

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Lillooet Timber Supply Area

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

effective August 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 Lillooet Timber Supply Area (TSA). The document will also identify where new or better information is required for incorporation into future AAC determinations.

Description of the timber supply area

The Lillooet TSA, located in the south-western portion of British Columbia in the Kamloops Forest Region, encompasses the entire Lillooet Forest District. The TSA lies east of the Coast Mountains and west of the Thompson-Okanagan Plateau. The total area of the TSA is 1 123 827 hectares (ha) and includes the Leeward Pacific Ranges in the west, the Southern Chilcotin Ranges in the centre and to the north, and the Pavilion Ranges to the east.

In 1991, the TSA had an estimated population of about 5680, including about 2700 First Nations people. The major communities and First Nation reserves in the TSA include Lillooet (pop. 1782), Seton Portage/Shalalth (pop. 500), X'axlip (pop. 485), Lytton (pop. 331), Pavilion (pop. 253), Spences Bridge (pop. 165), Bralorne (pop. 78), and Gold Bridge (pop. 68). About 35 percent of the population in the TSA lives outside these communities and reserves.

Due to the mountainous terrain in the TSA, the climate and vegetation of the area vary greatly. The western portion of the TSA includes wet coastal conditions, while the eastern portion has the characteristic low rainfall of the interior dry belt. The drier areas within the TSA are included in the Interior Douglas-fir and Ponderosa Pine biogeoclimatic zones. Forested areas with higher precipitation are primarily in the Engelmann Spruce-Subalpine Fir and Montane Spruce zones. The Alpine Tundra zone covers the ridges and mountain tops generally above 2000 metres in elevation. The main tree species in the TSA include lodgepole pine, Douglas-fir and spruce; also present are ponderosa pine, whitebark pine, subalpine fir (also known as balsam), western redcedar and hemlock.

The forest sector is a major employer for the region and for the First Nations population. About 27 percent of the employment in the Lillooet TSA results from forestry-related activities. The public sector is the next largest contributor, with 26 percent, followed by tourism (13 percent), agriculture (6 percent), and mining (4 percent). Over the past 6 years, the major timber companies located in the TSA area secured about 52 percent of their mill requirements from their licences in the Lillooet TSA.

History of AAC

In 1982, the allowable annual cut (AAC) for the TSA was temporarily increased from 650 000 cubic metres (m³) to 800 000 m³ to control mountain pine beetle infestations and to salvage damaged timber. In 1988, the AAC was reduced to 650 000 m³ after the temporary increase expired. This volume is currently apportioned by the Minister of Forests as follows:

Apportionment	cubic metres	% of AAC
Forest Licences	469 456	72.2
Small Business Forest Enterprise Program	152 544	23.5
Temporary Licence (non-replaceable forest licence)	15 000	2.3
Forest Service Reserve	6 500	1.0
subtotal	643 500	99.0
Allocated woodlot licence volume*	6 500	1.0
Total	650 000	100

(* N.B.: Allocated woodlot licence volumes are not included in AACs determined by the Chief Forester under Section 7 of the *Forest Act*, but are included in this table for reference, as an indication of harvestable volume for the area.)

Approximately 72 percent of the AAC is allocated to three long-term renewable forest licences. These three forest licences are currently held by Ainsworth Lumber Co. Ltd (348 168 m³), J.S. Jones Holdings Ltd. (88 510 m³) and Lytton Lumber Ltd. (32 778 m³). About 23 percent of the AAC is administered by the BC Forest Service (BCFS) through the Small Business Forest Enterprise Program. The remaining AAC is divided between temporary licences, woodlots and unallocated reserve.

New AAC determination

Effective August 1, 1996, the AAC for the Lillooet TSA will be 643 500 m³, which is unchanged from the previous AAC. This will remain in effect until a new AAC is determined, which must take place within five years of this determination. The new AAC does not include allocated woodlot licence volumes.

Information sources used in the AAC determination

Information considered in determining the AAC for the Lillooet TSA includes:

- *Lillooet TSA Timber Supply Analysis*. BCFS. December 1993;
- *Lillooet TSA Timber Supply Analysis Addendum*. BCFS. July 1995;
- *Lillooet TSA Socio-Economic Analysis*. BCFS. July 1995;
- *Lillooet TSA Timber Supply Review Discussion Paper*. BCFS. July 1995;
- *Lillooet TSA Timber Supply Review Summary of Public Input*. BCFS. Dec. 1995 (attached);

- Information package assembled by the Lillooet Forest District for the AAC determination meeting on November 16-17, 1995;
- Discussion with BC Forest Service staff, including Lillooet Forest District and Kamloops Forest Region staff, at AAC determination meeting, Nov. 16-17, 1995;
- News releases and backgrounders concerning the Stein Valley land use decision and Lillooet LRMP, November 23, 1995;
- *Lillooet TSA inventory audit*, BCFS Resource Inventory Branch, 1996;
- *Forest Practices Code of British Columbia Act* and regulations;
- Letter from the Minister of Forests to the Chief Forester, July 28, 1994, stating the Crown's economic and social objectives (attached);
- Memo from the Minister of Forests to the Chief Forester, February 26, 1996, stating the Crown's economic and social objectives regarding visual resources (attached).

Role and limitations of the technical information used

The *Forest Act* requires me to consider biophysical as well as social and economic information in the AAC determination. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, formed the major body of technical information used in my AAC determination for the Lillooet TSA. The timber supply analysis and associated inventory are concerned primarily with biophysical factors—such as rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices. 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 Lillooet TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

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

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. Two important ways of dealing with uncertainty are (i) avoiding unnecessary risk, and (ii) redetermining AACs frequently to ensure they incorporate up-to-date information and knowledge. In respect of these: (i) in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with AACs from a range of possible harvest levels; and (ii) the benefits of frequent analysis and decision making have been recognized in the legislated requirement to redetermine AACs at least every five years. This second principle in particular is central to many of the guiding principles that follow.

In considering the various factors required by section 7 of the *Forest Act* to be taken into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply, such as optimistic assumptions about harvesting in unconventional areas or using unconventional technologies that are not substantiated by demonstrated performance; or with respect to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the Forest Practices Code (the 'Code').

The impact of the 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, the analyses were unable to assess the impacts of any new constraints on timber production which might be imposed under the Code. In those determinations, I did not consider any more stringent restrictions or additional impacts upon timber supply beyond those anticipated to occur due to the application of the guidelines that were current at the time of determination. However, I assumed that the Code would at least entrench the standards exemplified by those guidelines as statutory requirements.

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995. Studies in selected TSAs (*Forest Practices Code Timber Supply Analysis*, BCFS, February, 1996) indicate that under the Code there will be some impacts on timber supply additional to those expected under previous guidelines. In AAC determinations made

since the coming into force of the Code, I have viewed with some caution the timber supply projections in the BCFS timber supply analyses for TSAs such as Lillooet, which pre-date the Code. At the same time, I am mindful that the full force of the Code may not be felt during the transition phase of its implementation, and that the impacts of specific factors on timber supply may not yet have been assessed on a local basis.

The impact on the timber supply of land use decisions resulting from planning processes such as the Commission on Resources and Environment (CORE) process, the Land and Resource Management Planning (LRMP) process, and the Protected Areas Strategy (PAS), 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, it may not always be possible to analyze their timber supply impact in an AAC determination. In most cases, government's land use decision must be followed by detailed implementation decisions. For example, a land use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made, it is impossible to properly assess the impact of the land use decision. However, the legislated requirement for AAC reviews at least every five years will ensure such decisions are addressed.

In the Lillooet TSA, the Stein Valley has been designated as a Class A provincial park, as part of the PAS. An LRMP process has only recently been initiated and its nature and scope remain to be determined. Accordingly, in this determination I am in a position to assess the impact on timber supply of the creation of the Stein Valley park, but not of the LRMP process.

