by the BCFS Research Branch to project estimated timber volumes for managed

coniferous stands was used in the licensee's analysis. Mean area-weighted site indexes based on existing stands were assumed to apply to regenerated stands.

TIPSY generated yields were then reduced using Operational Adjustment Factors (OAFs). OAF #1 was applied to reflect reduced production due to unproductive areas such as swamps and rock outcrops that were too small to be reflected in the inventory and ranged from 12 to 20 percent depending on the stand. OAF #2 ranged from 8 to 20 percent to account for natural losses incurred by biotic forces, including disease, as stands mature.

I note that these reduction factors are higher than used in other units having similar characteristics. However, I note that the use of these factors for this determination were approved for use by the BCFS Research Branch. Therefore, for the purposes of this determination, I accept the use of these factors but expect a careful evaluation of their application by the licensee prior to the next determination. I will return to this point below under "Implementation of Decision".

Stands aged less than or equal to 40 years of age, about 55 percent of the current timber harvesting land base, and all future regenerated stands were modeled as managed stands in the licensee's analysis. Managed coniferous stands were assumed to regenerate at a density of 1200 or 1600 stems per hectare, depending upon species and site index. Regenerated stand yield tables were reviewed and accepted by the BCFS Research Branch for use in this determination. Stands dominated by deciduous species were assumed to regenerate naturally and thus existing stand VDYP yield tables were used in their projection.

As was mentioned above in - *site productivity*, if site indexes are underestimated, then it stands to reason that managed stand yields could be higher. A sensitivity analysis indicated that if managed stand yields are increased by 25 percent, the base case harvest projection does remain the same for the first 5 year period of the projection but then increases about 7 percent per period for the next 15 years, stabilizing approximately 20 percent above the base case. This sensitivity, especially in the short-term, underlines the importance of further refined site productivity estimates as I discussed above and should new evidence become available it will be considered in the next determination.

The volume estimates for regenerated stands used in the licensee's analysis are based upon the best available information and I consider them reasonable for use in this determination.

- *minimum harvestable age*

In the licensee's analysis, the minimum harvestable age (MHA) for deciduous stands is defined by the culmination age (the age at which average growth reaches its maximum) and for coniferous stands is defined as the lesser of the culmination age or the age at

which the stand volume reaches 300 cubic metres per hectare and a minimum diameter at breast height of 30 centimetres.

Some concern has been expressed by BCFS staff that some of the MHAs used in the analysis seem low. While I agree that some of the MHAs used are lower than in other areas of the province, it is worth noting that some of the best growing sites in the province occur on this TFL and that the average age of harvested stands as projected in the licensee's analysis is about 80 years for regenerated stands which is not unreasonable. Further to this, the assumptions used are based upon evidence on operational experience, expected product size and market experience collected by the licensee.

I note that harvesting in this unit is in a transition phase from existing stands to second growth and depending upon market conditions, premium fibre value may often be found in younger stands. In addition, this transition will likely be influenced to some degree by landscape-level biodiversity objectives, especially with respect to old-seral stage distribution requirements, which are yet to be established as I discuss below under - *landscape-level biodiversity*. A sensitivity analysis indicates that short-term timber supplies are not sensitive to a 10 year change in the MHA and I have no evidence before me that indicates the harvest ages represented in the analysis are not appropriate. I am satisfied that the licensee's analysis is appropriate with respect to minimum harvestable ages on TFL 46 and make no adjustments to account for MHAs.

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

Not-satisfactorily-restocked areas

An area is classified as not-satisfactorily-restocked (NSR) if it is not covered by a sufficient number of tree stems of desirable species as specified in BCFS stocking standards. In the licensee's analysis, if such a condition exists and the area was harvested in 1987 or later, the land is defined as current NSR. If the area was harvested prior to 1987, then the land is classified as backlog NSR. On the timber harvesting land base there are approximately 390 hectares of NSR, all of which is current.

The representation of NSR in the licensee's analysis is representative of current practice on TFL 46 and consistent with provincial standards. Therefore, I have determined that no further adjustments to account for NSR are required at this time.

Impediments to prompt regeneration

No appreciable area has been identified as having significant impediments to prompt regeneration on the timber harvesting land base. About 497 of 561 hectares, or about 90 percent of the area considered to be susceptible to severe regeneration difficulty or in need of special management of brush were deleted from the timber harvesting land base.

