

**BRITISH COLUMBIA  
MINISTRY OF FORESTS**

# **Tree Farm Licence 19**

Held by Pacific Forest Products Limited

**Rationale for  
allowable annual cut (AAC)  
determination**

**effective August 1, 1996**

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Chief Forester**

## Table of contents

Objective of this document .....	3
Description of the TFL.....	3
History of the AAC .....	3
New AAC Determination .....	4
Information sources used in the AAC determination.....	4
Role and limitations of the technical information used .....	5
Statutory framework .....	5
Guiding principles for AAC determinations .....	5
Timber supply analysis .....	8
The role of the "base case" .....	9
Consideration of Factors as Required by Section 7 of the Forest Act .....	10
Land base contributing to timber harvest.....	10
- general comments .....	10
- economic and physical operability.....	11
- deciduous (broadleaf) stands .....	13
- roads, trails and landings .....	14
Existing forest inventory.....	15
- age of inventory .....	15
- age class structure .....	15
- species profile .....	15
- volume estimates for existing stands .....	15
Expected rate of growth .....	16
- site productivity estimates .....	16
- volume estimates for regenerated stands .....	18
- minimum harvestable ages .....	18
- aggregation procedures .....	19
Regeneration delay.....	19
Impediments to prompt regeneration .....	20
Not-satisfactorily-restocked areas .....	20
Regeneration .....	20
Incremental silviculture.....	21
- juvenile spacing .....	21
- commercial thinning .....	21
- fertilization.....	22
- genetic gain.....	22
Utilization and compliance .....	22
Decay, waste and breakage .....	23
Integrated Resource Management (IRM) objectives.....	23
- green-up and forest cover requirements.....	24
- environmentally sensitive areas .....	25
- sensitive soils .....	26
- avalanche areas .....	27
- recreation and cultural heritage.....	27

- wildlife.....	29
- riparian areas.....	30
- biodiversity .....	31
- visual quality objectives .....	32
- water licences.....	34
20-year plan.....	35
Vancouver Island Land-Use Plan.....	35
First Nations Land Claims .....	36
Partitioned component of the harvest .....	36
Alternative harvest flows .....	37
Community dependence on forest industry.....	38
Timber processing facilities and mill fibre requirements .....	38
Minister's letter and memorandum.....	39
Local objectives .....	40
Unsalvaged losses .....	40
Reasons for decision .....	40
Determination .....	44
Implementation .....	44
Appendix 1: Section 7 of the Forest Act.....	46
Appendix 2: Section 4 of the Ministry of Forests Act .....	47
Documents attached:.....	47
Appendix 3: Minister of Forests' letter of July 28, 1994 .....	47
Appendix 4: Minister of Forests' memo of February 26, 1996.....	47

## **Objective of this document**

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as Chief Forester of British Columbia in making my determination, under Section 7 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 19. The document also identifies where new or better information is required for incorporation into future determinations.

## **Description of the TFL**

Tree Farm Licence 19 is located on the west coast of Vancouver Island in the vicinity of Nootka Sound. It is bordered by the Strathcona Timber Supply Area and the Strathcona Provincial Park to the east, Nootka Sound to the west, Canadian Forest Products Ltd.'s TFL 37 and MacMillan Bloedel Limited's TFL 39 to the north, and Clayoquot Sound to the south. The TFL is held by Pacific Forest Products Ltd. and is administered from the Campbell River Forest District, as part of the Vancouver Forest Region.

The TFL area is composed of a rugged marine coastline, with steep mountainous terrain, and deep river valleys and inlets of the Pacific Ocean. The majority of the operable forest lies within the Coastal Western Hemlock biogeoclimatic zone, with other portions in the higher elevation Mountain Hemlock zone. There are also large areas of unforested alpine tundra.

The total land base is 192 551 hectares, of which 153 655 hectares are considered to be productive forest. In estimating the timber harvesting land base, the largest deductions from the productive forest are for inoperable stands and environmentally sensitive areas.

## **History of the AAC**

TFL 19, originally known as Forest Management Licence No. 19, was awarded in 1954 to Tahsis Company Limited. At that time, under Management Plan (MP) No. 1, the licence area was 161 612 hectares and the company was authorized to harvest 283 170 cubic metres per year. By 1978, the licence area had been increased, and with improved utilization standards, updated inventory and productivity estimates, and an expanded timber harvesting land base, the AAC was increased to 989 674 cubic metres.

A 25-year replaceable TFL agreement was offered in 1982. Tahsis Company Ltd. and Pacific Forest Products Limited were amalgamated in 1985, and began operating as Canadian International Paper Incorporated, Tahsis Pacific Region. In 1993, Canadian International Paper Incorporated assigned all timber tenures to its subsidiary company, Pacific Forest Products Limited (hereafter called Pacific), which was listed publicly on the stock market. Today, Pacific is 51 percent owned by Avenor Inc., formerly Canadian Pacific Forest Products Limited

The current AAC, under Management Plan (MP) No. 7 is 978 000 cubic metres. The original term of MP No. 7 was from January 1, 1988, to December 31, 1992, but four twelve-month extensions were granted (in total 48 months to December 31, 1996) in order to accommodate the incorporation of new information into the timber supply analysis.

The current AAC of 978 000 cubic metres also includes a Small Business Forest Enterprise Program component of 45 868 cubic metres.

## **New AAC Determination**

Effective August 1, 1996, the new AAC for TFL 19—including Schedule A and B land, and the Small Business Forest Enterprise Program—will be 978 000 cubic metres, unchanged from 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 19 includes the following:

- Pacific Forest Products Ltd. Tree Farm Licence 19 Draft Management Plan No. 8, 1995 to 1999, dated September 6, 1995;
- Pacific Forest Products Ltd. Tree Farm Licence 19 Draft Management Plan No. 8, 1995 to 1999, Backgrounder for Planned Management Strategy and Allowable Cut Determination, prepared by Pacific Forest Products Limited, updated to March, 1996;
- Tree Farm Licence 19 Twenty-Year Strategic Development Plan, prepared by Pacific Forest Products Ltd., October 1994;
- Pacific Forest Products Ltd. Tree Farm Licence 19 Draft Management Plan No. 8, 1995 to 1999, Timber Supply Analysis Report, prepared by Sterling Wood Group Inc. on behalf of the licensee, November, 1994;
- *Vancouver Island Land-Use Plan*, Government of British Columbia, June 22, 1994;
- Report on Field Study into Site Productivity and Tree Stocking on Temporary Roads, TFL 19, prepared by Reid Collins and Associates, September 1993;
- Summary of the public input solicited by the licensee regarding the contents of Management Plan No. 8;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives regarding visual resources;
- Technical review and evaluation of current operating conditions through comprehensive discussions with Forest Service (BCFS) and British Columbia Environment staff, notably at the AAC determination meeting held in Victoria on April 3, 1996;
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Regulations*, April 1995; and
- *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, 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 19. 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 answer or solution to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information I must consider in AAC determinations.

In making the AAC determination for TFL 19, I have considered known limitations of the technical information provided.

## **Statutory framework**

Section 7 of the *Forest Act* requires the Chief Forester to consider various factors in determining AACs for TSAs and TFLs. 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 AACs from a range of possible harvest levels; 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, 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 (as is the case in TFL 19). 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 timber supply impact in an AAC

determination. 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 impact of the land-use decision. However, the legislated requirement for five-year AAC reviews will ensure such decisions are addressed.

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 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 far 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. Specific identified activities in traditional areas will be taken into account as far as possible under Section 7(3)(a) 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*.

## **Timber supply analysis**

The timber supply analysis for TFL 19 was undertaken by Sterling Wood Group Inc. on behalf of the licensee, and was reviewed by Forest Service staff. Sterling Wood Group Inc. uses the simulation timber supply model TREEFARM to project harvest forecasts. While some aspects of this model differ from the Forest Service simulation model (FSSIM), in general, the model incorporates similar processes of forest growth and harvest under specified management regimes. I recognize the differences between the models and I accept that the TREEFARM model is capable of providing a reasonable projection of timber supply.

However, with respect to the harvest flow policy used by the licensee in the analysis, I note the following. In many of the projections, the long-term harvest level is allowed to continue at the lowest harvest level which occurs throughout the planning horizon. While this policy may project a more stable timber supply, it also masks the maximum long-term potential and thus obscures the effects on the long-term timber supply of changes in assumptions about forest management. While my determinations do focus on the short-term timber supply, I must also have knowledge of the maximum achievable long-term level and of the transition in between. While I am satisfied that the licensee's analysis is an adequate reflection of the short-term timber supply, in my determination I have remained mindful of, and have made allowances for, this aspect of the licensee's harvest flow policy.

The timber supply analysis for TFL 19 examined seven different management regimes or options. Pacific's "planned management option" is intended to represent their proposed management strategy for the term of Management Plan No. 8; this option represents the base case, which is discussed below, under "The role of the base case." In addition, the analysis examined harvest level impacts if the timber harvesting land base and management objectives were varied.

The timber harvesting land bases that were examined included

- the total gross productive land base;
- the total gross productive land base less the areas which Pacific proposes to include as being operable over the next 30 years (as discussed under *economic and physical operability* below); and
- the land base which is operable by means of current conventional harvesting systems.

Variations in management objectives were also examined. One of these, the "FS procedures option," was intended to reflect current Forest Service procedures. As noted in the

considerations which follow, it is my view that the combination of restrictive assumptions used in this analysis resulted in an overly constrained timber supply projection.

The analysis also examined the effect on timber supply of varying many of the assumptions and estimates used, and these sensitivity analyses have been of assistance in my determination, as discussed in my considerations below.

