

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Tree Farm Licence 37

Issued to Canadian Forest Products Ltd.

Rationale for Allowable Annual Cut (AAC) Determination

effective January 1, 1999

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Chief Forester

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm License (TFL) 37. This document also identifies where new or better information is required for incorporation into future determinations.

Description of the TFL

TFL 37 is located in the north central portion of Vancouver Island about 100 kilometres north west of Campbell River. The TFL is situated east of the Strathcona Timber Supply Area, north of Doman-Western Lumber Ltd.'s TFL 19, west of MacMillan Bloedel Ltd.'s TFL 39, and south of the Bonanza Lake management unit of Timber West Forest Ltd.'s TFL 47. Local communities near or within the TFL area include Sayward, Woss, and Port McNeill. The TFL is held by Canadian Forest Products Ltd. (Canfor) and is administered by the Port McNeill Forest District which is part of the Vancouver Forest Region.

Much of the TFL encompasses Vancouver Island's Nimpkish valley which contains some of the most productive forest land in Canada. The TFL also features rugged mountainous terrain and several large lakes including Nimpkish, Woss and Vernon Lakes.

The total land base of TFL 37 is 188 745 hectares of which 153 607 hectares (81 percent) are considered productive forest. The remaining 35 138 hectares (19 percent) are composed of non-productive areas including alpine tundra, rock, lakes, swamp, non-typed areas and existing roads. The timber harvesting land base—the area estimated to be economically and biologically available for harvesting—is approximately 103 248 hectares. The forests of TFL 37 are distributed between the Coastal Western Hemlock (CWH) and Mountain Hemlock (MH) biogeoclimatic zones. The license area supports a variety of commercial tree species including western and mountain hemlock, Douglas-fir, western redcedar, yellow-cypress, balsam (true firs) as well as minor components of sitka spruce, pine, and deciduous species.

Primary access to TFL 37 is via highway 19 between Port McNeill and Woss. To transport logs, Canfor also operates a railway system from Vernon Lake to its log sort at Beaver Cove. Forestry, tourism, mining and fishing are the principal economic activities in the region.

Canfor is an integrated forest products company based in Vancouver, B.C. The company has a significant presence in the provincial forestry sector with timber rights and manufacturing facilities throughout coastal and central interior B.C.

History of the AAC

The Province first awarded TFL 37 to Canadian Forest Products Ltd. in 1960. At that time, under Management Plan (MP) No. 1, the total area of the TFL was 185 310 hectares and the company was authorized to harvest 577 667 cubic metres per year from a timber harvesting land base of 85 541 hectares.

Between 1960 and 1969 the AAC increased from 577 667 cubic metres to 1 144 007 cubic metres per year. The expansion was largely attributable to revised utilization standards, increasing timber values as well as improved logging technologies applied on the TFL.

Over the period from 1975 to 1981 the AAC decreased 4.5 percent to 1 093 000 cubic metres per year under MP No. 4. This reduction reflects the licensee's intention to manage the transition from harvesting high-volume old growth stands to lower-volume second growth. In 1983 under MP No. 5, the AAC was increased by 14 000 cubic metres to 1 107 000 cubic metres per year as a result of an intensive forestry program and the acquisition and addition of private land to the TFL area. This was followed by a number of small reductions in the AAC from 1987 to 1994.

The most recent Management Plan, MP No. 7, was approved for the period January 1, 1994 to December 31, 1998, and an AAC of 1 068 000 cubic metres was determined. This included a 5000 cubic metre contribution from the licensee's commercial thinning program as well as 43 184 cubic metres administered under the Small Business Forest Enterprise Program (SBFEP).

New AAC determination

Effective January 1, 1999, the new AAC for TFL 37 will be 1 068 000 cubic metres—the same as the current AAC. This AAC includes 43 184 cubic metres administered under the SBFEP.

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 37 includes the following:

- Statement of Management Objectives, Options and Procedures (SMOOP) for Management Plan No. 8, TFL No. 37, accepted March 14, 1997;
- TFL No. 37, Draft Management Plan No. 8, Canadian Forest Products Ltd., submitted August 18, 1998;

- Timber Supply Analysis Information Package: TFL 37, Management Plan No. 8, Canadian Forest Products Ltd. (prepared by Timberline Forest Inventory Consultants Ltd.), accepted March 11, 1998;
- Timber Supply Analysis Report: TFL 37, Management Plan No. 8, Canadian Forest Products Ltd. (prepared by Timberline Forest Inventory Consultants Ltd.), accepted October 2, 1998;
- Timber Supply Analysis Report Supplement, Canadian Forest Products Ltd. (prepared by Timberline Forest Inventory Consultants Ltd.), dated November 10, 1998;
- Twenty-Year Spatial Feasibility Analysis Report for TFL 37, accepted October 23, 1998;
- 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;
- Letter from the Deputy Ministers of Forests, and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts of biodiversity management on timber supply;
- Technical information provided through correspondence and communication among staff from the British Columbia Forest Service (BCFS) and the Ministry of Environment, Lands and Parks (MELP);
- Managed stand yield tables and site index curves, approved by BCFS Research Branch, March 13, 1998;
- Existing stand yield tables for TFL 37, approved by BCFS Resources Inventory Branch, March 31, 1998;
- Technical review and evaluation of current operating conditions through comprehensive discussions with BCFS and MELP staff, including the AAC determination meeting held in Victoria on October 29, 1998;
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Act Regulations*, April 1995;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP;

- *Forest Practices Code, Timber Supply Analysis 1996*, BCFS and MELP;
- Vancouver Island Land Use Plan (VILUP), Commission on Resources and Environment, dated February 1994;
- Completing the Vancouver Island Land Use Plan (VILUP), Vancouver Island Resource Targets Technical Team, dated November 1997;
- Memorandum from the Chief Forester and Assistant Deputy Minister of Environment, Lands and Parks regarding procedures for identifying and approving existing ungulate winter ranges, dated August 6, 1998;

Role and limitations of the technical information used

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

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

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

In making the AAC determination for TFL 37, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

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

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. Two important ways of dealing with uncertainty are:

- (i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and
- (ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires 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 Code).

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

Although the Code is now fully implemented following the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in the context of the best available information.

As British Columbia progresses toward completion of strategic land use plans, the eventual timber supply impacts associated with the land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for sub-regional plans, the Protected Areas Strategy or the Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will eventually result from land-

use decisions that have not yet been taken by government. 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 1994 Vancouver Island Land Use Plan (VILUP)—it may not always be possible to analyze the full 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. The legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

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

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine all the AACs in the province—many of which were outdated—between 1992 and 1996. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

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

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 37.

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 (MOF) as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs. For TFLs, the analysis work is carried out by licensees and reviewed and approved by BCFS staff.

For each AAC determination a timber supply analysis is carried out using an information package including data and information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of data, and a computer model, timber supply forecasts are produced. These include sensitivity analyses to assess the timber supply effects of uncertainties or changes in various assumptions around a baseline option, normally referred to as the “base case” forecast.

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

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

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

Timber Supply Analysis

The timber supply analysis for TFL 37 was conducted by Timberline Forest Inventory Consultants Ltd. (Timberline) on behalf of Canadian Forest Products Ltd. Timberline used a proprietary computer simulation forest estate model called CASH6. Based on previous experience examining results from earlier versions of this model, as well as my staff's review of the model, I am satisfied that it is capable of providing a reasonable projection of timber supply.

The timber supply analysis examined harvest forecast options using four different assumptions for land base. These included a "MOF (Ministry of Forests) Base Case Option", a "Products-Based Silviculture Option", an "Enhanced Incremental Silviculture Option" and a "Vancouver Island Land Use Plan (VILUP)" option. The licensee's base case option closely models current harvesting practices on areas accessible using both conventional and unconventional harvesting technologies on TFL 37. Canfor's base case option also incorporates acceptable integrated resource management strategies and I find it suitable for use as the base case (as discussed above under "The role of the base case").

For TFL 37, the base case projected an initial harvest rate of 1 068 000 cubic metres per year for one decade, followed by a decline of 1.8 percent to 1 048 900 cubic metres per year in decade two. This harvest level is then reduced to 1 034 200 cubic metres per year in decade three and maintained for nine decades. The harvest flow then rises in decades 12 and 13 to reach a long term harvest level of 1 172 100 cubic metres per year.

Key factors affecting the base case harvest projection include the current age class structure of stands on the TFL; the productivity of the TFL 37 land base; the distribution of non-contributing areas; and, the availability of managed stands for harvest particularly during decades seven and eleven. Evaluation of these key factors shows that the base case timber supply is very stable. Data used in the analysis are up-to-date, and the flexibility inherent in the TFL 37 timber supply acts to buffer sources of uncertainty in the data.