Regeneration delay

Regeneration delay is the period between harvesting and the time at which an area is occupied by a specified minimum number of acceptable, well-spaced trees. A regeneration delay of 2 years was used for all regenerating stands in the licensee's analysis.

As discussed above under Not-satisfactorily-restocked areas, only 390 hectares of current NSR exist on this unit and there is no backlog NSR. The licensee's performance suggests that regeneration delay is in fact closer to 1.5 years rather than 2 years as assumed. This performance suggests that the licensee is meeting the regeneration delay assumption represented in their analysis and I therefore consider the licensee's analysis to be representative of current practice on TFL 46. Given this, I consider regeneration delay to be appropriately represented and make no further adjustments

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

Pre-Commercial thinning, fertilization and genetically improved planting stock

The licensee has undertaken stand tending activities that are incremental to the basic silviculture requirements for TFL 46. Approximately 23 800 hectares have been pre-commercially thinned, about 11 300 hectares have been fertilized and when available, genetically improved planting stock is used to regenerate sites following harvest. While no further pre-commercial thinning is scheduled for this unit, the licensee has committed in M.P. No. 3 to continue fertilizing portions of the private lands within the TFL and the use of genetically improved stock is expected to continue.

None of these activities were incorporated into the licensee's analysis but could result in yield benefits in the mid- to long-term. It is not possible to quantify the impacts of these treatments at this time, however, they could influence many factors such as the green-up age, adjacency requirements, minimum harvestable age and managed stand volume estimates. For now, I consider these incremental treatments to represent an unquantified upward pressure on the base case analysis in the mid- to long-term as I discuss below under "Reasons for Decision".

Commercial thinning

There has been no commercial thinning on TFL 46. However, I recognize that given the age class distribution of this unit, it may be possible to incorporate a management regime for commercial thinning which could afford increased management flexibility to the licensee. However, since at this time there is no indication of an intention to conduct commercial thinning, it would not be appropriate for me to speculate further on what the outcomes of such activities might be. In the event that such activities are planned or carried out they will be considered in future determinations.

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

Utilization standards and compliance

The standard of timber utilization defines the species, dimensions (stump height and minimum diameter), and quality of trees that must be harvested, and is used to estimate merchantable volume.

In the licensee's analysis, stands older than 200 years are assigned a minimum diameter at breast height of 17.5 centimetres and a top diameter of 15 centimetres. For younger stands, the standards are a minimum diameter at breast height of 12.5 centimetres and a top diameter of 10 centimetres. All trees are assumed to be utilized to a maximum stump height of 30 centimetres. These utilization parameters represent current practice on TFL 46 and BCFS staff indicate that the licensee is meeting these utilization requirements in their operations.

I consider utilization standards and compliance to be appropriately represented in the licensee's analysis as it is consistent with current standards and practice.

Decay, waste and breakage

The standard decay, waste and breakage factors approved for use by the BCFS were used in the licensee's analysis. I observe that there is a potential for some future reductions in waste and breakage in view of the licensee's increasing focus on thrifty, managed stands. However, this remains unproven at this time and for the purposes of this determination, I consider decay, waste and breakage to be appropriately represented in the licensee's analysis.

(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 (IRM) objectives

The Ministry of Forests is required by 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 IRM objectives for various forest resources and values affect the timber supply must be considered in AAC determinations.

- *cutblock adjacency*

In order to protect resources such as wildlife, water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks, and prescribe minimum green-up times (the time period required following harvesting for a stand of trees to reach a desired condition such as height). This provides for a distribution of harvested areas and

retained forest cover across the landscape, and as such takes into account the impact of several forest management requirements. Cutblock adjacency guidelines are commonly expressed in terms of the number of harvesting entries, or 'passes', required for harvesting operations to cover an area while meeting IRM objectives. A four-pass system was represented for the timber harvesting land base outside of the visual quality management areas in the licensee's analysis.

A sensitivity analysis that examined the impact of increasing or decreasing forest cover requirements outside of the visual quality management areas indicates that the base case projection is not sensitive to adjacency requirements until a full 6-pass system is imposed which indicates some inherent management flexibility. In light of this, and the fact that no evidence has been presented to suggest the representation of adjacency requirements in the licensee's analysis are not appropriate, I have determined that there is no need to make adjustments to the base case projection for cutblock adjacency in this determination.

- landscape-level biodiversity

Biological diversity, or biodiversity, is 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 landscape and stand levels. Landscape-level biodiversity objectives involve maintaining forests with a mix of ages, patches of old-growth, and forested corridors (i.e. forest ecosystem networks).