### **The role of the "base case"**

In the licensee's analysis, there are two harvest forecasts presented as references from which to test assumptions when assessing the effects of uncertainty on timber supply. These are Pacific's "planned management option" (referred to in this document as the "base case") and the "FS procedures option." For this determination, I have considered the "planned management option" as the "base case" because it was presented by the licensee as the forecast which best reflects their proposed management strategy as outlined in MP No. 8. As noted above, I consider the management assumptions incorporated into the "FS procedures option" analysis to be more constraining than I would reasonably expect under current and proposed management, and accordingly I have afforded very little weight to this forecast in comparison with the "planned management option" base case.

However, this base case forecast represents only one in a number of theoretical forecasts, and it incorporates information about which there is some uncertainty. 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 validation or precision 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.

In the base case harvest forecast, the current AAC of 978 000 cubic metres was projected to continue for 20 years, declining to 900 000 cubic metres in the third decade, and declining further

in the fourth decade to the long-term harvest level of 833 000 cubic metres per year. This represented the highest possible long-term harvest level. A key assumption in this projection is that approximately 25 percent of the currently inoperable areas will become operable in 30 years' time. This projection also incorporated fewer reductions to the timber harvesting land base for environmentally sensitive areas, and was less stringent than normal in accounting for other resource uses.

## **Consideration of Factors as Required by Section 7 of the *Forest Act***

### **Forest Act, 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 contributing to timber harvest

*- general comments*

The total area of TFL 19, as reported in the timber supply analysis, is 192 551 hectares. The land base that is considered available for timber harvesting is limited because of terrain-related and economic reasons, areas of poor timber quality or low timber volume that cannot be harvested economically, and environmentally sensitive areas with higher levels of non-timber resource management objectives. In the analysis, reasonable assumptions and, if necessary, projections must be made about these factors, and appropriate areas must be deducted from the productive forest area, to derive the timber harvesting land base.

The initial timber harvesting land base, as assumed in the base case, is 95 907 hectares (50 percent of the total land base). I have a number of concerns about the size of this land base, associated with the reasonableness of the assumptions made about the following factors:

- new parks which have been designated in the TFL
- areas critical to wildlife habitat (Ew1)
- areas significant to wildlife habitat (Ew2)
- areas with high value for recreation, education, ecological, aesthetic and cultural heritage (Er1)
- areas that require special management considerations for recreation education, ecological, aesthetic and cultural heritage (Er2n and Er2c)
- areas with soils that are moderately unstable and/or sensitive to disturbance (Es2)
- riparian areas requiring protection or special management (Ef1 and Ef2)
- areas with significant visual quality objectives (VQOs)
- unproductive areas occupied by roads, trails and landings

- areas of predominantly deciduous stands.

Environmentally sensitive areas were accounted for in the base case by the application of forest cover constraints. This differs from the normal procedure, which is to partially or completely exclude such areas from contributing to the timber supply through deductions in deriving the timber harvesting land base.

The assumptions about environmentally sensitive areas, and VQOs are discussed below, under Integrated Resource Management Objectives.

Concerns related to the remainder of the factors related to the land base are discussed immediately below.

*- economic and physical operability*

The inoperable land base deducted from the productive area, as assumed in the timber supply analysis, was based on a review of operability in TFL 19 completed in 1993. The total area considered as inoperable, for physical and economic reasons, was 45 725 hectares of good, medium and poor sites. In addition, 6 879 hectares of low site were not considered to be economically viable to harvest because of low productivity.

However, subsequent to the operability review, Pacific has asserted in its "Backgrounder for Planned Management Strategy," that the future operability of the entire 45 725 hectares must be taken into consideration. Nevertheless, in the timber supply analysis, Pacific assumes that, of this 45 725 hectares, only about 25 percent, the good and medium sites that are not environmentally sensitive, totalling 11 594 hectares, will become operable, in 30 years' time. The future inclusion of these sites is attributed by Pacific to anticipated increases in log prices which will permit more helicopter-logging, long-line yarding and balloon harvesting methods necessary to log on steeper slopes, and the construction of longer access roads to remote areas. Pacific has stated that this analysis technique was employed to illustrate the stability of the short-term timber supply, but that in reality it is their view, supported by evidence presented to me, that the harvesting of these stands will in fact be developed progressively over the 30-year planning horizon.

Historically, Pacific has harvested approximately 3 percent of their timber volumes using helicopters. The inclusion of the 11 594 hectares will require the licensee to increase the use of helicopter harvesting systems to 18 percent within the next decade.

Sensitivity analysis on the base case forecast tested the impacts of the exclusion of the additional 11 594 hectares. This indicated that the current AAC could be maintained for at least ten years without this additional land base, while maintaining a reasonable rate of decline after ten years to what I have evaluated to be a reasonable long-term harvest level. Thus, the short-term timber supply does not appear to be dependent on this additional land base at this time.

District staff agree that changes have occurred since the operability report was completed and some previously inoperable areas have become operable. However, they are concerned that the 25 percent figure is optimistic, given Pacific's current performance in these areas. The operability mapping was accepted by district staff with a provision that there be a strategy and a commitment to address the issue of harvesting performance across all operability classes and to demonstrate the appropriateness of including economically marginal stands in the aerial harvesting class. This has not been completed to the satisfaction of district staff.

I recognize the concerns of district staff regarding the assumption that all the excluded good and medium sites will become operable in 30 years. At my request and in response to these concerns, Pacific's field staff provided me with compelling information which confirmed that the proposed areas may indeed soon become economically available for harvest—indeed, I accept that some have already done so. In addition, during an aerial examination of the TFL, I observed and assessed many of the inoperable areas. Based on that assessment, on the presentation by the licensee, and on my experience gained through similar assessments in other areas of the province, I believe that it is reasonable to expect that some of the inoperable areas are currently contributing or will eventually contribute to the timber supply. With the cautions expressed below, I accept that up to 25 percent of the inoperable areas should be considered as contributing to timber supply, by the amount assumed in the timber supply analysis through the inclusion of the 11 594 hectares in the base case.

However, I do not agree with the licensee's submission that the entire 45 725 hectares of currently inoperable land must be taken into consideration. Many of these areas are unsuitable for road building due to bedrock control features. Moreover, many of the areas are characterized by shallow and often unstable soils, and contain stands of marginal productivity. Finally, in many cases the remoteness of the stands precludes consideration of aerial logging systems.

In accepting the contribution of the 11 594 hectares, I note the following concerns:

- the included areas are located in terrain in which it is very difficult to operate
- operating costs for these areas are expected to be higher than average
- the overall log profile is often of lower value than the historically accessible sites in the TFL.

In view of these concerns, district staff should monitor harvesting performance in these areas to ensure that, over time, operations occur across the distribution of terrain types, logging systems and operating conditions. This will ensure that the inclusion of these sites, and their contribution to the inventory, does not result in an increased concentration of harvesting elsewhere on the timber harvesting land base. I have accounted for my concerns regarding Pacific's proposal to expand operations into currently inoperable areas below, under "Reasons for decision." As discussed further under that section, I have included specific conditions in my approval letter which will require the licensee to

provide updated operability mapping, to provide a proposal indicating how the licensee will balance operations across the range of terrain types and to track and report on performance.

The licensee's performance in this regard will be critically reviewed for the next determination.

*- deciduous (broadleaf) stands*

There are a total of 771 hectares of deciduous stands on TFL 19 (broadleaf species in the case of this TFL). In the timber supply analysis, 713 hectares of these stands are included in the timber harvesting land base. However, Management Plan (MP) No. 8 states that deciduous species have not been utilized. The licensee claims that the deciduous areas are currently suitable for harvest, and that deciduous species will be considered for harvesting if opportunities arise.

Deciduous stands are increasingly becoming economic to harvest; however, I note that there is a lack of commitment in the Management Plan and no performance plan to harvest these deciduous stands. Therefore, it is unreasonable to consider including deciduous stands in the timber harvesting land base at this time. I have accounted for this small overestimation of the timber harvesting land base as discussed below, under "Reasons for decision."

*- roads, trails and landings*

There are 551 hectares of permanent roads located on TFL 19, and I am satisfied that these have been deducted appropriately in the timber supply analysis.

In addition, there are 1627 kilometres of temporary roads. BCFS staff submit that typically the width of a road is estimated as the distance from the top of the road cut to the top of productive fill, and this is used to estimate the total productive area lost. Pacific maintains that the total area lost from the productive land base to roads is less than the total road area because tree crowns use the road area as growing space, and this compensates to some degree for the total loss in productivity due to roads. Pacific calculated the area lost but considered the crown widths of trees adjacent to the road surface and trees planted on cut and fill slopes. As a result of this calculation, the timber harvesting land base was reduced by 1 percent (961 hectares) for existing temporary and permanent roads, and by an additional 2 percent (2 167 hectares) for future roads, for a total reduction of 3 percent after 100 years.

Field checks completed by BCFS staff raise questions regarding the validity of Pacific's conclusion that tree crown growth into the space over roads compensates to some degree for the loss in productivity due to roads. In reviewing this, I recognize there is uncertainty about road deductions in general in the province, and I have instructed BCFS staff to clarify provincial procedures for estimating losses of this kind and to assess their

implications for timber supply throughout the province, so that improvements in estimating these losses may benefit future AAC determinations.

I observed, during my field examination of the TFL, that some road reclamation and planting of cut- and fill-slope microsites is occurring. However, I am also mindful that, in general, a 3 percent reduction is lower than applied in other comparable coastal timber supply analyses. BCFS staff assessed the road width assumptions excluding the overlap of tree crowns and estimated that an additional 2 percent reduction is required to account for roads.

Given the information presented for TFL 19, I am not satisfied that the assumptions are a reasonable projection of road losses. Although this uncertainty does not affect short-term timber supplies, I am mindful that this represents an approximate 2 percent downward influence on the mid- to long-term timber supply. I have discussed this further below, under "Reasons for decision."