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 superior to those available in the past, and will undoubtedly provide for more reliable determinations.

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

With respect to First Nations issues, I am aware of the Crown's legal obligations resulting from the June 1993 Delgamuukw decision of the 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. My determination is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply. Aboriginal rights will be taken into account as far as possible under section 7(3)(a)(v) of the *Forest Act*, and will be respected in the administration of the AAC determined.

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

Overall, in making this determination, I am mindful of my obligation as steward of the forest land of British Columbia, 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 Act* and 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 Forest Service 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 trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long term productivity of forest lands is maintained. This is known as the "base case"

forecast, which forms the basis for comparison when assessing the effects of uncertainty on timber supply.

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

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its 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 available about forest management, which—particularly during the period leading up to, and now during the implementation of, the 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. Once an AAC has been determined that reflects appropriate assessment of all the factors required to be considered, no additional validation or precision may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined—it would be impossible for any such analysis to fully incorporate the subtleties of the judgement involved.

For the Lillooet TSA, the base case projection (i.e. in the *Lillooet TSA Timber Supply Analysis Addendum* which corrected a land base definition error in the original BCFS analysis) indicated that the harvest level could be maintained at 650 000 m³ for 3 decades, but then must decline by about 8 percent per decade before reaching the long-term harvest level of 362 600 m³ per year ninety years from now.

The Forest Act, section 7 (3)

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

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

Land base contributing to timber harvesting

The total land base of the Lillooet TSA is 1 123 827 ha. Areas that administratively do not contribute to the AAC were first removed from this total land base. In the base case, these areas were identified prior to the declaration of the Stein Valley as a Class A Park and represented 110 821 ha (about 10 percent of the TSA) including parks, wilderness areas, ecological reserves, Indian reserves, and federal and private lands. Non-forest and non-productive forest areas totalling 483 854 ha (about 43 percent of the TSA) were then deducted, leaving 529 152 ha (about 47 percent of the TSA) of productive forest land managed by the BC Forest Service (BCFS). However, not all of the productive forest land base contributes to the timber harvesting land base due to a variety of factors discussed below.

The land base contributing to timber harvesting over the long term estimated for the base case is 257 821 ha, which is about 49 percent of the productive forest land of the TSA and 23 percent of the total TSA area. The base case therefore excludes about 51 percent of the productive forest land as follows:

- about 22 percent (113 895 ha) accounting for environmentally sensitive areas,
- about 18 percent (97 737 ha) accounting for non-merchantable stands, sites with low timber growing potential, deciduous types and non-commercial cover,
- about 6 percent (32 083 ha) accounting for inoperable areas, and
- about 5 percent (27 615 ha) accounting for roads, trails and landings.

Recent information in the TSA has resulted in some revisions to the timber harvesting land base assumed in the base case. These revisions are first discussed individually below and then within a section on *aggregate impact*.

- environmentally sensitive areas

Sensitive soils (Es) were the main type of environmentally sensitive area (ESA) mapped in the Lillooet TSA, accounting for 86 percent of total ESA deductions. Given the importance of ESAs in defining the timber harvesting land base, and the high ESA reductions for sensitive soils, further soil and terrain hazard assessments should be completed in the TSA to re-examine their impacts on timber supply.

Since the base case was completed, BCFS district staff have noted that an additional 7071 ha area should have been deducted from the initial timber harvesting land base to account for other sensitive soils and problem regeneration areas inadvertently missed in the timber supply analysis. This is further discussed in the section on *aggregate impact*.

- non-merchantable stands, low sites, and deciduous stands

Lillooet district staff assessed the degree to which different forest types were in fact being utilized in the TSA in order to account for non-merchantable stands, sites with low timber growing potential, and deciduous types in the timber supply analysis. The BCFS analysis excluded 54 740 ha for non-merchantable stands (e.g. open-growing Douglas-fir stands with very low timber volumes), 40 311 ha of low growing sites, and 2686 ha of deciduous types and non-commercial cover (brush) - or 97 737 ha in total.

Since the timber supply analysis, district staff have reviewed and refined these exclusions, resulting in the identification of 53 106 ha of non-merchantable stands, 28 514 ha of sites with low growing sites, and 2924 ha of deciduous and brush—i.e. 84 544 ha in total.

The main difference is a reduction to the area of low growing sites. This is due to improved methodology which uses site index instead of site class to define these types. In total, 13 193 fewer hectares need to be excluded from the initial timber harvesting land base due to these factors. This change is discussed further under *aggregate impact*.

- inoperable areas

There were no operability lines for the Lillooet TSA when the timber supply analysis was undertaken. Instead, reduction estimates were applied (where possible) to planning cells. Planning cells are subdivisions of the TSA, typically defined by watershed boundaries. The reduction estimates were made using topographic maps, five-year development plans, and forest inventory maps. The base case excluded 32 083 ha based on inoperability.

Subsequent to the completion of the timber supply analysis, operability lines were developed for the TSA. The lines were drawn with the assistance of licensees, and include the assumption that cable systems will be used, where required, throughout the TSA. District staff consider this assumption to be reasonable, given the availability and use of cable systems in the TSA. The adjusted exclusion for inoperability was estimated by district staff to be 40 449 ha, i.e. 8366 ha more than the exclusion assumed in the base case for the initial timber harvesting land base. This is discussed further under *aggregate impact*.

In the submission by the Cariboo Lumber Manufacturers' Association (CLMA) it was suggested that there are more options for harvesting on steep and inaccessible slopes than assumed in the base case. The CLMA cited logging now being undertaken in the TSA using helicopters and mobile cable equipment, as well as economic cycles in the marketplace that periodically allow for high road costs when timber market prices are also high. However, Lillooet Forest District staff have informed me that nearly all of the helicopter and mobile cable logging has taken place in areas that were already assumed to be operable, although they do acknowledge that a limited potential exists to expand the assumed timber harvesting land base in the future by use of this specialized equipment. In keeping with my guiding principles, until licensees have demonstrated consistent performance in areas currently assumed to be inoperable, or until there are other factors which allow this change to be reasonably foreseeable and quantified, I will base my determination on practices now occurring in the TSA. However, if in the future, licensees are able to utilize timber in areas assumed to be outside the timber harvesting land base, then this can be factored into future AAC determinations.

- roads, trails and landings

For the BCFS timber supply analysis, it was assumed that existing roads, trails and landings account for as much as 12 percent of young stands (up to 40 years old) and 1.5 percent of stands older than 40 years in the timber harvesting land base. Future roads, trails and landings were assumed to represent an additional 8.1 percent of stands older than 40 years using the interior BC soil conservation guidelines for timber harvesting. The total area excluded from the timber harvesting land base was therefore 27 615 ha (7258 ha for existing and 20 357 ha for future roads, trails and landings) which represents about 10 percent of the timber harvesting land base.

Subsequent to the timber supply analysis, the Lillooet Forest District staff undertook an assessment of the actual area of existing roads, trails and landings in the TSA. Also, the CLMA's submission expressed concern that the reduction for roads, trails and landings used in the timber supply analysis was excessive. The study by the Lillooet Forest District found that existing roads, trails and landings, based on a representative sample of the TSA, cover about 5961 ha, and the revised projected allowance for future roads, trails and landings was 13 003 ha. These figures are respectively 1297 ha and 7354 ha lower than the those assumed in the base case, indicating that the reductions made to the initial and future timber harvesting land base in the BCFS analysis to account for roads, trails and landings were too high by 1297 ha and 8651 ha respectively.

The reduced estimate for roads, trails and landings increases the size of the estimated timber harvesting land base, but this mainly affects mid- to long-term timber supply, since the base case assumes that the timber will be first harvested from areas to be used for future roads, trails and landings. These considerations

indicate the need for some adjustment to the BCFS base case, which I have discussed below in *aggregate impact*.