In the licensee's analysis, landscape-level biodiversity was assumed to be accounted for through land base reductions such as riparian areas, wildlife requirements, ESAs, and forest ecosystem networks in accordance with the 1991 "Guidelines to Maintain Biological Diversity in TFL 44 and TFL 46" which were considered to be appropriate at the time by the Ministry of Environment, Lands and Parks. The analysis indicates that 22 percent of the timber harvesting land base is currently considered old growth forest which was defined as stands older than 200 years. In addition, after other reductions such as wildlife reserve areas, ESAs, and operability, approximately 4700 hectares were removed from the timber harvesting land base specifically to account for forest ecosystem network linkages which connect the other reserve areas together. In total, 18 336 hectares, or approximately 92 percent, of the area currently identified as significant for forest ecosystem networks, were excluded from the timber harvesting land base.

The licensee's 20-year plan incorporates biodiversity guidelines current to 1995 and indicates that in approximately 5 years, the amount of forest older than 200 years remaining on the timber harvesting land base will be reduced to approximately 18 percent. The same plan indicates a further reduction of older forest is projected to about 14 percent in the second 5-year period. Concern has been expressed that constraints for older-seral stage distribution are not adequately accounted for in the licensee's analysis. However, I note that the licensee has indicated that biodiversity, including old growth,

could be sufficiently maintained within the reserve and linkage areas in TFL 46, which represent about 17 percent of the productive forest area.

A landscape unit planning process which is intended to determine biodiversity emphasis options in view of Code requirements for the area commenced in 1996 and is expected to be finalized prior to the next determination. While I recognize that uncertainty exists regarding future directions concerning the retention of old growth forests in the area and that old growth contributions from the timber harvesting land base may be required until some second growth stands now in reserve have matured and can provide old growth attributes, I do not consider this to impose unacceptable levels of risk to timber supplies over the course of the next 5 years. Given the land base exclusions used in the licensee's analysis and that the 20-year plan indicates that about 18 percent of the timber harvesting land base will be over the age of 200 years following this 5 year period, I find it reasonable to wait for the outcome of landscape level planning processes which are expected to provide direction and help to reduce this uncertainty by the next determination. While this clearly underlines the importance of establishing these landscape level objectives, the Code will provide guidance regarding operational activities over the next 5 years. In addition, I note that the licensee's timber supply analysis and 20-year plan indicate a focus on harvesting younger stands. Thus, while higher level plans are being formulated for older stands of timber, the opportunity to harvest younger stands in the interim reduces the risk of excessive development in older stands that could compromise the setting of reasonable objectives for maintaining older forests on the landscape

In reviewing requirements for landscape-level biodiversity it is not entirely clear that further timber supply adjustments are necessary at this time. In addition, the landscape level biodiversity requirements may be met to some extent through the application of requirements for existing areas reserved for riparian, ESAs and forest ecosystem networks. I expect any further impacts on timber supply arising from the landscape-level biodiversity provisions of the Code should be more apparent by the time of the next determination and I will return to this point below under "Implementation of Decision". Nonetheless, I have remained mindful of the risks regarding landscape-level biodiversity as I discuss below under "Reasons for Decision".

- stand-level biodiversity

Provisions for stand-level biodiversity ensure maintenance of structural diversity and habitat for wildlife through the retention of wildlife tree patches, leave trees and coarse woody debris.

Although the licensee has been operationally managing for stand-level biodiversity for the last two years, the retention of wildlife tree patches was not explicitly represented in their analysis. Over the next five year period, plans indicate that 91 percent of clearcuts will have reserves. Studies by the Vancouver Forest Region and estimates by the licensee

indicate that reserve areas, retained exclusively for stand-level biodiversity requirements, have averaged about 3 percent of the total area.

Province-wide, provisions for biodiversity requirements under the Code, including the retention of wildlife tree patches, are expected to reduce harvest levels in the short term by a range of 2 to 4 percent. The findings of the Vancouver Forest Region and the licensee support an impact in this order of magnitude from stand-level biodiversity measures. However, Ministry of Environment, Lands and Parks staff have suggested that stand level requirements for this area may be higher than this. I do note though that contributions from areas deducted to account for other requirements such as riparian areas and ESAs will likely contribute to the attainment of stand level objectives.