#### Existing forest inventory

##### *- age of inventory*

The most recent inventory of TFL 19 was completed in 1989 and followed the procedures outlined in the Forest Inventory Manual. This inventory resulted in an increase in the estimated productive forest area of 32 388 hectares through the inclusion of poorer quality stands, previously classified as scrub areas. The reclassification of these areas was approved by Vancouver Forest Region staff. Updates for forest cover depletion and growth are current to January 1, 1991, and as a result, harvest forecasts are now already 5 years into the planning horizon.

An inventory audit is planned for 1997 and this will provide quantitative assessment of the accuracy of the volume projections used in the analysis. BCFS staff have reviewed the inventory and have found no areas of concern. Accordingly, I am satisfied that inventory data provides a reliable basis for my determination.

##### *- age class structure*

Approximately 49 percent of the existing stands in the timber harvesting land base are older than 250 years of age (excluding the inoperable). About 59 percent of existing stands in the timber harvesting land base have reached harvestable age. The balance of the inventory is distributed among the younger age classes. The relatively large area of older stands provides some flexibility in responding to changes in constraints on timber supply.

##### *- species profile*

Throughout the timber harvesting land base, stands with western hemlock as the dominant species are the most common. The next most prevalent stands are those dominated by western redcedar (23 percent), Douglas-fir (16 percent) and amabilis fir (7 percent). There are also smaller areas of deciduous species, pine and Sitka spruce.

*- volume estimates for existing stands*

Volume estimates for existing stands were developed using the Variable Density Yield Prediction (VDYP) model. VDYP is based on information gathered from a large number of sample plots, and is generally accepted in British Columbia as an adequate model for projecting volumes in existing stands. Therefore, as a general rule in making AAC determinations, in the absence of statistically valid contradictory evidence for a particular area, I rely on VDYP estimates for existing stand volumes.

In the case of TFL 19, the VDYP estimates for volumes in existing mature stands (greater than 141 years) on the gross operable land base were compared to average volume line (AVL) estimates developed from forest inventory plots in all forest polygons to be harvested within the twenty-year forest development plan. The AVL estimates indicated the average volume is 9 percent higher than the VDYP volume estimate. The mature stand volumes projected by VDYP were therefore adjusted by a factor of 1.09. The adjustment was accepted by Resources Inventory Branch. However, I note that in the analysis this increase was applied to all existing stands greater than 125 years, rather than the intended age of 141 years as described in the comparison. This resulted in an overestimation of 9 percent on 498 hectares, or 0.5 percent of the initial timber harvesting land base. This is a relatively small area, and the additional volume incorrectly included in the analysis is not sufficiently large to warrant a downward adjustment to the projected initial harvest level.

For stands with Douglas-fir or hemlock as the dominant species which are younger than 120 years, the timber supply analysis used yield tables based on adjusted site indexes (to be discussed in the following section).

A sensitivity analysis indicated that the base case harvest forecast is not sensitive to a 10 percent change in existing volumes until after the third decade.

At this time, I believe the information used to derive the volume estimates for existing stands to be the most accurate available, and I accept the estimates used in the timber supply analysis as suitable for use in this determination. Nonetheless, I am aware of a forthcoming inventory audit, and I believe that it is important to confirm or vary the inventory figures, based on the findings of the audit, before the next AAC determination.



Expected rate of growth*- site productivity estimates*

Inventory data includes site indexes used to classify the productivity or growth potential of sites. Site indexes are based on tree height as a function of the age of a particular forest stand. The productivity of a site largely determines how quickly trees will grow, and therefore affects the time seedlings will take to reach green-up conditions, the volumes of timber that will grow in regenerated stands, and the age at which those stands will reach merchantable size or minimum harvestable ages. Ongoing provincial paired-plot studies show that for some species in some areas, current site indexes, determined using inventory information from existing unmanaged forests, underestimate the growth potential of some regenerated forests. If site indexes are underestimated, volumes in regenerated stands could be higher, minimum harvest ages could be lower, and green-up conditions could be reached earlier than projected.

In the timber supply analysis, site indexes were estimated for all stands older than 35 years based on the inventory type groups and the delineation of three site-index range intervals—less than 22.5 metres, 22.5 metres to 32.4 metres, and greater than 32.4 metres, all at 50 years of age—labelled respectively, "poor," "medium" and "good". The area-weighted average site indexes of the 5 metre sub-class for each of the above classes were used for each "forest type/site class" combination, as recommended by staff of the BCFS Research Branch.

Pacific conducted a paired-plot study to estimate the correct site index for managed stands. To reflect the results of this study, in the base case it was assumed that site indexes for regenerated stands are higher by the following amounts: for Douglas-fir, 5.0 metres on good and medium sites; for western hemlock, 9.0 metres for good and medium sites, and 4.3 metres on poor sites. These adjustments were approved by the BCFS Research Branch.

Pacific then applied the hemlock adjustments to old-growth redcedar and amabilis fir stands after harvest, because these stands regenerate to hemlock. The BCFS Research Branch did not approve these adjustments before the analysis was submitted, although they have subsequently approved the adjustments for amabilis fir stands but not the adjustments for redcedar stands. Pacific used the redcedar adjustment in the base case on an estimated 18 748 hectares (about 20 percent of the base case timber harvesting land base).

A sensitivity analysis indicated that if no site index adjustment was made for regenerated redcedar and amabilis fir stands as was done in the base case, no impact resulted in the short term, although there was up to an 11 percent decrease in harvest levels in the long term. As the area covered by amabilis fir (for which the site index adjustment was

approved) is about 5 percent of the timber harvesting land base (4454 hectares), the actual impact on the long-term harvest level in the base case is less than 10 percent.

I note that the site index adjustments for Douglas-fir and western hemlock were approved at a time when the methodology for matching paired plots was less rigorous than it is today. The site index shifts are larger than estimated under the current methodologies. I view these results as an upper limit of the range of uncertainty. I also note that in MP No. 8, Pacific intends to carry out additional field samples to refine site index for redcedar and amabilis fir stands. The final results of the licensee's study and the province-wide paired-plot studies should provide more certainty about the accuracy of the current site indexes for future determinations for this TFL.

Without a review and approval by the BCFS Research Branch of the site index adjustments for redcedar stands, I am not prepared to accept the adjustments applied in the base case for this determination. Given that these unapproved adjustments were applied to 18 748 hectares, I have considered this as an over-estimation of up to 10 percent in the long-term timber supply, as discussed below, under "Reasons for decision."

*- volume estimates for regenerated stands*

Volume estimates for regenerated stands were developed using the Table Interpolation Program for Stand Yields (TIPSY) growth and yield model, version 2.1.2, for managed Douglas-fir, hemlock and redcedar stands, and VDYP, version 1.3, for naturally regenerated stands with no silvicultural treatments. This was accepted by staff of the BCFS Research Branch, subject to area weighting being accepted by Timber Supply Branch and the net land base remaining the same. While the net land base did not change, it was found upon examination of the timber supply analysis, that bias was introduced during assignment of site indexes as described below, under *aggregation*.

Operational adjustment factors (OAFs) were applied to TIPSY yield estimates in order to account for the loss of timber productivity due to particular conditions such as swamps and rock outcrops that were too small to be reflected in the inventory classification (OAF 1) and to losses due to pests, decay, waste and breakage (OAF 2). In the timber supply analysis, there were reductions of 15 percent for OAF 1, and 5 percent for OAF 2, with the exception of the adjustments applied to account for genetic gains (see below, under *genetic gains*).

Yields on existing amabilis fir/hemlock/redcedar, spruce/hemlock/amabilis fir, and pine/Douglas-fir/redcedar plantations were modelled using VDYP, with 5 percent added to account for expected increases in yield associated with planting. BCFS Research Branch staff considered this to be reasonable.

A sensitivity analysis indicated that increasing or decreasing the regenerated stand volumes by 10 percent resulted in an increase or decrease in the timber supply of approximately 5 percent after three decades, but no effect in the short term.

Having carefully evaluated the assumptions and methodology for projecting regenerated stand volumes, I consider the volumes applied in the analysis to be acceptable for use in this determination.

*- minimum harvestable ages*

Minimum harvestable age is the estimated average time required for forest stands to reach a harvestable condition. The minimum harvestable age for both existing and regenerated stands in TFL 19 was established at 60 years, provided stand volume has reached 350 cubic metres per hectare.

A sensitivity analysis indicated that increasing or decreasing the minimum harvestable volume by 50 cubic metres per hectare did not impact short-term timber supply, although mid-term timber supplies were projected to decline slightly after 30 years if the volumes are reduced, whereas the medium-to-long-term timber supply is stabilized or enhanced if the volumes are increased.

BCFS district staff accept that the minimum harvestable ages used in the timber supply analysis are consistent with current practice in the TFL. I am satisfied that no adjustments are required on this account to the projected short-term harvest level.

*- aggregation procedures*

Inventory information consists of a very large number of data records derived from numerous relatively small areas or polygons. Each record includes information on tree species composition, height and age, and the sites on which they grow. To simplify timber supply modelling and facilitate understanding of its results, this data can be aggregated by combining the information to describe a smaller number of larger units (analysis units)—usually on the basis of combining records with similar attributes.

For TFL 19, yield tables for each species group and site class were produced using an average value derived by weighting site indexes by area. Site indexes for mature stands over 140 years were weighted by area with the site indexes derived for younger stands. BCFS staff are concerned that because the original site classes were retained after the adjustment to the old-growth site index, there is an upward bias in site index for existing younger stands and a downward bias for regenerated old-growth stands with associated biases in stand yield estimates.

I am satisfied that this will not have an impact in the short term, and I have made no adjustments on this account in this determination. I expect Pacific to eliminate this bias in the next analysis.