In the timber supply analysis, sensitivity analyses were provided to assess the risk to timber supply resulting from uncertainty in data assumptions and estimates, and these have assisted me in considering the factors leading to my determination.

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

Section 8 (7)

In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

- (a) the rate of timber production that may be sustained on the area, taking into account
 - (i) the composition of the forest and its expected rate of growth on the area****

Land base contributing to timber harvest

- general comments

The total area of TFL 37 as reported in the timber supply analysis is 188 745 hectares. The productive forested areas, excluding non-forest, non-productive areas, non-commercial brush and existing roads, account for 153 607 hectares, or approximately 81 percent of the total TFL area.

As part of the process used to define the timber harvesting land base, a series of deductions were made from the productive forest land base. These deductions account for factors which reduce the forest area available for harvesting for economic or ecological reasons.

In timber supply analysis, assumptions and if necessary, projections, must be made about these factors prior to quantifying appropriate areas to be deducted from the productive forest area in order to derive the timber harvesting land base. For TFL 37, the timber harvesting land base used in the base case analysis is 103 248 hectares, or approximately 55 percent of the TFL area. Specific factors are described in detail below.

In reviewing this process I am aware that some areas may have more than one classification—for example, environmentally sensitive areas (ESAs) may also lie within riparian areas. To ensure the accuracy of the timber harvesting land base derivation, it is imperative that no deduction be made more than once in respect of the same area of land, by virtue of it or of some part of it coming under more than one classification for timber supply analysis purposes. Hence, the deduction reported in the analysis or the AAC rationale for a given factor does not necessarily reflect the total area with that classification; some portion of it may have been deducted earlier under another classification. I acknowledge the above approach was used in the licensee's timber supply analysis to appropriately determine the timber harvesting land base of TFL 37.

- non-commercial cover

In the analysis, the licensee excluded 175 hectares occupied by non-commercial brush species. No site rehabilitation is planned for these areas. They were therefore appropriately removed from the timber harvesting land base.

- non-forest and non-productive areas

Non-forested areas on TFL 37 include alpine areas, lakes, rock, brush and other non-productive areas. Based on the TFL inventory, 21 916 hectares of non-forested or non-productive areas were deducted when defining the TFL land base. Standard procedures were followed in the analysis to exclude these areas. I note the proportion of area classified as non-productive is lower than that in MP No. 7 as a result of detailed refinements made during the recent re-inventory.

- physical operability

The size of the TFL 37 timber harvesting land base identified by the licensee is limited by physical constraints. Canfor reassessed the land base for operability during the preparation of MP No. 8. The new classification represents the land base as either physically operable or inoperable. Canfor based this revised classification on an internal review of its operations including an assessment of safety considerations, previous performance using both conventional and unconventional harvesting systems, as well as local knowledge. A total of 13 132 hectares of productive forest was excluded from the timber harvesting land base to account for physically inoperable areas. BCFS Port McNeill District staff have reviewed the criteria and assumptions used to classify operability and consider the estimates appropriate for use in the base case. I accept the information as the best available and suitable for use in this determination.

- environmentally sensitive areas (ESAs)

Some areas are environmentally sensitive or significantly valuable for resources other than timber. During the re-inventory in 1997, Canfor assessed ESAs for sensitive soils, regeneration difficulties and avalanche tracks. Recreation ESAs were determined using recreation inventory information provided by BCFS District staff. Wildlife ESAs, including ungulate ranges and northern goshawk nest sites, were drawn from the licensee's wildlife inventories.

Based on the above information, the licensee removed a total of 8497 hectares of ESAs on the productive forest land base when defining the timber harvesting land base. Details of specific sensitive site categories are considered later in the section entitled, Integrated Resource Management objectives.

- uneconomic and low productivity sites

In the timber supply analysis, 17 332 hectares of uneconomic and low productivity sites were excluded from the timber harvesting land base.

As discussed below under *site productivity estimates*, Canfor applied Terrain Ecosystem Mapping (TEM) and related analysis to stratify stands based on biogeoclimatic site series categories. The licensee grouped these stands using expected site productivity criteria. Stands with site series expressing potential growth rates of less than 1.0 cubic metre per hectare per year were excluded from the timber harvesting land base. These include low

productivity hardwood and coniferous stands which are unlikely to produce sufficient timber volumes to be economic to harvest.

Stands within the physically operable land base were also identified as either conventional or unconventional based on terrain and economic conditions. Conventional areas are those stands accessible using grapple, high-lead, hoe-forwarding and right-of-way yarding methods. Unconventional areas are those accessible by helicopter yarding or skyline systems.

The licensee assigned all unmanaged productive forest to three economic operability classes: economic areas include stands available for harvest; marginally economic areas reflect stands included in the timber harvesting land base that are available for harvest under favourable economic conditions; uneconomic areas are stands with insufficient volume or value to permit economical harvesting operations.

The licensee provided two sensitivity analyses. The first sensitivity analysis examined the impact of excluding marginally economic areas from the timber harvesting land base. The second sensitivity analysis added to the timber harvesting land base those stands that are currently uneconomic but have sufficient site productivity and potential to become economic once regenerated. The results showed that removal of the marginally economic stands from the timber harvesting land base does not impact the base case harvest forecast in the short-term. The addition of uneconomic areas with future potential resulted in a small medium- and long-term improvement to the base case harvest flow.

I acknowledge the detailed methodology used by the licensee to assess economic operability. I note that the information used to derive economic operability reflects current practice and represents the best available information. I also note that many stands above the productivity limit (1.0 cubic metre per hectare per year) have been excluded based on economic criteria. While I consider the productivity criteria used to classify stands is relatively low, when used in conjunction with economic criteria many stands above the productivity limit will be excluded from the timber harvesting land base.

For this determination, I accept the information as modelled in the base case. I request that the licensee monitor its operations and report on its performance in these low productivity stands at the time of the next determination. Any significant changes to operability assessments and marginally economic areas can be incorporated into future determinations.

- deciduous forest type

The TFL area includes 557 hectares of deciduous-leading stands within the timber harvesting land base. Canfor has committed to assess these stands and to develop strategies to rehabilitate, convert or enhance them over time. The TFL also includes areas where deciduous volume occurs as a minor component of coniferous-leading stands. Both the deciduous-leading stands and the minor deciduous component of coniferous-leading stands were accounted for in the analysis.

Current practice on TFL 37 includes utilization of deciduous species and I am satisfied that these forest types have been considered appropriately in the derivation of the timber harvesting land base. I acknowledge that the harvest of deciduous species is periodic and note that the licensee has committed to regularly assess and monitor their performance in these stands. The area of hardwoods represents a very small proportion of the TFL 37 timber harvesting land base and any uncertainty regarding the utilization of hardwoods will have negligible impact on the base case harvest forecast. For these reasons, I accept the information as modelled as reasonable for use in this determination.

- estimates for roads, trails and landings

To account for *existing* roads, trails and landings, the licensee deducted 1626 hectares from contributing to the timber harvesting land base. This area is equivalent to less than two percent of the timber harvesting land base.

To estimate the deduction, the licensee employed computer mapping (GIS) technology to estimate road lengths. Canfor multiplied the estimated length of each road type (i.e., primary, secondary, spur, railway) by the corresponding average road width. Road widths were defined as the distance between productive growing sites on either side of a given road or railway and were based on a 1997 survey of existing roads on the TFL. Sampled road widths compared well with the licensee's own post-harvest site degradation database which includes detailed road width measurements on 186 cutblocks. District staff have reviewed the roads classification procedures and find them to be reasonable.

In deriving a deduction for *future* roads, trails and landings, the licensee assumed that all mainline roads are in place for accessing TFL 37; future road development will involve only secondary and spur roads. Canfor estimated that 40 680 hectares of operable area on the TFL is currently roaded. The licensee also estimated the area of secondary and spur roads associated with the already roaded area and applied the same proportion to the unroaded area (62 568 hectares) of the timber harvesting land base to derive a 2168 hectare deduction for future roads. BCFS District staff agree with this assessment and support the approach used.

I find that the assumptions and methodology applied in the timber supply analysis are acceptable. I also acknowledge that to date, Canfor has rehabilitated 376 kilometres of roads and currently evaluates the rehabilitation potential of roads on an ongoing basis. I further encourage the licensee's efforts to rehabilitate roads where feasible, noting that this practice restores productive land base on the TFL and augments the area available for timber production.