- *mapping*

One of the map sheets in the TSA (92J083) was incorrectly coded which meant that 3260 ha of total operable land was inadvertently removed from the forest inventory. District staff estimate that after appropriate deductions this area should contribute approximately 1630 ha to the initial timber harvesting land base, and I have considered this below in *aggregate impact*.

- *Stein Valley*

The provincial government announced on November 23, 1995 that the Stein Valley would be protected as a Class A provincial park, and it has now been so designated. This decision removes about 13 800 ha (5 percent) from the initial timber harvesting land base derived for the BCFS base case which I have accounted for below in *aggregate impact*. The impact on the short term timber supply is expected to be somewhat greater since the area affected by the decision represents about 7 percent of the mature timber volume in the TSA's timber harvesting land base.

My accounting in this determination for the removal of the new park area from the timber harvesting land base differs from the approach I have taken in other recent determinations, in which the designation of protected areas has been made within the context of the provisions of an overall land use plan that also includes elements intended to offset the timber supply impacts of the reduced harvestable area. I note that the Stein Valley (Nlaka'pamux) park was not designated in the context of such a plan, and my accounting for the timber supply impacts of the designation is addressed under "Reasons for decision".

- *aggregate impact*

As discussed above, since the BCFS timber supply analysis was completed, district staff have recently undertaken a number of projects to update the estimated timber harvesting land base and the Stein Valley park has been established. I am satisfied that the updates conducted by District staff are appropriate for consideration in this determination.

As noted above, the areas that should be *added* to the initial timber harvesting land base derived in the BCFS analysis are:

- 13 193 ha to redress the over-deduction for *non-merchantable stands, low sites and deciduous stands*;
- 1297 ha to redress the over-deduction for existing *roads, trails and landings*

(Note: the 7354 ha figure associated with future roads, trails and landings affects the future timber harvesting land base, but not the initial timber harvesting land base);

- 1630 ha to account for an inadvertent *mapping* error.

In total this represents 16 120 ha that should be added to the initial timber harvesting land base derived in the BCFS analysis.

The areas that should be *deducted* from the initial timber harvesting land base as defined in the BCFS analysis and as noted above, are:

- 7071 ha to account for additional *environmentally sensitive areas*;
- 8366 ha to account for additional *inoperable areas*; and
- 13 800 ha (approx.) to account for the *Stein Valley* park decision.

In total, this represents about 29 237 ha that should be deducted from the initial timber harvesting land base due to these factors.

The aggregate effect of adding 16 120 ha and deducting 29 237 ha in accordance with these updates and changes is a reduction of 13 117 ha, or about 13 000 ha (5 percent) to the initial timber harvesting land base assumed in the base case. This net reduction approximates the size of the area excluded due to the Stein park decision. As mentioned above, under *Stein Valley*, the mature timber volume affected is about 7 percent and I have noted this in my "Reasons for decision".

Existing forest inventory

The timber harvesting land base in the Lillooet TSA is mainly comprised of stands of lodgepole pine and Douglas-fir; also present are subalpine fir (also known as balsam), spruce, western redcedar, and hemlock stands. The timber harvesting land base has almost 80 percent mature timber as defined by minimum harvestable ages (i.e. 80 years for lodgepole pine and 120 years for all other species).

- age of inventory

The TSA was most recently re-inventoried from 1988 to 1990, and forest cover was projected to either 1990 or 1991. The re-inventory information, used for the base case, is on average 7.5 years out of date for harvesting and natural disturbance and about 5.5 years out of date for overall growth projections. Due to the age of the information, the TSA is already well into the first decade of the harvest forecast. This factor is discussed in "Reasons for decision".

- volume estimates for existing mature stands

In the BCFS analysis, existing volumes were estimated and projected using the Variable Density Yield Prediction (VDYP) model. This is a generally accepted yield model based on many sample plots throughout BC. However, a recently completed statistical inventory audit for the TSA found that, for the TSA taken as

a whole, the mean value of the mature timber volumes as projected by VDYP from inventory information and used in the BCFS analysis were on average approximately 18 percent lower than the mean of the volumes obtained from the plots sampled in the audit. This result indicates a strong probability that the mature volumes derived through VDYP from the inventory figures and used in the analysis are underestimated to some extent. The magnitude of the implications for timber supply of this probable underestimation are uncertain, since the audit is intended to provide generalized results which are statistically reliable for the entire TSA, but which do not identify the accuracy of the volume estimates in the inventory data for a particular part or parts of, or for particular groups, species or site classes within, the TSA.

An examination of the subsample of audit plots likely to fall within the timber harvesting land base corroborated the likelihood of an underestimation of existing stand volumes on the timber harvesting land base. In addition, an earlier (1990) study of cutting permits in the TSA showed that cruise and scale volumes were greater than inventory volumes, which, although not conclusive in itself, provides some further support to the general findings of the audit. The underestimation appears to be associated in small part with inventory information on stand characteristics, but is mainly associated with the appropriateness of the data used in the VDYP model to accurately reflect the local conditions in this particular TSA, and I am requesting that work be carried out to reduce uncertainties in this respect (see below, "Implementation of decision").

From these studies there is a strong indication that the inventory volumes used in the base case harvest forecast are underestimated. Sensitivity analysis shows that a 20-percent increase in existing timber volumes within the TSA permits maintenance of the initial base case harvest level for an additional 4 decades (i.e. from 3 decades in the base case to 7 decades). I have considered this factor in "Reasons for decision".

Expected rate of growth

- site productivity estimates

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

I am aware that site index estimates from both young and older stands may not accurately reflect site productivity. Although studies in other areas of the province suggest that some site indexes may be higher than indicated by data from mature

forests, as yet I have no conclusive evidence to quantify the extent to which any potential underestimation may have occurred in the Lillooet TSA. Since site indexes are used to estimate future regenerated stand volumes, any changes will primarily affect long-term timber supply forecasts. In some circumstances, site index assignments may also have a short-term impact on timber supply, in that they can affect the estimated time required to satisfy forest cover green-up and criteria for mature harvestable age. However, sensitivity analysis conducted for this TSA where green-up periods were decreased by 5 years showed no change from the base case, and increasing green-up periods by 5 years resulted in no change in the short term supply, and only a small change in the longer term.

The CLMA submission states that the site index assignments used in the BCFS analysis are low, and urges that further study be done on site indexes for second-growth stands. The BCFS has initiated a program to improve site index estimates, through a Site Productivity Working Group, which will provide valuable information for use in subsequent analysis. In the meantime, I am satisfied that the site indexes incorporated in the BCFS analysis represent the best information available, and are suitable for use in this determination. If future studies cause changes to site indexes for this TSA, the matter will be reviewed in a future determination.

- volume estimates for regenerated stands

The BCFS uses the Table Interpolation Program for Stand Yields (TIPSY) to estimate volumes from managed stands. Volumes projected using TIPSY assume management practices such as control of stocking density through planting, brushing and spacing. In the Lillooet timber supply analysis, only a minor portion of the existing stands under 40 years of age was assumed to meet current requirements for managed stand conditions and was ascribed a managed stand yield curve. Volume estimates for the majority of existing regenerated stands were therefore estimated using VDYP. It was assumed that all not-satisfactorily-restocked (NSR) areas and all stands harvested in the future will be managed such that they will grow according to TIPSY predictions. Volumes in stands managed by selection harvesting were also estimated using their VDYP curve.

For managed stands where TIPSY was used, Operational Adjustment Factors (OAFs) were applied to account for a loss of timber volume due to such factors as openings in stands (OAF1), as well as age-dependent factors such as pests, disease, decay, waste and breakage (OAF2). The Lillooet timber supply analysis used the provincial standard OAFs of 15 and 5 percent respectively. There is concern about the presence of root disease and other stand-damaging agents within the TSA. Root disease is most prevalent in Douglas-fir stands managed primarily by selection harvesting. Research into root disease and its impacts on timber supply is proceeding in various parts of the province, and I expect future analyses will have the benefit of improved information regarding appropriate

OAFs. However, at this time, the OAFs assumed in the base case reflect the best available information and I accept them as appropriate for use in this determination.