In view of the evidence presented and applying judgement based upon my experience, I consider a 3 percent inventory reduction to be reasonable at this time and have accounted for the impact this will have on timber supply below under “Reasons for Decision”. I recognize the potential for refinements to estimates for stand-level biodiversity as the impacts of Code requirements become more clear in the future. Any such refinements will be considered in future determinations as they become available.

- *watersheds*

A coastal watershed assessment has been completed for the Gordon River watershed. The results of the assessment have been incorporated into the 20-year plan, but not into the timber supply analysis. A hydrological assessment of the San Juan drainage is currently underway, and an assessment is being proposed for the Caycuse drainage. While I am aware that the timber supply in the short term is not constrained by forest cover requirements as discussed above, under - *cutblock adjacency*, it still remains that there was no specific provision in the analysis for hydrological rates of cut which is expected to have an impact on timber supply in the future. Any new requirements or information derived from ongoing reviews of watershed rates of cut will be considered in future determinations. For the purposes of this determination, I am satisfied that there should be adequate opportunity to meet both harvest level objectives and watershed objectives over the term of this AAC. I am not aware of any other specific information regarding these watersheds that could otherwise be considered at this time.

The TFL contains portions of two major community watersheds—Shawnigan Lake and Sooke Lake watersheds—which total approximately 1400 hectares. In the analysis, these areas were represented as requiring a 3-metre green-up, except in the visually sensitive areas, where a 5-metre green-up was modeled. Given that there are specific provisions for community watersheds under the Code, I anticipate that an accounting for the management practices required will be available for consideration at the next determination. For the purposes of this determination, I am comfortable with the licensee's analysis with respect to these areas given that no specific conditions beyond those represented have been defined for these areas and that they represent a very small proportion of the overall timber harvesting land base.

- *wildlife*

In the licensee's analysis, wildlife habitat was assumed to be accounted for by areas removed from the timber harvesting land base for riparian, ESAs and forest ecosystem networks and linkages. Ministry of Environment, Lands and Parks staff and BCFS staff indicate that habitat for red and blue-listed species (species at risk), as identified in the draft "Managing Identified Wildlife Guidebook", were not appropriately accounted for in the analysis. An operational example of this is the current deferral of proposed cutblocks pending habitat studies for Northern Goshawk nesting areas.

It is unclear at this time exactly how much additional habitat will be required for species at risk. However, given that there are new Code requirements for these species that are incremental to those already accounted for in the licensee's analysis, I accept that there likely are additional areas that will be constrained beyond those represented in the analysis. Nonetheless, I am also aware that current analysis of the draft "Managing Identified Wildlife Guidebook" does not project a large impact on timber supply on a provincial basis, although in local areas the impact may be larger. For this determination, I have accounted for the risk that this introduces to timber supply as discussed below, under "Reasons for Decision".

- *riparian areas*

To protect riparian habitat, riparian management areas are located along watercourses, which limit timber harvesting activities. Riparian areas identified as reductions from the timber harvesting land base were based on the 1993 Coastal Fisheries/Forestry Guidelines, while current practice is based on the Forest Practices Code. In order to meet Code requirements, the licensee has estimated that an additional 2100 hectares should have been deducted from the timber harvesting land base to account for reserve zones or riparian management zones.

I find that the licensee's estimate of additional land base deductions for riparian habitat has been derived from a rigorous, map-based assessment which is considered reasonable at this time by Ministry of Environment, Lands and Parks staff. Therefore, in my judgement, it is reasonable to conclude that a further riparian deduction of approximately 3 percent of the timber harvesting land base is required in the TFL to account for riparian provisions of the Code, and I have taken this into account in my determination, as discussed below, under "Reasons for Decision".

- *visually sensitive areas*

One of the resources required by the *Ministry of Forests Act* to be managed by the Ministry of Forests is outdoor recreation, which is defined under the *Forest Act* to include scenic features. Visual landscape foresters in B.C., in collaboration with specialists from around the world, have developed procedures for identifying and managing visually

sensitive areas. Recommended procedures incorporate both biophysical and social factors including visual sensitivity ratings, numbers of viewers and their perceptions, and others—and provide recommended visual quality objectives for visually sensitive areas.

To meet these objectives, constraints must be placed on timber harvesting, road building and other forest practices in the sensitive areas. These constraints are based on research and experience, and on public preferences and acceptance of degrees of alteration of visual landscape. The constraints are expressed in terms of "forest cover" requirements that relate to the maximum allowable percentage of a visually sensitive landscape that can have visual disturbance at any one time, and through "visually effective green-up", i.e., the stage at which regeneration is perceived by the public to represent a newly established forest.

