

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

**Tree Farm Licence
TFL 18**

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

effective October 1, 1995

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Table of Contents

AAC Rationale for TFL 18

Objective of this document.....	1
Description of the tree farm licence	1
History of AAC.....	1
New AAC determination	2
Information sources used in the AAC determination	2
Role and limitations of the technical information used.....	2
Statutory framework	3
Guiding principles for AAC determinations.....	3
Consideration of factors as required by section 7 of the <i>Forest Act</i>	6
The role of the "base case"	6
Composition of the forest	8
Land base contributing to timber harvesting.....	8
Existing forest inventory	9
Expected rate of growth	10
Site productivity estimates	10
Minimum harvestable ages	11
Volume estimates for regenerated stands.....	11
Expected time for forest to re-establish	12
Regeneration delay.....	12
Not-satisfactorily restocked area.....	12
Silvicultural treatments	12
Utilization standards and decay, waste and breakage.....	13
Integrated resource management objectives	13
Biodiversity.....	14
Wildlife habitats.....	14
Riparian habitats	15
Lakeshore areas.....	15
Community watershed.....	15
Visual quality	16
Recreation	16
Other information relating to capability to produce timber.....	17
Twenty-year plan	17
Residual balsam stands	17
Harvest flow alternatives	18
Timber processing facilities	18
Economic and social objectives	19
Abnormal infestations and major salvage programs.....	20
Reasons for decision.....	20
Determination	22
Implementation of decision	22
Appendix 1: Section 7 of the <i>Forest Act</i>	
Appendix 2: Section 4 of the <i>Ministry of Forests Act</i>	
Appendix 3: Minister of Forests' letter of July 28, 1994, to Chief Forester, re: social and economic objectives of the Crown	
Appendix 4: Minister of Forests' letter of February 26, 1996, to Chief Forester, re: social and economic objectives of the Crown - visual resources	

Objective of this document

This document is intended to provide an accounting of the factors considered and the rationale employed in making my determination, under section 7 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 18. The document will also identify where new or better information is required for incorporation into future AAC determinations.

Description of the tree farm licence

TFL 18, held by Slocan Forest Products Ltd., is situated in the Clearwater Forest District, about 4 km west of the town of Clearwater, south of Wells Gray Provincial Park, north of the Kamloops Forest District, and east of the Cariboo Forest Region. The total area of TFL 18 is about 74 600 hectares (ha), with a productive forest area of about 69 000 ha, about 92 percent of the total TFL area. The TFL area is primarily high elevation plateau (above 1200 metres in altitude). The forest cover is dominated by spruce, lodgepole pine and balsam (also known as subalpine fir).

The TFL mainly consists of two biogeoclimatic zones: the Sub-boreal Spruce (SBS) zone and the Engelmann Spruce - Subalpine Fir (ESSF) zone. The Interior Cedar - Hemlock (ICH) zone covers a small portion of the TFL.

The volume of logs harvested annually from the TFL represents about one-third of the wood processed in the Slocan Forest Products Ltd. mill in Vavenby, located just east of Clearwater. The sawmill produces random-length, export grade lumber, and the facility also produces wood chips that are shipped to pulp mills. The Vavenby sawmill, which procures its wood primarily from the TFL and surrounding Kamloops Timber Supply Area, creates approximately 160 full-time processing jobs in the Clearwater and Vavenby areas.

History of AAC

TFL 18 was originally issued to Clearwater Timber Products Ltd. in 1954, and then assigned to Slocan Forest Products Ltd. in 1987. A replaceable TFL agreement was offered to Slocan Forest Products Ltd. in 1995.

The AAC was set at 70 792 cubic metres in 1955 and incrementally increased to 210 000 cubic metres by 1983. This increase was due primarily to the use of lodgepole pine, closer utilization practices, and improved inventory information. In 1993, the AAC was reduced to its current level of 187 000 cubic metres to more accurately reflect the productivity of the land base. The current AAC apportionment is 176 500 cubic metres

Page 1

AAC Rationale for TFL 18

to the TFL licensee and 10 500 cubic metres to the Small Business Forest Enterprise Program (SBFEP). There is no partitioning of the AAC for the TFL.