The CLMA raised a concern that VDYP curves may be inappropriate for stands managed by selection harvesting. I agree that an uneven-aged stand model is needed, and the BCFS is currently developing such a model for future use. However, I am aware of no information that would allow me to determine if any future model would increase or decrease estimated volumes from selection stands relative to the base case. At present, the method used represents the best available information. I therefore consider the current method appropriate for this determination.

District staff have assessed stocking levels in recently planted stands within the TSA and found them to be below those assumed in TIPSy. District staff found average initial stocking levels to be 893 stems/ha versus the 1120 stems/ha average assumed for the BCFS analysis using TIPSy. District staff attributed this difference to the fact that areas are sometimes planted at minimum stocking levels and the anticipated fill-in by natural regeneration is not occurring to the extent expected. If these lower stocking levels continue, regenerated volumes may be lower than predicted, which would affect the long term timber supply level. However, sensitivity analysis shows that there is no effect on the short-term timber supply in this TSA when regenerated stand volumes are either 20 percent higher or lower than assumed in the base case. Therefore, I am satisfied that base case assumptions for stocking and volume estimates for regenerated stands are satisfactory for the purposes of this determination.

Nevertheless, I am concerned about the medium- and long-term timber supply implications of the low stocking levels observed in the TSA. District staff therefore will be examining this matter further and will monitor performance to ensure compliance with target stocking levels. Furthermore, I will be following up on this matter in preparation for the next review of this AAC to ensure satisfactory compliance with provincial standards and objectives in this regard.

From the foregoing, for the purposes of this determination, I am satisfied that regenerated volumes have been adequately represented in the BCFS analysis, and that no adjustment to the projected short-term harvest level is required on this account.

- minimum harvestable ages

Minimum harvestable age is the age at which forest stands reach a harvestable condition. In the BCFS base case, the minimum harvestable ages are estimated to be 80 years for lodgepole pine and 120 years for all other species. District staff have subsequently examined harvest ages and indicate that current practice

involves cutting below these minimum harvestable ages, and that this may in part be in response to the several *deferrals and delays* (discussed later) in the TSA. This practice suggests that minimum harvestable ages are lower than assumed in the base case. Sensitivity analysis shows that reducing minimum harvestable ages by 10 years allows extension of the initial harvest level in the base case for another decade (i.e. from 3 to 4 decades). Therefore this factor represents a slight increase in the timber supply from that projected in the base case and I have accounted for this in "Reasons for decision".

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

Regeneration delay

Regeneration delay is the period between harvesting and the time an area is occupied by a specified minimum number of acceptable well-spaced seedlings that are relatively free from growth-inhibiting brush, weed and excessive tree competition. In the Lillooet TSA, regeneration is accomplished primarily by planting. The timber supply analysis assumed a regeneration delay of 4 years. Current information from the Lillooet district office indicates the actual regeneration delays are 3.5 years in forest licence areas and 2.4 years in areas managed under the Small Business Forest Enterprise Program. Since forest licence areas dominate the TSA, the overall average is closer to 3.5 years, which is very close to that assumed in the base case. Therefore, I am satisfied the base case assumptions concerning regeneration delay are appropriate for this determination.

Not-satisfactorily restocked area

The base case assumed 15 060 ha of not-satisfactorily restocked (NSR) area existed in the TSA. About two-thirds was current NSR expected to meet normal regeneration delay, and the remainder was backlog NSR expected to be restocked by the year 2000. Current records show 9539 ha of the assumed NSR in the base case is now restocked and should have represented by assigning slightly higher ages to the restocked area. This represents a small timber supply increase in the medium to long term, but will not affect the short term supply. Therefore, I accept the assumptions in the base case as appropriate for this determination.

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

Silvicultural treatments

Clearcutting is the silvicultural system practised on the majority of the TSA, while 14 percent of the TSA's timber harvesting land base occurs in drier areas where selection systems are employed. The selection zone occurs in areas predominated by Douglas-fir stands that are considered ecologically well suited for this type of treatment. A small amount of clearcutting is also practised in the selection zone,

primarily due to the presence of root disease. Conversely, a small amount of selection harvesting is carried out outside the selection zone, primarily to address visual or wildlife values. These amounts are approximately equal in size and are not expected to affect the base case projections.

Enhanced silvicultural treatments are applied to very few free-growing stands and none are assumed in the base case analysis. No commercial thinning is being done in the Lillooet TSA and there is limited opportunity in the near future due to adverse terrain and lack of suitably aged stands. Over the past 5 years, juvenile spacing has occurred on average on about 550 ha/year, and with funding support of Forest Renewal BC spacing is expected to increase by another 600 ha/year. In the last 2 years, 86 ha have been pruned, and increased levels of pruning are planned now that background surveys have been completed. There are no plans to fertilize stands in the TSA on an operational basis at this time.

Both spacing and pruning are highly labour intensive and therefore create important jobs in the TSA. The main purpose of these activities is to increase the value of the timber eventually harvested from these stands, but this is not expected to enhance timber volumes beyond those projected in the base case. Therefore, for the purposes of this determination, I am satisfied the base case assumptions regarding silvicultural treatments are appropriate.

- (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

Sawlog utilization standards used in the timber supply analysis are consistent with BCFS interior utilization standards which include a minimum diameter at breast height (dbh) of 12.5 cm for pine, 17.5 cm for other conifers, and a minimum top diameter of 10 cm. These utilization standards were used with VDYP and TIPSY to estimate volumes for existing and regenerated stands.

BCFS district staff confirm that although one licensee has been utilizing timber to a 5-cm top diameter, in general the level of utilization practised in the TSA is as assumed for the analysis, and I therefore consider these assumptions appropriate.

No harvesting operations have taken place specifically for pulpwood under pulpwood agreement #16 (PA16). However, some harvesting for sawlogs has occurred under a forest licence within the PA16 area (see also *pulpwood agreements*), which is subject to more stringent pulpwood utilization standards. This level of utilization is currently occurring, but the difference in volume between the sawlog and pulpwood utilization standards is not charged to the licensee's forest licence AAC, since these pulpwood volumes are charged to PA16.

Therefore the increased utilization required within the PA16 area does not affect the base case timber supply projection.

In the future, if PA16 harvesting plans are developed for this TSA, I will consider the appropriateness of establishing a partition encompassing the forest types on which the award of PA16 was predicated in order to recognize and facilitate the plans.

Decay, waste and breakage

The VDYP model used to project existing stand volumes incorporates estimates of the volumes of wood within a stand lost to decay, waste or breakage. Estimates of losses have been developed for different areas of the province based on field samples. At this time, these figures constitute the most complete and rigorous estimates available. I am not aware of any information that would render these estimates an unreasonable basis for consideration 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 objectives

The purpose and function of the Ministry of Forests (as provided in the *Ministry of Forests Act*) is to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources to ensure that the production and harvesting of timber, and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values, are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives constrain the timber supply must be considered in AAC determinations.

- forest cover requirements

In order to protect forest resource values such as wildlife, water quality and aesthetics, forest cover objectives are developed that prescribe the "green-up" stand conditions that must exist on a reforested site before timber on adjacent areas may be harvested. This provides for a distribution of harvested areas and retained forest cover across the landscape in keeping with overall management objectives for an area.

In the Lillooet TSA, the timber supply analysis modelled 6 different management zones on the TSA's timber harvesting land base. The objectives for, and management of, specific forest resources in the Lillooet TSA, such as wildlife, water and visual quality, are discussed under the relevant sections below.

