

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Invermere Timber Supply Area

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

effective March 1, 1996

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Objective of this Document

This document is intended to provide an accounting of the factors considered and the rationale employed in making my determination, under Section 7 of the *Forest Act*, of the allowable annual cut (AAC) for the Invermere Timber Supply Area (TSA). The document will also identify where new or better information is required for incorporation into future determinations.

Description of the TSA

The Invermere TSA covers approximately one million hectares in the south-eastern part of British Columbia along the Alberta border. The TSA is in the Nelson Forest Region, and is administered from the Invermere Forest District office in Invermere. The TSA's boundaries coincide with those of the district, adjoining the Alberta border to the east, the Cranbrook TSA to the south, the Kootenay Lake TSA to the west, and the Golden TSA to the north.

The topography of the TSA is varied and includes two rugged mountain ranges, the Rocky Mountains and the Purcell Mountains, separated by the Rocky Mountain trench, a flat valley through which the Kootenay River flows south and the Columbia River flows north.

About 51 percent of the provincial land in the TSA is either not managed by the British Columbia Forest Service (BCFS) or is not forested. Of the productive crown forest land, more than half is not economical or feasible to harvest and adequately reforest, either due to environmental sensitivity, low timber production, rough terrain, difficult access, wildlife habitat requirements or non-merchantable timber. In total, the area on which timber harvesting may currently be expected to occur (the current timber harvesting land base) is 233 759 hectares, about 23 percent of the total TSA land base.

Lodgepole pine forests are the most prevalent in the TSA, accounting for 44 percent of the timber harvesting land base. Forests dominated by Douglas-fir, ponderosa pine, spruce and larch are also common. Over half of the forests of the timber harvesting land base are currently considered immature (younger than 80 years for pine and 120 years for other species).

The Invermere TSA encompasses the communities of Invermere, Windermere, Canal Flats, Edgewater, Radium Hot Springs and Fairmont Hot Springs. In total, the population of the TSA was 7185 in 1991; 31 percent resided in the town of Invermere at that time. Approximately 400 members of the Columbia and Shuswap bands live within the TSA.

The timber processing facilities in the TSA are outlined below in section 7(3)(c).

History of AAC

Prior to 1990 the AAC was 696 190 cubic metres. Effective January 1, 1990, that level was raised for a three-year period by 40 000 metres to 736 190 metres, with the stipulation that the additional volume would be harvested exclusively from small-diameter pine stands previously excluded from the net operable land base. Subsequent to that determination, 21 518 hectares were transferred from the TSA to TFL 14, and the AAC was reduced, effective January 1, 1990, by 38 926 metres to 697 264 metres. The temporary uplift for small-diameter pine was later extended for a year but failed to attract interest from the industry. As a result, the AAC was reduced to 657 264 metres as of January 1, 1994.

That level remains in effect today and is currently apportioned by the Minister of Forests as follows:

	Cubic Metres	% of AAC
Forest Licences (2)	545 169	82.9
Timber sale licences <10 000 m ³	12 142	1.9
Small Business Forest Enterprise Program	81 579	12.4
Woodlot Licences	6700	1.0
Subtotal (allocated)	645 590	98.2
Unallocated (forest service reserve)	11 674	1.8
Total = current AAC	657 264	100.0

New AAC Determination

Effective March 1, 1996, the new AAC for the Invermere TSA will be 591 500 cubic metres. This 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 the Invermere TSA includes the following:

- *East Kootenay Land Use Plan*, March 1995;
- Total Resource Plans (TRPs) for the Invermere Forest District;
- Forest inventory planning file, British Columbia Forest Service (BCFS);
- Five-year timber harvesting development plans;
- Silviculture history records, BCFS;
- Interior Close Utilization Standards, BCFS;
- Soil Conservation Guidelines for Timber Harvesting (Interior BC), BCFS;
- *Invermere TSA Timber Supply Analysis*, BCFS, April 1995;

- *Invermere Timber Supply Area Socio-Economic Analysis*, May 1995;
- *Invermere Timber Supply Area: Timber Supply Review Public Discussion Paper*, BCFS, May 1995;
- *Invermere TSA Summary of Public Input*, BCFS;
- *Invermere TSA Timber Supply Review Audit*, Timberline Forest Inventory Consultants, August 1995 (the "licensees' analysis");
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Regulations*, April 1995;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Technical review and evaluation of current operating conditions through comprehensive discussions with BCFS staff, including the AAC determination meeting held on August 23-24, 1995.

Role and Limitations of the Technical Information Used

The *Forest Act* requires me to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis and the inventory and growth and yield data used as inputs to the analysis formed the major body of technical information used in my AAC determination for the Invermere TSA. The timber supply analysis is concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices. The analysis also indirectly incorporates some economic information such as an operability classification that defines the types of terrain and timber that can be physically and economically accessed given current technology and markets.

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

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

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

Statutory Framework

Section 7 of the *Forest Act* requires the Chief Forester to consider various factors in determining AACs for TSAs. Section 7 is reproduced in full as Appendix 1.

Guiding Principles for AAC Determination

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

In considering the various factors that section 7 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply—such as integrated resource management (IRM) objectives beyond those articulated current plans, as for instance, in approved resource plans for the Invermere TSA or the Forest Practices Code.

The impact of the Forest Practices Code on timber supply is a matter of considerable public concern. In determinations made before the Code was brought into force, no final standards or regulations were available at the time the BCFS timber supply analyses were conducted. Accordingly, these analyses were unable to assess the impacts of any new constraints on timber production which might be imposed under the Code. In those determinations I did not consider any more stringent restrictions or additional impacts upon timber supply beyond those anticipated to occur due to the application of guidelines current at the time of determination. However, I assumed that the Code would at least entrench the standards exemplified by those guidelines as statutory requirements.

The *Forest Practices Code Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995. Preliminary studies in selected TSAs indicate that under the Code there will be some impacts on timber supply additional to those expected under previous guidelines. In many AAC determinations made since the coming into force of the Code, I have viewed with some

caution the timber supply projections in the BCFS timber supply analyses for TSAs such as Invermere, which pre-date the implementation of the Code. At the same time, I have been mindful that the full force of the Code may not be felt during the transition phase of its implementation, and the impacts of specific factors on timber supply may not yet have been assessed on a local basis. In the Invermere TSA, forest practices currently implemented largely reflect the requirements of the Code. Therefore, while I expect that some modifications or adjustments to forest practices may be required as improved information becomes available regarding practices under the Code, it is likely that future analyses will indicate that any additional constraints on timber supply will be minimal.

The impact on the timber supply of land use decisions resulting from planning processes such as the Commission on Resources and Environment (C.O.R.E.) process or the Land and Resource Management Planning (LRMP) process is a matter often raised in discussions of AAC determinations. In determining AACs it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from land-use decisions that have not yet been taken by government. Thus I do not consider the possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made land-use decisions—such as its March 1995 East Kootenay Land Use Decision—it may not always be possible to assess their timber supply impact in an AAC determination. In most cases, government's land-use decision must be followed by detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made, it is impossible to properly assess the impact of the land-use decision. However, the legislated requirement for five-year AAC reviews will ensure such decisions are addressed.

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

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

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

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

Regarding future treaty decisions, as with other land-use decisions, it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

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

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

The role of the "base case"

In considering the factors required under section 7 to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the timber supply review project. For each TSA determination a timber supply analysis is carried out, using a data package of information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of data and a computer simulation model (FSSIM), a series of timber supply forecasts is produced. Each forecast is based on the same set of data, and reflects different decline rates, initial harvest levels and potential trade-offs between short- and long-term harvest levels.

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

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

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its theoretical estimates 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 about forest management, which—particularly during the period leading up to and now during the implementation of the Forest Practices Code—may well have changed since the original data package was produced.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. But once an AAC has been determined that reflects appropriate assessment of all factors required to be considered, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined — it would be impossible for any such analysis to fully incorporate the subtleties of the judgement involved.

For the Invermere TSA, the BCFS analysis indicated that maintaining the current AAC would cause serious future declines in timber supply. To avoid such declines in the BCFS analysis base case, it was necessary to establish an initial harvest level of 568 000 cubic metres per year, which is 12.7 percent less than the current allowable annual cut. After the first decade, the projected harvest level falls by 12 percent per decade for the next four decades before reaching a level of approximately 315 000 cubic metres per year at year 50. The projected timber supply remains at this level for four decades before rising over two decades to a long-term level of 360 000 cubic metres per year in 120 years. Overall there is a 45 percent decline from the current harvesting level to the long-term level.

In the BCFS analysis, the land base allocated to woodlots was deducted to reflect their separate AAC administration. In order to maintain a correlation between the initial harvest level shown in the analysis and the timber harvesting land base, the volume apportionment for woodlots—6700 cubic metres—was not included in the base case projection.

Section 7 (3)

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

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

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

Land base contributing to timber harvest

The total area of the Invermere TSA is approximately one million hectares. The land base that is considered available for timber harvesting (the "timber harvesting land base") is limited by environmentally sensitive areas (ESAs), non-merchantable forest types, inoperability and the use of the area for purposes other than timber production. Reasonable assumptions, and if necessary, projections, must be made about these factors and appropriate areas must be deducted from the productive forest area in order to determine the timber harvesting land base. The timber harvesting land base established for the purposes of the BCFS analysis was 233 759 hectares.

I note that in the Invermere TSA a relatively large area has been deducted to account for ESAs and other resource values as currently managed. While practices in place at the time of the BCFS analysis may have precluded any development on these excluded areas, it is possible that there may be some future potential for limited development in some of these areas. In particular, harvesting methods other than clearcutting, where suitable, may provide opportunities to harvest in some of these excluded areas (as discussed in Silvicultural systems). Additionally, information gathered during the implementation of the Code may provide new insight into methods of development that could be appropriate for use in these areas. Since the eventual extent of any potential development is not known at this time, and the specific implications for timber supply are currently uncertain, any consideration of such development must await future AAC determinations.

As described in the *Timber Supply Review Discussion Paper* for the Invermere TSA, the timber harvesting land base used in this analysis is smaller than the land base used in previous timber supply analyses. This is due primarily to deductions for a wilderness area established in 1987, updated information on steep slopes and other areas that are not economical or feasible to harvest, and the creation of forest ecosystem networks (FENs).