New AAC determination

Effective October 1, 1995, the new AAC for TFL 18 will be 187 000 cubic metres, which is unchanged from the current AAC. The new AAC is the same as proposed by the licensee in their draft Management Plan (MP) No. 8. This new 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 18 includes the following:

- Statement of Management Objectives, Options and Procedures by the licensee dated July 20, 1992;
- Draft MP No. 8 submitted by licensee on November 4, 1994;
- Timber supply analysis submitted by the licensee on November 4, 1994, with addendum on June 2, 1995, and further revisions in August, 1995;
- 20-year plan for TFL 18 submitted by the licensee on November 4, 1994;
- Kamloops Timber Supply Area Socio-Economic Analysis, May 1995, prepared for Economics and Trade Branch, BC Forest Service by G.E. Bridges and Assoc.;
- Kamloops Land and Resource Management Plan (LRMP), February 1995, by Kamloops LRMP Team;
- News release, May 18, 1995, from Office of the Premier, stating approval-in-principle of the Kamloops LRMP;
- Letters of December 8, 1994, and April 24, 1995, from the Regional Manager, Kamloops Forest Region to the licensee regarding TFL 18 and Draft MP No. 8;
- Letter of August 23, 1995, from the Forest Ecosystem Specialist, BC Environment, to the Clearwater Forest District regarding draft MP No. 8;
- Letter of August 28, 1995, from the Regional Manager, Kamloops Forest Region, to the Chief Forester regarding draft MP No. 8;
- Information package assembled by Timber Supply Branch for AAC Determination and Management Plan Approval meeting on August 30, 1995;
- Discussion with BC Forest Service staff, including Kamloops Forest Region and Clearwater Forest District staff, at AAC Determination meeting, August 30, 1995;
- *Forest Practices Code of British Columbia Act* and regulations.

Role and limitations of the technical information used

The *Forest Act* requires me to consider biophysical as well as social and economic

Page 2

AAC Rationale for TFL 18

information in the AAC determination. 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 18. The timber supply analysis and

associated inventory are concerned primarily with biophysical factors, such as 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 to 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 correct answer or solution when making forest management decisions such as AAC determination. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information I must consider in AAC determinations.

In making the AAC determination for TFL 18, I have considered the limitations of the technical information provided. I am satisfied that this information provides a sound basis for my determination.

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) avoiding unnecessary risk, and (ii) redetermining AACs frequently to ensure they incorporate up-to-date information and knowledge. In respect of these: (i) 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) the benefits of frequent analysis and decision making have been recognized in the

Page 3

AAC Rationale for TFL 18

legislated requirement to redetermine AACs every five years. This second principle in particular is central to many of the guiding principles that follow.

In considering the various factors required by section 7 of the *Forest Act* to be taken 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 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. Preliminary studies in selected TSAs 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 the licensee's timber supply analyses for TFLs such as TFL 18, which pre-date the Code. 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

Page 4

AAC Rationale for TFL 18

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, it may not always be possible to analyze their 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 timber supply review 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 determination can be made solely on the basis of a response to uncertainty. Nonetheless, 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 BC Court of Appeal regarding aboriginal rights. The AAC I determine for a TFL should not in any way be construed as limiting

Page 5

AAC Rationale for TFL 18

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. My determination is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply. Aboriginal rights will be taken into account as far as possible under section 7(3)(a)(v) of the *Forest Act*, and it is expected that these rights 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 this determination, I am mindful of my obligation as steward of the forest land of British Columbia and 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*.

Consideration of factors as required by Section 7 of the *Forest Act*

The role of the "base case"

In considering the factors required under section 7 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me by the licensee. The licensee's timber supply analysis is based on information on the forest land base, timber growth and yield, and management practices in TFL 18. Using this information and a computer simulation model, a series of timber supply forecasts was produced. Each forecast is based on the same set of data, and reflects different decline rates, starting harvest levels, and trade-offs between short and long term harvest levels.

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

For TFL 18, the base case forecast indicates that, with a timber harvesting land base of 60 724 ha, the harvest level could be maintained at the current AAC of 187 000 cubic metres for 40 years, and then gradually decline to 156 600 cubic metres per year by 90 years from now. Increased growth rates in regenerated stands are projected to increase timber supply to 178 000 cubic metres per year beginning 160 years from now.

Page 6

AAC Rationale for TFL 18

Because it represents only one in a number of possible forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the assumptions incorporated into the computer model used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination

of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which 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 to, and now during the implementation of, the Forest Practices Code—may well have changed since the original assumptions were developed.

Thus, it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed.

Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. But once an AAC has been determined that reflects appropriate assessment of all the factors required to be considered, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined—it would be impossible for any such analysis to fully incorporate the subtleties of the judgement involved.

Page 7

AAC Rationale for TFL 18

The *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**

Composition of the forest

Land base contributing to timber harvesting

The land base contributing to timber harvesting over the long term assumed in the base case is 60 724 ha, about 88 percent of the productive forest land of the TFL and 81 percent of the total TFL land area. The base case therefore excludes about 12 percent of the productive forest land as follows:

- about 6 percent accounting for existing and future roads, trails and landings;
- about 3 percent accounting for environmentally sensitive areas; and
- nearly 3 percent accounting for sites with non-commercial or deciduous species, or low productivity.