The majority of the TSA (about 76 percent) is subject to forest cover objectives for general IRM. For these areas, no more than 33 percent of the area may be

under the cover of stands that are shorter than 3 m in height. This equates approximately to a 3-pass harvesting system, which was used in the BCFS analysis. District staff indicate that the current practice is now for a combination of 4-pass and 3-pass harvesting. Sensitivity analysis indicates that changing to a 4-pass system would have no effect on the base case. Therefore, I am satisfied that, for this determination, the base case reasonably incorporates the effects of general IRM guidelines.

- *biodiversity*

Biological diversity, or biodiversity, is the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, and the evolutionary and functional processes that link them. A major consideration in managing for biodiversity is leaving sufficient, and appropriately located, mature forests for species dependent on, or strongly associated with, old growth forests. Under the Code, a biodiversity guidebook has been approved recently that addresses stand and landscape-level biodiversity needs for a variety of ecological units found within the province.

The Code was not in effect when the timber supply analysis was undertaken for the TSA and therefore the base case does not specifically account for potential volume or land base reductions due to stand and landscape-level biodiversity factors. However, the various reductions made to define the timber harvesting land base identify the potential availability of about 243 000 ha (46 percent) of productive Crown forest area to help support old-growth needs for biodiversity under current management.

Since the timber supply analysis was completed, harvesting methods have been modified in some areas to support stand-level biodiversity objectives that include leaving high stumps and wildlife trees in clearcut areas, retaining patches in some harvest areas, and the establishment of Douglas-fir reserves in the Montane Spruce biogeoclimatic zone. A landscape-level biodiversity plan is being implemented on a pilot basis in the Yalakom Local Resource Use Plan area through the design and application of a forest ecosystem network.

BC Environment's submission notes that the base case does not explicitly address biodiversity. Its authors estimate that under current Code requirements, stand-level biodiversity practices will reduce the annually available volume by about 5000 m³ to account for wildlife trees, patch retention, and Douglas-fir reserves, and that there will be an unquantifiable impact from the leaving of high stumps. BC Environment staff indicate that they select decayed trees for high stumping, and that these trees may already be excluded from the timber supply analysis in allowances for decay, waste and breakage. More work is needed to verify that the high stumps left for stand-level biodiversity involve wood that is not assumed to be usable, in order to better assess timber supply impacts. BC Environment's

estimates of impacts on timber volumes have been developed in consultation with Lillooet Forest District staff. While there is some uncertainty associated with these estimates, they constitute the best available information at this time and permit some accounting, in this determination, of the impacts on timber supply from provisions for biodiversity.

The CLMA submission suggests that the large area of productive forest land in the TSA that is not assumed to be part of the timber harvesting land base contains a broad spectrum of sites and species categories found within the TSA, and that this area will largely be old growth and can contribute to meeting non-timber resource objectives. The CLMA sees no justification for cover requirements for older-forest retention or extended green-up periods on the harvesting land base when 50 percent of the productive forest land of the TSA is considered unavailable for harvesting. While I agree that this forest will contribute to meeting objectives for other values, its ability to provide the required distribution of forests of different ages cannot be assured without addressing related spatial issues.

I acknowledge that more explicit provisions are needed to model the implications of managing for biodiversity in the future, such as the need for old-growth management areas and forest ecosystem networks distributed across the landscape. However, it is not possible for me to speculate at this point on the impacts that possible new provisions for planning for landscape-level biodiversity will have on timber supply. The Code requires consideration of biodiversity during forest planning, and enables the development of biodiversity objectives. Until clarity is provided on the objectives for biodiversity, through plans developed in accordance with the Code, and on the extent to which protected areas, riparian reserves under the Code, and other forests that are not in the timber harvesting land base can contribute to meeting those objectives, I cannot speculate quantitatively on the impacts. It is hoped that the LRMP process will assist in the development of objectives for biodiversity. Following the LRMP process and implementation of the Code, the next timber supply analysis conducted for the Lillooet TSA should be in a better position to examine any new requirements for biodiversity and to assess with more precision their implications for timber supply.

For this determination, I have considered the estimated timber supply impact of 5000 m³ annually for stand-level biodiversity to be a downward pressure on the short term timber supply, and I note that there will be an unquantifiable impact from future provisions for landscape-level biodiversity. These considerations are reflected in my "Reasons for decision".

- wildlife habitats

The Lillooet TSA has a great diversity of wildlife species, including ungulates such as mountain goat, bighorn sheep, deer, and moose; predators including grizzly and black bears, and wolves; furbearers such as marten, fisher, and lynx; numerous

forest bird species such as woodpeckers that depend on large diameter trees and snags; and reptiles such as the western racer. Habitat also exists in the TSA for red-listed (endangered/threatened) and blue-listed (sensitive/vulnerable) species such as the prairie falcon, spotted owl, pallid bat, wolverine, badger, and western rattlesnake.

The forest inventory used in the timber supply analysis for the base case recognized approximately 1280 ha as being environmentally sensitive for wildlife (Ew). In the analysis, about 45 percent of this Ew area, 582 ha, was deleted from the timber harvesting land base. The analysis also applied the Lillooet Forest District Integrated Resource Management Timber Harvesting Guidelines, which recommend that at least 20 percent of the timber harvesting land base be at least 80 years or older at any one time in order to provide thermal cover conditions for ungulate winter range. The base case implicitly addresses some additional wildlife habitat needs through the large area of productive forest land that is not in the timber harvesting land base, as well as forested areas in other management zones within the TSA (such as the selection zone); although, as is the case for biodiversity (as discussed above), the magnitude of this protection is uncertain at this time.

In an effort to reduce the number of guidelines directing forest development, use of the Lillooet Forest District Integrated Resource Management Timber Harvesting Guidelines was discontinued when the Code was introduced. The Code and associated regulations and guidebooks will direct development planning to ensure protection of wildlife habitat.

BC Environment submitted that the timber supply analysis did not specifically model ungulate winter range, grizzly bear habitat, or rare and endangered species, and that the forest cover requirements assumed in the base case may not be adequate to protect wildlife habitat. Concern was also expressed that if non-conventional logging methods were to occur outside the assumed timber harvesting land base, this could impact mountain goat winter range.

Currently, protection of ungulate winter range is the principal objective of wildlife habitat management in the TSA. Approximately 209 000 ha of ungulate winter range lie within the total operable area of the TSA, of which an estimated 100 000 ha overlap with the timber harvesting land base. This substantial area represents about 38 percent of the timber harvesting land base and is primarily deer winter range defined on the basis of the capability of the land to support wintering deer. BC Environment staff suggests that, for deer winter range, ideal forest cover objectives would allow no more than 20 percent of the area to be below a green-up height of 3 metres (as opposed to 33 percent assumed in the IRM zone), and would require greater than 40 percent of the area to be under thermal cover at 19.5 m height (compared to 20 percent mature cover as assumed in the IRM zone).

These prescriptions are similar to a 5-pass harvesting regime, which sensitivity analysis shows to have a significant short-term timber supply impact when modelled for the entire timber harvesting land base. However, as noted, the above-referenced management strategy has not been approved by the district manager and does not reflect current management or planning objectives in the TSA at this time, nor is it implied that this regime should be considered for the entire TSA. The 14 percent of the timber harvesting land base that lies in the selection zone, and the 3 percent in the visual zone, are primarily in the winter range and are subject to management prescriptions that should accommodate deer winter range. Nevertheless, much of the winter range falls within the IRM zone. Given the timber supply impacts of assuming a 5-pass harvesting system for the large deer winter range in the TSA, this issue could have significant implications for timber supply depending on the balance to be struck between managing for deer and managing for timber outputs. The Lillooet LRMP process can provide a means of developing appropriate guidelines, tailored to the TSA, which can be incorporated in detail in the next timber supply analysis. For the present determination, I have been mindful of the potential risk which this factor presents to the timber supply in the near term.