District staff indicate that due to the erroneous inclusion of part of the TFL 14 land base, the size of the timber harvesting land base for the TSA was overestimated in the BCFS analysis. The analysis included 11 600 hectares of TFL timber harvesting land base as part of the TSA because a 1989 boundary change to TFL 14 had not yet been updated in the old inventory file. This TFL area, which formed 4.7 percent of the timber harvesting land base used in the BCFS analysis

should not contribute to the timber supply for the Invermere TSA and I have accounted for this along with the land base adjustment discussed in the next paragraph.

The Invermere licensees commissioned a timber supply analysis (the licensees' analysis) from Timberline Inventory Consultants and this analysis was submitted through the public input process for the TSA. In the licensee analysis, an error in the coding stage of the BCFS analysis was noted and District staff have acknowledged that an adjustment is required. In this case, a small portion of the timber harvesting land base, 540 hectares or 0.2 percent, was excluded in error. Overall, the combined impact of the adjustments for the inclusion of 11 600 hectares of TFL land and the 540 hectares excluded in error, results in a 4.5 percent reduction in the overall size of the timber harvesting land base used in the BCFS analysis. The land base sensitivity analysis created as part of the BCFS provides an indication of the magnitude of the timber supply impact associated with this adjustment. However, the sensitivity analysis may be slightly conservative as the TFL land is slightly more productive than the average across the TSA. I agree that these adjustments are required, and I have accounted for a five percent influence on the initial harvest level shown in the base case analysis as described in my "Reasons for decision".

- the East Kootenay Land Use Plan

The government's East Kootenay Land-Use Plan was released on March 13, 1995. Under this plan, various land uses are designated, some of which will result in decreased availability of timber for harvesting, and some of which will work to increase timber availability. It is not yet possible to predict with certainty the overall implications for timber supply that will result from implementing this plan. Further information is required before these implications may be incorporated into an AAC determination. Experience gained during the implementation of the plan will provide essential information for consideration in a future AAC determination.

- deductions for integrated resource management objectives

As indicated in the appropriate sections below, under section 7(3)(a)(v), some integrated resource management objectives were accounted for in the BCFS analysis through deductions from the timber harvesting land base. As discussed in those sections, I am satisfied that this methodology accounts appropriately for the timber supply impacts of meeting these objectives.

- excluded forest types

In the BCFS analysis for the Invermere TSA, 26 863 hectares or 5.3 percent of the crown productive land base were deducted as low productivity sites and unmerchantable forest types, including mature small diameter lodgepole pine and Douglas-fir in pure stands. The original reductions for excluded forest types were developed through a joint committee of licensees and the BCFS.

In the public input received it was suggested that the criteria used to define excluded forest types should be developed in consideration of all potential forest products, not just sawlogs. It was in recognition of the possibility of producing forest products other than sawlogs that AAC increases were offered to promote the utilization of these deducted forest types each year from 1983 to 1994. Although there has been limited harvesting in these forest types to date, the contribution of the forest types will undoubtedly become more significant as timber supplies decline.

In the BCFS analysis, some marginally productive younger forests were excluded from the timber harvesting land base. These forests were excluded because BCFS staff felt that the analysis methods may not correctly reflect the growth of these types of forests and may overestimate their timber supply contribution. Indeed, assuming that *all* of these forests will eventually grow to be merchantable does introduce an element of risk to timber supply projections. However, the approach used in the BCFS analysis is likely too conservative as it implies that *none* of these marginally productive forests will contribute to timber supply. While greater certainty cannot be achieved without longer-term research results, I accept that it is likely that some portion of marginally productive younger forests excluded from the timber harvesting land base in the BCFS analysis will contribute to a higher timber supply than projected in the BCFS base case, particularly in the medium to long term.

In their analysis, licensees suggest that the methodology used to define non-merchantability in the BCFS analysis was too broad. The licensee analysis uses an alternative methodology, a modified removal of some unmerchantable forests occurring on slopes less than 30 percent, where lower harvesting costs make harvesting lower value wood more feasible. Using this methodology, the licensee analysis defined a timber harvesting land base about two percent larger than the one used in the base case.

In assessing the overall potential timber supply contribution attributable to excluded forest types, I am guided by the base case analysis presented by BCFS staff, in which these marginally productive forests were not included and by the licensee analysis which included deducted forest types on slopes less than 30 percent. I am satisfied that there is a potential for some portion of these excluded forests to become merchantable and that fully excluding them underestimates the timber supply. I have accepted that these forest types contribute up to two percent to timber supply through the forecast period beyond that projected in the base case and I have accounted for this in my determination as discussed in "Reasons for decision".

- estimates for roads, trails and landings

While inventory files include information about major roads, an estimate for other roads, trails and landings is applied in each BCFS analysis. In the BCFS analysis, a

reduction of 10.5 percent was applied to the areas of the timber harvesting land base occupied by forests younger than 40 years of age to account for existing roads, trails and landings. Forests currently over 40 years of age are subject to the same 10.5 percent reduction to account for future roads, trails and landings after the areas have been harvested once. This approach was supported by licensees and was duplicated in their own timber supply analysis.

One public submission questions the net total 10.5 percent reduction for current and future roads applied to the timber harvesting land base, stating that seven percent is the provincial allowance. According to the *Soil Conservation Guidelines for Timber Harvesting (Interior BC)* which govern current practice, seven percent disturbance is the permissible limit for permanent roads and landings, but the guidelines also specify that trails may contribute an additional six to 13 percent depending on displacement and erosion hazards. The BCFS base case includes an estimate of the loss for all three of these structures and is therefore well within applicable provincial guidelines.

In reviewing timber supply in other areas of the province, I note that deductions for roads, trails and landings are not all projected from the basis of an average provincial value, but instead vary with the particular terrain characteristics of each TSA. From my experience, I would expect the percentage reduction for roads, trails and landings for an area with the topography found in the Invermere TSA to be higher than the provincial average, and this borne out by the BCFS analysis. I am satisfied that the estimate used in the analysis is acceptable for use in this determination.

- operability

Operability was defined in the BCFS analysis according to slope, topography, access, soil stability, elevation and terrain characteristics. In the BCFS analysis, the Crown forest was reduced by 186 497 hectares to account for inoperable areas and steep slopes. The *Timber Supply Review Discussion Paper* for the Invermere TSA identified as a critical issue the potential for increasing the timber harvesting land base by harvesting with new technologies.

In their timber supply analysis, licensees used a different steep slope reduction from that used in the BCFS analysis. The adjustment made in the licensees' analysis implies that licensees will be able to harvest on some of the steeper terrain within areas currently included in harvesting plans. Licensees have provided information indicating they now have the equipment required to successfully harvest on steep slopes and that there is a good record of recent success in operating on some steep slopes, although it is difficult to assess the extent to which this would affect the base case operability estimates. Additionally, even where harvesting is technically feasible, some portion of these areas may also be unavailable for harvest as they are required for other resource values.

In evaluating the methodologies used in the base case and in the licensees' analysis, I find that there is likely to be some harvesting on steep slopes not accounted for in the BCFS analysis. However, no data are available to assist me in quantifying the extent to which such harvesting may occur. In recognition of the uncertainty associated with this factor, I have considered it as a very small upward influence on the initial harvest level projected in the base case as discussed in "Reasons for decision".

Existing forest inventory

- general comments

The last inventory for the Invermere TSA was conducted between 1974 and 1979. A reinventory was carried out in 1993 and 1994 for 30 percent of the TSA's mapsheets. The reinventory includes new classification standards for environmentally sensitive areas (ESAs), and was updated for disturbances such as fire and harvesting in 1992, and projected to reflect forest growth up to 1994. I have no evidence to indicate that the inventory information used in the BCFS analysis is inaccurate, and I am satisfied that this inventory provides the best information available from which to project the timber supply.

- age class distribution

Twenty-three percent of the forests in the timber harvesting land base are older than 140 years of age and these older forests provide the wood volumes necessary to allow continuation of short-term harvests above the long-term harvest level. Only 4.9 percent of the forests on the timber harvesting land base are between 21 and 40 years of age and this shortage necessitates a decline in harvest level 10 years from now in order to ensure a relatively gradual transition to long-term levels.

- volume estimates for existing stands

The BCFS analysis used the Variable Density Yield Prediction (VDYP) growth and yield model to predict volume estimates for existing stands. VDYP is based on information gathered from a large number of sample plots, and is generally accepted in British Columbia as an adequate model for projecting volumes in existing stands. Therefore, as a general principle in AAC determinations, in the absence of statistically valid contradictory evidence for a particular area, I rely on VDYP estimates for existing stand volumes. Inventory audits are currently being conducted throughout the province, and a ratio-sampling study carried out as part of the audit of the Invermere TSA supports the volume estimates for existing stands. For the purposes of this determination, I am satisfied that with the volumes projected by VDYP estimates.

Expected rate of growth*- site productivity estimates*

Inventory data are used to determine site indexes, which are indicators of the productivity or growth potential of forest sites. Site indexes are based on the relationship between tree heights and ages in forest stands. The productivity of a site largely determines how quickly trees will grow and therefore affects expectations of the time seedlings will take to reach green-up conditions, the volumes of timber that will grow in regenerated stands and the time required for stands to reach a merchantable size or minimum harvestable age.

Ongoing provincial paired-plot studies show that for some species in some areas, current site indexes, determined using inventory information from existing unmanaged forests, underestimate the growth potential of some regenerated forests. The licensee analysis endeavoured to correct for this potential bias by replacing the site index values for older forests with those of forests aged between 30 and 150 years on the assumption that these latter forests provide a more reliable estimate of site productivity for regenerated sites. Using these adjusted site indexes, the licensee analysis projected higher values in regenerating forests.

I accept that site productivity may be higher than was estimated in the BCFS analysis. The underestimation of site productivity has the potential to influence minimum harvestable ages, green-up periods and future forest volumes and would likely affect timber supply in the mid and long term. However, without further evidence, I cannot consider the attribution of site indexes for younger stands to all older stands, as was done in the licensees' analysis, to be a reasonable extrapolation. The BCFS is examining site productivity concerns across the province, and based on this investigation, where appropriate, site productivity adjustments will be incorporated into future analyses

The licensee's analysis also points out that the BCFS analysis procedures did not recognize the "special-site" coding in the inventory data base. Special-site coding is applied to particular areas where site estimates have been revised to reflect improved information. BCFS staff agree that, had the special-site coding been used, the overall effect would be to increase the total existing stand volumes by up to three percent. BCFS staff have acknowledged that this adjustment is reasonable.