I reviewed these exclusions with BC Forest Service (BCFS) staff and find them to be reasonable assumptions for the purposes of this determination, as they reflect current practices in the TFL.

Timber harvesting in this TFL is largely unrestricted by operability factors such as adverse terrain. Most of the land base is considered operable, and a very large portion of it is already accessible by road. Areas that are inoperable are accounted for by reductions made to the harvesting land base to account for environmentally sensitive soils and sites with low productivity.

A reduction of 2465 ha was made to the *initial* timber harvesting land base in an attempt to account for losses expected to occur as a result of future roads, trails and landings. This is normally not done because these areas are currently occupied by stands that can be harvested prior to use for trails and landings or for road construction. This represents a small upward pressure, about 2 to 3 percent, on short term timber supply that is not reflected in the base case harvest forecast.

The Kamloops LRMP encompasses all areas in both the Kamloops and Clearwater forest districts, which include the Kamloops Timber Supply Area and TFL 18.

Page 8

AAC Rationale for TFL 18

Provisions in the Kamloops LRMP regarding zones, objectives and strategies were declared as a higher level plan under the *Forest Practices Code of British Columbia Act*. Land-use recommendations from the plan that affect TFL 18 include portions of two proposed protected areas. The boundaries of the two proposed protected areas have yet to be designated in legislation or by Orders-in-Council, but it appears that about 374 ha of the proposed Taweel Lake protected area and 5 ha of the proposed Clearwater River Corridor protected area lie within TFL 18. Two additional small areas in the TFL are also being reviewed for consideration as protected areas: one is a 2 ha area by Coldscaur Lake with a natural rock bridge, and the other a 100 ha area around McKenzie Lake. Also part of the

LRMP are enhanced resource development areas whose boundaries and management practices have yet to be finalized. Until the necessary decisions are made and implemented, it is impossible to assess the overall timber supply impact of this land use decision, and I have not fully taken the LRMP into account for this determination. I am, however, mindful that, given the portions of the LRMP that are known and the uncertainty associated with the parts that are still being worked on, it does not appear to introduce any extraordinary risk to the decision to maintain the AAC at this time.

Existing forest inventory

TFL 18 is dominated by stands consisting of spruce, lodgepole pine, and balsam (subalpine fir). About 55 percent of the TFL's stands are considered mature, and 45 percent are considered immature, according to recent inventory work. A re-inventory of TFL 18 in 1992 was accepted by the BCFS Kamloops Regional Manager in March 1994. The licensee's 1974/75 inventory, in conjunction with new aerial photography and field sampling, was used for the re-inventory. An inventory audit is underway but the audit has not yet been completed. I am satisfied that the inventory is acceptable for this determination. If the audit highlights any problems with the inventory information, I may revisit this determination.

The licensee proposed the use of actual volumes estimated from the 1992 re-inventory together with a special method to assess future volumes (yield projections) from existing stands. This special method is called the approach to normality yield (volume) forecasting option and is provided by the Timber Resource Inventory Model (TRIM). BCFS Inventory Branch required a comprehensive review in order to accept the proposed volume estimates and yield projections from this method. Rather than undergo a lengthy review process, the licensee chose to revise their proposed volume estimation and yield projection method and adopt the commonly used BCFS standard Variable Density Yield Projection (VDYP) model for use in the base case, as it is accepted by Inventory Branch. The initial growing stock estimated in the base case using VDYP was 12.1 million cubic metres, while the estimate using the initially proposed method was about 5 percent lower, at 11.5 million cubic metres.

Page 9

AAC Rationale for TFL 18

Inadvertently, the stocking class factor SC 1 was assigned to derive the VDYP yield tables for residual balsam stands, and I view this to be inappropriate (see section on *Residual balsam stands*). Residual balsam stands refer to stands that contain remnant mature balsam that was left on-site following timber harvesting activities in the 1950s and '60s. Volumes from residual balsam stands would likely be 50 to 75 percent less than predicted in the base case if the appropriate stocking class factors of stocking class 2 (SC 2) or residual stand label (R) were used. Residual balsam stands were forecast in the base case to contribute about 4 percent of the short term (first decade) timber supply; therefore, the corrected volumes suggest they will contribute only about 1-2 percent to timber supply in the short term. Sensitivity analysis, as described below, showed that a change of this magnitude does not significantly affect timber supply.