Existing forest inventory*- general comments*

Canfor has developed a variety of resource inventories since the license was awarded in 1960. During the term of MP No. 7, the licensee completed a significant project to update and revise both timber and non-timber resource inventories. Work included Terrestrial Ecosystem Mapping (TEM) and a new forest classification system to address incongruities found in a 1996 BCFS inventory audit. The new classification and re-inventory provided improved forest cover information and resolved previous TFL boundary inconsistencies. The new inventory also resulted in increases to the operable area of TFL 37 compared to the previous inventory.

Timber inventory information used in the analysis was updated for depletions and growth to January 1, 1997.

I note that the inventory has been extensively revised to BCFS standards and acknowledge the recent work undertaken by the licensee to address the deficiencies identified during the 1996 inventory audit. I accept the inventory data as the best available information and, as such, suitable for the purposes of this determination.

- age-class distribution

Approximately 40 percent of the timber harvesting land base is covered by stands more than 250 years old. These stands represent the most abundant age class on TFL 37. Four percent of stands are between 80 and 250 years old, and 56 percent of stands are younger than 80 years old, distributed across a range of age classes.

- species profile

TFL 37 consists of stands comprised of hemlock, Douglas-fir, balsam (true firs), yellow-cypress, western redcedar, spruce, lodgepole and western white pine, as well as several deciduous species including red alder and broad leaf maple.

Approximately 53 percent of the timber harvesting land base is covered by hemlock-leading stands. Douglas-fir-, yellow-cypress-, balsam-, and western redcedar-leading stands comprise a further 28 percent, five percent, seven percent and five percent respectively. TFL 37 also includes minor components of spruce-and deciduous-leading stands.

Expected rate of growth*- aggregation procedures*

For the timber supply analysis, the inventory for TFL 37 was aggregated into analysis units based on species composition, site productivity, management emphasis, and available yield information.

I have reviewed the approach used and note analysis unit definitions applied by the licensee are quite detailed and effectively capture the productivity of the unit. The approach used follows acceptable procedures and I therefore find the aggregation procedures to be appropriate for use in this determination.

- volume estimates for existing stands

To project stand yields for this timber supply analysis, natural stands in the inventory were assigned to one of two categories based on the method used to generate natural stand volumes. For one category, Canfor developed local average volume lines (AVLs) and for the other, the licensee used yield tables based on the BCFS Variable Density Yield Projection (VDYP) model.

The licensee developed AVLs for 77 analysis units from 742 inventory plots located within the non-harvested portion of the timber harvesting land base. All plots have been compiled using accepted BCFS appraisal standards for decay, waste and breakage and were stratified based on species composition, stocking class, age range and height class. AVLs are based on local inventory information and provide an effective means of estimating stand volumes in older stands.

For the older immature and mature components of the inventory where local inventory plots were unavailable, Canfor used VDYP to generate volume curves for 18 analysis units covering 15 percent of the timber harvesting land base. VDYP is based on information gathered from a large number of sample plots throughout the province and is an adequate model for projecting natural stands.

Existing stand yields were generated for the timber supply analysis using both AVLs and VDYP and both are acceptable methods. I consider the information to be the most accurate available and accept the estimates used in the timber supply analysis as suitable for use in this determination.

- volume estimates for regenerated stands

For regenerated stands, managed stand yields tables (MSYTs) were generated after stands had been grouped into four silvicultural “eras”: era 1 stands are those regenerated from 1960 to 1970; era 2 stands from 1971 to 1980; era 3 stands from 1981 to 1996; and era 4 stands are those regenerated post-1997. These groupings reflect the progressive improvement in silviculture and forest management strategies over the past four decades.

For eras 1 through 3, MSYTs were aggregated using BatchTIPSY (Table Interpolation Program for Stand Yields, version 2.3.0), a computer model developed by the BCFS. MSYTs for era 4 stands were developed using silvicultural prescriptions based on ecological criteria and elevation. The prescriptions describe the intended species composition, stocking levels and the type and extent of intensive forest management regimes (e.g., fertilization, genetic improvement, juvenile spacing).

Yield tables for each managed stand were compared and compiled into 20 yield tables based on similar attributes including maximum mean annual increment, culmination age, and average diameter at culmination age. I acknowledge the approach applied to aggregate the yield tables reflects detailed consideration of yield table characteristics and note the method and estimates were reviewed and approved by BCFS Research Branch staff.

I am satisfied that the assumptions and methods used in the base case to estimate managed stand volumes appropriately represent past, current and foreseeable future management, and are based on suitable growth models. I therefore find them acceptable for use in this determination.

- site productivity estimates

Inventory data includes estimates of site productivity, expressed in terms of a site index. A site index is based on the height, as a function of the age, of a particular stand of trees. The productivity of a site largely determines how quickly trees will grow, and therefore affects the volumes of timber that will grow in regenerated stands and the time required for these stands to reach a merchantable size or minimum harvestable age. In addition, site productivity influences the time seedlings will take to reach green-up conditions, and the age at which stands will satisfy mature forest cover requirements

For TFL 37, the licensee assigned site indexes to those stands older than 35 years and not associated with AVLs using standard BCFS site curves. Stands for which yields were projected using AVLs needed no site index estimates since the volumes generated for these stands are independent of site index.

Stands 35 years of age or younger as well as all future regenerated stands are considered managed. Site indexes for these stands were adjusted and assigned based on detailed ecological mapping and an associated site index sampling project for the license area. The project involves site series-level Terrain Ecosystem Mapping (TEM) and entails photo-interpretation, field verified with associated inventory plots.

The use of site series mapping to estimate site index is an innovative technique and I compliment the licensee's initiative for pursuing this approach. It does not rely on old-growth stand attributes to assign site index which is the approach frequently applied in other units. BCFS Research Branch staff have reviewed the estimates of site index and find them acceptable. While I agree with this assessment, I note there is room for improvement of the site index assignments, particularly in high elevation stands. I

encourage the licensee to refine these site index estimates before the next analysis. For the purposes of this determination, I accept the site index estimates as the best available information.

- operational adjustment factors (OAFs)

To account for the loss of timber volume due to operational conditions, Operational Adjustment Factors (OAFs) were applied to the yield projections for regenerated stands used in the timber supply analysis. The licensee applied a ten percent OAF for unmapped stand openings (OAF 1) and a five percent OAF to account for decay and for age-related losses such as waste and breakage during harvest (OAF 2).

While the OAF 1 used is lower than values applied in other coastal units, the licensee indicates that the reduction factor is warranted because of improved inventory and extensive ground sampling of non-productive areas. Staff of the BCFS Research Branch have reviewed the licensee's OAFs and consider the adjustments sufficiently well documented. I agree with their assessment and accept the licensee's assumptions regarding operational adjustment factors as appropriate for use in this determination.

- minimum harvestable ages

Minimum harvestable age is an estimate of the earliest age at which a stand will reach a harvestable condition. Changing the minimum harvestable age generally affects when second growth will be available for harvest and, accordingly, the rate at which existing stands may be harvested. In practice, many forest stands will be harvested at different ages than the minimum due to constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife and other operational considerations.

In the TFL 37 timber supply analysis, minimum harvestable ages were established based on several criteria. For most natural and managed stands, minimum harvestable ages were determined as the age at which a stand's annual growth is within 0.05 cubic metres per hectare per year of its culmination of mean annual increment (CMAI). At this point a stand is at or very close to the age at which its average annual volume growth is at its greatest. For marginally economic stands, the licensee applied a second criterion—that a stand's volume must be at least 250 cubic metres per hectare before being available for harvest. All stands where AVLs were used to estimate volume are currently at or above minimum harvest age. Therefore, the licensee used a default minimum harvestable age of 100 years for modelling purposes.

Canfor did not conduct a sensitivity analysis on the minimum harvestable age of existing stands since most existing stands are well beyond culmination age. However, the licensee did examine the impacts on timber supply of varying minimum harvestable age of managed stands on TFL 37 by ten years.

Increasing the minimum harvestable age of managed stands by ten years reduces the short- and medium-term harvest forecast relative to the base case by approximately

13 and seven percent respectively. By contrast, decreasing the minimum harvestable age increases the short-term harvest flow by two percent, while decreasing the long-term harvest level by slightly less than two percent.

I acknowledge that predicting the age at which stands may be harvested in the future is difficult and subject to considerable uncertainty. Having considered the age and volume criteria which were applied in the analysis, I accept the minimum harvestable ages modelled in the base case as satisfactory for use in this analysis. However, I note that on TFL 37 the availability of harvestable timber is especially critical during decades seven and 11. Any deviation from those minimum harvest ages assigned in the base case will significantly impact the harvest flow particularly in those decades.