The BCFS existing mature volume sensitivity analysis shows that short-term timber supply is sensitive to changes in estimated volumes in mature forests. Correcting existing stand volumes for special site coding therefore has the potential to increase short-term timber supply. I am mindful of an opportunity for

a small increase in the initial timber supply from that indicated in the BCFS base case, and I have considered this in my determination.

- volume estimates for regenerated stands

In predicting regenerated stand volumes for future managed forests, the BCFS timber supply analysis used the Table Interpolation Program for Stand Yields (TIPSY) growth and yield model for future regenerated stands. TIPSY was also applied to stands which have been harvested and regenerated over the past 20 years. Volumes predicted using TIPSY account for the effects of initial stocking and density control.

To account for operational conditions, Operational Adjustment Factors (OAFs) are applied to TIPSY yield predictions in order to compensate for the loss of timber productivity due to such factors as openings in stands (OAF1), as well as age-dependent factors such as pests, decay, waste and breakage (OAF2). For the Invermere analysis, OAF1 was 20 percent and included a deduction of five percent to account for unharvested seed trees. OAF2 varied between 8.1 percent and 10.8 percent and accounted for future losses anticipated due to the spread of root rot.

It is current practice in the Invermere TSA to not return later to harvest seed trees retained on cutblocks after harvesting. To account for the ongoing retention of seed trees a five percent reduction, derived from data collected in an adjacent TSA, was applied. While I recognize that there may be some future potential to salvage some volume from these seed trees, I note that the current practice of leaving seed trees on the site contributes to biodiversity requirements as discussed in *stand-level biodiversity*. Losses due to root rots are often difficult to apply with certainty, but in the Invermere TSA recently completed root rot surveys have allowed district staff to estimate expected root rot losses more accurately than has been possible in some other TSAs. Overall, the BCFS analysis for the Invermere TSA used higher than average OAFs and this resulted in the prediction of lower yields than in other units across the province. However, these OAFs are based on well-founded estimates and the resulting yields are reasonable for use in this TSA. I therefore find the OAFs used in the BCFS analysis to be acceptable for use in this determination.

As discussed in *site productivity estimates*, above, an underestimate of site productivity may result in attaining higher volumes in regenerated stands than currently expected. BCFS sensitivity analysis indicates that if regenerated stand volumes were 10 percent higher than estimated in the base case, some increase in the base case harvest forecast would be apparent in the long term, but not earlier. Based on these considerations, I accept the estimates of regenerated stand volumes prepared by the BCFS as the best available information for this determination.

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

Minimum harvestable ages

Minimum harvestable age is an estimate of the age at which a forest stand has grown to a harvestable condition. Current practice in the Invermere TSA is to harvest forest stands at ages that are based on integrated resource management, forest health and operational considerations; this results in projected minimum harvest ages ranging from 70 to 160 years depending on tree species and site productivity.

As discussed in *site productivity estimates*, if site indexes are underestimated, then the age of harvestability may be overestimated. Sensitivity analysis of minimum harvestable ages projects that if minimum harvest ages were 20 years less than those assumed in creating the base case, there could be a small increase in the immediate harvest level, and mid-term harvest levels could be increased, thereby avoiding a drop below the steady long-term level. I am therefore mindful that if site productivity is underestimated, it may be possible that minimum harvestable ages will be less and this could work to increase the timber supply. However, for two reasons I must be cautious in giving too much weight to this factor. First, there is uncertainty about the assumed higher site indexes, and second, minimum harvestable ages are based on management objectives which include assessments of the future marketability of particular products. For the present determination I am satisfied that the minimum harvestable ages assumed in the BCFS analysis reflect current management practices, and I have made no adjustment respecting lower harvestable ages.

Regeneration delay

Regeneration delay is the period between harvesting and the point at which an area is occupied by a specified minimum number of acceptable, well-spaced trees. In the Invermere TSA analysis, regeneration delays of four years for planted areas and seven years for naturally regenerated areas were assumed. The analysis also included assumptions about the relative proportion of planted areas and naturally regenerated areas.

The licensees' analysis suggests that the delay periods used in the BCFS analysis are too long and that current practice in the TSA actually creates delay periods closer to two years and five years for planted and naturally regenerated areas respectively. The licensee analysis projects that reducing regeneration delay periods to two and four years respectively results in a four-percent upward influence on the projected timber supply after the second decade. However, district staff have reviewed their records regarding regeneration delay periods and have confirmed that the regeneration delay periods assumed in the base case are a reasonable reflection of current practice.

A recent review of 759 Integrated Silviculture Information System (ISIS) records indicates that the use of natural regeneration is more prevalent than was anticipated at the time of the analysis. This shift away from planting harvested areas has the potential to extend regeneration delay periods, thereby generating a downward pressure on timber supply, mostly in the mid and long term. However, there is an opportunity to offset this downward pressure by restoring the proportion of planted area to naturally regenerated area to the level indicated in the base case. To the extent that this trend continues, any timber supply impact will be considered in a future determination.

I also note that decreasing average regeneration delay periods for this TSA, by increasing the use of planting beyond what is indicated in base case, could offset some downward pressures on timber supply. Therefore, it is reasonable to examine the merit of an aggressive reforestation strategy in the Invermere TSA. At this time, however, the increased use of natural regeneration methods adds a small element of risk to timber supply and I have considered this in my determination.

Impediments to prompt regeneration

Some reforestation challenges exist in the Invermere TSA, primarily on dry sites, as a result of wildlife browsing and due to root rot. However, these impediments were considered in the base case. To overcome barriers to prompt regeneration, aggressive silviculture practices are being implemented in the Invermere TSA, including: site preparation, prompt planting after site preparation, and utilizing a variety of silviculture systems. To overcome wildlife browsing, trees are being protected with netting, and to overcome reforestation impediments arising from root rots, the District is using methods such as pushover harvesting and destumping.

I am confident that existing impediments to prompt regeneration are being addressed with current management and that this factor has been considered appropriately in the base case.

Not-satisfactorily-restocked areas

At the time of the BCFS analysis, a total of 17 817 hectares of NSR areas existed in the Invermere TSA. In the analysis it was assumed that the current NSR, 10 533 hectares, comprised of recently harvested areas not yet covered by a sufficient number of trees of a desirable species, would be restocked at an even rate over the next 20 years. The remaining 7825 hectares of backlog NSR which have not reached stocking standards within the specified regeneration delay period were assumed to be restocked within the next 10 years.

With regard to backlog NSR, surveys completed over the next three years will resolve questions regarding the future treatments to be applied to backlog NSR areas. BCFS staff suggest that it will likely not be feasible to treat the majority of

these sites due in part to their location and stocking densities. As many of these forests are currently on the margin of meeting minimum stocking standards, the cost of any treatments is likely to far exceed the anticipated benefits. The lower stocking densities anticipated for backlog NSR areas will produce lower volumes than those modelled by TIPSy and this results in a small downward influence on long-term timber supply. Further detailed information about the long-term impacts of managing backlog NSR in the Invermere TSA will be available when surveys are completed prior to the next determination. To the extent that any timber supply impact occurs, it will be considered at that time.

Upon examining the assumptions for current NSR used in the base case analysis, I must conclude that the assumptions used do not accurately reflect current practice. BCFS staff have re-examined the 20-year time frame used in the BCFS analysis and they now feel that five years would be a more appropriate estimate. This shorter delay in establishing forests on current NSR areas creates a small addition to the timber supply throughout the forecast period, and I have accounted for this as discussed in "Reasons for decision".

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

Silvicultural systems

Some areas of the TSA are currently harvested using methods other than clearcutting. The BCFS analysis included adjustments for the use of seed tree systems, but did not model other methods of non-clearcut harvesting occurring in the TSA, as their growth and yield implications are uncertain. Research into the development of growth and yield information for these silvicultural systems is underway. For the purposes of this determination, I have no information to suggest that the current use of alternative silviculture systems will affect the short-term harvest level. I anticipate that further research information will be available so that the use of non-clearcut silvicultural systems may be addressed more fully in the next timber supply analysis for this TSA.

I note that if increases are made in the amount of non-clearcut methods used, it is likely that adjacency and green-up requirements will not restrict timber supply to the same extent. It is foreseeable that a shift to harvesting more area using these systems may become necessary in order to accommodate other important forest management objectives. As discussed in Land base contributing to timber harvest, it is also possible that the use of alternatives to clearcut harvesting could affect harvest flows by allowing access to some currently excluded forest stands. To the extent that a shift from clearcutting towards other silvicultural systems occurs, any consequent effects on timber supply will be considered in future determinations.

The seed tree silviculture system is used on approximately 30 percent of the harvested sites in the Invermere TSA. As discussed in - *volume estimates for*

regenerated stands, it is current practice to leave seed trees on cutblock areas to meet stand level biodiversity requirements and *future* volumes were adjusted to account for this. However, no adjustment was made in the BCFS analysis to account for seed trees left behind when *existing* forests are harvested. The BCFS sensitivity analysis for existing stand volumes shows that if existing stand volumes are underestimated, short timber supply is affected; therefore, I have accounted for a small downward influence on the short-term harvest levels projected in the base case in "Reasons for decision".

Intensive silviculture

Over the next five years, 511 hectares of pruning and 1900 hectares of fertilization are planned to be carried out in the Invermere TSA. In the *Timber Supply Review Discussion Paper* the potential for intensive silviculture to increase tree growth, and thereby alleviate timber supply pressures, was discussed as a critical factor. The fertilization program currently planned for the TSA was not modelled in the base case and is anticipated to produce some very minor volume gains. This creates a very small unquantified upward pressure on the long-term base case timber supply.

Commercial thinning

Documented research indicates that single-entry commercial thinning will not significantly increase long-term timber supply, though it may increase the value of the future final harvest. Commercial thinning is therefore viewed as a mechanism to alleviate timber supply reductions arising from age-class gaps by moving the harvesting of some volume forward from the planned harvest age.

Approximately 23 percent of the forests in the Invermere TSA timber harvesting land base are 40 to 80 years old and may be potential candidates for commercial thinning. To date, very little commercial thinning has occurred in the Invermere TSA. However further studies are required to identify candidate forests for commercial thinning and to assess the impact of this practice on the projected short- and long-term timber supply. If a commercial thinning strategy is developed in the future, then the implications will be reflected in a future determination.