Sensitivity analysis was undertaken to examine the implications of existing volumes for all stands being 10 percent less than assumed in the base case harvest forecast. The analysis showed that the relatively large volume of mature timber in the TFL still facilitates the maintenance of current harvest levels while requiring only small reductions in the harvest forecast in the medium term. Therefore, I am satisfied that even if more appropriate stocking class factors had been used for residual balsam stands, this factor alone would not affect short term timber supply.

Expected rate of growth

Site productivity estimates

Inventory data includes estimates of site productivity which is usually expressed in terms of "site index." Site index is based on stand height as a function of the age of a particular forest stand. Site index assignments for all areas except residual balsam stands were made according to BCFS standards. Special site indices were assigned to residual balsam stands due to their unique origin (see section on *Residual balsam stands*). These assignments were approved by the BCFS Research Branch in October 1993, and I accept them as reasonable for this determination.

I am aware that studies elsewhere in the province suggest that inventory information on very old stands may underestimate actual site productivity. I am aware of no such study for TFL 18 specifically, but believe these results will apply in some measure to this TFL. However, I have no information on which to base any adjustments to the timber supply analysis; moreover any impacts on timber supply would occur in the medium to long term and therefore have limited importance to this determination.

Page 10

AAC Rationale for TFL 18

Minimum harvestable ages

Minimum harvestable age is the time it takes for stands to grow to a harvestable condition. For clearcutting silvicultural systems, which are used predominantly on the TFL, the licensee defined minimum harvestable ages for existing stands based on the time needed to reach a minimum volume per hectare and minimum average diameter at breast height (dbh). The minimum requirements for pine stands were 160 cubic metres per hectare and 20 centimetres dbh, and for all other stands they were 200 cubic metres per hectare and 22 centimetres dbh. These minimum requirements are assumed to define that stands that will have sufficient volume to be economical to harvest and with trees which are large enough to process at the minimum harvestable age. After consultation with Clearwater Forest District staff, I am satisfied the approach taken by the licensee appropriately reflects current and, likely, future practices.

Volume estimates for regenerated stands

Existing stands that have been subject to site preparation and/or planting and future stands that will regenerate after harvest are considered to be managed stands. The licensee estimated managed stand volumes using the BCFS Table Interpolation Program for Stand Yields (TIPSY) and this approach was accepted by Research Branch. Volumes projected using TIPSY assume management practices such as brushing, spacing and control of stocking density through planting. Because TIPSY projections are initially based on ideal conditions of full site occupancy and absence of pests and diseases, operational adjustment factors (OAFs) are applied to account for field conditions where a loss of timber volume due to such factors as openings in stands, pests and diseases is expected.

For this TFL, the licensee used OAFs that adjust volume projections so that volumes at culmination age were no more than 25 percent greater than VDYP yields for the same species and site index. This was done to reflect the licensee's view about the conditions that occur in TFL 18 due to factors like pest damage on regenerated stands. This OAF adjustment is not a standard procedure and may result in a conservative estimate of regenerated stand volumes. If the procedure is conservative, this would underestimate medium and long term timber supply, but would not affect short term timber supply. Therefore, although I am mindful that the projection of regenerated stand volumes may be conservative, it does not have a bearing on this determination.

Page 11

AAC Rationale for TFL 18

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

Expected time for forest to re-establish

Regeneration delay

Regeneration delay is the period between harvesting and the time an area is initially restocked with a specified minimum number of acceptable well-spaced seedlings. The licensee has rapidly reforested harvested areas in order to minimize regeneration delay. Regeneration is accomplished primarily by replanting, although some prescribed natural regeneration is also achieved. The licensee's analysis assumes an average regeneration delay of three years, whereas actual regeneration delay is reported by Clearwater Forest District staff to be somewhat shorter. The assumption of longer regeneration delays in the analysis may underestimate timber supply somewhat but is not sufficiently significant to affect my determination.

Not-satisfactorily restocked area

As of December 1993, the not-satisfactorily restocked area (NSR) area on the TFL consisted of 1460 ha of current NSR (created since 1989 by harvesting or natural disturbance) and 2811 ha of backlog NSR (before 1989). The base case assumes the restocking of all backlog NSR within six years and all current NSR within three years. The licensee reduced the backlog NSR from 3453 ha in 1991 to 2811 ha in 1993. Given the licensee's performance and management plan commitments, I am satisfied that the restocking objectives can be met and that these assumptions are therefore appropriate for consideration as part of this determination.