I note the licensee recognizes this concern and provided additional analyses as part of a “Products-Based Silviculture Factors Option”. In this option Canfor examined future product objectives at the stand level which effected a five- to ten-year reduction in minimum harvestable age. The option shows a non-declining harvest flow with an initial harvest level slightly greater than the base case timber supply forecast.

In conclusion, I accept the minimum harvestable ages modelled in the base case as reasonable, although I note a strategic concern—the transition to second-growth harvest and the available volume during decades seven and eleven. I recommend the licensee continue to examine the dynamics of timber supply specifically in these decades during future timber supply analyses.

- harvest species profile

In the base case analysis, Canfor assumed that harvesting would be conducted in older stands first as well as be distributed by season of harvest. Canfor’s inventory includes designation of harvest areas by two harvesting seasons—summer harvesting areas and winter/intermediate harvesting areas. In the base case, the licensee distributed 52 percent of the harvest to summer areas and 48 percent to winter/intermediate areas during the first two decades.

I note the proportions used closely reflect current and intended practice and I therefore find the assumptions applied in the base case suitable for use in this determination.

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

Regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. The timber supply analysis for TFL 37 assumed an average one-year regeneration delay for all stands. District staff have reviewed the regeneration delay and acknowledge that Canfor’s current practice is to regenerate most areas within the same year of harvest.

The licensee conducted a sensitivity analysis to examine the impacts of increasing and decreasing regeneration delay by one year. The results showed that eliminating regeneration delay provides a small increase in medium-term harvest flow.

The assumptions applied in the analysis reflect current practice and I acknowledge the licensee's intent to further reduce regeneration delays. At this time I find that no further adjustments to the base are required on this account. Should the licensee show that regeneration delay has been eliminated, I will take this into account in future determinations.

Not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are areas of productive forest land that have been denuded and have failed, partially or completely, to regenerate either naturally or by planting or seeding to the specified or desired free growing standards for the site. These areas include "backlog" NSR areas—areas in which harvesting or other disturbance occurred before 1987—as well as "current" NSR.

During the re-inventory, the licensee identified 480 hectares of potentially backlog NSR areas and these were accounted for appropriately in the base case. I acknowledge the licensee's commitment to assess and regenerate these areas to a fully stocked condition during the term of MP No. 8.

No current NSR area was assumed to exist in the base case timber supply analysis. I note that this is somewhat unusual, because typically the amount of current NSR reflects the average annual area harvested multiplied by the regeneration delay. However, I acknowledge that Canfor has a very aggressive and effective regeneration program and most areas are restocked within the same year in which they are harvested (see above, Regeneration Delay). District staff concur with this assessment. For this reason I am satisfied that the timber supply analysis provides an adequate accounting of NSR for use in this determination.

Impediments to prompt regeneration

BCFS District staff identified colluvial sites where regeneration may be difficult to re-establish. The licensee removed ten percent (311 hectares) of these areas from the timber harvesting land base. Recognizing the difficulties sometimes encountered in establishing stands on colluvial sites, I accept that this factor has been accounted for appropriately.

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

Silvicultural systems

The predominant silvicultural system currently used on TFL 37 is clearcutting with reserves. Reserves are intended to contribute to wildlife, riparian, visual and biodiversity values. During the past five years, opening sizes averaged 25 hectares and ranged from

less than one hectare to 40 hectares, well within targets established in the Vancouver Island Resource Targets process (see below under Vancouver Island Land Use Plan).

A limited amount of partial cutting—19 hectares in 1997—has been employed within Special Management Zones, consistent with the Vancouver Island Land Use Plan (VILUP).

In the timber supply analysis, the entire area was modelled as being clearcut with no specific accounting made for the small area that is currently harvested using partial cutting systems. I acknowledge that, while methods to more accurately reflect partial cutting systems in growth and yield models and timber supply analyses are currently being developed, there is still considerable uncertainty about forest growth and yield under these systems. Due to the relatively small area that is currently harvested using systems other than clearcutting, I conclude that the lack of specific accounting for partial cutting does not introduce significant risk into my decision. I therefore accept the information as modelled for use in this determination.

Basic silviculture

Basic silviculture on TFL 37 includes site preparation, planting of suitable species, and treatments to ensure that regenerated areas achieve free-growing status within a specified time. In the timber supply analysis, harvested areas are assumed to be regenerated with a mix of various coniferous species through planting and natural regeneration. The key aspects of basic silviculture were discussed under *volume estimates for regenerated stands* and Regeneration delay, and related practices have been represented appropriately in the analysis.

Intensive silviculture

Intensive silviculture activities include commercial thinning, juvenile spacing, pruning, fertilization, and genetic improvement. Intensive silviculture activities are practiced extensively on TFL 37 and I acknowledge the licensee's commitment to enhancing stand volume and value through the use of these treatments and will discuss individual treatments below under their respective sections.

- genetic improvement

Canfor's genetic improvement program includes maintaining an inventory of genetically-improved seed supplied by the licensee's own seed orchard located in Sechelt. First-generation seed has been successfully employed in Canfor's reforestation activities for many years. In the base case, gains in volume and growth from planting genetically-improved seedlings were incorporated in the projection of regenerated stand yields. The licensee estimated average yield gains attributable to first-generation genetically-improved seed to range from two to nine percent. BCFS Research Branch staff confirmed these values and approved their use in the timber supply analysis.

The licensee has recently begun deploying second-generation seed on TFL 37 as part of its reforestation activities. As discussed under *enhanced incremental silviculture option*, the application of second-generation seed suggests potential increases in timber supply of an additional two and eight percent over first generation seed in the medium- and long-term respectively.

I acknowledge Canfor's tree improvement program and the licensee's intention to expand the use of second-generation seed in reforestation activities. Furthermore, I agree with the Research Branch assessment that second-generation progeny trials show significantly higher growth rates as reflected in the licensee's own Enhanced Incremental Silviculture Option. Accordingly, while I accept the base case timber supply as modelled, I acknowledge that in the future, average yields may be even higher. When the results of further genetic improvement are quantified and demonstrated operationally, their impact on timber supply can be examined in future AAC determinations for TFL 37.

- fertilization

Canfor has fertilized extensively on TFL 37. Treatments are applied to selected managed stands younger than 35 years old and to selected stands 50 to 60 years old that may be harvested within the subsequent development plan period. To date the licensee has fertilized 7600 hectares on TFL 37 through various government funding agreements.

The licensee incorporated expected gains from Douglas-fir fertilization into yield projections using the BCFS Tree and Stand Simulator (TASS) growth and yield program. TASS provides reasonable estimates of expected gains for Douglas-fir and these estimates were reviewed and accepted by BCFS Research Branch.

I acknowledge the licensee's commitment to regularly review fertilization treatment priorities. I note that the precise impacts of fertilization on yield are the subject of ongoing research. For the purposes of this analysis, I accept the assumptions used and consider what was modelled to reasonably approximate current practice and therefore suitable for this determination. If and when revised plans or an expanded fertilization strategy is demonstrated operationally, their implications will be reviewed in future AAC determinations.

- juvenile spacing

Canfor uses juvenile spacing extensively as part of its forest management program; the licensee's objectives are to improve stand quality, manage forest health, enhance wildlife and biodiversity and create employment. During the past ten years Canfor has juvenile spaced an average of 450 hectares per year. Past and planned future spacing was included in development of yield curves for the base case.

I accept the base case projection for the purposes of this determination, noting that what was modelled reflects current practice.

- pruning

According to the licensee, pruning treatments are implemented to improve timber value, promote wildlife habitat, maintain biodiversity, and manage risks to forest health. As a general rule, pruning treatments, while increasing timber value, do not impact stand volume. The licensee appropriately did not include any volume adjustment for pruning treatments in the timber supply analysis and I accept the base case as modelled.

- commercial thinning

Commercial thinning involves the harvesting, in a maturing stand, of trees large enough to be considered a commercial product. Canfor has conducted commercial thinning activities on TFL 37 for over 15 years. MP No. 7 committed the licensee to harvest 5000 cubic metres per year using commercial thinning and the licensee has exceeded this commitment.

I acknowledge that Canfor's commercial thinning program may create additional harvesting flexibility, encourage employment, and further integrated resource management objectives. However, it was not explicitly modelled in the base case because the area involved is relatively small and yield gains associated with commercial thinning are still uncertain. I note that the licensee has committed to developing a commercial thinning strategy and I expect this will provide better information to project associated timber supply impacts. For the purposes of this determination I accept the information as modelled.

- enhanced incremental silviculture option

Canfor also included a "Enhanced Incremental Silviculture Option" in the timber supply analysis. This option demonstrates the timber supply impacts of augmenting the level of intensive silviculture on TFL 37, and incorporates productivity gains associated with second-generation tree improvement as well as increased juvenile spacing and fertilization activities. The option indicates that an aggressive silviculture program could potentially increase the timber supply above base case levels in the medium- and long-term by approximately two and eight percent respectively.