The licensee's analysis accounted for visual quality management by incorporating specific visual quality objective (VQOs) zones. Approximately 15 455 hectares, or about 23 percent, of the timber harvesting land base are identified as visually sensitive. The modification and partial retention VQO's compose approximately 62 and 37 percent of this area respectively. Depending on the VQO assigned, varying amounts of area within the zone are permitted to have stands less than 5 metres in height at any time.

Standard BCFS procedures were followed in the identification of these zones and the definition of their associated forest cover requirements. BCFS staff have confirmed that the visual quality objectives incorporated in the licensee's analysis are reflective of requirements for these zones and current practice on TFL 46. In view of this and the fact that I have no evidence to suggest visual quality requirements are not appropriately represented in the licensee's analysis, I am satisfied for the purposes of this determination, that no further accounting is required.

(vi) any other information that, in his opinion, relates to the capability of the area to produce timber;

20-year plan

The current 20-year plan, covering the years 1995-2014, has been submitted and accepted by the BCFS. The main purpose of the a 20-year plan is to show that proposed harvest levels can be spatially achieved over the 20-year period. While the plan indicates that harvesting at the proposed harvest level could result in a small shortfall in available timber supplies in the second 5 year period of the base case harvest projection, the licensee contends that shifts in harvest scheduling, alternative assumptions regarding biodiversity objectives and a somewhat different cutblock configuration could alleviate this shortfall. In addition, I note that the current plan does verify the availability of timber supply at the base case harvest level in the first 5 years. I also observe that opportunities exist, through the increased use of alternative silviculture systems, to offset the spatial constraints. I expect the licensee to further investigate the timber supply impacts of these opportunities such that they are available for assessment at the next determination and I will return to this point below under "Implementation of Decision". For the purposes of

this determination, all indications are that the proposed harvest level can be achieved over the period of this AAC. I will discuss this factor further under "Reasons for Decision".

Vancouver Island Land-use Plan

The provincial government's *Vancouver Island Land-Use Plan* (VILUP) implementation report was released in January 1995 and revised in April 1995. The plan designated various land uses for different parts of Vancouver Island, including TFL 46. At present, the plan has identified protected areas and a small amount of Low Intensity Areas (Walbran and San Juan Ridge). The Carmanah Walbran Provincial Park was formally designated in July 1995 through legislation. As part of the Goal 2 protected area strategy, the Hitchie Creek Provincial Park was designated in April 1996 by order in council.

Currently, the VILUP is being implemented through the Vancouver Island Resource Targets process. An "Interim Technical Report: Discussion Paper" was released in April 1996 which outlines proposed resource management goals, delineation of Enhanced and General Management Zones, and refinement of objectives for the existing Low Intensity Areas. Through the Resource Targets process, and with the support of Forest Renewal BC, it is possible that management in the Enhanced and General Management zones could offset impacts as a result of the establishment of Low Intensity Areas.

In keeping with my guiding principles for AAC determinations, until such implementation decisions are made, it is not possible to properly assess the overall impact of the resource targets portion of the land-use decision. Future AAC determinations will be better positioned to incorporate timber supply implications of the plan as implementation is completed and strategies are assigned.

However, where specific protected areas have been designated by legislation or by order in council, these areas no longer contribute to the timber supply. As was discussed above under *-protected areas*, through the VILUP, two new protected areas have been designated by legislation within TFL 46; the Carmanah Walbran and Hitchie Creek Provincial Parks, and I have fully accounted for the exclusion of these areas in this decision.

For this determination, no further accounting is required as a result of the VILUP.

First Nations

First Nations with traditional territory in TFL 46 include: Ditidaht First Nation, Pacheedahts First Nation, Hul'Qumi'Num Treaty Group and Te'Mexw Treaty Association. The First Nations are at various stages in the land claim settlement process. As noted in "Guiding Principles for AAC Determinations", First Nations land claims, when settled, will be reflected in future AAC determinations.

- (b) **the short and long term implications to the Province of alternative rates of timber harvesting from the area;**

Harvest flow alternatives

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 volumes of older wood can permit harvesting above the long-term harvest level without compromising future timber supplies. However, the base case projected a harvest level starting at a steady long term level of 535 000 cubic metres per year for approximately 170 years.

An alternative harvest rate was examined which started at the current harvest level of 558 860 cubic metres per year. This level could be maintained for 10 years before declining down to the long-term harvest level of 535 000 cubic metres. However, the level could then only be maintained for 40 years before falling below the long-term harvest level for 10 years.