Moose winter range is associated with wetlands and riparian areas in the TSA. According to BC Environment, the BCFS analysis base case has indirectly modelled mature forest cover requirements in moose winter range (i.e. 20 percent of the forest cover must be greater than 80 years old), but the analysis does not model special habitat requirements around wetlands. BC Environment staff would like no more than one-third of the forest surrounding wetlands to be less than 20 years old, and the buffer surrounding wetlands to be about 200 metres in width. If these prescriptions are adopted in the TSA, this will represent a slight downward influence on the timber supply projected in the base case. However, at this time, the currently approved management regime is as modelled in the base case.

Grizzly bear habitat requirements were not directly modelled in the base case. BC Environment would prefer a 5-pass harvesting system for about 8000 ha (3 percent) of the timber harvesting land base in wetter biogeoclimatic units, and a 4-pass system for about 4000 ha in drier biogeoclimatic units. BC Environment stated that a forthcoming provincial grizzly bear strategy may provide additional direction on the management of grizzly bear habitat. As noted above, sensitivity analysis shows that the use of a 5-pass system (on the whole timber harvesting land base) creates a short-term supply reduction, but no effect is shown with the use of a 4-pass system. I have recognized in this determination that if a 5-pass system is needed for some grizzly bear habitat areas, that this would represent a small downward influence on projected short-term timber supplies.

The base case does not provide for any special habitat requirements for rare or endangered species like the spotted owl. BC Environment estimates that about

34 000 ha of productive forest lands are capable of providing spotted owl habitat in the TSA, but it is not known how much of this is in the timber harvesting land base or in protected areas. The provincial government is developing a provincial strategy concerning spotted owls, but at this time, the timber supply impacts of the strategy and its applicability to the Lillooet TSA are not known.

In summary, there is uncertainty over what management practices should apply in important wildlife habitat areas in the TSA in order to integrate the maintenance of wildlife and timber supply. The Lillooet LRMP provides an appropriate forum for public discussion and resolution of this issue, for incorporation into the next AAC determination. The current uncertainty respecting management practices and impacts on timber supply highlights the need to assess, in the next timber supply analysis, the contributions toward achieving desired wildlife habitat conditions that are made by any new protected areas, by new Code provisions for riparian habitats and for biodiversity, and by the extensive area of productive forest land that is not in the timber harvesting land base.

I am aware that sensitivity analysis shows that changing to a 5-pass harvesting system over the entire TSA would result in a reduction of about 5-percent from the initial base case harvest level, and that potentially more restrictive forest cover guidelines to meet habitat objectives in parts of the TSA could therefore have an impact on timber supply. In view of the potential risks to timber supply associated with the uncertainty in this issue, in this determination I have acknowledged the risks to future timber supplies associated with the need to protect important wildlife habitat, as discussed under "Reasons for decision".

- riparian habitats

Riparian habitats occur around streams, lakes and wetlands. The *Forest Practices Code of British Columbia Act* requires the establishment of riparian reserves that exclude timber harvesting, and riparian management zones that restrict timber harvesting. The timber supply analysis was completed before the Code came into force and did not directly account for riparian habitats, although some riparian areas with non-contributing forests (such as private land and deciduous types) have already been excluded from the timber harvesting land base.

A study was undertaken throughout the TSA by district staff to estimate the amount of area that should now be considered to be in riparian reserves and riparian management zones under Code regulations. The resulting estimates were:

	area in riparian reserves (ha)	area in riparian management zones (ha)	total (ha)
In total TSA	8084	5782	13 866
In timber harvesting land base	1997	1428	3425

The affected area in the timber harvesting land base was estimated by assuming riparian areas are representative of the entire land base in terms of operability and forest types, and consequently that the same percentage of the total riparian area would fall within the timber harvesting land base as is the case for the TSA as a whole. The combined 3425 ha area represents about 1.3 percent of the timber harvesting land base. The impact on timber supply, however, is a somewhat smaller percentage, since some of the riparian management zone can be harvested. The study did not estimate reserves required around wetlands, but this is believed by district staff to be a small area since there are relatively few wetlands in the TSA. More precise estimates of riparian habitats are desirable to decrease uncertainty for the next determination.

For this determination, while I recognize that there is some uncertainty about these estimates, I am prepared to accept the estimate that about 1.3 percent of the timber harvesting land base is in riparian reserves and management zones as the best currently available information. This represents a slight downward pressure on both the short- and long-term timber supplies projected in the base case, which I have addressed under "Reasons for decision".

- community watersheds

The BCFS timber supply analysis base case accounts for the 6 community watersheds that were recognized when the analysis took place. The area within the timber harvesting land base subject to specialized cover requirements under community watershed designation was 6200 ha, or about 2 percent. Since the BCFS analysis, new areas have been established, and the number of designated community watersheds has increased by 13 to a total of 19. These newly designated community watersheds cover 3266 ha that were in the IRM zone in the BCFS analysis, a change representing about 1 percent of the timber harvesting land base. The 13 new community watersheds came from an interim list of 18 potential watersheds referred to in the public discussion paper and in the public comments.

Relative to the base case, the main changes with the new watershed designations are that, on the 1 percent of the timber harvesting land base that is affected, a 4-pass harvesting regime would have to be employed to meet forest cover requirements, rather than the 3-pass harvesting assumed for the IRM zone, and that green-up heights would increase from 3 metres to 6 metres. Sensitivity analysis for the entire TSA showed that implementing a 4-pass harvesting system would not change the harvest forecast relative to the base case, and that extending

green-up periods by 5 years (e.g. to help achieve 6-metre rather than 3-metre green-up heights) has only a very minor effect on mid-term harvest flows. Therefore only a very slight downward pressure on the base case is expected with these additional community watersheds, which I have addressed under "Reasons for decision".

- visual quality

A visual management zone was identified and represented in the BCFS analysis base case. This zone consisted of areas with known 'retention' and 'partial retention' visual quality objectives (VQOs), but excluded visually sensitive areas in the selection zone (since partial-harvest prescriptions can accommodate these VQOs), and in the special Spruce Lake and Mid-Stein zones. Areas having a 'modification' VQO were not included in the visual management zone for the analysis, because it was believed that management in these areas would be similar to the cover requirements of the IRM zone. This left 7756 ha (3 percent) of the harvesting land base in the visual management zone. The timber supply analysis specified that no more than 14 percent of this zone could be less than 6 metres tall at any time.

Since the timber supply analysis, the District Manager has approved interim VQOs along major travel corridors and at significant recreation sites. These new VQOs are being applied on an interim basis and will be assessed as part of a public LRMP process. Therefore, retention and partial retention interim VQOs currently constitute a total of 56 184 ha (22 percent) of the timber harvesting land base. This figure is difficult to compare to the 7756 ha used in the timber supply analysis owing to the overlap of VQOs with other management zones. Nonetheless, the area under the interim retention and partial retention VQOs is larger than originally assumed in the base case.

A number of public comments expressed concern about the visual impact of logging operations within the TSA and the effect they could have on tourism. The BC Ministry of Small Business, Tourism and Culture expressed an interest in working with the Lillooet Forest District to address visual quality concerns. The CLMA expressed concern that the VQOs assumed in the base case may not be appropriate because they have not undergone a public review process, and that the forests not in the timber harvesting land base could be used to address visual quality.

I recognize that there is some uncertainty about the amount of area that should be considered visually sensitive, and I support the district's plan to obtain public input on the issue. I consider the LRMP to be a suitable public forum for discussion on appropriate VQOs, and any resulting changes can be modelled in the timber supply analysis supporting the next AAC determination within five years.