It is clear that expanding intensive silviculture activities provides an opportunity to increase timber supply on TFL 37, and I acknowledge Canfor's initiatives such as increasing the use of second-generation seed in reforestation. However, I cannot account for potential increases in timber supply without a comprehensive strategy or proven application of the intensive silviculture activities at the level modelled in this option. Nevertheless, the enhanced incremental silviculture option does indicate that additional investment in intensive silviculture will have a positive impact on medium- and long-term harvest flow as well as provide improved operational flexibility. If and when these treatment levels become current practice, their implications will be assessed in future AAC determinations.

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

Utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. These standards were incorporated into the timber supply analysis for TFL 37 to estimate minimum merchantable stand volume. To derive stand volumes, a 30-centimetre stump height was assumed in the analysis. For managed stands generated using the TIPSYS growth and yield model, the licensee assumed a 12.5-centimetre minimum diameter-at-breast-height (dbh) and a 10-centimetre top diameter-inside-bark. Volume estimates for natural stands generated using VDYP were based on a 17.5-centimetre minimum dbh with a 10-centimetre top diameter-inside-bark. For older stands whose volume estimates were developed using AVLs, Canfor used a 17.5-centimetre minimum diameter-at-breast-height (dbh) and a 15-centimetre top diameter-inside-bark.

The above assumptions reflect Canfor's current operational practice except that the licensee harvests all stands to a 15 centimetre top, not to 10 centimetres as was modelled in some natural stands. The licensee assumed a 10-centimetre top-diameter because the VDYP model does not accommodate a 15-centimeter top-diameter. Previous analyses in similar units have shown that small differences in top diameter produce insignificant differences in stand volume. The importance of this difference is further diminished by the fact that volumes derived from VDYP represent a minor proportion of total stands in TFL 37.

In summary, I find the utilization standards used in the analysis are consistent both with current operational practice and provincial standards, and I find them reasonable for use in this determination.

Decay, waste and breakage

To account for decay, waste and breakage, the licensee applied data specific to the TFL area (Special Cruise #347) to generate the VDYP- and AVL stand volumes (existing stands). The approach was reviewed and accepted for use in this timber supply analysis by staff of the BCFS Resources Inventory Branch.

I consider the estimates for decay, waste and breakage used in the timber supply analysis to reflect the best available information for this area and therefore to be appropriate for use in the determination.

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

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

- non-timber resource inventories and assessments

Non-timber resource inventories were revised or completed between 1995 and 1998 and have been reviewed and accepted by BCFS region and district staff as well as BC Environment staff. These inventories were used in developing data assumptions for the timber supply analysis as further discussed below under the appropriate sections.

- sensitive soils

Canfor completed a preliminary assessment of terrain stability of TFL 37 in 1997. Areas mapped included areas classified as terrain class IV (moderate likelihood of landslide initiation following harvesting) and terrain class V (high likelihood of landslide initiation). In the determination of the timber harvesting land base, the licensee removed 95 percent of areas designated as terrain class V, reflecting the possibility that up to five percent of very unstable areas may eventually be harvested.

The licensee applied a ten percent reduction to account for Terrain Class IV areas within the TFL, except for areas within the Kilpala watershed. Terrain Class IV areas within this watershed are typically more prone to landslides and therefore Canfor applied a proportionately higher reduction (25 percent).

The total productive forest area identified as terrain class IV and terrain class V was 27 771 and 7964 hectares respectively. BCFS District and BC Environment staff agree with the methodology and reductions applied in the base case.

I note the licensee's commitment to complete further terrain stability mapping on TFL 37 during the term of MP No. 8. For this determination, I find the reductions for sensitive soils used in the base case to represent the best available information and to suitably reflect current practices.

- avalanche considerations

TFL 37 includes mountainous terrain which is prone to avalanches. After other overlapping deductions, 1663 hectares of productive forest were identified as being

sensitive to avalanches and excluded from the timber harvesting land base. The reductions reasonably reflect existing information and practice and I accept them as suitable for this determination.

- archaeological sites

An Archaeological Overview Assessment of the Port McNeill including the area of TFL 37 was recently conducted. It identified areas on the TFL having a high, medium or low probability of containing archaeological sites. The assessment determined that most of the culturally sensitive areas are situated within or adjacent to existing land base reserves such as riparian areas. No significant modifications to harvesting plans have been necessary to protect these sites. Accordingly no further reductions were made for archaeological sites or cultural resources in the base case.

At this time I have no additional information to suggest whether or to what extent the timber supply in TFL 37 may be further affected by archaeological or historical values. However, I expect that more detailed site specific assessments will continue to be completed during the next management plan period. If the results of these assessments indicate the need to exclude additional archaeological sites from the timber harvesting land base, the impact on timber supply will be considered in future AAC determinations.

- recreation

TFL 37 provides various recreational opportunities including boating, camping, hiking and fishing. Recreation opportunities are mainly associated with established campsites. In the timber supply analysis, 62 hectares of recreation areas were removed on this account. Karst features, characterized by distinctive limestone formations, are also present on the TFL but these are managed on a site specific basis and no specific accounting was made for them in the base case.

District staff have reviewed the deductions made for recreation areas and agree with the assumptions made by the licensee. For the purposes of this determination, I am satisfied that the licensee has adequately accounted for recreation concerns.

- wildlife habitat

The biodiversity and riparian provisions of the Forest Practices Code are intended to provide for the needs of most wildlife species. However, some wildlife species "at risk" require special management practices. The Identified Wildlife Management Strategy, which has recently undergone public review, will provide direction for managing critical habitat for identified wildlife species (usually red- or blue-listed) when implemented. This strategy includes two guidebooks: "Species and Plant Community Accounts for Identified Wildlife"; and "Procedures for Establishing Wildlife Habitat Areas". Also included is the document entitled "General Wildlife Measures for Identified Wildlife" which outlines the requirements for practices within designated wildlife habitat areas.

TFL 37 supports a great diversity of fish and wildlife species and habitats. Thirty-three native mammal species reside on the TFL, including Columbian black-tailed deer, Roosevelt elk, black bear, wolf, cougar, beaver, and marten. Other animals inhabiting TFL 37 include various birds, amphibians, reptiles and numerous invertebrate species.

Ungulate management areas identified between 1973 and 1992 include 66 deer winter range areas, three elk summer ranges and 13 elk winter ranges. In 1983 the province recognized the high wildlife values associated with the Nimpkish valley by approving an ungulate winter range plan for TFL 37. Consistent with the Forest Practices Code *Operational Planning Regulation*, these winter range areas have been formally designated.

After accounting for non-productive areas and other overlaps, a total of 4901 hectares of productive forest was removed from the timber harvesting land base for ungulate ranges (winter and summer), consistent with current inventories and the existing management plans for ungulates.

For the purposes of this determination, I accept as modelled the information regarding ungulate winter range and have made no further adjustments. I note that in conjunction with BCFS and BC Environment staff, the licensee will be reviewing and updating winter range areas by October 15, 2003, as required by the *Operational Planning Regulation*. Any new information can be incorporated into subsequent analyses.

TFL 37 also provides habitat to several vulnerable species. Canfor and government agencies have located eight Queen Charlotte goshawk nests on the TFL. For the base case analysis, the licensee removed a total of 84 hectares (accounting for overlaps) from the timber harvesting land base to account for the reserves associated with nest sites.

The licensee conducted sensitivity analyses to examine the implications on timber supply of applying draft provincial management guidelines for the Queen Charlotte goshawk. Results indicate that compared to the base case, the application of the draft guidelines will impact short-, medium- and long-term timber supply. While additional areas for goshawks may be required as inventories and guidelines are improved, mitigation strategies may also be developed to minimize the timber supply impacts. I acknowledge the sensitivity analyses undertaken by Canfor as a positive step towards understanding the relationships between habitat requirements and timber supply and developing effective management strategies.

Nonetheless, I acknowledge there is currently considerable uncertainty about the impacts of goshawk habitat requirements on timber supply, and until the government finalizes the Identified Wildlife Management Strategy, and wildlife habitat areas are declared with associated management regimes, I am unable to predict the precise impact on timber supply due to goshawks, and have further discussed this below under “Reasons for Decision”.

Marbled murrelets are also known to occur on the TFL. The licensee has conducted broad inventories and surveys over the past six years. No nest sites have been found to date and no specific deductions were made to account for murrelet habitat in the base case. While the potential impacts on timber supply are unknown, I note that many murrelet habitat requirements may be accommodated by forest reserved for other resource values such as riparian areas, wildlife tree patches as well as old seral stage requirements (described below under *landscape-level biodiversity*) and in newly created protected areas adjacent to the TFL.