The licensee submits that elevated harvest levels are not supported by either the forest development plan or the 20-year plan. Although the timber supply analysis shows some flexibility, in order to avoid future disruptions, the initial harvest level projected was established at the steady long-term level.

For this determination, I accept the base case forecast as a suitable reference on which to base my considerations.

Community dependence on the forest industry

The communities of Youbou, Lake Cowichan and, to a lesser extent, Duncan, Port Renfrew and Sooke are dependent upon the forest industry activity generated by TFL 46.

I am aware of the potential implications of a change in harvest level on the communities surrounding TFL 46 which are largely dependent on forest-based income. This is of particular importance to Youbou, which relies on the timber harvested from TFL 46 for employment and economic activity.

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

Timber processing facilities

TimberWest Forest Ltd. owns and operates two timber processing facilities: the Cowichan Sawmill at Cowichan Lake, and the Elk Falls Mill in Campbell River.

The Cowichan Sawmill includes a large log sawmill, a small log sawmill, a planer mill and dry kilns. The Elk Falls Sawmill includes a small log sawmill and integrated whole

log chipping facility, a planer mill and dry kilns. Both mills have been re-tooled to handle smaller diameter timber from second-growth stands. These renovations have helped to resolve past economic difficulties experienced in harvesting and utilizing timber from younger stands. The new milling configuration creates an opportunity for the successful utilization of small diameter, second-growth timber which is forecast for harvest in TFL 46.

Fletcher Challenge Canada, which owns 51 percent of TimberWest Forest Ltd., owns and operates two pulp and paper mills: the Crofton and the Duncan Bay mills. The Crofton Pulp and Paper Mill has an annual fibre requirement of 3 323 700 cubic metres and produces 686 000 metric tons of pulp and 437 000 metric tons of paper. The Duncan Bay Pulp and Paper Mill has an annual fibre requirement of 2 736 750 cubic metres and produces 819 000 metric tons of pulp and 593 000 metric tons of paper.

Approximately 53 percent of the wood supply from TFL 46 goes to the Cowichan Sawmill, approximately 10 percent goes to the Crofton Pulp and Paper Mill, and the remaining 37 percent is sold or traded.

The estimated annual fibre requirements of all the facilities is approximately 6.9 million cubic metres. TimberWest Forest Ltd. obtains fibre supply from a number sources including a number of forest licences in the Vancouver Forest Region and two tree farm licences (TFL 46 and TFL 47). Fibre for the two pulp and paper mills is obtained from various chip agreements as well as from internal production.

- (d) **the economic and social objectives of the Crown, as expressed by the minister, for the area, for the general region and for the Province; and**

Minister's letter and memo

The Minister 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 46. They are consistent with the objectives stated in the Forest Renewal Plan and 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 continuity of employment.

The Minister stated in his letter 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. The latter would likely require the use of alternative harvesting systems, and to encourage this the Minister suggested consideration of partitioned AACs.

To date, the use of alternative harvesting systems and commercial thinning have not been significant in this TFL. However, in areas that are subject to visual quality objectives, the use of these systems may be appropriate. The Minister's memorandum addressed the effects of visual resource management on timber supply. It asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. As noted earlier, under *visually sensitive areas*, the existing visual quality management objectives for this area were assigned according to current standards and I accept them as appropriately represented in the licensee's analysis.

I have thoroughly considered the social and economic objectives of the Crown as stated by the Minister of Forests and have accounted for them in my determination wherever appropriate.

Local Objectives

The Minister's letter suggests that the Chief Forester should consider important local 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. During the public review, a number of comment forms were received and were summarized. I have considered the comments received and I am mindful of the views which were brought forward.

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

Non-recoverable losses

In the licensee's analysis, a 1 percent reduction was applied to the harvest forecast to account for non-recoverable losses due to windthrow, disease and insects. In TFL 46, losses due to fire are insignificant, therefore no reductions were applied for fire damage. Unsalvaged losses associated with endemic levels of disease and insect attack are assumed to be accounted for in the volume projections.

I have carefully reviewed this information and accept that the best information available to assess this factor was used in the licensee's analysis. As such, I do not find it necessary to make further adjustments to the base case analysis in order to account for non-recoverable losses.

Reasons For Decision

In reaching my decision on an AAC for TFL 46, I have considered all of the factors presented above and have reasoned as follows.