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

Utilization standards and compliance

The utilization level defines a standard maximum allowable stump height and minimum merchantable diameter by species and is used to calculate merchantable volumes. In the BCFS analysis, the *Interior Close Utilization Standards* were assumed. I have received no evidence which would indicate any problems in complying with these standards. Therefore, I am satisfied that the assumption used

in the analysis adequately represents the minimum utilization standards practised in the area and that these are appropriate for the area.

Decay, waste and breakage

Standard BCFS procedures were used in the analysis to account for decay, waste and breakage. No evidence was presented to suggest inaccuracies in these factors, and I accept them as suitable for use in this determination.

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

Integrated Resource Management (IRM) objectives

As provided in the *Ministry of Forests Act*, the purpose and function of the Ministry of Forests is to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources to ensure production and harvesting of timber and the realisation of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. In recognition of the Ministry's role in planning the integrated use of forest resources, the Invermere District has completed and approved Total Resource Plans (TRPs) for 80 percent of the timber harvesting land base of the TSA. The district describes their TRPs as comprehensive, landscape level plans that provide detailed direction for operational practices which facilitate integrated resource management, including strategies for timber harvesting and biodiversity over an 80- to 100-year time frame. At the time of the BCFS analysis, the implications of this planning had not been refined for use in an AAC determination. BCFS staff have since had the opportunity to define the land base implications of TRPs.

- cutblock adjacency

In order to protect important resource values such as wildlife, water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks, and prescribe minimum times for adjacent cutblocks to reach a desired height (green-up). This provides for a distribution of harvested areas and retained forest cover across the landscape, and as such, it takes into account the impact of several forest management issues. In B.C., cutblock adjacency guidelines are commonly expressed in terms of the number of harvesting entries, or 'passes', required to remove the mature timber from the timber harvesting land base.

The *Timber Supply Review Discussion Paper* for the Invermere TSA identified the number of passes modelled in the BCFS analysis as a critical factor. A three-pass harvesting regime was assumed in the timber supply analyses for this TSA, in which 40 percent of the timber is harvested in the first pass. After the harvested areas are reforested and meet green-up requirements, 30 percent of the remaining harvestable forest is planned to be removed in each of two future passes.

Based on a review of TRPs approved since the time of the BCFS analysis, in which past harvest patterns, cutblock locations, cutblock sizes and topography in the Invermere TSA were reviewed, District staff indicate that a more restrictive harvesting regime would more accurately represent cutblock adjacency constraints. A sensitivity analysis in the BCFS analysis shows that if harvesting throughout the TSA were actually conducted under a four-pass regime, the projected initial harvest level would need to be lowered to 510 000 cubic metres per year, instead of 568 000 cubic metres per year as shown in the base case.

After examining a number of similar TSAs in the province, I note that an average of three passes are assumed in the BCFS analyses. I acknowledge that the number of passes is often difficult to determine. However, the three pass harvesting system assumed in the BCFS analysis for this TSA represents the average used in the current timber supply review, and I have no reason to believe that a four-pass regime would be required throughout the Invermere TSA to reflect overall forest cover requirements. However, detailed study of TRPs reveals that a four pass system may be required in some areas of the TSA. Further study of the number of harvesting passes that would most accurately represent cutblock adjacency constraints in the Invermere TSA is required prior to the next AAC determination for this TSA. For the purposes of this determination, I have concluded that the likelihood of additional harvesting passes being required in some areas does create downward pressure on the base case, and I have accounted for this in "Reasons for decision".

- visual quality objectives

Under the *Ministry of Forests Act*, the BCFS is required to manage outdoor recreation resources, including its scenic values. Procedures for identifying and managing visually sensitive areas incorporate both biophysical and social factors and provide recommended visual quality objectives (VQOs) for visually sensitive areas. The VQOs determine what percentage of the area is permitted to have forests below specified heights.

In the BCFS analysis for the Invermere TSA, scenic landscapes were considered to occupy 14.5 percent of the timber harvesting land base. For these areas, it was assumed in the BCFS analysis that harvested blocks must have forests at least six metres tall before adjacent mature timber can be harvested; on over half of the scenic landscapes, only a maximum of 16 percent of the forests can be below six metres in height at any one time.

District staff have presented information which indicates that the VQOs used in the BCFS analysis were unnecessarily stringent when considered in combination with reductions and constraints for other resource values. Additionally, the dry-fir/pine grass ecosystems of the trench area do not require the stringent VQOs currently specified and the contribution to visual quality objectives made by the use of partial harvesting systems, as compared to clearcut methods, was not considered. I note

that there is an established pattern of harvesting locally and that harvesting outside of the main highway corridor has generated few concerns from the public or tourists. Additionally, many of the other deductions and management objectives used in the BCFS analysis contribute to meeting visual quality objectives. Several public comments, received as input to this review, support this view and indicate that VQOs could be relaxed in order to sustain timber supplies while maintaining environmental objectives.

In view of the Minister of Forests' letter of July 28, 1994, conveying the social and economic objectives of the Crown, in which he suggested the Chief Forester should take into account locally expressed objectives where these are consistent with provincial objectives, and in view of the Minister's expressed objective of minimizing AAC reduction consistent with maintaining long-term forest productivity in my determination, I have accounted for the difference between the VQOs as modelled and as practiced, as an addition to timber supply, as discussed in "Reasons for decision".

- riparian areas

In the BCFS analysis, a total of 1.5 percent of the timber harvesting land base was deducted to account for the management of riparian areas. Given that the Forest Practices Code now requires a more restrictive regime than required by the previous guidelines, a greater land base reduction is required than was accounted for in the base case. After examining preliminary studies of the timber supply impacts of Code requirements for riparian management, and based on experience gained in other TSAs, I conclude that a reduction in the order of magnitude of five percent of the timber harvesting land base would likely be required for this TSA. However, the required characteristics of these riparian areas overlap with requirements for other resource values and objectives in this TSA, significant deductions have been made to account for these other values (see *landscape-level biodiversity*). For this reason I anticipate that the riparian requirements of the Code will have some impact on the base case, but that the impact will be less than 3.5 percent, as described in "Reasons for decision".

- stand-level biodiversity

Provisions for stand-level biodiversity to provide structural diversity and habitat for wildlife through the retention of tree patches and leave trees have become standard practice in the Invermere TSA. This was not specifically accounted for in the BCFS analysis; however, stand-level biodiversity largely overlaps with, and hence is accounted for, through deductions for seed trees, FENs and riparian management. I am satisfied that requirements for stand-level biodiversity are adequately represented in the BCFS analysis.

- *landscape-level biodiversity*

The Invermere TSA *Timber Supply Review Discussion Paper* identified the protection of biodiversity and wildlife habitat through the use of FENs and old growth as a critical factor affecting timber supply. FENs consist of important wildlife habitats connected by linking corridors. The location of FENs is dependent on the distribution of old growth across the land base.

FENs

In the BCFS base case an eight-percent reduction, based on TRPs completed at the time of the analysis, was applied to the timber harvesting land base to account for FEN connectivity. Since the time of the analysis, additional TRPs have been completed and District staff advise that the eight percent reduction is not adequate and that a 10.5-percent reduction would reflect current management for FENs more accurately.

old growth

In creating the base case, a requirement was modelled for at least 10 percent of the forests in the Crown productive forest land base to be older than 141 years of age. It was found in the analysis that part of this requirement could be met from areas already excluded from the timber harvesting land base, such as ESAs and FENs. In the analysis it was found that, in addition to these excluded areas, currently 5.2 percent of the timber harvesting land base is also required to meet this old-growth requirement.

Since the time of the analysis, district staff have reviewed the old-growth areas designated through TRPs and have determined that 7.2 percent of the timber harvesting land base was reserved as old growth through the TRP process. Therefore, a larger portion of the timber harvesting land base than was shown in the BCFS analysis is currently influenced by old-growth management.

Public input on this issue is varied; some comments support the 10-percent old-growth objective modelled in the base case while others suggest that the 10-percent requirement will not maintain old growth values across ecosystem types. It was also noted that new practices may permit some development to occur within old-growth forests without compromising old-growth values.

I have considered the information presented by the district along with the public input received in relation to old growth values and FENs and I have concluded that the effect of current plans is underestimated in the base case. It is difficult to determine how these factors interact, given their overlap with reductions for important resource values, and what overall effect they will have on the timber supply. However, I can determine that these two factors will not have a strictly cumulative effect and that they in turn will interact with other resource objectives, as discussed in *riparian areas* above. Experience with the Forest Practices Code will provide further guidance regarding the management strategies for both FENs

and old growth and will assist in addressing overlapping objectives. Further study on the interaction of FEN requirements with other provisions for integrated resource management should be carried out before the next AAC determination for this TSA. In the meantime I accept that there is some downward pressure on the base case due to planned practices for FENs and old growth, as discussed in "Reasons for decision".

- wildlife habitats

Wildlife habitat requirements are considered through the use of current wildlife management practices, as described in the *Logging Guidelines for Wildlife Habitat Classes-Kootenay Region*, which include leaving a number of dead trees and larger trees, either individually or in groups, to provide wildlife habitat. Additionally, as discussed under *landscape-level biodiversity*, a further eight percent of the timber harvesting land base was deducted for a network of forest ecosystems that connect important wildlife habitat throughout the TSA. Further wildlife requirements are considered as described below in 'ungulate winter range' and in 'caribou habitat'.

Wildlife habitat requirements will be refined through the implementation phase of the Code, but in this TSA, I anticipate that many of the Code requirements in this respect will be met by deductions for other values such as riparian areas, old growth, FENs and wildlife habitat requirements already included in the BCFS analysis.

ungulate winter range

The *Logging Guidelines for Wildlife Habitat Classes* were also used to determine the forest cover requirements for the wildlife winter range zone which represents approximately 30 percent of the timber harvesting land base. The BCFS analysis used forest cover constraints were applied to represent old growth and thermal and hiding cover objectives in the ungulate winter range zone. The old growth requirement was modelled as an independent constraint to ensure that a minimum of six percent of the zone would always be greater than 140 years of age. A second constraint limited the area below 15 metres at any time to 33 percent in order to meet thermal and hiding cover objectives. By applying these two objectives as one constraint, thermal cover was treated as an adjacency constraint similar to hiding cover. A BCFS sensitivity analysis reveals that forest cover constraints have significant impacts on (short term) timber supply.