In addition to those species identified above, I acknowledge the extensive work being undertaken and proposed by Canfor and other agencies to establish and improve inventories of other species on TFL 37. I also note that the Vancouver Forest Region is currently developing watershed management strategies which will include considerations for wildlife and biodiversity. Any new information including its potential impacts on timber supply can be considered in future determinations.

In conclusion, I accept that there are uncertainties regarding the total area that will eventually be required to protect wildlife habitat on TFL 37. At this time it is not possible to quantify the extent of potential impacts on timber supply but I note that government has made a commitment to limit the impacts of managing identified wildlife species to one percent of the provincial timber supply. This matter will be thoroughly reviewed at the next determination and any new information will be reflected in the decision at that time. I recognize the importance of wildlife management on the TFL and have discussed this in my “Reasons for Decision”.

- *riparian habitat*

The *Forest Practices Code* requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, as well as riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats. Stream riparian classes are designated S1 to S6 depending on the presence of fish, stream channel width, and presence of community watersheds.

The timber supply analysis for TFL 37 accounts for the protection of riparian resources. Riparian habitats occur along streams and around lakes and wetlands. On TFL 37, stream classification was based on the licensee’s 1981 stream classification and progressively updated to standards identified in the Forest Practices Code *Riparian Management Area Guidebook* using TRIM maps and local knowledge. The licensee used computer (GIS) technology to approximate the area in riparian reserves adjacent to the streams, lakes and wetlands. The appropriate riparian reserve widths specified in the guidebook were applied. For the corresponding riparian management zones, the licensee applied the prescribed zone widths as well as the retention levels specified in table 4 of the guidebook to approximate an equivalent area-based deduction.

Insufficient detail was available to precisely classify all streams. As a result, some streams that may be S3 and S4 streams were classified more conservatively as S2 and S3

streams respectively; the widths of the adjacent buffers were adjusted accordingly. A total of 5428 hectares of productive forest was excluded from the timber harvesting land base to account for riparian areas. BCFS Port McNeill District staff agree that the assumptions and reductions applied in the base case reflect the current management of riparian areas.

For the purposes of this analysis, the licensee used acceptable procedures to represent riparian resources. I note that some deficiencies in the stream inventory exist and acknowledge the licensee's commitment to refine this information during the term of MP No. 8. Although precise stream classification was not available for some streams, the approach used to model these streams presents minimal risk to the base case harvest forecast. I therefore accept the information as modelled and have made no adjustments to the base case on account of this factor.

- 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 cut block size and requires that adjacent cutblocks to be "greened-up" before harvest is allowed. The objective of green-up and adjacency requirements is to distribute the harvest pattern and retain forest cover across the landscape. These requirements are commonly expressed in terms of the number of entries or "passes" required to harvest mature timber from the timber harvesting land base.

With the exception of 384 hectares of visually sensitive areas (discussed below under *visually sensitive areas*), the licensee modelled the timber harvesting land base using a four pass harvesting regime and a green-up height of three metres. This forest cover constraint was applied separately to each draft resource emphasis area identified in the Vancouver Island Land Use Plan (VILUP) and reflects current management; specific management objectives will be available once implementation of the VILUP is finalized. While not strictly required, Canfor also applied this forest cover constraint on each of the goshawk fledgling and goshawk foraging zones. I acknowledge that this progressive modelling approach ensured known goshawk habitat was recognized during the analysis.

The licensee conducted a sensitivity analysis to evaluate the impact of increasing and decreasing maximum allowable disturbance levels in the non-visually sensitive areas, to 33 percent and 20 percent respectively. The results showed that the base case harvest flow is slightly sensitive in the medium- and long-term to changes in allowable disturbance. Canfor also provided further sensitivity analyses to show the potential impact of progressively reducing green-up requirements in the proposed VILUP resource management zones. While the VILUP and associated management objectives for these zones are not yet complete, the General Forestry Areas (GFAs) and High Intensity Areas (HIAs) are likely to have more emphasis on timber harvesting than the Low Intensity Areas (LIAs) and therefore may have less stringent green-up provisions. The sensitivity analysis showed that the base case harvest flow is insensitive to changes in green-up height in the GFAs and HIAs. Although final assessment of timber supply implications

of the VILUP must await completion of related management strategies, the sensitivity analyses provide me with a useful perspective and the uncertainty related to future management in GFAs and HIAs is unlikely to cause significant impact on the base case timber supply.

In conclusion, I find that the approach used by the licensee to model forest cover constraints was appropriate and have made no further adjustments.

- *visually sensitive areas*

Visually sensitive areas on TFL 37 are based on a 1997 visual landscape inventory update completed to BCFS standards. Approximately 384 hectares of the timber harvesting land base were identified as visually sensitive and include areas along the Highway 19 scenic corridor.

I note that the inventory is current and visually sensitive areas represent a small proportion (0.4 percent) of the timber harvesting land base on TFL 37. The information was modelled appropriately and I am satisfied that any uncertainty in visually sensitive areas will not significantly impact the base case harvest forecast.

- *community watershed considerations*

There are no community watersheds on TFL 37. Practices represented in the base case reflect the licensee's commitment to minimize impacts on water quality and quantity within lakes and streams. I therefore accept the base case as modelled with regard to this factor.

- *biodiversity*

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

- *stand-level biodiversity*

Stand-level biodiversity is managed by retaining reserves of mature timber or wildlife tree patches within or adjacent to cutblocks to provide structural diversity and wildlife habitat. In the timber supply analysis, the licensee first used computer mapping (GIS) technology to analyze all areas removed from the productive land base. To assess the requirement for additional wildlife tree patches, the licensee used the GIS to buffer all deducted productive areas with a 250-metre wide band to simulate the maximum acceptable distance (500 metres) between wildlife tree patches, consistent with the *Biodiversity Guidebook*.

The licensee then identified suitable candidate areas for additional wildlife tree patches in order to supplement the distribution of reserves across the TFL. An additional 1021 hectares of productive area were identified and appropriately excluded from the timber harvesting land base. Although approximately 4 000 hectares of the timber harvesting land base were not buffered during the GIS exercise, operationally these areas are not expected to require wildlife tree patches. BC Environment staff agree with these assumptions.

I note the licensee used a sophisticated spatial approach to determine the distribution of wildlife tree patches on TFL 37. The areas identified as wildlife tree patches are well dispersed across TFL 37. The assumptions and methodology used in the base case are consistent with the recommendations of the *Biodiversity Guidebook* and I accept them as appropriate for use in this determination.

- *landscape-level biodiversity*

Landscape-level biodiversity objectives involve maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures across a variety of ecosystems and landscapes. The *Biodiversity Guidebook* is based in part on the principle that maintaining such attributes and structures, together with connectivity of ecosystems and the maintenance of forested areas of sufficient size to maintain forest interior habitat conditions, will provide for the habitat needs of most forest and range organisms.

A major consideration in managing for biodiversity at the landscape level is leaving sufficient and appropriately-located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests. Although some general forest management practices can broadly accommodate the needs of most species, more often a variety of practices is needed to represent the different natural disturbance patterns under which specific ecosystems have evolved. Natural disturbance patterns vary from frequent wildfires in the dry interior regions to rare stand disturbance events in the wetter coastal regions.

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

For areas where landscape units have not yet been formally established, or an emphasis option has not been assigned for a landscape unit, in accordance with the *Biodiversity Guidebook*, the lower biodiversity emphasis option is used as a default to guide operations pending establishment of landscape units and objectives. Current government policy intended to balance social and economic impacts against the risk to biodiversity stipulates that the eventual distribution of emphasis options within a sub-regional

planning unit should include approximately 45 percent of the area within the lower, approximately 45 percent within the intermediate, and approximately ten percent within the higher biodiversity options.

For landscape units where old seral forests are in short supply but the economic and social consequences of halting harvesting of older forest immediately are deemed unacceptable, the *Biodiversity Guidebook* allows additional harvesting flexibility. In these cases a minimum of one third of the old seral forest retention objective in low emphasis areas described in the guidebook must be retained and the shortfall recruited over time so that the intended old seral forest retention objective is in place within three rotations.