The licensee's base case indicates an initial harvest level of 535 000 cubic metres per year, about 4.3 percent below the current AAC of 558 860 cubic metres, can be maintained for the first 170 years.

My considerations have identified forest management requirements and changes in practice or information since the completion of the timber supply analysis that either increase or decrease the timber supply relative to that projected in the base case harvest forecast.

Factors that place some quantified downward pressure on the base case timber supply projection are Forest Practices Code requirements for:

- stand-level biodiversity requirements; and
- requirements for riparian areas.

Studies in TFL 46 and the Vancouver Forest Region indicate that reserve areas, exclusively for stand-level biodiversity could in effect reduce the inventory volume by about 3 percent in the short term. In view of this and applying judgement based upon my experience, I consider a downward pressure on the base case harvest projection of 3 percent to be reasonable at this time in order to account for stand-level biodiversity requirements associated with the Code. I remain mindful however, of the potential for refinements to estimates for stand-level biodiversity as the impact of Code requirements becomes more clear in the future and any such refinements will be considered in future determinations as they become available.

A rigorous, map-based assessment of additional land base reductions to account for riparian habitat has been completed by the licensee and is considered reasonable by Ministry of Environment, Lands and Parks staff. I agree that the estimate is reasonable for use in this determination and therefore consider riparian areas to represent a quantified downward pressure on the base case harvest projection of about 3 percent.

Factors that introduce an upward influence to the base case harvest projection but which are unquantified at this time are:

- the potential underestimation of site productivity; and
- future yield returns resulting from incremental silviculture activities.

I consider it possible that the productivity of some sites may be underestimated in the licensee's analysis. While the magnitude and impact of any such underestimation remains unclear at this time, the likelihood of this occurring adds stability to the base case harvest forecast in all periods.

Stand tending activities considered incremental to the basic silviculture requirements for TFL 46 have been undertaken by the licensee including pre-commercial thinning, fertilization and when available, the use of genetically improved planting stock to regenerate sites following harvest.

Although pre-commercial thinning is not scheduled to continue, significant areas have already been treated. In addition, the licensee intends to continue fertilizing portions of the private lands within the TFL and continue to use genetically improved stock where feasible. The impacts of these activities were not accounted for in the licensee's analysis, but could influence many factors such as the green-up age, adjacency requirements, minimum harvestable age and managed stand volume estimates resulting in yield benefits in the mid- to long-term. Since it is not possible to quantify the impacts of these treatments at this time, I consider these incremental treatments to represent an unquantified upward pressure on the base case analysis.

Factors that work to offset the unquantified upward uncertainties on the base case timber supply projection are:

- uncertainty regarding landscape-level biodiversity objectives; and
- uncertainty surrounding habitat requirements for wildlife.

As was discussed above under - *landscape-level biodiversity*, the licensee did account for their approved 1991 biodiversity plan for the TFL. However, given the subsequent implementation of the Forest Practices Code, there is now some uncertainty regarding biodiversity objectives for this unit. A landscape unit planning process which is intended to determine biodiversity emphasis options in view of Code requirements for TFL 46 commenced in 1996 and is expected to be completed prior to the next determination. I note that many areas are excluded from the timber harvesting land base in order to account for other requirements that will also contribute to the maintenance of biodiversity. In addition, the licensee intends to focus on the harvest of younger stands while higher level plans are being formulated for older stands. Given this, and the inherent stability of the base case harvest projection in the short-term, I do not consider uncertainty regarding this factor over the next 5 years to introduce unacceptable levels of risk to the timber supply or the maintenance of biodiversity values. Nonetheless, this uncertainty does exist and I anticipate that any impacts on timber supply arising from the landscape-level biodiversity provisions of the Code will be more apparent at the next determination.

Closely linked to the biodiversity emphasis options noted above will be the determination of wildlife habitat requirements in the area. Although it remains unclear at this time exactly how much additional habitat will be required for species at risk, I am aware that new Code requirements for these species are expected to be incremental to those already accounted for in the licensee's analysis, but at present, the impacts are not expected to be large. Overall, I accept that there likely are additional requirements that will further constrain the base case harvest projection.

While none of these unquantified factors can be measured with complete certainty, my personal knowledge and experience provides guidance with respect to the orders of magnitude associated with each of these risks. For the purpose of this decision, and in the absence of any definitive guidance on these factors, it is my judgement that, the unquantified factors that work to increase or stabilize the timber supplies in the base case projection are offset by the unquantified factors that exert a downward influence on the base case in the short-term. I expect these matters to be more carefully assessed at the time of the next analysis. In the meantime, I am satisfied that this

approach does not introduce unacceptable risk into this decision and this approach fully recognizes the social and economic objectives of the Crown.