The licensees' analysis used an alternative approach to modelling the same winter range objectives. The licensees' results cannot be compared directly to the BCFS analysis as other assumptions in their analysis were varied at the same time. However, I do consider that their results provide some insight into the relative merits of using alternative approaches to modelling ungulate winter range zone requirements. The licensee analysis addresses thermal cover requirements by ensuring that at least 30 percent of the zone is over 15 metres

at any one time, with a second constraint that the area below three metres always lies between 15 and 33 percent. In using this approach, thermal cover does not constrain the projected short-term timber supply to the degree indicated in the BCFS analysis. I conclude that it is likely that in attempting to meet wildlife winter range requirements, the assumptions used in the BCFS analysis overly constrained the projected timber supply.

The *Timber Supply Review Discussion Paper* for the Invermere TSA identifies the cover requirements for wildlife winter ranges as a critical factor and specifically notes that partial cutting practices in these areas may help to reduce the timber supply impact of the forest cover requirements for these areas. I have discussed this potential in Silviculture systems and have concluded that the timber supply implications of the use of these systems will be considered in future decisions, should their use become current practice.

A further issue relating to wildlife winter range has also been identified by district staff. Since the time of the analysis, newly available TRIM (Terrain Resource Information Mapping) data has allowed district staff to complete a more detailed examination of the land base associated with winter ranges. District staff estimate that winter ranges actually occupy 43 851 hectares, compared to the 109 724 hectares, estimated in the base case.

I am advised by BCFS staff that the combined effect of revising the area of winter range as well as modelling thermal requirements will increase the base case projection of timber supply by almost 12 percent in the short and medium terms. I am satisfied that the BCFS base case timber supply projection underestimates the timber supply by approximately this indicated extent, and I have considered this in my determination as discussed in "Reasons for decision".

caribou habitat

The management of caribou habitat is an important forest management consideration in the Invermere TSA. In the BCFS analysis base case it was assumed that 40 percent of the core caribou habitat within the TSA would be greater than 121 years of age. It was found that this requirement could be met entirely outside of the timber harvesting land base.

In the public input received, questions were raised about the boundaries of core caribou habitat, and it was suggested that while management within the core areas is acceptable, caribou do in fact range through a much broader area than just these core areas. Furthermore, a lack of old-growth forests outside the designated core caribou habitat may isolate herds which are already small and potentially vulnerable. The East Kootenay Land-Use Plan is currently refining land-use decisions for the area and a component of the plan will incorporate some caribou habitat in protected areas as well as in special

management zones. Any future changes to the land base resulting from caribou habitat requirements will likely have an impact on timber supplies in the mid- to long-term in the Invermere TSA. However, until the formal land-use decisions are implemented, I cannot speculate on the likelihood or magnitude of timber supply implications that might arise from the land-use plan.

While I cannot speculate on potential future adjustments to caribou habitat requirements, I must still consider whether the analysis accurately reflected current practice. The analysis suggested that core caribou habitat requirements could be met entirely outside the timber harvesting land base. However, district staff now suggest that some portion of this habitat should also be located within the timber harvesting land base. I note that the old-growth requirements for caribou overlap with some of the requirements for other resource values, particularly those discussed above in *landscape-level biodiversity*, and I have considered the lack of representation of caribou habitat within the timber harvesting land base along with these other resource values as discussed in "Reasons for decision".

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

Land-Use Planning

On March 13, 1995, the provincial government announced the East Kootenay Land-Use Plan (KLUP). As noted under "Guiding principles for AAC determinations", government's land-use decisions generally must be followed by detailed implementation plans. This is the case with the East-Kootenay Land-Use Plan. Although the land-use decision has been announced, all the details are not complete at this time. Three zones have been identified—Integrated Resource Management, Enhanced Resource Development and Special Resource Management—and a process is now underway to develop targets and resource objectives. This process will also help to clarify the requirements for biodiversity under the Forest Practices Code and significant wildlife habitat requirements in context of the KLUP.

Until the necessary decisions are made and implemented, it is impossible to assess the timber supply impacts of this land-use decision. For example, the impacts of some aspects of the land-use decision, such as protected areas, may be offset by the objectives of the Enhanced Resource Development Zone. Therefore, although some areas have recently been designated as protected areas, until the entire plan is completed and approved by Cabinet I cannot speculate on the overall effects that the plan may have on timber supply.

As I have also noted under "Guiding principles for AAC determinations", due to the complexity and time requirements of the timber supply analysis process, it may not always be possible in the current round of analyses to address land-use decisions that will be or have already been made. The legislated requirement to revisit AAC determinations will ensure such decisions will be addressed within five years. However, if at any time during the implementation of the land use plan it becomes apparent that the new AAC is no longer consistent with the Plan, I am prepared to reassess the timber supply and redetermine the AAC before the five-year period required under the *Forest Act*.

Traditional use surveys

Traditional use surveys have been completed for the Invermere TSA. However, the timber supply impacts of measures required to protect even identified values are still unquantified at this time. When the timber supply implications of these surveys are quantified, they will be taken into account in a future determination of the AAC.

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

Harvest flow alternatives

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in TSAs that have an old-growth component, such as the Invermere TSA. In the short term, the presence of older forests permits harvest levels above the long-term harvest level without jeopardizing the future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and mid-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supplies should remain sufficiently stable that there will be no inordinately adverse impact on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply, nor so low as to cause immediate social and economic impacts that are unnecessary to maintain forest productivity and future harvest stability.

The BCFS timber supply analysis for the Invermere TSA indicates that if the current AAC were maintained for one decade under the management assumptions used in the analysis, the projected 60-year decline in timber supply is projected to fall well below the long-term sustainable level. In order to meet the AAC determination objectives stated above, the BCFS analysis indicates that some immediate reduction in the current AAC may be required in order to minimize future community disruptions and later shortfalls. The base case forecast shows that an immediate 12.7 percent harvest level reduction may be required. This harvest level which is maintained for 10 years is followed by a decline of 12

percent per decade for the following four decades. The timber supply is projected to remain at that level for 40 years before rising over 20 years to the long-term level of 360,000 cubic metres per year.

Under the set of forest management assumptions that were used to create the base case many different harvest flows are possible. The base case harvest forecast is the result of using defined criteria, such as the maximum rate of decline per decade, avoidance of large harvest shortfalls and the maintenance of a fairly constant volume of growing stock over the long term. In the BCFS timber supply analysis for the Invermere TSA, four alternative harvest flow forecasts were produced, based on the same set of data as the base case. These provide some insight into different decline rates, initial harvest levels and potential trade-offs between short- and long-term harvest levels.

In the first harvest flow forecast, the current harvest level is maintained for 10 years. Projected harvest levels then decrease by 20 percent per decade over the following 30 years. Maintaining the current harvest level for one decade requires a much sharper decline and an extended time during which the harvest level remains below the long-term level to avoid timber supply shortfalls in the long-term.

A second forecast presents an indication of the harvest flow consequences of immediately reducing the harvest level by 40 percent, to a level which can be maintained for 120 years before dropping a further 7.5 percent to the long term level.

Another harvest flow alternative shows the effect of reducing the harvest at a rate of 10 percent per decade instead of 12 percent, from an initial level 10 percent lower than the current harvest level, instead of 12.7 percent lower as in the base case. Maintaining this lower rate of decline and the higher starting level than in the base case would result in shortfalls of merchantable timber during the seventh and ninth decades when older, currently existing stands have been harvested, and when insufficient second-growth stands have reached a harvestable age.

The final harvest flow scenario shows the projected effect of setting harvest levels so that timber supply levels do not fall below the long-term level. The initial harvest level in this case would be 8.4 percent lower than the base case and 23.3 percent lower than the current harvest level.

In reviewing these harvest flow scenarios, I find that they show that there is some flexibility in varying the rate of "interdecadal" decline for this TSA while meeting other important objectives. Varying this rate within the values shown indicates a range of choices; the choice is dependent on social and economic objectives.

A socio-economic analysis (SEA) report for the Invermere TSA was prepared by BCFS staff, and I have considered this report in my determination. The SEA

details the importance of the forest industry to local economies and describes the community impacts associated with three of the timber supply scenarios referred to above, namely: the base case; the scenario in which the current AAC is maintained for 10 years; and the scenario in which the initial harvest level drops by 40 percent.

In the base case impact assessment, the SEA indicates that immediately reducing the harvest level to 568 000 cubic metres per year would lead to the loss of an estimated 51 direct jobs and an additional 19 person-years of indirect and induced employment.

In the second scenario, employment and economic impacts are postponed for one decade. However, these jobs are maintained at the cost of greater rates decline in future harvest levels (20 percent as compared to 12 percent in the base case) with associated job loss. After three decades, the total decrease in harvest level would exceed that in the first scenario, as would the associated socio-economic impacts. After four decades, the total decrease would exceed that incurred in scenario three.

The final scenario examines the employment and community impacts if the initial harvest level were dropped to the highest non-declining rate of harvest that can be sustained for the next 12 decades. In this scenario, employment would be reduced directly by 162 person-years. The loss of an additional 60 person-years of indirect and induced employment is also implied in this scenario.

Overall, the long-term harvest level, common to all three scenarios, represents 55 percent of the current AAC. Immediately setting the harvest level at the long-term level would involve the cumulative loss of 180 person-years of direct and 67 person-years of indirect and induced employment.

Public input included some criticism of the methodology and data used in the SEA. I have consulted with BCFS staff regarding this input and I am satisfied that each of the concerns has been adequately addressed and that the approach taken in the SEA provides a reasonable assessment of the potential social and economic impacts associated with different harvest levels. In particular, the analysis assumed a linear relationship between harvest levels and revenue and employment levels and some have suggested that the relationship is more complex. I understand and accept that the interaction of these factors is extremely complex and that each of them is further influenced by changing economic conditions, however I find it reasonable to rely on the socio-economic analysis for some guidance in anticipating future trends.

I have reviewed the impacts associated with the different harvest levels as described in the SEA report, together with the comments of the forest industry and others received through the public input process. I am satisfied that the SEA provides a useful and reliable indication of the social and economic implications of

alternative rates of harvest in the Invermere TSA. I will return to this point under the discussion of the social and economic objectives of the Crown.

Community dependence on forest industry

The SEA report indicates that the Invermere TSA has a growing, diversified economy with tourism, forestry, the public sector, construction, mining and agriculture serving as the primary generators of employment. Overall, tourism accounts for 33 percent of the employment in the TSA, followed by forestry, 22 percent and the public sector, 20 percent. While tourism creates the most employment in the TSA, forestry provides the greatest amount of income: 22 percent of the basic income in the area is created through forestry employment while 16 percent is attributable to tourism employment.