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

Regeneration delay

Pacific plants 90 percent of the areas harvested within 18 months after harvesting, even though many of the areas will regenerate naturally. Among other benefits, this prompt regeneration strategy reduces regeneration delay, provides maximum opportunity for conifers to compete with brush ingress, and thereby reduces the use of herbicides for brush suppression. Planted stock also provides an opportunity to obtain yield gains from genetically improved seed (see below, under *genetic gain*). The timber supply analysis assumed a three-year regeneration delay for naturally regenerated stands and a two-year delay for plantations. I am satisfied that the regeneration delay periods assumed in the timber supply analysis are sufficient for use in this determination.

Impediments to prompt regeneration

According to MP No. 8, TFL 19 has been relatively free from infestation of diseases or pests. Some damage has occurred to Sitka spruce by the spruce terminal weevil (*Pissodes strobi* Peck), and to western white pine by white pine blister rust (*Cronartium ribicola*). However, planting of Sitka spruce and western white pine has been and will continue to be minimized until resistant stock is developed.

About 6500 hectares of the TFL area have been identified and classified as having severe regeneration problems (Ep1) due to site conditions, or moderately severe regeneration problems (Ep2) due to brush or wildlife. Only 1200 hectares of these problem areas are currently operable. In the Ep2 areas, browsing by elk in plantations constitutes the worst problem. Pacific plans to use seedling caging, delayed planting and cluster planting to alleviate this problem. As a result, Pacific may prescribe a variance to stocking standards on the most heavily browsed sites, as described in MP No. 8. In the timber supply analysis, the operable Ep1 areas (153 hectares) were reduced by 90 percent, and the operable Ep2 areas (1047 hectares) were reduced by 50 percent.

Given the relatively small area of operable land affected, and the reasonable reductions applied, I am satisfied that this factor has been adequately accounted for in the timber supply analysis.

Not-satisfactorily-restocked areas

There are 560 hectares of not-satisfactorily-restocked (NSR) areas contributing to the timber harvesting land base. This area reflects current NSR and no areas were identified as backlog. The number of hectares were verified from silviculture records by BCFS district staff. I accept that this factor has been appropriately modelled.

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

As noted above, under Regeneration delay, Pacific plants 90 percent of the areas harvested within 18 months after harvesting. I note that the relative proportions of species planned in MP No. 8 for planting over the next five years are not consistent with the assumptions used in the timber supply analysis; the areas assumed to be planted to Douglas-fir and hemlock are greater in the timber supply analysis than in the plan. As a result, the timber supply analysis incorrectly projects higher yields relative to the planned strategies outlined in MP No. 8. However, an examination of the timber supply impacts indicates that the effects are in the long term only. As I therefore do not consider this factor to introduce a significant risk to the timber supply, I have made no adjustments on this account in this determination. However, for the next determination, I expect the assumptions in the timber supply analysis to better reflect actual practices.

### Incremental silviculture

According to MP No. 8, the basis for the incremental silviculture program is to apply treatments that will increase the timber supply in 40 to 60 years. The licensee states that this strategy, with the exception of genetic improvement, is conditional upon funding from Forest Renewal BC. As stated above, under "Guiding principles for AAC determinations," 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. For TFL 19 at this time, with the exception of genetic improvement (see below, *genetic gain*), the actual level of incremental silviculture activities to be carried out over the next five years and any consequences for timber supply are unknown. The next AAC determination will be better positioned to determine how the strategies may affect timber supply.

#### *- juvenile spacing*

Pacific expects to space 10 to 15 percent of juvenile stands with all of the following site characteristics: site index greater than 25 metres; age 12 to 18 years; height between 4 and 7 metres; and stocking density greater than 3000 stems per hectare. A review by district silviculture staff indicated that the timber supply analysis assumptions reflects Pacific's historical performance. Since Pacific's plans are consistent with historical performance, I accept that the timber supply analysis appropriately reflects these plans.

#### *- commercial thinning*

MP No. 8 identifies approximately 3400 hectares of hemlock and Douglas-fir stands of an appropriate age and condition for commercial thinning. Stands on medium and good site classes have been planted, spaced and fertilized and are now of an adequate size for commercial thinning. In MP No. 8, Pacific commits to conducting a study of commercial thinning opportunities during the period of the plan. No commercial thinning was assumed in the timber supply analysis. Since there are no current plans to conduct operational commercial thinning I am satisfied that the analysis appropriately reflects the current situation.

*- fertilization*

In the early 1980s, Pacific fertilized 4380 hectares of Douglas-fir. In the timber supply analysis, gains attributed to fertilization were modelled by increasing yield tables by a constant volume per hectare until harvest, as follows: 22 cubic metres per hectare for good sites; 29 cubic metres per hectare for medium sites; and 41 cubic metres per hectare for poor sites. This was accepted by the BCFS Research Branch. Future fertilization of spaced and/or thinned stands of Douglas-fir is planned, but is conditional upon funding from Forest Renewal BC and thus was not assumed in the timber supply analysis for this determination. I accept that the initial harvest level projected in the analysis adequately reflects the implications for timber supply associated with fertilization.

*- genetic gain*

Pacific has undertaken an extensive tree improvement program, in which all Douglas-fir and western hemlock stock are genetically improved from a first-generation seed orchard. Second-generation seed orchards approved by the BCFS will be producing planting stock by the turn of the century. Anticipated harvest yield gains from first-generation seed are 5 percent for Douglas-fir and 2.5 percent for managed western hemlock. Second-generation seed orchard stock is expected to produce a further 4 percent yield gain (9 percent total) for Douglas-fir and a 5.5 percent gain (7.5 percent total) for western hemlock. This was accepted by the Research Branch Forest Biology section. Yield projections in the timber supply analysis were adjusted accordingly.

I have seen much evidence to support these gains, and I accept that these are modelled appropriately.

**(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 and compliance

Utilization standards define the species, dimensions (stump height and minimum diameter), and quality of trees that must be harvested and removed from an area during harvesting operations. The utilization standards are incorporated in the analysis to estimate minimum merchantable stand volume.

The standards assumed in the timber supply analysis are as follows: For stands over 120 years of age, trees are utilized to a minimum of 17.5 centimetres in diameter at breast height and to a minimum top diameter of 10 centimetres. For second-growth stands (age 120 or less) trees are utilized to a minimum of 12.5 centimetres in diameter at breast height, and to a minimum top diameter of 10 centimetres. Stump height must not exceed 30 centimetres in either category.

I observe that a minor difference exists between the commitments in the management plan for utilization (15-centimetre top for older stands) and the limits used in the analysis.

This difference is not significant, and I consider the assumptions used in the analysis to be acceptable for use in this determination.

Decay, waste and breakage

The timber supply analysis used standard Metric Diameter Class Decay, Waste and Breakage Factors for Forest Inventory Zone B to account for decay, waste and breakage in existing stands. Nootka PSYU waste and breakage factors were applied in immature stands (up to 120 years). These were accepted by the BCFS Resources Inventory Branch.

New tables of decay and waste factors are presently being developed by Resources Inventory Branch for the province on a zonal basis. For now, the estimates used in this analysis constitute the best available information, and I consider them to be reasonable for use in this determination. Any new information which might subsequently be developed will be considered in a future AAC determination.

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

Integrated Resource Management (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 to ensure production and harvesting of timber 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 constrain the timber supply must be considered in AAC determinations.

*- resource inventories and assessments*

Data collection and the completion of the information package on which the timber supply analysis was based took place before the introduction of the Forest Practices Code and well before the finalization of the various guidebooks. Therefore, the management practices assumed in the analysis do not meet the new requirements in several instances.

Furthermore, other major initiatives such as the Vancouver Island Land-Use Plan and the Recreation Plan have yet to be finalized. The management of environmentally sensitive areas is of particular concern, as discussed below. I expect the licensee to carry out its commitments in MP No. 8 to complete and update the information for use in the preparation of MP No. 9, and I emphasize the importance of this information for the next AAC to be determined for this TFL. For these reasons, in my approval letter I have specified certain conditions with respect to the development of strategies for managing biodiversity, wildlife habitat, and scenic values. Furthermore, if the information from these strategies indicates that such action is warranted, I am prepared to redetermine the AAC for this TFL before the next scheduled determination date.

*- green-up and forest cover requirements*

To protect such resources as wildlife habitat, water quality and visually sensitive areas, the Forest Practices Code specifies limitations on cutblock size and the requirement for adjacent cutblocks to be greened-up, before harvest is allowed. This is designed to distribute the harvest pattern and retain forest cover across the landscape. This is commonly expressed in terms of the number of harvesting entries or “passes” required to harvest the mature timber from the timber harvesting land base.

In the base case, a one-pass harvest regime was modelled in the timber zone (59 719 hectares). Pacific acknowledges that more than one pass may be required to distribute harvesting operations, but submits that because of the diverse and broken terrain of TFL 19, in the timber supply analysis, no forest cover requirements are necessary to account for adjacency.

For the FS procedures option, a four-pass harvesting regime was modelled. I am not persuaded that the assumption of a four-pass regime represents current practice in the TFL. Since the number of passes assumed in the analysis can significantly affect the validity of the assumptions for a number of management objectives, as noted above, under "The role of the base case," I consider the FS procedures option to be generally more constraining than may reasonably be expected under current management.

Nonetheless, I am mindful that no explicit forest cover requirements for cutblock adjacency were modelled in the base case. I have examined the TFL both from the air and on the ground, and I find that, historically, harvesting has been very well distributed across all harvesting zones. From this and from my understanding of the range of forest management objectives in the TFL, I consider it very unlikely that the timber supply will be constrained by cutblock adjacency requirements during the period for which this AAC will remain in effect. For this determination, therefore, I am prepared to accept that the assumptions made in the analysis regarding forest cover requirements are reasonable. However, in my approval letter for MP No. 8, I have requested that the licensee include specific management objectives, expressed as forest cover requirements, for incorporation in the next analysis.