Three draft landscape units associated with TFL 37 have been delineated, namely the Nimpkish, Tsitika, and the Woss-Vernon landscape units. In the base case, the old growth seral stage constraint for each biodiversity emphasis option was modelled using the accepted distribution of biodiversity emphasis, consistent with the government policy described above. Forest cover requirements were applied to each biogeoclimatic subzone of the TFL. This included full application of old-seral stage targets in the proposed low biodiversity emphasis areas. Non-contributing areas—i.e., areas outside the timber harvesting land base—within each landscape unit provide for landscape level biodiversity requirements and the licensee accounted for established parks during its assessment of old seral stage distribution.

Information from the licensee's base case confirmed that the old seral stage targets could be entirely met in all except one variant (CWHxm) in the Nimpkish landscape unit. An additional 411 hectares—two percent of the timber harvesting land base—was required in this variant to satisfy old seral stage requirement during the first 70 years. After 70 years additional stands from outside the timber harvesting land base are forecast to develop old growth attributes and are expected to satisfy the old seral stage requirements in this variant.

After reviewing Canfor's analysis, I find the landscape biodiversity requirements have been comprehensively addressed in the timber supply analysis. I note that while the old seral stage requirement was not immediately achieved in one variant of the Nimpkish landscape unit, current government policy allows old seral retention requirement to be initially reduced to one third of the values indicated in the *Biodiversity Guidebook*. The licensee has demonstrated that minimum landscape-level requirements can indeed be achieved and for the most part they are met in areas that do not contribute to timber supply. I therefore find it reasonable to consider that a reduction to one third of the old seral retention requirement in the low biodiversity emphasis area will not significantly impact the base case harvest forecast. Moreover, additional old-seral areas could easily be accommodated in the short-term by modifying operational harvest plans without compromising the harvest forecast over the effective period of this determination.

I note that the Vancouver Island Resource Targets (VIRT) project team has recommended draft landscape units for TFL 37 as part of the ongoing Vancouver Island Land Use

Planning (VILUP) process (see “Vancouver Island Land Use Plan” below). While I have accepted these as an interim tool for assessing the timber supply implications of managing for landscape-level biodiversity, I am aware that the landscape unit boundaries and objectives have not yet been formally declared.

I consider the risk to be low that the eventual outcome of the landscape unit planning processes will be any more constraining to timber supply than the assumptions modelled in the base case. In fact there may be more flexibility than portrayed in the analysis; however this uncertainty will only be resolved when the planning process is completed. For this determination I accept the landscape level biodiversity assumptions as modelled and have made no further adjustments to the base case harvest forecast.

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

Vancouver Island Land-Use Plan (VILUP)

The government’s 1994 Vancouver Island Land-Use Plan (VILUP) decision established 23 new protected areas aimed at improving the representation of protected ecosystems on Vancouver Island. These areas include five new parks which influence TFL 37. These parks were formally established by Order-in-Council in 1995 and those areas affecting TFL 37 were removed from the timber harvesting land base and do not contribute to the base case harvest forecast. The decision also announced the creation of three zones categorized on the basis of resource management priorities. Since the 1994 decision, these three zones have been renamed and are now known as special management zones (SMZs), enhanced development zones (EDZs) and general management zones (GMZs).

Subsequent work on the VILUP to develop more specific resource management objectives led to the Low Intensity Area report, endorsed by the government in 1995. The report identifies boundaries of SMZs (previously known as low intensity areas) on TFL 37. While preliminary resource values were also identified in the report, specific management practices within these areas have not been formally established.

In May 1995 the Vancouver Island Resource Targets (VIRT) project was initiated to recommend precise boundaries for GMZs and EDZs, as well as develop specific management objectives for all zones. In April 1996 the technical team produced an interim technical report entitled *Resource Management Zones for Vancouver Island*. The report was further refined and released in November 1997 for public review. Final government approval of all zones and associated objectives is expected in 1999. Consistent with my Guiding Principles, I cannot speculate on the potential implications of these eventual approved management practices on timber supply.

A portion of TFL 37 also lies within the area covered by the Tsitika Watershed Integrated Resource Plan that was approved by the government’s Environment Land Use Committee in 1978. Completion of the VILUP zoning, together with the requirements of the Forest Practices Code will ensure that the resource values and objectives identified in the Tsitika plan are considered in all planning initiatives in the watershed.

In formulating my decision, I have been mindful of the content and status of the various planning initiatives discussed above. Although the overall timber supply implications of ongoing planning initiatives involving TFL 37 cannot be known with certainty and taken into account fully at this time, I am satisfied that given the constraints applied in the analysis, the AAC I determine will be achievable throughout the effective period.

Twenty-year plan

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

To develop the 20-year plan, Canfor used a spatially explicit version of the timber supply model (CASH6), applying similar inputs and assumptions to those used in the base case timber supply analysis which did not represent the spatial pattern of harvest explicitly. To simulate operational conditions, Canfor's engineering and planning staff designed most of the individual cutblocks; the balance were generated using computer techniques. In order to better reflect the standard five-year development planning interval, the simulation period was set at five years rather than the ten-year period used in the base case analysis.

The 20-year plan indicates there is sufficient flexibility to distribute cutblocks to achieve the harvest level projected in the base case for the next five years. In order to satisfy green-up constraints in the analysis, a 4.5 percent decrease in the harvest level was required from the sixth year onwards. All other forest cover requirements were met during the remaining 15 years of the simulation.

The licensee conducted several sensitivity analyses to examine opportunities to mitigate the spatial constraints, by reducing green-up height as well as reducing the time to achieve green-up through enhanced silviculture treatments. While green-up is a key limitation to maintaining short-term harvest rates in the plan, the results of the sensitivity analyses demonstrate that a moderate reduction in green-up requirements can accommodate the base case harvest schedule for the full 20-year period of the plan. BCFS District staff reviewed the analyses and have approved the 20-year plan.

I note that while the 20-year plan is unable to accommodate the base case harvest flow for the full 20-year period, the plan is not intended to represent an operational plan. Moreover, the plan does indeed demonstrate that the base case harvest rate of 1 068 000 metres per year can be accommodated for at least the next five years. I expect that further opportunities to mitigate spatial constraints such as reviewing green-up requirements, modifying cutblock size and orientation, employing partial cutting systems or using commercial thinning techniques can be found during more detailed forest development planning.

In summary, I recognize that the base case harvest level can be supported over the next five years, while accounting for other management objectives. I find the 20-year plan

appropriate for use in this determination, and acknowledge the licensee's initiative in applying this relatively new spatial technology.

Partitioned component of the harvest

The *Forest Act* provides for portions of an AAC to be specified as attributable to different types of timber and terrain in different parts of a TFL or TSA. Partitioning an AAC ensures that harvesting is appropriately distributed in forest types, operability classes, or distinct areas.

The AAC determination associated with MP No. 7 committed the licensee to harvest at least 5000 cubic metres per year using commercial thinning. The intention was to provide Canfor with an opportunity to demonstrate performance and develop a commercial thinning strategy. While the licensee has yet to develop an overall strategy for its commercial thinning operations, I note Canfor has exceeded its commitments in MP No. 7 by employing commercial thinning to harvest an average of over 9 000 cubic metres annually during the past five years.

While I encourage the licensee to further expand commercial thinning opportunities to the extent they may improve operational flexibility and local employment, I see no need to partition the AAC at this time. Commercial thinning is clearly well established on the TFL as reflected by current management. Analysis showed that maintenance of the base case harvest forecast does not depend on commercial thinning operations and I therefore accept the information as modelled.

(b) the short and long term implications to British Columbia 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 large volumes of older forest often permits harvesting above the long-term levels without jeopardizing future timber supplies.

On TFL 37 the most notable feature of the base case harvest projection is its relative insensitivity to changing many of the inventory and management assumptions. The base case and associated sensitivity analyses describe a stable harvest flow characterized by future reductions between decades of less than two percent.

The licensee presented several other potential harvest forecasts including an even-flow forecast, a non-declining harvest flow and a harvest forecast with an increased initial harvest rate. Canfor also provided a fourth alternative that maintained the current AAC for three decades before declining to the long term harvest level.

I have reviewed the alternatives presented by the licensee and observe that the timber supply dynamics of TFL 37 provide considerable flexibility in short-term harvest rates.

The short-term harvest can indeed be maintained for several decades without incurring significant future rates of decline, but only at the expense of medium-term harvest levels.

For this determination, I accept the base case harvest forecast based on its indication of stable supply with gradual controlled change and consider it a suitable reference on which to base my determination.

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

Timber processing facilities

The majority of Canfor's woodlands operations and manufacturing facilities are located in British Columbia and Alberta. The company is a major producer and supplier of lumber, kraft pulp and kraft paper.