Employment and income reductions in the forest industry are implied by the inevitable transition to the long-term harvest level. However, it is noted in the SEA that the communities of the Invermere TSA are characterized by a relatively diversified economy and that this reduces the overall dependence of these communities on the forest industry.

Nevertheless, I am aware of the dependence of Invermere TSA communities on timber harvesting, and I have considered this in my determination along with the social and economic objectives of the Crown.

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

Timber processing facilities

Two large firms operate sawmills at Canal Flats and Radium Hot Springs, which obtain an average of 54 percent of their timber supply from Forest Licenses within the TSA. Remaining supplies come from a Tree Farm Licence, private lands, other timber supply areas and forests outside of British Columbia. The majority of wood chips generated within the TSA are shipped to the pulp mill at Skookumchuk. Four smaller firms operate sawmills and value-added manufacturing operations within the TSA. I have considered the information regarding forest sector operations in the Invermere TSA provided in the SEA.

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

Minister's letter

The Minister has expressed the economic and social objectives of the Crown for the province (letter to former Chief Forester John Cuthbert, dated July 28, 1994, and attached as Appendix 3), and I understand these to apply to the Invermere TSA. They are consistent with the objectives stated in the Forest Renewal Plan

and include forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest level changes in a managed transition from old growth to second-growth forests, so as to provide for continuity of employment.

The Minister also stated in his letter that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the Chief Forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. The latter would likely require the use of alternative harvesting systems, and to encourage this the Minister suggested consideration of partitioned AACs.

The employment and community impact issues are discussed in detail in the SEA, and I am familiar with the varying impacts of different harvest levels as discussed in Harvest flow alternatives. The use of commercial thinning has been discussed in Commercial thinning, where I concluded that until commercial thinning opportunities have been identified and plans for the use of commercial thinning have been completed, it is premature to rely on wood volumes from commercial thinning in determining the AAC for the Invermere TSA.

The possibility of harvesting in previously uneconomical areas was addressed above, in Land base contributing to timber harvest. There I concluded that there are some harvesting opportunities on steep slopes and in deducted forest types beyond those assumed in the base case and I have accounted for this in "Reasons for decision".

Local objectives

The Minister's letter suggests that the Chief Forester should consider important local social and economic objectives that may be derived from the public input in the timber supply review. Submissions were received from government agencies, forest licensees, interest groups and several individuals in response to the BCFS *Timber Supply Analysis Report*, the SEA and the *Timber Supply Review Discussion Paper*.

Of additional significance in this TSA are the local objectives articulated through the TRP process. District staff have presented information to me indicating that community representatives have been involved in these planning processes. Therefore, I consider that TRPs provide me with some further information about local objectives regarding resource management objectives and practices.

I have considered the public input received and I am mindful of the many views which were brought forward. The consideration of these views is an important component of this determination, and where possible I have attempted in this rationale to respond briefly to many of the views expressed.

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

Non-recoverable losses

To account for yearly losses due to insects, disease and damage from fire and wind, the BCFS analysis assumed that a volume of 63 597 cubic metres per year is lost to damaging agents and is not recoverable from the contributing timber supply.

The estimate used in the BCFS analysis was based on historical records and did not adequately reflect the influence of current forest management. Recently, additional information has become available which indicates that losses due to fire were overestimated. Specifically, the area affected by fire was overestimated because the data used by the district to determine fire losses weighted recent catastrophic fire events too heavily. The area affected by fire was also overestimated due to the inclusion of parks and TFLs in the calculation. Moreover, improved fire suppression and salvage harvesting technology have decreased the volume of wood lost to fires. Improved salvage logging technology has also decreased the estimate for losses attributable to damage by mountain pine beetle. Overall, district staff now estimate that non-recoverable losses actually come more closely approximate 48 800 cubic metres per year. In view of the changes identified, I consider this reassessment to be reasonable, and I have taken this into account as a small increase to the timber supply as indicated by the initial harvest level projected in the BCFS base case as discussed below in "Reasons for decision".

Reasons for decision

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

The current AAC for the Invermere TSA is 657 264 cubic metres. As outlined in 7(3)(b) above, the BCFS timber supply analysis indicates that the current AAC could be maintained for 10 years while avoiding subsequent acute timber shortages only if it were followed by a drop in harvest level of 20 percent per decade for three decades. It is my view that such a drop would be accompanied by similar reductions in socio-economic activity with increased risk of mill closure and thus is not a desirable option.

The base case harvest forecast shows an initial level of 568 000 cubic metres per year, which is 12.7 percent below the current harvest level for the Invermere TSA. After the first decade, the projected harvest level falls by 12 percent per decade for the next four decades to about 315 000 cubic metres per year. The projected timber supply remains at this level for four decades before rising over the next two decades to a long-term level of 360 000 cubic metres per year.

Given the inevitability in this TSA of an imminent decline in harvest levels toward a lower long-term harvest level, and the associated need to accommodate changes in socio-economic activity, in my view it would be inequitable to postpone all impacts to the future, particularly when the timber supply would thus be used up more quickly, reducing future control over the rate of decline. In my view it is more equitable to distribute the necessary adjustments in both immediate and future declines. For this reason I am satisfied that for this TSA at this time it is appropriate to consider some immediate harvest level reduction, as projected in the BCFS base case.

However, my considerations in this determination have identified several reasons why it would not be appropriate at this time to establish the AAC at the particular initial harvest level projected in the BCFS base case. Several factors—some of which may overlap—indicate that the timber supply is in some respects greater, and in some respects lower, than projected in the base case forecast. In considering the overall timber supply implications of these factors, I am mindful that there may be overlaps and that the individual timber supply impacts may not be entirely cumulative. At the same time, as noted in Guiding principles, I am also aware that further and as yet unquantified impacts on timber supply may be expected due to the implementation of the Forest Practices Code and the East-Kootenay Land-Use Plan.

My considerations have identified some factors that exert upward or downward influences on the timber supply, that were not accounted for in the initial harvest level in the base case forecast, due to changes in practice or new information which has become available since completion of the analysis in April 1995. Some of these factors can be quantified and their impact projected; others influence timber supply by adding an element of risk or uncertainty to the decision.

With regard to changes in practices, recent changes to the way in which forests are managed in the TSA affect the availability of timber in both the short and the long term. However, many of the integrated resource management factors examined in this determination which constrain timber supply overlap to some extent. For example, management objectives for values such as visual quality often meet requirements for other values, such as wildlife habitat. In considering the timber supply implications of these changes in management, I must therefore be mindful that overlaps exist and that the individual timber supply impacts are not necessarily entirely cumulative.

Factors identified as limiting the timber supply relative to the base case forecast include the following:

- Natural regeneration is being used more widely than was estimated at the time of the analysis. This shift away from planting harvested areas has the potential to extend regeneration delay periods, thereby generating a downward pressure on timber supply, mostly in the mid and long terms.
- The combined impact of the adjustments for the inclusion of 11 600 hectares of TFL land and 540 hectares excluded in error (see Land base contributing to timber harvest) results in a 4.5 percent reduction in the overall size of the timber harvesting land base used in the BCFS analysis, with an associated reduction of approximately five percent to the initial harvest level projected in the BCFS base case.
- TRP analysis, carried out since the BCFS timber supply analysis, suggests that the BCFS analysis underestimated the downward influence of management for several integrated resource management objectives, including old growth, caribou habitat, FENs and riparian areas. It is important to note that the timber supply influences of management for these values are not isolated, as the requirements for their management often overlap. As well, objectives for old growth, caribou habitat, FENs and riparian areas may be met to some degree in areas deducted from the land base to reflect environmental sensitivity, inoperability and low site productivity. Overall it is likely that the impacts of managing for this range of objectives are not entirely cumulative. In total, considering the individual impacts of these factors as well as the moderating effect of overlaps, I consider it reasonable to accept that current management in the Invermere TSA for old growth, caribou habitat, FENs and riparian areas creates a net downward pressure of approximately seven percent on the initial harvest level projected in the base case.
- The likelihood that additional harvesting passes may be required in some areas creates a small downward influence on initial harvest level projected in the base case.
- The existing forest volume loss attributable to retained seed trees was not accounted for in the BCFS analysis. This exerts a small downward influence on the short-term harvest level projected in the base case.

Factors which tend to increase the timber supply or to offset the risks and downward pressures identified above, include:

- Correcting existing stand volumes for special site coding creates a small increase in the initial timber supply from that indicated in the BCFS base case.
- An overestimation of the land base associated with wildlife winter ranges and an overly constraining modelling of thermal and hiding cover for wildlife imply an upward influence of approximately 12 percent on the initial harvest level projected in the BCFS base case.
- The BCFS analysis underestimated the rate at which current NSR will be eliminated, which creates a small addition to the timber supply in all periods.
- Losses due to fire and damage by mountain pine beetle were overestimated in the BCFS analysis relative to current practice; this creates a small upward influence on the projected initial harvest level.
- There is likely to be some harvesting on steep slopes, which was not accounted for in the BCFS analysis; this creates a very small upward influence on the projected initial harvest level.
- There is potential for some portion of the excluded forest types deducted in the BCFS base case to contribute a small addition to the timber supply, particularly in the medium to long term.
- Because other forest management objectives included in the BCFS analysis overlap with the forest cover requirements needed to meet visual quality objectives (VQOs), the constraint applied in the analysis to meet the VQOs was more stringent than required to reflect current practice. This provides a moderate addition to the timber supply in the short and medium terms, and a small addition in the long term.

In examining the restrictive and augmenting influences on the timber supply for the Invermere TSA, I find that those factors exerting an immediate upward influence on the initial harvest level projected in the base case are: special site index adjustments; adjustments for wildlife winter range; adjustments for NSR; lower non-recoverable losses; steep slope harvesting; and changes in accounting for the forest cover requirements to meet visual quality objectives. The downward factors offsetting these upward influences in the short term are: the land base adjustment; current management of old growth, caribou habitat, FENs, and riparian areas; the need for more than three harvest passes to meet IRM objectives in some areas; and the retention of seed trees in existing forests.

Assessment of the overall impact on timber supply from the downward influences is subject to uncertainty in the outcome of interactions between the various components of

the KLUP and the implementation of the Forest Practices Code. Likewise there is also some uncertainty in the upward influences, particularly with respect to requirements for wildlife winter ranges. Taking these uncertainties into account, it is my assessment that the combined total net impact on timber supply from the downward influences is outweighed to a small degree, in the order of approximately three percent, by the total net impact on timber supply from the upward influences. That is, a harvest level which takes into account all of the above considerations must be approximately three percent higher than the initial harvest level projected in the BCFS base case analysis.