*- environmentally sensitive areas*

An inventory of environmentally sensitive areas (ESAs) conforming to provincial standards was completed with the timber inventory in 1989. Recreation, wildlife habitat and fisheries inventories were done separately and will be discussed below.

Environmentally sensitive areas (ESAs) include areas with sensitive soils, regeneration problems, riparian and wildlife habitats, recreation or cultural heritage values, and avalanche areas. Many of these areas have more than one feature and can be labelled twice—e.g. for soil sensitivity and regeneration problems. For the purpose of this analysis, ESAs were classed according to their most restrictive use, thereby eliminating



overlaps. The total area with ESA classification in TFL 19 is 51 000 hectares, of which 29 168 are considered operable. The total ESA area removed from the timber harvesting land base in the base case forecast was 4184 hectares. Using standard BCFS analytical procedures, the deductions would have been 11 865 hectares. In the base case, Pacific chose to apply forest cover requirements to the remaining 7378 hectares rather than assume them to be deducted from the land base.

A sensitivity analysis tested the impacts of using the standard BCFS analytical procedures for ESA land base reductions. This provides only a limited indication of the impacts because this timber supply projection was further constrained by simultaneous adjustments to other factors. Nevertheless, under this more highly constraining set of assumptions the initial harvest level projected in the base case could still be maintained for two decades, declining at an acceptable rate to a long-term harvest level of approximately 775 000 cubic meters. I therefore accept that Pacific's modelling of ESAs did not introduce significant error.

In general, I am not averse to considering forest cover requirements as an alternative to land base withdrawals to model ESAs, provided this is demonstrably based upon a clearly workable strategy which is incorporated in the management plan. This is not the case for MP No. 8, as will be discussed in later sections, and for now, it is not clear how ESA management objectives will be met by the application of forest cover constraints. Until such a strategy is provided, I must conclude that the analysis has overestimated the timber harvesting land base because reductions for ESAs were not sufficient. For this decision, I am accounting for a higher deduction than shown in the analysis for a number of factors, as follows:

- 100 percent reduction for areas of critical wildlife habitat (Ew1) and 50 percent reduction for areas of significant wildlife habitat (Ew2), which will result in a timber harvesting land base reduction of 4036 hectares;
- 100 percent reductions for recreation areas of high value (Er1) and 50 percent reductions for recreation areas requiring special management considerations (Er2n and Er2c), which will result in a timber harvesting land base reduction of 3342 hectares;
- for areas with soils that are moderately unstable and/or sensitive to disturbance (Es2), as discussed below there is uncertainty in the appropriate level of constraint that should reasonably apply; the range is noted to be from a 20 to 50 percent reduction, i.e. from 980 to 2500 hectares; and
- a 5 to 7 percent total land base reduction for riparian areas.

These are discussed in detail below, under *wildlife, recreation and cultural heritage, sensitive soils* and *riparian areas*.

- *sensitive soils*

Soils were mapped according to Ministry of Forests' Inventory Manual standards in 1989. Mapping according to the Vancouver Region terrain stability

classification is ongoing and is scheduled to be completed in 1996. The current terrain stability classification, completed on a portion of the TFL, indicates that areas originally mapped with soils that are extremely fragile or unstable (Es1) or moderately unstable and sensitive to disturbance (Es2) must now be doubled to reflect current standards. To extrapolate this finding to the whole TFL, the areas for Es1 and Es2 were assumed in the timber supply analysis to be twice the size of the originally mapped areas.

In the timber supply analysis a 90 percent reduction was made to Es1 areas in the timber harvesting land base. This was approved by staff of the Vancouver Forest Region, and I am satisfied that the Es1 areas are modelled using reasonable assumptions.

However, no reduction was made in the analysis to account for the 4908 hectares of Es2 areas in the timber harvesting land base. Pacific believes that strict adherence to a management regime developed by a professional geologist will protect these sensitive sites while allowing some harvesting to take place. I am advised that BCFS district staff insisted throughout the timber supply analysis process that a 50 percent reduction is warranted. Recent research by Vancouver Forest Region research staff indicates that, for coastal areas, a 20 percent reduction is recommended for Es2s.

BCFS district staff have brought forward examples demonstrating that some of these Es2 areas are currently unable to support any harvesting activity and state that on such areas no harvesting activities would be approved. In the absence of a more detailed description of the management regime proposed by Pacific for these areas, and of performance-based information proving that the proposed regime does protect the resource, I cannot accept that 100 percent of these areas will be harvested over time. I agree with BCFS staff that some degree of land base reduction is warranted for Es2s, and I expect the reduction could range from 20 to 50 percent. In reviewing the information presented, I conclude that the timber harvesting land base has been overestimated in a range of 980 to 2500 hectares, and I have accounted for this in "Reasons for decision." I expect that the terrain-stability mapping scheduled for completion in 1996 will be completed and will be taken into account in the next determination.

*- avalanche areas*

A total of 188 hectares within TFL 19 have been labelled as having avalanche potential as the single most restrictive ESA category. One hundred percent of this area was removed from the timber harvesting land in the base case. I am satisfied that the projected timber supply accounts adequately for these areas and that no further adjustment is required on this account in this determination.

*- recreation and cultural heritage*

A recreation inventory of TFL 19, which included cultural heritage sites, was completed in 1989 and updated in 1991 and 1993. A recreation analysis was completed and approved by the district in 1994. Pacific has worked in cooperation with the Gold River Community Tourism Committee to develop a recreation strategy. Implementation of the work proposed will be funded by Pacific on Schedule A lands, but is dependent on BCFS funding for implementation on crown land.

Recreation ESAs are assigned in the following categories:

- ### areas having high recreation value for education, aesthetics and ecological and cultural heritage (Er1),
- ### areas classed as requiring special management considerations to protect recreation values (Er2n), and
- ### areas which were classed as requiring no forest cover constraints to maintain values (Er2c).

The recreation potential of TFL 19 is high. About 9 percent (17 612 hectares) of the total land base, not including visually sensitive areas, has been recognized for management of recreation resources. Most of this area is located in inoperable or non-forest areas.

Recreation objectives in the base case were modelled using cover constraints. Standard BCFS analytical procedures, however, make use of deductions to the timber harvesting land base.

The following table summarizes the two approaches:

ESA	Total operable area	base case	Standard BCFS procedures
	(ha)	(cover constraints)	(% removed)
Er1	608	max 15% < 15 years min 25% >200 years	100%
Er2n	2489	max 20% < 15 years	50%
Er2c	2977	no constraints	50%

According to MP No. 8, harvesting in the Er1 areas will provide for access, facilities such as campsites, cabins and parking lots, and will remove dangerous trees through selection logging. However, the forest cover constraints for the base case could allow up to 75 percent of the area to be harvested over 75 years. The district is concerned that some of these areas are of international significance and that their values should not be compromised in any way until appropriate

management for a range of objectives can be assured through implementation of the recreation strategy and through completion of careful planning.

Comments were received from the public that more marine access, boat ramps and campsites are needed, and that logging has beneficially opened up areas for recreation.

These recreation opportunities are not necessarily incompatible with harvesting if undertaken carefully and if sensibly integrated and managed. Nonetheless, I do share the district's concern for the range of values in these areas, and I agree that there should have been some additional accounting for them. I conclude that, instead of applying forest cover constraints to these areas in the timber supply analysis, land base deductions should have been made. I consider that the timber harvesting land base has therefore been overestimated by up to 3342 hectares, and I have taken this into account in my determination. However, I await the completion of the recreation strategy to more quantitatively adjust the associated impacts on timber supply.

- *wildlife*

According to the draft Vancouver Island Wildlife Management Plan (1986), TFL 19 is home to large mammals, including deer, elk, bear, cougar, and wolf, and to many species of non-game mammals, fur-bearers, upland game birds, non-game birds, waterfowl, amphibians and reptiles. Vulnerable species such as the Vancouver Island wolverine and the marbled murrelet have been sighted on the TFL, but the only endangered species in the vicinity is the sea otter. This information is summarized in Appendix II(b) of MP No. 8.

Comments received from the public ranged from the view that harvesting should be reduced in areas of high wildlife values, to the view that sufficient recognition has been given to wildlife values in MP No. 8.

A wildlife inventory of TFL 19 was completed to Ministry of Environment Lands and Parks' standards in 1993. The licensee's proposed strategy for managing wildlife habitat is to maintain the critical habitat areas while recognizing that suitable replacement habitat will shift geographically and become available over time in new locations in accordance with tree growth and stand management practices. A wildlife management regime, including the application of forest cover constraints, was developed in cooperation with the Ministry of Environment, Lands and Parks. These methods were acceptable to Ministry of Environment, Lands and Parks staff, subject to a sensitivity analysis using BCFS standard land base reductions. The FS procedures option used the standard BCFS reductions of 100 percent for Ew1 and 50 percent for Ew2; however, the specific effects of these deductions could not be determined in isolation from the other changes in assumptions incorporated in that projection.

In the wildlife inventory, 2728 hectares of otherwise operable area were identified as critically important to wildlife for food, shelter and reproduction (Ew1), and 2615 hectares were identified as having significant value for wildlife (Ew2), including deer winter ranges in low snowfall areas below 300 metres in elevation, and areas under deferral to protect nesting sites. In the base case, forest cover requirements were applied that permit no more than 10 percent of stands in the Ew1 area to be less than 15 years old at any time and that ensure that more than 75 percent of stands are older than 140 years at all times. This results in an implied rotation of 560 years. For Ew2 areas, a forest cover requirement was applied allowing no more than 25 percent of stands to be less than 15 years old at any time.