The Minister of Forests has expressed the provincial socio-economic objective of ensuring an appropriate balance between protecting visual resources and minimizing the impact of such protection measures on timber supplies, recognizing that visual quality objectives may overlap with other objectives now required under the Code (see below, Economic and social objectives and Appendix 4).

In this respect, I recognize that, on one hand, the BCFS base case may underestimate to some extent the area currently assumed to be in the visual management zone, but, on the other hand, I also recognize that timber supply impacts of VQOs can be reduced by improved coordination with other objectives under the Code, by improved design practices, by the use of alternative silvicultural systems, and by the relaxation of green-up requirements in areas with good cutblock design. Some BCFS staff believe the much larger area in VQOs than modelled will result in a net decrease in the timber supply, but due to the degree of uncertainty present, I find the potential for restricting or increasing timber supply to be currently unpredictable. I believe, as noted above, that the LRMP process is a suitable forum for public discussion of VQOs in context of an appropriate balance with other values, and any changes resulting from these discussions can be incorporated in the next AAC determination. In this determination I have made no specific adjustment to the projected timber supply respecting potential changes in visual quality management.

- recreation

With its abundance of scenery and varied landscapes, the Lillooet TSA offers recreationists many opportunities, including (i) sightseeing and touring, for example the promoted "Coast Mountain Circle Tour", which travels through Vancouver, Hope, Lytton, Cache Creek, Lillooet and Whistler; (ii) hiking, camping, trail riding, mountain biking, and mountain climbing, both in areas well accessed by roads and in roadless backcountry areas like the Stein and Spruce Lake areas; (iii) fishing, particularly for steelhead, sturgeon, trout and salmon, and hunting, especially for California bighorn sheep, mule deer and mountain goats; and (iv) other activities like white water rafting, skiing and snowmobiling. I understand that improved access to the TSA from Vancouver is considered to be the main factor associated with the increasing number of visitors to the area.

The forest inventory used to support the BCFS timber supply analysis base case recognized about 4700 ha of important recreation resource lands (Er lands), and in the analysis 2056 ha (about 44 percent of the 4700 ha) were deleted from the timber harvesting land base to account for protection of particularly sensitive recreation resources. In the base case, designated parks, ecological reserves and wilderness areas were also removed from the timber harvesting land base.

Outside these areas, the assumption was made in the analysis that recreation resources and activities can be integrated with timber harvesting through

management prescriptions in the various land use zones such as the visual management zone. As noted, about 50 percent of the productive forest land in the TSA is outside the timber harvesting land base; this represents a large area in the TSA that should continue to provide backcountry recreation opportunities. I am therefore satisfied that the assumptions made for recreation in the base case are reasonable for use in this determination and that no adjustment to the projected timber supply is required on this account.

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

Other information relating to the capability to produce timber

- land use planning

Since the timber supply analysis was undertaken, the Lillooet district has completed the Bralorne local resource use plan (LRUP), and has nearly completed the Yalakom LRUP. The Bralorne LRUP covers a relatively small area (about 4000 ha) and the main impact on timber supplies is associated with visual quality. I have addressed this impact within the consideration of visual resources for the entire TSA (see above, *visual quality*,) in respect of which no adjustment to timber supply is contemplated at this time.

The main impact of the Yalakom LRUP (approximately 110 000 ha) on timber supply will likely be the incorporation of forest ecosystem networks to address biodiversity. I have considered this impact under the section on biodiversity, where I acknowledged that provisions for biodiversity exert a downward pressure on timber supply.

Various stakeholders are embarking on an LRMP for the Lillooet TSA. This process should provide valuable direction that will help to guide the analysis work supporting future AAC determinations. One key issue the LRMP process will likely address is what areas should become new protected areas within the TSA. The TSA currently has 9 approved study areas under the Protected Areas Strategy (PAS) which, in essence, has precluded timber harvesting in these areas until a land use decision is made. These, and several deferrals in the TSA, have made it difficult to harvest at the level of the AAC in recent years, as discussed below.

- deferrals and delays

Timber harvesting is being deferred or delayed in a number of areas in the Lillooet TSA until decisions or resolutions are reached. The recent November 23, 1995 Stein Valley decision, which created a provincial park covering the entire Stein Valley, reduced the number of deferred areas under the PAS - reducing the total area in protected areas and areas deferred due to PAS from about 23 percent of

the total TSA area to 18 percent. Areas currently under deferral through PAS, or delay due to First Nations' concerns, include:

- nine approved PAS study areas, including the Spruce Lake area, which total about 90 000 ha; and
- four areas with First Nations' concerns, in the Camoo area, Pavilion Creek, Siska Creek, and Fountain Valley, totalling about 43 000 ha.

Using the percentage of the entire TSA in the timber harvesting land base as a basis for approximation, about 33 000 ha of this 133 000 ha area could be in the timber harvesting land base, representing about 13 percent of the TSA.

Although harvesting is not presently carried out in the deferred areas, these areas were included in the timber harvesting land base in the BCFS analysis and, as noted in AAC rationale statements for a number of other TSAs, I find no statutory basis upon which to exclude them from the timber harvesting land base. My interpretation of Section 7 of the *Forest Act*, read in conjunction with Section 53 and Part 15 of the *Act*, is that in an AAC determination under Section 7 of the *Forest Act*, until and unless government makes land-use decisions prohibiting or restricting harvesting in contentious areas, these areas must be considered as part of the timber harvesting land base, even though the timber in these areas may not be expected to provide any of the actual harvest.

The avoidance of harvesting operations in deferred areas in this TSA is causing increasing harvesting pressures on the remainder of the timber harvesting land base, and has presented major difficulties to the district and licensees in finding environmentally acceptable areas in which to harvest at the level authorized under the current AAC. The recent decision to reduce the area in deferrals under PAS should lessen this difficulty to some degree, but nevertheless the deferrals and delays still pose a major operational challenge to the forest district.

I am concerned that the ongoing avoidance of harvesting in contentious areas means that, for harvesting to continue in the TSA at the level indicated by the AAC, the remaining areas must be harvested at higher rates. If the deferrals continue, at some point, the achievement of integrated resource management objectives may necessitate a reduction in the harvest level in order to meet forest cover or other objectives. If the issues remain unresolved and at some point the district manager becomes concerned that the allowable harvest level cannot be met on the remaining available land base while continuing to meet integrated resource management objectives, the district manager may wish to take steps towards an application to Cabinet for the specification of designated areas that would allow for a temporary AAC reduction under Part 15 of the *Forest Act*.

For this determination, while I appreciate the major impacts caused by existing deferrals and delays in the TSA, in keeping with my guiding principles and my

interpretation of the *Forest Act*, I will not speculate on future land use decisions and treaty negotiations that government may make in the future, and I cannot exclude these areas from the timber harvesting land base in my determination. However, once land use decisions have been made by government, further analysis can be undertaken and, if necessary, this AAC may be redetermined before the end of the required five-year period.

- pulpwood agreements

Pulpwood agreement #2 lies in the TSA but has never been active, although it was recently renewed. Pulpwood agreement #16 (PA16) supports an oriented strand board plant in 100 Mile House, and 25 000 m³/year have been allocated to the Lillooet TSA. No harvesting has occurred in the TSA under the PA16 allocation (although some harvesting does take place on the PA16 area under a forest licence, as noted above in Utilization standards) and no five-year development plan has yet been submitted. The timber supply analysis indicates that the TSA has sufficient volumes to provide for PA16 without affecting the base case harvest forecast and this point has been verified by district staff. Since no harvesting is currently planned under the pulpwood agreements, no partition is required in the AAC for this purpose at this time. When the intentions for development under PA16 become clearer, the AAC can be redetermined to reflect the planned management and timber harvest regime as explained above in Utilization standards.