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

Silvicultural treatments

Clearcutting is the silvicultural system practised on the majority of the TFL; this is assumed in the base case and will likely continue for most of the TFL in the foreseeable future. However, there is a trend towards expanding the use of group selection harvesting (i.e. very small clearcuts less than one hectare in size) for some areas, and the timber yield implications of this system should be assessed further prior to the next determination. Commercial thinning is discussed in the section on "Economic and social objectives." Silvicultural treatments are applied to very few free-growing stands, and none are assumed in the licensee's base case analysis. I am therefore satisfied the base case assumptions regarding silvicultural treatments are appropriate for this determination.

Page 12

AAC Rationale for TFL 18

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

Utilization standards and decay, waste and breakage

Utilization standards used in the licensee's analysis are consistent with BCFS Interior utilization standards—minimum dbh of 12.5 cm for pine, 17.5 cm dbh for other conifers, maximum stump height of 30 cm, and minimum top diameter of 10 cm. These utilization standards were used with VDYP and TIPSY to estimate existing and regenerated stand volumes. BCFS district staff confirm this level of utilization is being practised on the TFL, and I therefore consider these assumptions appropriate.

Decay, waste and breakage are accounted for in VDYP by reducing timber volume estimates from existing stands through the use of standard factors for different areas, and in TIPSY for regenerated stands through OAFs. The factors used in the licensee's analysis for existing stands were accepted by Inventory Branch, and I am satisfied these factors are appropriate for use in this

determination. The general method for estimating volumes in regenerated stands was discussed earlier (under *Volume estimates for regenerated stands*). Often, there are concerns expressed about uncertainty associated with decay, waste and breakage projections for future stands. Allowances for decay, waste and breakage are greater in the licensee's analysis than normally assumed since, as previously mentioned, the OAF adjustments are larger than generally used in TIPSY. However, for the purposes of this determination, I accept the licensee's analysis. If further refinement of this factor is possible in the future, any changes will most likely affect only the long term harvest level and not short term timber supply.

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

Integrated resource management objectives

The purpose and function of the Ministry of Forests (as provided in the *Ministry of Forests Act*) is 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 integrated resource management objectives affect the timber supply must be considered in AAC determinations.

Page 13

AAC Rationale for TFL 18

Biodiversity

Biodiversity, or biological diversity, is the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, and the evolutionary and functional processes that link them. The licensee's base case excludes 360 ha of pure deciduous stands from the timber harvesting land base to help retain biodiversity. In a letter to the Clearwater Forest District, a Forest Ecosystem Specialist from BC Environment expressed concern that these deciduous stands may not remain under deciduous cover without some harvesting, and that maintaining biodiversity will entail additional measures. The licensee has recently begun leaving approximately 10 trees (mainly deciduous) per hectare after harvesting for stand-level biodiversity and wildlife considerations in some stands. The small volume associated with these residual stems was not accounted for in the base case analysis.

I acknowledge that more provisions for biodiversity may be recognized in the future, such as the need for old-growth management areas and forest ecosystem networks distributed across the landscape. However, it is not possible for me to speculate at this point on the impacts of possible new provisions for biodiversity. The Forest Practices Code requires consideration of biodiversity during forest planning, and enables the development of biodiversity objectives. Until the objectives for biodiversity are known, the impacts on timber supply will not be clear. The next

timber supply analysis conducted for TFL 18 should examine any new requirements for biodiversity that are in place at that time so that their implications for timber supply can be fully quantified. In the meantime, I accept this factor does introduce the risk of some unquantified downward pressure on the timber supply, and I have accounted for this in my "Reasons for decision."

Wildlife habitats

Large mammals found in the TFL include deer, moose and black bear. The TFL also provides habitat for a variety of small mammals, birds, fish (e.g. rainbow and eastern brook trout) and other species. The licensee's analysis identified a six ha critical wildlife habitat area that was deleted from the timber harvesting land base. As well, special forest cover guidelines apply to a 1376-ha wildlife corridor along Mann and Canimred Creeks, and these were represented in the licensee's analysis. However, mature or old-growth forest cover requirements were not applied to about 80 percent of the timber harvesting land base. I accept that the licensee's analysis reflects current practices, but I also recognize there is some uncertainty associated with these assumptions. Given current trends in forest management, more restrictive forest cover guidelines are very likely to apply in the future, and this will present a downward pressure on timber supply. Requirements for the protection of wildlife habitat should be reassessed in the next determination. For the purposes of this determination, however, I am satisfied that the abundance of mature timber available for harvest will allow the protection of wildlife

Page 14
AAC Rationale for TFL 18

habitat while still achieving the short term harvest levels indicated in the base case. I have accounted for the risk associated with this uncertainty as representing an unquantified downward pressure on timber supply, and this is further noted below under "Reasons for decision."