I note that Pacific has brought forward some interesting ideas for managing wildlife through the use of forest cover requirements rather than land base reductions. However, many questions are left unanswered as to how this can be spatially applied to the landscape and I am therefore unable to determine whether this proposal has sufficient merit. Until the strategy is clarified with a wildlife management plan that is clearly workable and is map-based, harvesting should be avoided in Ew1 and Ew2 areas as assumed in the FS procedures option. In my approval letter for MP No 8, I instruct the licensee to provide a map-based wildlife strategy for approval by the District Manager in consultation with the Ministry of Environment, Lands and Parks.

For the purposes of this determination, I conclude that the timber harvesting land base has been overestimated by 4036 hectares due to the inclusion of areas sensitive to wildlife values, and I have taken this into account in my determination as discussed below in "Reasons for decision."

*- riparian areas*

TFL 19 supports highly valued salt and freshwater fisheries resources, in particular the Chinook salmon fishery within the Nootka Sound and the steelhead fisheries on the Gold, Heber and Burman Rivers. A number of the public comments received highlighted the importance of fisheries in the area. The protection of fisheries values is an important management objective for riparian areas in this TFL.

An inventory of riparian areas was conducted and completed in 1994 using the standards of the Coastal Fisheries/Forestry Guidelines. 2877 hectares of otherwise operable area were identified as streamside management zones (SMZ) adjacent to class A, major class B and C streams, and class A lakes and estuaries (Ef1); this is about 3 percent of the base case initial timber harvesting land base. In addition, 111 hectares of operable area were identified as off-channel fish habitat, such as side channels, flood channels and ponds (Ef2).

To account for the protection of Ef1 areas, the analysis assumed application of the Coastal Fisheries/Forestry Guidelines, which specified that a 100 percent land base reduction be applied to a 20-metre SMZ on each side of Class A and major Class B and C streams greater than 10 metres wide, 20 metres on either side if less than 10 metres wide, and a 30-metre SMZ around major lake shores and estuaries. A 50 percent land base reduction was assumed for Ef2 categories.

BCFS district staff have concerns about the adequacy of the riparian zones assumed in the analysis, since the Forest Practices Code operational planning regulations now require more stringent riparian reserve zones and partial retention of timber in riparian management zones. Class A and B streams in TFL 19 are comparable to, or even more significant than, those in the Strathcona TSA.

I share the concerns of district staff regarding the representation of riparian habitat in the analysis. Preliminary studies for the Strathcona TSA indicate that the constraints on timber supply from riparian management under the Code are expected to be greater than under the Coastal Fisheries/Forestry Guidelines. After an on-site review of many of the riparian areas in TFL 19, I conclude that, like Strathcona TSA, the riparian impacts on TFL 19 will definitely exceed those modelled. In the absence of a more definitive analysis for riparian habitat, I have taken the findings of the Strathcona TSA and applied them here. From this I have concluded that the timber harvesting land base has been overestimated by 5 to 7 percent, and I have taken this into account in my determination as discussed below, under "Reasons for decision."

*- biodiversity*

Biodiversity guidelines, developed under the Forest Practices Code, had not been released in time for incorporation into this timber supply analysis. Pacific states that a coordinated strategy for the management of biodiversity within social and economic constraints will be developed, as required by the Forest Practices Code, during the period of MP No. 8, and that this will include provisions for wildlife trees and stand-level biodiversity.

Pacific states that landscape-level biodiversity is partly addressed through the land base deductions made in the timber supply analysis for areas identified as being inoperable, environmentally sensitive, or of low productivity. Pacific also states that, in addition to this, large land areas protected from timber harvest immediately adjacent to the boundaries of TFL 19 (including Strathcona Provincial Park, Woss Lake, Bligh Island, Megin/Moyeha, Bedwell Rivers and White Ridge Protected Areas) will contribute significantly to biodiversity.

BCFS district staff raised a number of concerns regarding the assumptions for biodiversity. Pacific expects that 25 percent of the inoperable lands will be operable in the next 30 years, and has stated the expectation that all of the inoperable area will

eventually become operable. Staff are also concerned that the land areas immediately adjacent to TFL 19 that have been protected from harvest are mostly high-elevation areas. Many of the areas now protected from harvest within TFL 19 are low-elevation areas that have been already been harvested, and are unlikely to contribute to old-growth biodiversity for some time. Furthermore, no commitments or long-term management objectives have been made for forest ecosystem networks (FENSs), although allowances for proposed FENS were incorporated in the 20-year plan.

I expect that the biodiversity plan will provide appropriate information for consideration in the next AAC determined for this TFL. I also recognize that the management of biodiversity is likely to continue to be refined through plans, and hence management objectives are still uncertain. On this TFL, I am concerned that the expectation that 25 percent of the inoperable area will become operable during the next 30 years creates a pressure to harvest parts of the forest that are presently assumed to contribute to biodiversity now and in the future. Since the timber supply analysis incorporates no allowance for biodiversity, I believe it is reasonable to expect that biodiversity management will reduce the projected timber supply to some degree. In the absence of specific management objectives at both the stand and landscape level, I consider that this introduces some uncertainty, which I have taken into account, as discussed in "Reasons for decision." In addition, I have included in my approval letter of MP No. 8 a requirement for the licensee to prepare a stand- and landscape-level strategy for biodiversity for MP No. 9.

*- visual quality objectives*

The *Forest Practices Code of British Columbia Act* specifies that one of the forest resources to be managed in British Columbia is the recreation resource, which includes a "scenic or wilderness feature or setting that has recreational significance or value." In order to manage such scenic features, visual landscape foresters in B.C., in collaboration with specialists in other parts of the world, have developed procedures for identifying and managing visually sensitive areas. These procedures incorporate both biophysical and social factors—including visual sensitivity ratings based on topography, slope and other biophysical factors, and social factors such as numbers of viewers and their perceptions—and provide recommended visual quality objectives (VQOs) for these visually sensitive areas. These objectives limit the amount of visible disturbance that is acceptable in these 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 expressed in terms of forest cover requirements which relate to "visually effective green-up" (i.e., the stage at which regeneration is perceived by the public as newly established forest) and to the maximum allowable percentage of a landscape unit that can be in a non-greened-up state at any one time.

In TFL 19, landscape mapping of viewsapes using Ministry of Forests' standards was done in 1992 and 1994. This includes areas which can be viewed along the road corridors from Gold River to Tahsis, from Pinder Pass to Zeballos, and from Zeballos to Rowland Creek; the marine corridor from Gold River to Tahsis; and in other areas including Matchlee Inlet, Espinosa Inlet, the lower Gold River and Muchalat Lake.

In the timber supply analysis it was determined that 24 282 hectares of the mapped visually sensitive areas fall within the timber harvesting land base. According to BCFS district staff, the Forest Service road from Gold River to Tahsis will be screened in two to three years, obscuring much of the corridor from view. District staff consider that if these screens remain in place, there is a potential for less restrictive VQO prescriptions to be applied. I agree with this position.

In the base case, forest cover requirements were applied to 2163 hectares of visually sensitive areas in the retention and partial retention categories around town sites. Visually effective green-up was assumed to be achieved when the average tree height reached three metres. The proportion of each visually sensitive area that was allowed to be less than three metres in height at any time was 16.5 percent. Travel corridors including waterways and roads were considered to be scenic areas where the use of forest landscape design principles and alternate silviculture systems would be applied.

In the FS procedures option, forest cover requirements were applied to the 24 282 hectares of visually sensitive areas. Visually effective green-up was assumed to be achieved when the average tree height reached five metres. The proportion of each visually sensitive area which was allowed to be less than five metres in height at any time depended upon the visual sensitivity of the area, and varied from 2.5 to 27.5 percent.

District staff consider the FS procedures option to be too constraining, in part due to the potential for less restrictive prescriptions along the corridor from Gold River to Tahsis.

The licensee conducted a sensitivity analysis which I find particularly relevant to this determination. This analysis tested the sensitivity of the base case to applying BCFS VQO standards to the entire 24 282 hectares classified as visually sensitive. The projection showed that even with these restrictive prescriptions, the current harvest level could be maintained in the first decade, after which there would be a decline in timber supply to 900 000 cubic metres per year in the second decade, and another decline in the third decade to a long-term harvest flow of 744 000 cubic metres per year. In addition, a sensitivity analysis was performed to examine the impacts of changing green-up ages by five years. There was little change to the base case.

Pacific maintains that the landscape requirements modelled in the base case reflect the VQOs expressed by the public. BCFS district staff submit there is insufficient evidence to confirm this and that the licensee's assumptions in the base case do not adequately recognize the scenic values in this area. Ultimately, the Nootka Resource Board should provide some guidance in incorporating community interests in establishing VQO



requirements, but it is inappropriate for me to speculate in my determination on the actual outcome of this process.

The Minister of Forests, in conveying the social and economic objectives of the Crown, has suggested that the Chief Forester take into account locally expressed objectives where these are consistent with provincial objectives, and has asked that the management constraints applied to meet VQOs be examined when setting AACs in order to ensure that they do not unreasonably restrict timber supplies when considered in conjunction with requirements to manage riparian habitat, and biodiversity under the Code (see below, under Minister's letter and memorandum).

I have reviewed many of the VQO areas in the field. Determining the appropriate prescriptions and practices for managing visual sensitivity is a difficult exercise in this TFL. The varied terrain, diverse recreation opportunities and often divergent views in society all contribute to the complexity. I believe this should be carefully reviewed in future determinations.

For the purposes of this determination, it is my conclusion that, while the VQOs assumed in the base case are less constraining than current operational practices, accepting them for the period of this determination will not compromise long-term sustainability. I base this conclusion in part on the sensitivity analysis, which I view as providing an extreme lower bound to the uncertainty in management for scenic values. In my approval letter, I have requested that the district manager develop a management strategy for scenic values through consultation with the licensee, the Nootka Resource Board, and the public prior to the next AAC determination.