An appropriate harvest level which meet the objectives of good forest stewardship for this area thus requires an immediate reduction of approximately 10 percent from the existing AAC. As such, this determination will have an impact on established patterns of socio-economic activity in the Invermere area. As confirmed in the Minister of Forests' letter (Appendix 3), setting out the socio-economic objectives of the Province, in AAC determinations the long-run sustainability of the forests of the area must be a paramount concern, and I have taken this into account in the harvest level I have determined.

As discussed in 7(3)(a)(vi) above, I have not attempted to predict or to take into account the overall timber supply implications of the KLUP. Although the plan and the land-use decision have been announced, all relevant details are not complete at this time. A process is currently underway to identify and define objectives and to develop resource targets in the KLUP. Until outstanding decisions are made and implemented, I cannot speculate on the overall effect of the plan on timber supply.

It is therefore my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that provides for anticipated constraints during the initial implementation of the Forest Practices code, that ensures longer-term IRM objectives can be met, that meets provincial objectives and avoids severe curtailment of locally established socio-economic activity based on timber harvesting, and that avoids disruptive shortfalls in future wood supply, can best be achieved in this TSA at this time by establishment of an AAC of 591 500 cubic metres.

Determination

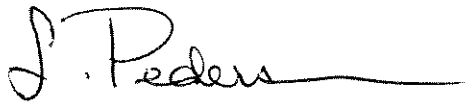
Effective March 1, 1996, the new AAC for the Invermere TSA will be 591 500 cubic metres.

Implementation

This determination comes into effect on March 1, 1996 and will remain in effect until a new AAC is determined, which must take place within five years of this determination.

In the period following this determination and leading up to the subsequent determination, I am directing BCFS staff to examine several issues:

1. clarify management practices for NSR areas;
2. examine the cutblock adjacency requirements in the Invermere TSA;
3. evaluate alternative analytical approaches to assessing the timber supply implications of uneven-aged silvicultural systems and mixed species management;
4. clarify the timber supply implications from riparian habitat management, stand-level biodiversity, old-growth retention, forest ecosystem networks and mature forest cover retention;
5. identify candidate forests for commercial thinning and assess the impact of this practice on the projected short- and long-term timber supply;

A handwritten signature in black ink, appearing to read "L. Pedersen", with a long horizontal flourish extending to the right.

Larry Pedersen
Chief Forester

January 30, 1996

Appendix 1: B.C. *Forest Act*, Section 7

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

Allowable annual cut

7. (1) The chief forester must determine an allowable annual cut before December 31, 1996, and after that determination at least once every 5 years after the date of the last determination, for

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

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

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

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

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

(1.11) If

- (a) the allowable annual cut for the tree farm licence is reduced under section 7.1 (3), and
- (b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 7.1 (6).

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

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

(1.3) In determining an allowable annual cut under this section the chief forester may specify portions of the allowable annual cut attributable to

- (a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area,
- (b) different types of timber and terrain in different parts of private land within a tree farm licence area, and
- (c) gains in timber production on Crown land that are attributable to silviculture treatments funded by the Province, the federal government, or both.

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

- (3) In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 10, shall consider
- (a) the rate of timber production that may be sustained on the area, taking into account
 - (i) the composition of the forest and its expected rate of growth on the area;
 - (ii) the expected time that it will take the forest to become re-established on the area following denudation;
 - (iii) silvicultural treatments to be applied to the area;
 - (iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area;
 - (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production; and
 - (vi) any other information that, in his opinion, relates to the capability of the area to produce timber;
 - (b) the short and long term implications to the Province of alternative rates of timber harvesting from the area;
 - (c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities;
 - (d) the economic and social objectives of the Crown, as expressed by the minister, for the area, for the general region and for the Province; and
 - (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: B.C. *Ministry of Forests Act*, Section 4

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: July 23, 1994, letter from Honourable Andrew Petter, Minister of Forests, to former Chief Forester John Cuthbert

Appendix 4: Summary of Public Input.



File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4



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

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

Yours truly,



Andrew Petter
Minister

Invermere Timber Supply Area Timber Supply Review

Summary of Public Input

Ministry of Forests
Invermere Forest District
625 Fourth St.
Invermere, B.C.
V0A 1K0

This is a summary of the public input that has been received on the Timber Supply Review in the Invermere Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Invermere Timber Supply Area

Background

As part of the review of timber supply in the Invermere Timber Supply Area, the British Columbia Forest Service distributed the *Discussion Paper* and two technical reports, the *Timber Supply Analysis* and the *Socio-Economic Analysis*. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information. This report summarizes the input received during the 90-day review period. This information was provided to the chief forester for his consideration when he reviewed the allowable annual cut for the Invermere Timber Supply Area.

The first section of this summary, Public Review Process and Response, outlines the public review process implemented by the Forest Service and describes the types of public input received. The second section, Public Input, summarizes the input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Invermere Forest District office.

Public Review Process and Response

Invermere District staff actively solicited public input on the Timber Supply Review in the Invermere Timber Supply Area through the following actions:

- copies of the *Timber Supply Analysis*, *Socio-Economic Analysis* and *Discussion Paper* were directly mailed to 120 interested individuals and organizations within the Invermere Timber Supply Area. The *Discussion Paper* included a response form that readers were encouraged to complete and return to the district manager

- an information booth was staffed at the Invermere & District Trade Fair, and documents were distributed to interested persons
- four information sessions were held with representatives from local governments, Kootenay National Park and First Nations (see Table 1)
- four open houses were advertised extensively
- radio interviews were provided
- newspaper articles were encouraged

As Table 1 shows, approximately 40 individuals attended the information sessions and the open houses, in addition to approximately 1,000 who attended the Trade Fair. The Invermere Forest District also received two completed response forms and eight written submissions (see Appendix 1). The Invermere Timber Supply Area licensees also commissioned Timberline Forest Inventory Consultants to undertake an independent timber supply analysis. This report is referred to as the "licensees' analysis" in this summary.

Organizations (No. of participants)	Date
Information sessions	
Radium Town Council (4)	May 10
Invermere & District Trade Fair (1,000)	May 12-13
Columbia Lake Indian Band (5)	May 15
Regional District of East Kootenay (approx. 20)	June 2
Kootenay National Park staff (3)	July 28
Open houses	
Canal Flats (3)	May 17
Radium (0)	May 18
Invermere (2)	May 24
Canal Flats (3)	June 1

Table 1: Participation in public information activities

Invermere Timber Supply Area

Public Input

In this section, public input on the information presented in the three Timber Supply Review documents for the Invermere Timber Supply Area is summarized under the following headings:

- Timber Supply Analysis
- Socio-Economic Analysis
- Discussion Paper

Public input on other issues or ongoing government processes that may influence timber supply in the Invermere Timber Supply Area in the future is summarized at the end of this section.

Timber Supply Analysis

Licensees' analysis

In the process of conducting an independent timber supply analysis, the consultant incorporated different land base and productivity assumptions from those used in the Forest Service analysis. These include:

- a slight increase to the timber harvesting land base by including 540 hectares designated as recreation reserves
- an additional increase of 1,626 hectares following a reduction in the area removed from the timber harvesting land base as economically or environmentally infeasible to harvest
- the use of updated forest productivity information

The changes to the above three factors result in an increase in the predicted timber supply levels.

The licensees' analysis then examines the impact of the following factors and compares them with the Forest Service analysis:

- **More refined analysis units**
Refining the analysis units (subdividing them by age range), combined with a recalculation of minimum harvestable ages, produces no significant impact on timber supply.
- **Future productivity estimates**
When the timber productivity expected from sites currently occupied by older forests is

adjusted upward, a marginal increase in timber supply results.

- **Reductions for ecosystem networks**

In the Forest Service analysis, the timber harvesting land base was reduced by eight per cent to provide for forest ecosystem networks that connect important habitats throughout the timber supply area. The licensees' analysis cites the timber supply impacts of this approach and asserts it does not consider the dynamics of forest development.

The licensees' analysis proposes that the eight per cent reduction be eliminated and that networks instead be subject to the same forest cover constraints that apply to moderately sensitive visual zones—partial retention. This would significantly increase the short- and long-term timber supply, according to the licensees' analysis.

- **Ungulate winter range**

The licensees' analysis maintains the forest cover requirements in this zone—that no more than 33 per cent of the timber harvesting land base can have stands less than 15 metres tall at any time—have a significant negative impact on timber supply and do not meet habitat objectives. By proposing different requirements and using a different model, the licensees' analysis is able to increase timber supply considerably.

- **Steep slopes**

In the Forest Service analysis, sites considered too steep for harvesting were removed from the timber harvesting land base. The licensees' analysis proposes a modified approach, which increases the land base by about three per cent.

- **Non-merchantable forest types**

Rather than removing all of these types from the timber harvesting land base, as was done in the Forest Service analysis, the licensees' analysis proposes a modified removal on slopes less than 30 per cent. This increases the land base by about two per cent and has a slight impact on timber supply.

Invermere Timber Supply Area

- **Regeneration delay**

The Forest Service analysis uses a regeneration delay of four years for planted areas and seven years for naturally regenerated areas. The licensees' analysis recommends two and five years, respectively.

When all the above changes are combined, the licensees' analysis states the short- and long-term timber supply is significantly increased compared to that indicated in the Forest Service base case.

Other public input

- **Size of the timber harvesting land base**

A forest industry submission maintains further information is needed to provide confidence that double-counting did not occur in the various reductions from the timber harvesting land base. For example, an area may have been removed twice because it has steep slopes and low growing potential.

Another submission questions why it was assumed that 10.5 per cent of the timber harvesting land base would be lost to roads, trails and landings when the *Soil Conservation Guidelines* limit allowable losses to seven per cent.

A third submission notes that the estimates of the land base are incomplete because they do not account for other ongoing processes, such as the regional land-use plan or the Forest Practices Code, or for changes in harvesting and processing methods.

The removal of areas considered to have stands that are not environmentally or economically feasible to harvest is questioned by another submission. While these stands may not be useful for sawlogs, other products such as posts are feasible, according to this individual. Following the harvest, such sites can then be returned to full productive capacity.

- **Minimum harvestable age**

One respondent suggests minimum harvestable ages could be reduced by 10 years if intensive silviculture were practised.