Riparian habitats

With the introduction of the *Forest Practices Code of British Columbia Act*, a requirement to maintain riparian reserves and management zones that limit timber harvesting around streams, wetlands and lakes was established. The licensee's analysis was completed before the Code came into force, and therefore the base case did not make any allowance for riparian protection. Although the impact of riparian reserves and zones on timber supply is not known for TFL 18, analysis completed for similar areas of the Interior indicates it is likely to be less than 5 percent. Since this TFL has an abundant supply of available mature timber, these additional provisions for riparian habitat considered in isolation are unlikely to create excessive risk to medium and long term timber supply if base case harvest levels are maintained in the short term. This factor will need to be better quantified so that it can be assessed as part of the next AAC determination. I have accounted for this factor under "Reasons for decision."

Lakeshore areas

The base case recognizes a special 2690-ha lakeshore buffer zone where special forest cover and green-up guidelines apply in order to reduce impacts on lakeshore values such as visual quality. Additional guidelines to protect lakeshore values, as required to manage for recreation needs and fish and wildlife habitat requirements, are provided in the Kamloops Timber Supply Area Lakeshore Harvesting Guidelines. These guidelines include special recognition for high value lakes, classified as Class A, where 200-metre or larger lakeshore reserves may be recommended. Class A lakes in the TFL include Windy, Rioux, Deube and Walter lakes. The base case does not include potential Class A lakeshore reserves. I therefore recognize that this may result in a downward pressure on timber supply as reflected under "Reasons for decision." This factor will need to be better assessed as part of the next AAC determination.

Community watershed

Part of the Gill Creek Community Watershed is situated within the TFL. The watershed is no longer in active use as a community water supply; however, it retains community watershed status and special green-up and forest cover prescriptions are modelled in the base case to reflect this classification. The area of the watershed that occurs within the TFL is 933 ha. The assumption employed in the base case was that at any time no more

Page 15
AAC Rationale for TFL 18

than 20 percent of the area may be covered by stands under nine metres tall. This nine metre height requirement is assumed in the base case as hydrologically effective green-up. The draft Interior Watershed Assessment Procedures indicate a range of three to nine metres as the green-up height required for hydrological recovery. Hydrologically effective green-up could be achieved in the community watershed at lower heights such as seven metres. I recognize that the base case harvest forecast could underestimate timber supply slightly because of this factor (see "Reasons for decision").

Visual quality

The licensee undertook a visual landscape inventory, which delineates visual quality management zones in the timber harvesting land base. A five-hectare retention zone and a 6387-ha partial retention zone have been defined by the licensee. In addition, as previously mentioned, a 2690-ha lakeshore buffer zone that addresses visual quality concerns is also recognized. For each of these three zones, visually effective green-up (VEG) is considered to be six metres in height. A minimum green-up area that varies for each zone is assumed in the base case in order to reflect the long term management objectives. The licensee's analysis was viewed at a public meeting, and no comments were received at that time. A further public presentation of these zones will be made during the review of 1996 development plans.

BCFS staff have identified a few more areas that should be included in these visual quality zones, and I have required the licensee to make these revisions in their landscape inventory as

part of my approval of their management plan. These few additional areas, however, are not likely to have a significant impact on timber supply. I also understand there may be opportunities to mitigate these impacts somewhat through alternative silvicultural systems and partial cutting, but there should be demonstrated performance and quantification of this potential first so it can be assessed as part of the next determination for this TFL. In summary, while there may be a small increase in the area managed for visual quality, the area in question is sufficiently small, and alternative harvesting systems may offset any potential short term timber supply reduction. Therefore I have made no further allowances for visual quality management in my determination. This matter is further discussed under "Economic and social objectives", and is also noted in "Reasons for decision."

Recreation

The TFL provides a number of recreation opportunities, particularly in association with the many lakes in the area. Recreation activities in the TFL include angling, boating, camping, hunting and snowmobiling. The licensee undertook a recreation inventory as part of their draft management plan, and the timber harvesting land base was reduced by a

Page 16

AAC Rationale for TFL 18

small amount to protect important recreation features. Because the TFL is well accessed with roads, about 75 percent of the land base provides roaded recreation opportunities, while about 25 percent provides semi-primitive recreation opportunities in areas generally greater than one kilometre from a road and larger than 1000 ha in area. The licensee's analysis assumes that about 95 percent of the TFL will provide roaded recreation opportunities, and about 5 percent will provide semi-primitive opportunities over the next 20 years. I consider these assumptions reasonable for this determination, given the acceptance of the recreation inventory by BCFS staff, the two new protected areas that are recommended for the area—Taweel Lake and Clearwater River Corridor, and the provisions for visual quality and lakeshore buffers.