*- water licences*

The watersheds in TFL 19 drain a large catchment area on the west coast of Vancouver Island. Three areas in the TFL—McKelvie Creek, Zeballos Creek, and Zeballos River—are designated as community watersheds.

A preliminary watershed assessment for the Zeballos River, using the Coastal Watershed Assessment Procedures (CWAP), has been carried out but not yet released. This shows an equivalent clearcut area (ECA) of well below 25 percent. A CWAP has not been initiated for McKelvie Creek, but Pacific is committed to ensuring that the proposed development and harvesting do not infringe on the access to a quality water supply by the Village of Tahsis. Pacific will prepare an integrated watershed management plan for the McKelvie Creek watershed during the period of MP No. 8.

To account for watershed protection of McKelvie Creek, forest cover requirements were applied in the base case to 696 hectares. These permit no more than 25 percent of the area to be less than 15 years old at any time. This was accepted by BCFS district staff. No forest cover requirements were applied to the watershed areas associated with Zeballos River.

The CWAP should be completed for the three designated watersheds for incorporation in MP 9. This, in conjunction with implementation of the Forest Practices Code, may result in the need for higher forest cover requirements, which I expect Pacific to meet. Where appropriate, these will be taken into account in the next AAC determination when their associated timber supply impacts have been assessed.

For this determination, the absence of forest cover requirements in the timber supply analysis introduces a risk that there may be a very small overestimation in the timber supply, and I have accounted for this in "Reasons for decision."

**(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 1993 to 2012, is based on terms of reference approved by the Regional Manager in 1993. These terms followed an early version of the Vancouver Forest Region Coast Harvest Planning Guidelines. The plan met the terms of reference and was approved by the District Manager, with some qualifications in July 1995.

The main purpose of a 20-year plan is to show that the proposed harvest level is spatially achievable over the 20-year period. I acknowledge that the plan was written and approved before the Code was implemented. However, there appears to be considerable flexibility in harvest scheduling due to the large supply of old growth and the well-dispersed operations. Therefore, I am satisfied that the licensee's proposed harvest level is spatially feasible for the short term.

#### Vancouver Island Land-Use Plan

The provincial government's Vancouver Island Land-Use Plan implementation report was released in January 1995 and revised in April 1995. The plan designated 8000 hectares of TFL 19, or 4 percent of the total land base, as Low Intensity Areas. These areas include Zeballos Lake (4920 hectares), Pinder Pass (96 hectares) and Twaddle Lake (2984 hectares). The delineation of High Intensity Areas is ongoing at this time, but this phase of the plan has not yet been finalized. It is a feature of the plan that the types of zones referenced above will have objectives and strategies associated with them that will in some cases restrict timber supplies and in other cases augment timber supplies relative to previous management assumptions about the areas—such as were applied in the timber supply analysis for TFL 19.

In addition, approximately 960 hectares of Goal 2 areas were designated through Order-in-Council on April 30, 1996, as Class A Provincial Parks. These areas are the Muchalaht-Gold area (653 hectares), and Weymer Creek Karst (307 hectares). Only

about one-half of the total areas designated are estimated to be included in the timber harvesting land base in the analysis.

Since the areas now declared as parks were included in the analysis, I have accounted for this by removing the timber supply contribution from these areas in this decision. Considering the estimate that only one-half of the parks contributed to the timber supply analysis, their full removal reduces the timber harvesting land base by about 0.4 percent, which is not a significant amount in the context of this decision.

It is not possible to predict with certainty the overall implications for the AAC that will result from implementing the zonal portion of the plan. The objectives and strategies for the various zones (excluding the newly designated parks) must be finalized before their implications can be quantified with any measure of precision.

I have accounted for the removal of the parks and for the zonal features of the land use below under "Reasons for Decision."

#### First Nations Land Claims

The land claim of the Nuu-Chah-Nulth Tribal Council covers the entire TFL and is currently being negotiated with the Province of B.C. and Canada. The Mowachaht/Muchalaht, Ehattesaht and Nuchatlaht Bands have existing forestry-based economic activity and expansion plans that are linked to the achievement of a permanent land claims settlement. As noted in "Guiding Principles," First Nations land claims, when settled, will be reflected in future AAC determinations.

#### Partitioned component of the harvest

The AAC for TFL 19 currently includes no partitions. The licensee has proposed harvesting in a portion of the inoperable land base. While some uncertainty surrounds harvesting above current operability lines, the information presented to me by Pacific's field staff, my experience in assessing operability for other units, together with my aerial reconnaissance of this TFL, provides me with some assurance that TFL 19 is well positioned to take advantage of this opportunity. The proposal to harvest with long-line yarders and non-conventional harvest systems such as helicopters and balloons suggests an opportunity for a partition to ensure that a suitable proportion of the total harvest does indeed occur in these areas. I considered establishing a partition for TFL 19; however, based on the above I am prepared to accept the licensee's proposal for the period of this MP. As noted above, under *economic and physical operability*, in my letter approving the management plan I am requiring the licensee to provide information detailing performance in these areas. If performance falls short of planned expectations, the appropriate adjustments will be incorporated in the next AAC determination.

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

Alternative harvest flows

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short term, the presence of older stands permits harvest levels to be above the long-term harvest level without jeopardizing the future timber supply. The base case projected a harvest level starting at the current AAC of 978 000 cubic metres for 20 years, after which it declined to 900 000 cubic metres in the third decade, and then further declined to the long-term harvest level of 833 000 cubic metres in the fourth decade.

The FS procedures option projected an initial harvest level of 700 000 cubic metres with a gradual decline to 516 000 cubic metres by the third decade, then a gradual increase in the sixth decade to a long-term harvest level of 662 000 cubic metres in the twelfth decade. As in the base case, the FS procedures option projects the highest attainable long-term harvest level. As noted above in "Timber supply analysis," "The role of the base case," and other sections, due to the unnecessarily restrictive assumptions incorporated in the FS procedures option, I have placed relatively little weight on this harvest forecast.

Apart from the base case and the FS procedures option—as discussed earlier, under "The role of the base case"—several alternative harvest flows were provided. However, many of these projections incorporated simultaneous changes in other assumptions and thus did not provide specific guidance in my assessment of alternate harvest flows. I expect future analyses to be performed in a more conventional application of changes in assumptions.

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

Community dependence on forest industry

The Nootka Sound communities of Gold River, Tahsis, and Zeballos and the First Nations communities of Ehattesaht at Ehatis, the Mowachaht/Muchalaht at Gold River and the Nuchatlaht at Oclugje are all dependent on forest-based resources.

According to Pacific, the area currently supports a permanent population of approximately 5000 people, of whom approximately 900 are from the First Nations communities. Approximately 74 percent of the Nootka Sound area pre-tax employment income was forestry-derived. Total area income was \$94.3 million, which includes \$18.9 million in non-basic employment income that can be partially attributed to re-spending of employment income earned in forestry. It is estimated that there are currently between 1000 and 1100 individuals resident in the area that are employed in the forest industry.

I am aware of the dependence of communities around TFL 19 on forest-based income, and of the potential implications of a change in harvest level. I have considered this under "Reasons for decision," below.

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

Timber processing facilities and mill fibre requirements

Avenor Inc., which owns 51 percent of Pacific, operates a bleached kraft pulp mill in Gold River currently producing 260 000 tonnes of pulp per year. Pacific operates a sawmill at Tahsis. For these two facilities, TFL 19 is a significant source of timber.

The Gold River pulp mill has an annual fibre requirement of 1.4 million cubic metres, of which about 200 000 cubic metres are supplied in the form of chips by the Tahsis saw mill, 370 000 cubic metres are supplied as pulp logs by Pacific's Nootka Sound harvesting operations (of which about two-thirds of the volume comes from TFL 19), and the balance comes primarily from Pacific's saw mills in Nanaimo and Ladysmith, and log purchases. About 80 percent of the pulp mill employees live in Gold River; the remainder are from the Comox/Campbell River area. Annual payroll at the pulpmill is \$31.8 million. Other annual expenditures are \$2.5 million around Gold River and \$3 million around Campbell River. Property taxes to Gold River are \$4.4 million.

The Tahsis Lumber mill has an annual fibre requirement of 575 000 cubic metres and is almost completely dependent on the company's Nootka Sound operations. Production at the mill in 1993 was 138 million board feet, and was primarily destined for the Japanese housing market. Annual wages were \$21.7 million. Annual supplies purchased from the North Island area were \$11 million. Property taxes to Tahsis were \$1.9 million.

A thermo-mechanical newsprint mill adjacent to the Gold River pulp mill opened in 1989 but was shut down in 1993 due to depressed newsprint markets. Fibre supply shortages contributed to the inability to re-start this facility.

- (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 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), and I understand these to apply to TFL 19. 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.

As noted above, under *commercial thinning*, the age structure of this unit offers some opportunity for commercial thinning, and although there has been a commitment to conduct feasibility studies, no commercial thinning is planned. With regard to operability, the licensee has proposed movement of some operations into previously inoperable areas, which I have accepted as discussed under *economic and physical operability* and below under "Reasons for decision."

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 district will be preparing a scenic value management strategy in consultation with the licensee, the public, and the Nootka Resource Board to establish VQOs for this TFL.

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. In the present case, the local objectives appear generally to parallel the provincial objectives expressed by the Minister. I have considered the input received and I am mindful of the

views which were brought forward. Where possible I have attempted in this rationale to respond briefly to many of those views.

Some public submissions discussed concerns that are not relevant to the determination of the AAC: in particular, the need for the licensee to educate their employees and the public regarding recent changes to forest practices. However valid these suggestions may be, they do not fall into the considerations that I am required to take into account in AAC determinations under section 7 of the *Forest Act*.