- **Productivity estimates**

One respondent states that the productivity estimates for second-growth forests are suspect

and very liberal, but offers no evidence except to point to failures in Europe where more favourable climates prevail.

- **Forest management practices in visually sensitive areas**

One submission suggests these should be relaxed since the tourism industry produces low-paying jobs, compared to the forest industry. This individual states that ski hills and golf courses are as visually disturbing as clearcuts; the latter, at least, are reforested and don't cost money to enter.

Another respondent contends that, in selecting management objectives, visual quality should be secondary to environmental values such as wildlife winter range, biodiversity, etc. If a choice must be made to reduce timber supply constraints, environmental quality must take precedence over views for tourists.

- **Wildlife and fish habitat requirements**

According to one submission, forest cover requirements for deer winter range should be relaxed by at least five per cent. This individual maintains that deer do not feed in mature forests, but often follow harvesting crews to eat the mosses and lichens growing on felled trees. The need for cover can be met by leaving groups of trees on sunny slopes and by partial cutting. This individual also asks why cattle are allowed to graze in these areas if concerns for deer are so high.

One submission questions the boundaries of the area of core caribou habitat; in particular, it asks whether the upper Spillimacheen River was included. The harvest level guidelines developed for the core areas are satisfactory, according to this individual, but because caribou are wide-ranging, detailed planning is required over a broad area to ensure the range of habitats used in each season is available and connected.

The submission from Kootenay National Park staff contains the following comments regarding fish and wildlife values:

- it offers strong support for ecosystem networks but expresses concern that they

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may not be wide enough to function effectively as wildlife corridors

- further wildlife habitat measures are needed, such as maintenance of deciduous trees, large rotten wildlife trees, and openings with understory forage; these are not found in dense, even-aged, managed forests
- green-up and forest cover requirements do not appear to be sufficient to protect the functioning of watersheds that contain high-value fish resources

The Park staff submission also states intensive silvicultural practices in managed stands may exacerbate *Armillaria* root disease problems, leading to poor growth or tree mortality. Such fungal diseases are a critical agent of biodiversity and an essential factor in the creation of suitable wildlife trees.

An individual respondent expresses support for more forest ecosystem networks.

- **Biodiversity**

One submission agrees with the requirement to maintain at least 10 per cent of each management zone as older forests, but speculates whether partial cutting and simulation of older-forest characteristics could help minimize this reduction.

Another respondent predicts the amount of older forests remaining in 50 years will be minuscule compared to historical amounts, putting at risk wildlife that depend on this type of forest. This individual also states that inoperable areas may not provide the characteristics needed for species that depend on older forests, and emphasizes the need to protect representative forests. The Kootenay National Park submission and another individual submission echo these concerns, adding that 140-year-old forests do not provide adequate habitat for some old-growth-dependent species.

The Kootenay National Park submission also stresses the importance of maintaining a mix of forests of all ages, including some older than 250 years, in order to protect biodiversity

values and to provide long-term sources of high-quality wood.

- **Estimates of unsalvageable timber losses**

A forest industry submission questions whether the estimate used in the Forest Service analysis reflects the higher levels of utilization currently being practised.

Socio-Economic Analysis

Employment and community impacts

A forest industry submission asserts the importance of the forest sector was underestimated in the *Socio-Economic Analysis*. The following assertions are made:

- forestry accounts for 30 per cent of after-tax income in the timber supply area, not 22 per cent as stated
- local pulp mill employment is understated by 35 per cent
- intensive silviculture employment is not included
- Forest Service employment should be recognized as dependent on harvest levels
- by excluding non-cash benefits such as pension payments, contributions to insurance plans and health care premiums, forest sector employee income is understated
- federal government revenue was ignored, e.g. income tax
- payments such as unemployment insurance and social assistance do not have the same significance to the economy as do sectors that generate wealth

In general, this forest industry submission asserts that the employment and income impacts from lost forestry jobs cannot be mitigated or alleviated through other initiatives.

Another submission contends that while major short-term job losses may occur with the needed reduction in timber supply, this will be offset by the re-emergence of smaller specialty mills, value-added manufacturing, increased silviculture, commercial thinning, and more labour-intensive harvesting and road-building.

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A tourism operator makes the following comments:

- the economic benefits of heli-skiing and heli-hiking are underestimated in the *Socio-Economic Analysis*. These activities generate an annual revenue of \$13 million (not \$3.5 million) and employ 225 people (not 90) full-time on a seasonal basis
- revenue from the movie industry should be included—an estimated \$80 million over the past three years
- considering that tourism generates 33 per cent of total employment and 16 per cent of total basic income, this sector should have received a comprehensive review in the analysis

Another respondent questions the inclusion of guide-outfitting with tourism and outdoor recreation, saying this dilutes its relevance and obscures its differences from that sector. Guide-outfitting is affected less by visual quality management and more by access development. This individual maintains that increased access has more detrimental effects on wildlife—and therefore on guide-outfitting—than benefits for humans. According to this submission, the effect of changes in harvest levels should have been examined in the same detail for other sectors as it was for forestry.

Non-timber values

The submission from the forest industry claims that allegations made in the *Socio-Economic Analysis* regarding the environmental impacts of harvesting are unsubstantiated because of the following:

- no study has been done to link the alleged decline of bull trout with harvesting activity
- the future of wildlife is affected more by how government manages road access and rural settlements than by road construction itself
- many of the impacts listed are general and may not even apply to the Invermere Timber Supply Area
- the broad statement that current harvesting practices will result in a decline of biodiversity values is oversimplified and incorrect

- it is unclear whether the caribou population is more sensitive to habitat availability or to changes in predator numbers

One submission raises the following questions:

- what are the criteria for determining which older forests are managed?
- are Upper Dutch and Findlay Creek watersheds still unprotected and fragmented?
- in what drainages are fish declining due to harvest activity?
- what riparian areas were identified, and are maps available?

Since the *Socio-Economic Analysis* describes bighorn sheep and grizzly bear as rare or uncommon and susceptible to large-scale disturbances, one respondent asks how this was factored into the analysis.

Another respondent maintains that although non-timber values will continue to provide increasingly greater benefits to society they were underrated in the analysis.

Discussion Paper

Several issues raised in the *Discussion Paper* prompted public input.

Alternative practices

One respondent declares there is a need to shift away from a clearcut/slashburn/replant system of forest management to management of a continuous forest with selective cutting. This would produce more job opportunities now and make the land base more productive in the long run. As well, it would conserve more mature timber for the future when it will be more valuable, according to this individual.

One respondent predicts skyline logging, with the participation of the heli-industry, would increase harvesting options above and below operability lines.

Another respondent maintains the three-pass harvesting system is inadequate to protect biodiversity values and recommends either a four- or five-pass system, depending on site productivity.

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Commercial thinning

One industry submission states that 15,000 hectares of lodgepole pine stands have been identified as candidates for commercial thinning. This opportunity should be included in the timber harvesting land base since value-added facilities exist to use it.

An individual maintains the percentage of mature to immature forests (more than 50 per cent) indicates a significant opportunity for commercial thinning. Unless the major timber companies use this opportunity, incentives should be offered to smaller operators to do the thinning, according to this submission.

Allowable annual cut adjustment

Several submissions discuss whether and how the allowable annual cut should be adjusted. This input varies from a suggestion that a reduction is not needed, to support for immediate reductions—either to the long term sustainable level or by as much as 40 per cent to protect tourism, biodiversity and wildlife values. Most of the input agrees a reduction to the allowable annual cut is inevitable, at least over the long term. Several alternative ways to implement a reduction are suggested:

- based on its re-analysis of the data, the licensees' analysis indicates the current allowable annual cut can be continued for 40 years, followed by 10 per cent reductions each decade for the following 50 years. Alternatively, the licensees' analysis predicts an immediate 10 per cent reduction could be implemented and the resulting harvest level sustained for 70 years
- to allow for the implementation of the regional land-use plan, Forest Practices Code, land claims, and measures to offset impacts, one individual recommends a maximum five per cent reduction for the next five years
- to ensure the industry will be stable in the future, to protect future generations from suffering from overcutting, to protect non-timber values, and to accommodate the uncertainty inherent in some critical factors or created by current initiatives such as the Forest Practices Code, three submissions recommend reducing the allowable annual cut to the long-

term level as soon as possible. One questions whether this level is low enough to protect all other values

- one respondent states it is important to step down the timber supply so that it never drops below the long-term timber supply level;
- one industry submission contends that any reduction would seriously jeopardize its operations because of its precarious timber supply position, but does not specify a preference for an allowable annual cut level
- in order to slow the conversion of old forests to younger, managed forests, one submission prefers an immediate 40 per cent reduction

One submission suggests no more than 50 per cent of the allowable annual cut should be allocated to the two major licensees, with the remainder going to the woodlot program, small business program, specialty and value-added manufacturing sector, and commercial thinning.

Another submission expresses concern about the distribution of the cut across the landscape, stating that prolonged concentrations of harvesting in his guide-outfitting area will adversely affect his business.

Related Input

Other comments are summarized here to indicate perspectives that may influence timber supply issues in the future.

Timber supply review process

One submission questions why public input is only solicited at the end of the process. This only allows for input on assumptions and methods already used in the analysis, rather than input on what should be used.

This individual also questions why all other sectors and values are portrayed as “constraints” on harvesting levels if integrated resource management is the direction of the future. Other values can’t be managed properly if they’re always considered secondary to timber harvesting.

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Other land-use processes

Two submissions assert the importance of protecting the integrity of the timber harvesting land base, once processes such as the land-use plan and implementation of the Code are complete.

Another respondent maintains the land-use plan does not protect representative forests in low to mid-elevations. To achieve its goals, the government must remove some productive low-elevation sites from the timber harvesting land base.

Apportionment

One submission recommends the woodlot allocation be increased to five per cent from one per cent and that woodlots be assigned to visually sensitive areas, deer winter habitat, community watersheds, environmentally sensitive areas and areas close to communities. This individual believes management objectives will be better met because of the sustainable, selective and labour-intensive nature of woodlot harvesting.

Appendix 1

Submissions received by the Invermere Forest District

Government agencies

Kootenay National Park

Forest industry

Brisco Wood Preservers Ltd.

Invermere Timber Supply Area Licensees (timber supply analysis prepared by
Timberline Forest Inventory Consultants)

Interior Lumber Manufacturers' Association

Woodlot licensee

Interest groups

Sylvan Consulting

R.K. Heli-Ski Panorama Inc.

White Swan Lake Outfitters

Individuals

Two submissions