Most of the logs harvested from TFL 37 are processed in the B.C. Lower Mainland at one of two major processing facilities. Howe Sound Pulp and Paper Ltd. (HSSP), located in Port Mellon near Vancouver, has an annual fibre input requirement of over two million cubic metres and produces bleached kraft pulp and newsprint. Logs produced from TFL 37 are either directly or indirectly allocated to supply HSSP with chips. Pulp logs are sent directly from TFL 37 for chipping, while higher quality timber is traded for additional pulp logs and/or chips.

Westcoast Cellulofibre located in Vancouver has an annual fibre requirement of about one million cubic metres and provides chips to HSSP manufactured from material supplied by Canfor's various operations as well as other suppliers.

Approximately 75 000 cubic metres per year of logs from TFL 37 are sold annually to local mills on Vancouver Island. The material includes mostly high- or low-grade western redcedar, yellow-cypress, and Douglas-fir. TFL 37 contributes approximately 24 percent of Canfor's total harvest in B.C. Total mill consumption of Canfor's B.C. operations means the company must purchase over 50 percent of its mill fibre requirements.

I note the contribution of the TFL 37 timber harvest to the licensee's provincial operations is significant, and have considered this in my determination.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia; and

Minister's letters and memorandum

The Minister has expressed the economic and social objectives of the Crown in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). I understand both documents to apply to TFL 37. 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 community stability.

The Minister stated in his letter of July 28, 1994, that “any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.” He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

As discussed under *uneconomic and low productivity sites*, the licensee used a very detailed approach to review the economic operability on TFL 37. The methodology employed and standards used in the unit appropriately reflect current practice; I see no timber supply benefits or opportunities that would warrant partitioning the harvest at this time. I have also reviewed the opportunities for commercial thinning, and, as discussed under *commercial thinning*, the licensee is already employing this practice on the TFL.

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 discussed under *visual quality objectives*, visually sensitive areas on TFL 37 amount to less than 400 hectares or less than one percent of the timber harvesting land base. Forest cover requirements for these areas have been modelled appropriately and I have made no further adjustments to the timber supply estimate from that projected in the base case.

Local objectives

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

The licensee took a number of steps to provide opportunities for public review of the draft statement of management objectives, options, and procedures (SMOOP); draft MP No. 8; 20-year harvest plan and timber supply analysis by:

- advertising open houses in local and regional newspapers;
- distributing information by mail to municipal councils, First Nations groups, community organizations and government agencies; and,
- holding open houses, hosting a field trip and making the documents available for public viewing.

Although only two written responses from the public were received, the licensee made suitable efforts to encourage and collect public input. I have considered the general employment and community stability implications of TFL 37 in my AAC determination.

First Nations

There are three First Nations that claim traditional territories within the license area. About 90 percent of the TFL lies within the traditional territories of the Namgis First Nation. The remainder of the TFL lies within territories of the Mowachat Muchalaht, and Tlowitsis Mumtagila bands. No specific First Nations issues affecting the TFL 37 timber supply analysis or the associated MP No. 8 have been raised. As discussed above under *archaeological sites*, an Archaeological Overview Assessment (AOA) has been conducted on TFL 37 in partnership with First Nations. No significant timber supply impacts have been discovered to date. The results of further studies can be reflected in future determinations to the extent that they may affect timber supply.

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

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed or damaged by natural causes such as fire and wind, and not recovered through salvage operations.

To estimate unsalvaged losses due to fire on TFL 37, the licensee reviewed annual reports for TFL 37 issued during the period 1961 to 1996. From this information Canfor estimated average net losses of 2140 cubic metres per year for the period. In addition, the licensee estimated an average of 1025 cubic metres per year are lost to windfall, based on an estimate of annual windfall damage less average annual salvage rates of windfall for the period 1992 to 1996. The licensee indicates there are no significant losses to insect pests or disease on TFL 37.

BCFS staff have reviewed the approach and accept the assumptions used in the base case. They note that in some regenerated stands on TFL 37, snow press has been recently observed as a damaging agent but state that this damage occurs infrequently.

I find the estimates for unsalvaged losses to be reasonable although compared to similar units the estimates appear low. However I do acknowledge that the established road network that is in place on the TFL enables efficient log salvage operations. For this determination, in the absence of better information, I accept the accounting for unsalvaged losses as modelled.

Reasons for Decision

In reaching my decision on an AAC for TFL 37, I have considered all of the factors presented above and have reasoned as follows:

For the reasons stated above in “Timber supply analysis”, and from reviewing the considerations as recorded above, I accept the licensee’s base case as an adequate basis from which to assess timber supply for the purposes of this AAC determination.

In determining AACs, my considerations typically identify factors which, considered separately, indicate that the timber supply may be either greater or less than that projected in the base case. Some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be reliably quantified at the time of the determination.

In TFL 37, I find the information used in the analysis was up-to-date, appropriately portrayed and reflects current operations. The only factor where significant uncertainty exists is the issue of identified wildlife habitat requirements discussed above under *wildlife habitat*. Canfor provided an accounting of known significant wildlife habitat requirements and applied a reduction during the derivation of the timber harvesting land base. However in the base case, the management of red- and blue-listed species, as well as regionally significant species is still subject to some uncertainty.

Given this context, it is important to note that the analysis describes a very stable harvest forecast with inherent flexibility to accommodate some degree of uncertainty. For example, I expect that other key resource considerations such as riparian zones and wildlife tree patches in conjunction with the many other reductions and forest cover requirements will fulfill some of the requirements for identified wildlife. I also acknowledge that government has made a commitment to limit the impacts of managing identified wildlife species to one percent of the provincial timber supply.

Taking these factors into account, I find that the initial harvest level projected in the base case analysis can indeed be accommodated for the duration of the effective period of this AAC while accounting for uncertainties associated with the potential timber supply impacts associated with identified wildlife. Furthermore, I am satisfied this may be accomplished without introducing unacceptable risk to the management of important wildlife habitats.

In summary the analysis confirms that over the short-term the base case harvest forecast presented by the licensee can be achieved. Canfor provided a sound and well-documented analysis with no significant information deficiencies. Having considered and reviewed all the factors documented above, and taking into account the risk and uncertainty associated with the information provided, it is my conclusion that the base case projected harvest level of 1 068 000 cubic metres per year represents a suitable harvest level for TFL 37 at this time.

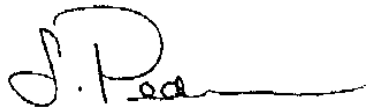
Determination

It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects the socio-economic objectives of the Crown for the area, that ensures longer-term IRM objectives can be met including those in the Forest Practices Code, and that reflects current management practices, can best be achieved in TFL 37 at this time by establishing an AAC of 1 068 000 cubic metres.

Implementation

This determination is effective January 1, 1999 and will remain in effect until a new AAC is determined, which must take place within five years of the effective date of this determination. In the period following this determination and leading to the subsequent determination, I request that the licensee perform the following:

- continue to examine potential management strategies to provide flexibility in accessing timber supply during decades seven and eleven;
- clarify the definitions of NSR areas and the relationship with regeneration delay.



Larry Pedersen
Chief Forester

December 22, 1998

Appendix 1: Section 8 of the *Forest Act*

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

8. Allowable annual cut

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

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

(2) If the minister

- (a) makes an order under section 7 (b) respecting a timber supply area, or
- (b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

- (c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
- (d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

- (a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
- (b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

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

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

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

- (c) gains in timber production on Crown land that are attributable to silviculture treatments funded by the government of British Columbia, the federal government, or both.
- (6) The regional manager or district manager must determine a volume of timber to be harvested from each woodlot licence area during each year or other period of the term of the woodlot licence, according to the licence.
- (7) The regional manager or the regional manager's designate must determine a volume of timber to be harvested from each community forest agreement area during each year or other period, in accordance with
 - (a) the community forest agreement, and
 - (b) any directions of the chief forester.
- (8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider
 - (a) the rate of timber production that may be sustained on the area, taking into account
 - (i) the composition of the forest and its expected rate of growth on the area,
 - (ii) the expected time that it will take the forest to become re-established on the area following denudation,
 - (iii) silviculture treatments to be applied to the area,
 - (iv) the stand of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
 - (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
 - (vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,
 - (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,
 - (c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,
 - (d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and
 - (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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

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

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to
 - (a) encourage maximum productivity of the forest and range resources in the Province;
 - (b) manage, protect and conserve the forest and range resources of the Crown, having regard to the immediate and long term economic and social benefits they may confer on the Province;
 - (c) plan the use of the forest and range resources of the Crown, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the Crown and with the private sector;
 - (d) encourage a vigorous, efficient and world competitive timber processing industry in the Province; and
 - (e) assert the financial interest of the Crown in its forest and range resources in a systematic and equitable manner.

Documents attached:

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

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