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

#### Unsalvaged losses

Sources of unsalvaged losses include fire, insects, disease and windthrow. In TFL 19, losses due to fire, insects and disease are typically very low. The greatest annual gross area expected to be affected is 40 hectares of windthrow resulting from winter storms, of which the company expects to salvage 34 hectares. For this reason, no non-recoverable losses are applied in the analysis. BCFS district staff agree that losses are very low.

Throughout the province there is considerable uncertainty surrounding the estimates of unsalvaged losses. As I have no better information to rely upon and because BCFS district staff concur with the estimate, I accept Pacific's approach for this determination. However, I expect the licensee to monitor actual losses over the next few years so that I may assess this estimate more confidently at the next AAC determination.

### **Reasons for decision**

In reaching my decision on an AAC for TFL 19, I have considered all of the factors presented above and have reasoned as follows.

Pacific's base case indicates the current AAC of 978 000 cubic metres could be maintained for two decades before reaching the long-term harvest level of 833 000 cubic metres by the fourth decade.

However, in reviewing the information for this determination, I have identified a number of factors that exert a downward influence on the base case harvest forecast, due to changes in practice, and new or updated information provided since the completion of the licensee analysis.

Factors identified as downward influences on the timber supply relative to the base case forecast include:

- *deciduous stands*: 713 hectares of deciduous forest stands were included in the timber harvesting land base. These areas should not be considered as contributing to timber supply at this time, given that there are no firm plans to develop them.

- *roads, trails and landings*: estimates of existing and future productivity losses due to roads, trails and landings are underestimated in the analysis by up to 2 percent. This represents a downward influence on mid- and long-term timber supplies.
- *site productivity estimates*: unapproved site index adjustments were applied to redcedar stands in the analysis. This results in an overestimation on yields on 18 748 hectares, which represents about 20 percent of the timber harvesting land base. This represents up to a 10 percent overestimation in the long-term timber supply.
- *environmentally sensitive areas*:
  - between 980 and 2500 hectares of areas with sensitive soils that are moderately unstable and/or sensitive to disturbance (Es2) should not have been included in the timber harvesting land base until terrain stability mapping has been completed and incorporated into the management plan. The most current studies indicate that the actual area is likely to be closer to the lower than to the upper bound of this range;
  - forest cover constraints were applied to critical or significant wildlife habitat (Ew1 and Ew2) in place of land base reductions. In the absence of workable area-specific strategies in the management plan, I consider the timber harvesting land base to be overestimated by up to 4036 hectares;
  - forest cover constraints were applied to areas with high values for recreation, education, aesthetics, and ecological and cultural heritage (Er1 and Er2n), and no constraints were applied to Er2c areas, in place of land base reductions. In the absence of a recreation strategy in the management plan, I consider the timber harvesting land base to be overestimated by up to 3342 hectares;
  - additional land base reductions—beyond what was accounted for in the analysis—are required to account for new Forest Practices Code requirements for managing riparian habitats. This represents an additional 5 to 7 percent downward influence on the land base over the next several decades;
- *biodiversity*: represents an unquantified downward pressure on timber supply to account for stand- and landscape-level biodiversity.
- *Class A Parks*: Since the completion of the timber supply analysis, two areas previously referred to as "Goal 2" areas have subsequently been declared as Class A Parks. The new parks are 960 hectares in size, and it is estimated that about one-half of this area was included in the timber harvesting land base. I am removing the total area of parks from consideration in this determination and this results in an approximately 480-hectare reduction to the timber harvesting land base.
- *Vancouver Island Land-Use Plan*: Since the completion of the analysis, the Vancouver Island Land-Use plan has been accepted by government, and work is ongoing in the definition of high- and low-intensity areas, for which objectives and strategies are currently being developed. It is expected that some features of the plan's ultimate



implementation will work to restrict timber supply in some areas and potentially increase timber supply in other areas, relative to what was assumed in the base case.

- *Watershed assessment plans:* In the analysis no cover constraints were applied to designated community watersheds. This matter has not been specifically analyzed, but this could affect the timing of timber supply from this portion of the TFL. Without a specific analysis, it is not possible to predict what the outcome will be relative to overall timber supply for the TFL. However, the Zeballos River watershed is noted to have an equivalent clearcut area of well below 25 percent, and given the abundance of mature inventory in this TFL, I am satisfied that harvesting can be accommodated over the term of this plan, at the end of which I expect a specific prescription for the watersheds to be completed and available for consideration in the next determination.

It is acknowledged that there may be some uncertainty in the factors identified above, but taking this uncertainty into account, when considered in isolation, none of these factors indicates a need to consider reducing the initial harvest level projected in the licensee's base case. Nevertheless, in order to reduce the uncertainty for future determinations I have specified a number of conditions in my approval of MP No. 8.

Other downward influences such as deciduous stands; roads, trails and landings; and site productivity estimates do not affect short-term timber supply. However, in addition to the above factors, there is an unquantified downward pressure on timber supply resulting from the past five years of harvesting which have not been accounted for in the inventory used in the timber supply analysis, leading me to conclude that the timber supply in TFL 19 is somewhat less stable in the short term than indicated in the base case.

Clearly, it is not possible to predict the timber supply implications for the zonal features of the Vancouver Island Land-Use Plan relative to the timber supply analysis for TFL 19 at this time. Information and experience generated during the implementation of the plan will provide the necessary guidance for refining the implications in future AAC determinations. Given the uncertainty associated with management objectives and timber supply implications of the zones in this determination, I am not attributing any weight to this part of the land use plan. I am confident that not attributing any weight to the zonal features of the land use plan does not introduce an unacceptable level of risk into the decision. The uncertainty can be accommodated within the flexibility afforded by alternative harvest flow considerations for this unit. Furthermore, I am mindful of community dependence on the forest sector in this Region and specifically on the timber supply derived from TFL 19.

In addition to the factors identified above as downward influences, there are a number of outstanding concerns that will require further examination prior to the next determination. The most notable is the inclusion in the timber harvesting land base of 11 594 hectares of previously inoperable good and medium sites. I reviewed operability as part of my field examination of the TFL, and although I am not entirely convinced that all of the 11 594 hectares will be operable within 30 years, I believe that some of the areas previously classified as inoperable are operable

at present and it is likely that more will become operable in the future. Nonetheless, I am instructing further mapping and monitoring of performance in these areas.

Future inclusion of sites which were previously considered to be inoperable will require proven performance by showing balanced operations over time across the distribution of terrain types, logging systems and operating conditions. This matter is given further attention under "Implementation" below. For this determination, I feel the inclusion of these areas in the analysis is reasonable, based on my review of recent performance which proves some of the areas have in fact been developed, and on my field review to assess the likelihood of future development of these areas. Clearly, many of the proposed areas will be difficult to develop, but I have concluded that they can reasonably be considered as contributing to the timber supply at this time.

The concept of management of wildlife habitat, through the use of forest cover constraints rather than land base reductions, has the tentative approval of BC Environment, but still requires a more clearly articulated strategy. In addition, assumptions in the timber supply analysis for recreation, visual quality and biodiversity are uncertain pending the outcome of the initiatives of the Nootka Resource Board, the Gold River Community Tourism Committee, and the implementation of specific Forest Practices Code requirements, as well as finalization of the VILUP zone objectives and strategies. The outcome of these initiatives—which may or may not change the current objectives and management regime—will need to be addressed in the next determination. As discussed above, under "Guiding principles for AAC determinations," until such decisions are made and implemented, it is inappropriate for me to speculate on their impacts on timber supply.

Other ongoing processes such as the province-wide inventory audit and paired-plot study should provide more certainty about the forest inventory and the estimates of site productivity. Further studies for terrain stability will provide much needed refinement of the information about sensitive soils.

In addition to reviewing factors in the analysis, based on my field review I note that the area has a history of geographically well-dispersed operations across a variety of site conditions. On the harvested areas, I observed acceptable regeneration site occupancy with no obvious extensive problems in reaching a free-growing state, and a large proportion of highly productive areas with excellent growth rates.

The Minister of Forests has expressed that the social and economic objectives of the Crown are best served by maintaining AACs where possible and without impairing the long-term productivity of the unit. From my review of all the factors in this determination—including studying various sensitivity analyses to gain a perspective on the implications of the downward pressures noted above—and from my field examination of the TFL, I am satisfied that the current AAC can be maintained at this time without introducing risk of unacceptable rates of decline in the future and without impairing the long-term productivity of the unit. Nonetheless, it is clear that the harvest level for TFL 19 cannot be maintained for as long as projected in the base case, given current management practices and data assumptions in the timber supply analysis.

## Determination

It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that ensures longer-term IRM objectives can be met, that reflects current management practices, and that minimizes the risk of disruptive shortfalls in future wood supply, can best be achieved in this TFL at this time by maintaining the current AAC. The new AAC for TFL 19—including Schedule A and B land, and the Small Business Forest Enterprise Program—will be 978 000 cubic metres.

## Implementation

This determination comes into effect on August 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 term of this current Management Plan, the following must be provided or undertaken by the licensee:

1. Operability mapping must be reviewed and updated to reflect current practices and identify any areas proposed for future inclusion. Also, a yearly reporting system that tracks and reports on performance across the range of terrain type, operability classes, and logging systems, particularly in aerial and long-line classes, must be implemented.
2. Commercial thinning opportunities in the TFL should be examined.
3. A detailed strategy is required for wildlife habitat.
4. A plan which incorporates a strategy for stand- and landscape-level biodiversity, is required.
5. Other requirements have been noted in my Management Plan approval letter.



Larry Pedersen  
Chief Forester

July 26, 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.

### **Documents attached:**

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

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