The licensee's 20-year plan has identified some spatial concerns in the second 5 year period of the projection but changes in harvest scheduling, alternative assumptions regarding biodiversity requirements and different cutblock configurations could alleviate this short-term deficit. As I discussed above, the use of alternative or incremental silviculture practices could influence many factors, including spatial assumptions used in the 20-year plan in a manner that improves operational flexibility in the short-term.

Apart from the unquantified influences, there are two quantified influences on the base case which combine to represent a downward pressure of approximately 6 percent. However, sensitivity analysis indicates that if more than half of the existing stand volume estimates are reduced by 10 percent, the base case harvest projection can still be maintained for the next 20 years. Further, the base case projection can still be maintained for 5 years if volume estimates for regenerated stands are reduced by as much as 25 percent. I therefore consider that the base case harvest projection is attainable in the first 5 years of the projection, even after accounting for these factors.

In summary, I conclude that adjusting the AAC to the proposed harvest level, which is a reduction of about 4.3 percent below the current AAC, is reasonable and will not impose unacceptable levels of risk to future timber supplies on TFL 46. It is worth noting that this reduction also accounts for the removal of the Carmanah Walbran and Hitchie Creek Provincial Parks. At the time of the next determination, I expect that information regarding biodiversity objectives, the Vancouver Island Land Use Plan and any timber supply impacts resulting from the implementation of the Code will be much clearer than they are now. This adjustment is also consistent with the social and economic objectives of the Crown to avoid unnecessary adverse impacts on current or future generations by setting the AAC not so high as to cause later disruptive shortfalls in supply, nor so low as to cause undue social and economic impacts today.

Determination

Effective December 1, 1996, the new AAC for TFL 46 will be 535 000 cubic metres, a reduction of 23 860 cubic metres or about 4.3 percent below the current AAC. This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Implementation of Decision

his determination comes into effect on December 1, 1996, and will remain in effect until a new AAC is determined, which must take place within five years of this determination. During the interim, and in preparation for the next AAC determination, I expect:

1. the licensee to further investigate the timber supply impacts of the increased use of alternative silviculture systems such that they are available for assessment at the next determination;
2. a careful evaluation of the application OAF reduction factors in the next timber supply analysis for this unit by the licensee prior to the next determination;
3. the licensee to include an assessment of any further impacts on timber supply arising from the landscape-level biodiversity provisions of the Code prior to the next determination.



Larry Pedersen
Chief Forester

November 28, 1996

Appendix 1: Section 7 of the *Forest Act*

Section 7 of the *Forest Act* reads as follows:

Allowable annual cut

7. (1) The chief forester must determine an allowable annual cut before December 31, 1996, and after that determination 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 and woodlot licence areas, and
- (b) each tree farm licence area.

(1.1) If, after the coming into force of this subsection, the minister

- (a) makes an order under section 6 (b) respecting a timber supply area, or
- (b) amends or enters into a tree farm licence to accomplish the result set out under section 33.1 (1) (a) to (d),

then, with respect to that timber supply area or tree farm licence area, as the case may be, the chief forester is not required to make the determination under subsection (1) of this section before December 31, 1996, or within 5 years after the last determination, but is required to make the determination

- (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.

(1.11) If

- (a) the allowable annual cut for the tree farm licence is reduced under section 7.1 (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 7.1 (6).

(1.12) If the allowable annual cut for the tree farm licence area is reduced under section 7.1 (3), the chief forester is not required to make the determination under subsection (1) or (1.1) of this section at the times set out in subsection (1) or (1.1) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 7.1 (2).

(1.2) [Repealed 1994-39-2.]

(1.3) In determining an allowable annual cut under this section 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 Province, the federal government, or both.

(2) The regional manager or district manager shall determine a volume of timber to be harvested under a woodlot licence during each year or other period of its term, according to the licence.

(3) In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 10, shall 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) silvicultural 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 his opinion, relates to the capability of the area to produce timber;
- (b) the short and long term implications to the Province 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 Crown, as expressed by the minister, for the area, for the general region and for the Province; and
 - (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

- - - - -

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

Section 4 of the *Ministry of Forests Act* (consolidated 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.

- - - - -