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

Other information relating to capability to produce timber

Twenty-year plan

The licensee's 20-year plan for the TFL was submitted in November 1994 and reviewed by district staff who have made suggestions to improve the plan. The 20-year plan has identified the availability of a greater quantity of timber than projected in the base case timber supply harvest forecast. However, it has not been determined if green-up provisions assumed in the base case are achieved in all areas of the plan. Notwithstanding this concern, which is not overly significant, I am generally satisfied that the plan confirms that short term harvest levels projected

in the base case are attainable. I expect that any uncertainty with green-up is likely offset by having located more than 20 years' supply of timber.

Residual balsam stands

The TFL contains a significant area where subalpine fir stands (hereafter referred to as "balsam") are known to be residual stands. These stands contain remnant mature balsam that was left on site following timber harvesting in the 1950s and '60s using intermediate utilization standards. Residual balsam stands occupy about 6410 ha, or 11 percent of the timber harvesting land base. Due to the relatively low volumes in these stands, there has been limited harvesting performance in them to date. However, draft MP No. 8 includes commitments to:

- treat and harvest residual balsam stands as part of the 20-year plan; and
- prepare a detailed plan for coordinating harvesting and rehabilitation of residual balsam stands.

Page 17

AAC Rationale for TFL 18

The licensee's 20-year plan indicates that a substantial amount of the harvest will come from residual balsam stands—about 8 percent of the 20-year harvest. The first decade of the base case identifies a harvest of 8100 cubic metres per year from these stands, which is about 4 percent of the total harvest.

Any avoidance of harvesting in residual balsam stands may lead to a concentration of harvesting on the remainder of the timber harvesting land base. However, sensitivity analysis indicates that, even if the residual balsam stands were removed from the timber harvesting land base, short term harvest levels can be maintained. This is because the large volume of mature timber that currently exists in the TFL allows the current harvest to continue in the short term harvest without causing unreasonable rates of decline to future harvest levels.

As part of this determination, I hold the licensee to their commitments to harvest and rehabilitate these stands, and as part of my acceptance of MP No. 8, I have specified certain conditions in this regard. I expect compliance with the commitments of the management plan and the conditions I have specified in my approval of the plan. If sufficient performance in residual balsam stands does not occur, the AAC may need to be revisited and partitioning considered.

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

Harvest flow alternatives

The nature of the transition from harvesting old-growth forests to harvesting second-growth forests is a major consideration in determining AACs for areas with a significant old-growth component. A number of alternative harvest forecasts were modelled for the TFL, and these confirm that the short term timber supply can be maintained without causing large disruptions in

long term harvest levels. In my determination, I am aware of the flexibility offered by the stock of existing mature timber to maintain current harvest levels without placing future timber supply or non-timber resource objectives at high risk, while at the same time meeting the need for an orderly rate of decline or transition to the long term harvest level.

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

Timber processing facilities

The licensee's analysis included those types of timber that are capable of being processed in their Vavenby sawmill or used as wood chips and sent to pulp mills. For practical

Page 18
AAC Rationale for TFL 18

purposes, all of the wood harvested from TFL 18 is processed at the Vavenby mill and represents about one-third of the total volume the mill processes. Therefore, I am aware that timber from TFL 18 provides a significant component of the supply to that mill.

(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

Economic and social objectives

The Minister has expressed the social and economic objectives of the Crown for the province (letters attached as an appendix), and I understand these to apply to TFL 18.

They are consistent with the objectives stated in the Forest Renewal Plan and include good 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 also states 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." The Minister placed particular emphasis on the importance of long term community stability and the continued availability of forest jobs. In that regard, since this determination maintains the current AAC for the TFL, there should be no employment impacts due to reduced timber supply.

The Minister asked that the Chief Forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas and to make use of all available vehicles, such as partitioned cuts, to provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

In that regard, there is very little experience with commercial thinning in the TFL, and some studies have met with difficulty due to the high winds common to the area causing windthrow losses to remaining stand volumes. Because the current AAC can be maintained without commercial thinning, and because there is very limited local information that can be used to estimate its success, the base case analysis and this determination are not predicated on commercial thinning.

The Minister also mentioned the importance of considering local public input. The licensee has advertised extensively and sought local public input for its management plan, which includes the timber supply analysis. A number of people attended the licensee's open house meeting but no written public comments were received.

Finally, most recently, the Minister has asked that constraints applied to timber supplies in order to meet visual quality objectives be re-examined when setting AACs in order to ensure that they do not unreasonably restrict timber supplies. I have concluded, therefore, that there are unquantified timber supply benefits associated with establishing and meeting visual quality objectives and I have noted this below under "Reasons for decision."

Page 19

AAC Rationale for TFL 18

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

Abnormal infestations and major salvage programs

A total allowance of 3793 cubic metres per year for all non-recoverable losses was made in the licensee's analysis. This represents about 2 percent of the current harvest level. Losses are attributed to windthrow (35 percent), disease (32 percent), insects (22 percent) and fire (11 percent). The licensee accounts for other normal losses due to pest damage as part of the operational adjustment factors applied to managed stand yield tables. The allowance for non-recoverable losses appears quite low relative to many other areas in the province. District staff report that extensive road access in the TFL has helped the licensee to recover many losses. In the absence of other information, I accept the licensee's assumption. I observe wide provincial variation on this factor and have initiated a provincial review of how this factor is quantified and used in timber supply forecasts. Improved guidance, and any further analysis undertaken in the TFL, will be useful for the next AAC determination.

Reasons for decision

In reaching my decision of an AAC for TFL 18, I have considered all of the factors presented above and have reasoned as follows.

The base case indicates there is some ability to buffer downward pressures on short term timber supply since it shows that the current AAC can be maintained for 40 years from now. Sensitivity analysis indicates a relatively high degree of stability in existing timber supply. For example, the current AAC can still be maintained even if a 10 percent reduction in existing volumes for all stands is assumed.

My considerations have identified factors that exert upward and downward influences on supply that were not accounted for in the base case due to changes in practices or information since the completion of the timber supply analysis.

The main factors identified as limiting short term timber supply relative to the base case forecast include:

- a 2–3 percent reduction in existing mature volumes due to corrections in estimated volumes for residual balsam stands;
- up to a 5 percent reduction in the timber harvesting land base due requirements under the Forest Practices Code for riparian reserves and riparian management zones; and
- an unquantified downward pressure due to any new management practices for biodiversity, wildlife habitat and lakeshore management.

Page 20

AAC Rationale for TFL 18

The main factors suggesting short term supply could be higher relative to the base case include:

- a 2–3 percent increase in existing mature volumes to account for harvestable stands that occur on areas to be used for future roads, trails and landings;
- a slight upward pressure in that the management practices assumed for the community watershed are overly restrictive; and
- unquantified potential benefits associated with establishing and meeting visual quality objectives.

On balance, I accept that the licensee's base case is an adequate analysis from which to assess timber supply for the purposes of this AAC determination. I recognize that there is uncertainty in some factors that could increase timber supply, and some factors that could decrease timber supply. The net affect of weighing the upward and downward factors influencing timber supply causes me to believe that there is a small overall downward pressure on timber supply beyond that forecast in the base case. This is primarily expected due to continued implementation of the Forest Practices Code. While timber supply may be slightly smaller than indicated in the base case, I also recognize that this TFL has a large volume of available mature timber that provides the flexibility to maintain the short term harvest without adversely affecting medium and long term timber supply.

In the medium and long term, the likely underestimation of site productivity gives rise to optimism that the long term sustainable harvest level in TFL 18 could be higher than modelled in the base case. This underestimation could ameliorate the downward factors mentioned above. Potentially, the net effect is less timber supply in the short term than indicated in the base case, moderated by improved flexibility in the medium term and a potentially higher long term level than currently projected. This will, however, become clearer through future analysis, assuming no other significant changes. In the meantime, I am fully satisfied that these uncertainties do not introduce any extraordinary risk to this decision at this time.

As discussed under *Land base contributing to timber harvesting*, I have not attempted to predict or to take into account the overall timber supply implications of the Kamloops LRMP. Although some protected areas have been announced, they appear to have a minimal impact on TFL 18.

Decisions have yet to be made about other components of the plan such as the delineation of enhanced resource development areas. Therefore, until outstanding decisions are made and implemented, I cannot determine the overall effect of the plan on timber supply.

Page 21

AAC Rationale for TFL 18

Determination

The AAC for TFL 18 will be 187 000 cubic metres. This will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Implementation of decision

This determination comes into effect on October 1, 1995 to correspond with approval of MP No. 8. Approval conditions for MP No. 8 ensure that the licensee's stated commitment to harvest and rehabilitate residual balsam stands will be monitored, and that the visual landscape inventory is revised, consistent with both the recognition of additional sensitive areas, as well as the need to confirm how the objectives are to be met in order to minimize the impacts on timber supply.

A handwritten signature in black ink, appearing to read "L. Pedersen". The signature is fluid and cursive, with a long horizontal stroke at the end.

Larry Pedersen
Chief Forester