- cut-control carry-over

In the previous cut-control period from 1987 to 1991, Ainsworth cut only 91 percent of its AAC. The undercutting was largely attributable to difficulties in securing cutting permits and road construction authorities to new harvesting areas due to factors such as protracted planning processes and the deferral of areas pending land use decisions. As a consequence, the Minister of Forests authorized a 180 000 m³ carry-over from the previous cut control period to the current period, i.e. 1992 to 1996, with 120 000 m³ apportioned to Ainsworth and 60 000 m³ added to the Small Business Forest Enterprise Program. To date, there has been no harvesting of these carried-over volumes. To the extent that any harvesting of these volumes does take place, the inventory will be depleted faster than projected in the analysis. This could affect the inventory volumes for the next timber supply analysis, which will be taken into account in the next AAC determination.

- (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 in old-growth forests to harvesting in second-growth forests is a major consideration in determining AACs for areas with a significant old-growth component, such as the Lillooet TSA. In the short term, the presence of large volumes of older wood permits harvest levels above long-term levels without jeopardizing the future stability of timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined so as to ensure that current and medium-term harvest rates will be compatible with a smooth and orderly transition towards the usually (but not always) lower long-term harvest rates. Thus, timber supplies should remain sufficiently stable that there will be no inordinately adverse impacts on current and future generations. To achieve this, the rate set 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 base case showed that, due to the availability of higher volume older stands, harvest levels in the short and mid terms in the TSA can remain above, but must decline toward a long-term steady harvest level by about 90 years from now. The base case projected that the existing inventory and future growth will enable the current AAC of 650 000 m³ to be maintained for 30 years, after which timber supply would decline by 8 percent per decade until the long-term harvest level of 362 600 m³ is reached 90 years from now.

Many other harvest flow patterns are possible and the timber supply analysis indicated some alternatives. If a gradual decline in harvest level to the long term level is not required, then a harvest level of 650 000 m³ could be maintained for 70 years. However, after the 70 years an abrupt reduction of about 50 percent would be required, to a level below the currently projected long-term harvest level (about 330 000 m³) until 140 years from now when the harvest could increase to the long-term level projected in the base case.

Another alternative examined the effects of immediately reducing the initial harvest level to 520 000 m³ (80 percent of the current AAC) and maintaining the harvest at that rate for as long as possible. Analysis showed this reduced initial harvest level could be maintained for 90 years before falling by 8 percent per decade until the long-term harvest level is reached, 130 years from now.

In making my determination, I have considered the socio-economic analysis (SEA) report for the Lillooet TSA prepared by the BCFS. The SEA describes the economic importance of the TSA's forest industry, both to local communities and to the province as a whole. The SEA shows that about 27 percent of employment

in the Lillooet TSA is associated with the forest sector, and estimates that the current AAC supports 657 person-years of employment in the TSA (direct and indirect/induced) and 2516 person-years province-wide. It also shows that the harvesting of the current AAC generates estimated provincial government revenues of \$21 million per year.

The SEA discusses the economic, community, First Nations, and environmental implications associated with two timber harvest forecast scenarios. Scenario One in the SEA corresponds to the base case, while Scenario Two corresponds to the alternative with the initial annual harvest level of 520 000 m³ described above. These scenarios were chosen to illustrate a range of socio-economic implications.

Relative to Scenario One, in the first decade under Scenario Two there would be 132 fewer person-years of employment in the TSA (about 5 percent of the TSA's labour force), 504 fewer person-years of employment province-wide, and \$4.1 million less in annual provincial government revenues from the forest sector. The SEA discusses the potential implications of these impacts for individuals and communities in the TSA. Local First Nations bands expressed a preference for reduced harvest levels, for reasons related to environmental protection, traditional uses of the forest, and land claims. However, some also see the forest sector as a means to provide employment opportunities and economic development, and many First Nations people are active participants in the forest industry.

A number of submissions received during the public input period raised concerns about the SEA. The Cariboo Lumber Manufacturers' Association (CLMA) expressed concerns that the SEA underestimated the local economic importance of the timber industry. BCFS staff reviewed this submission, and concluded that the SEA presented a reasonably accurate picture of forestry in the TSA's economy. The CLMA also provided additional information, regarding mill throughput levels and the demographic profile of mill employees. Other submissions noted concerns related to the SEA, including the following: the negative impact of logging on environmental values, tourism, and outdoor recreation; the value of First Nations' traditional uses of the forest; the potential employment impacts of lower harvest levels; and the accuracy of the TSA population estimates.

I have given consideration to the points raised in these submissions, and upon review, I find it is reasonable to rely on the SEA for some guidance on issues relating to socio-economic factors. From this I am aware of the dependence of local communities in the TSA on timber harvesting, which I have considered, along with the social and economic objectives of the Crown (discussed below), in assessing the implications to the province of alternative harvest rates.

One factor to which I have given extensive consideration, in my assessment of the implications of alternative rates of harvest in this and in other recent AAC determinations, is the taking into account of reductions in timber supply which may

result from government decisions to protect areas within, or for other reasons to remove areas from, the timber harvesting land base of a TSA. As noted above, under *Stein Valley*, in this TSA the Stein Valley has been recently designated as a Class A park, with no additional interacting components of an overall land use plan intended to offset the associated timber supply impacts, as has been the case in other recent determinations. In the present case it is therefore clear that the designation of this park has reduced the overall timber inventory in the Lillooet TSA. However, the short-term stability of the timber supply in this TSA permits the consequent reductions in harvesting opportunities to be accounted for over time in a number of ways, with differing temporal distributions of risks and costs. I have addressed this in "Reasons for decision".

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

Timber processing facilities

Two of the major licensees operating in the Lillooet TSA have mills in the TSA, while J.S. Jones' mill is located just outside the TSA in Boston Bar. The licensees' mill throughputs (or consumption) relative to their AAC and actual harvest, primarily from areas under forest licence tenure, are shown below. The units are in cubic metres/year and are based on a 6 year average:

licensee	mill throughputs (m ³)	AAC (m ³)	harvest (m ³)	AAC as % of mill throughput
Ainsworth Lumber	369 761	348 168	283 394	94%
J.S. Jones Holdings	460 000	88 510	94 090	19% (103%)*
Lytton Lumber	81 426	32 778	39 382	40%
Total	911 187	469 456	416 866	52% (90%)*

* J.S. Jones' mill is also dependent on wood from the Fraser TSA; the adjusted percentage in parentheses accounts for the Fraser TSA.

As indicated in this table, the mills in the Lillooet TSA have secured about 52 percent of their wood through their AAC apportionment in the Lillooet TSA. The balance of the fibre supply supporting the mills comes from the nearby Fraser TSA, the Small Business Forest Enterprise Program, existing woodlots, and private land.

The Ainsworth Lumber mill in Lillooet is primarily a veneer plant. The company trades sawlogs for peelers from other mills to provide the proper log mix to operate the veneer plant. In addition to these larger mills noted above, a number of smaller mills in the TSA utilize wood from the TSA.

- (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;

Economic and social objectives

The Minister has expressed the social and economic objectives of the Crown for the province (letter to Chief Forester dated July 28, 1994, attached as Appendix 3, and memo to Chief Forester dated February 26, 1996, attached as Appendix 4) and I understand these to apply to the Lillooet TSA. They are consistent with the objectives stated in the Forest Renewal Plan and include good forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest level changes in a managed transition from old-growth to second-growth forests, so as to provide for continuity of employment.

The Minister also stated in his letter that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end, he asked that the Chief Forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. The latter would likely require the use of alternative harvesting systems, and to encourage this the Minister suggested consideration of partitioned AACs. As discussed above, in Silvicultural treatments, opportunities for any significant use of commercial thinnings in the TSA at this time are very limited. With respect to harvesting in previously uneconomical areas, the operability classification for the TSA is based on terrain factors and assumes use of cable systems. Currently even helicopter harvesting is not occurring in areas classed as inoperable, and it appears that there are few opportunities at this time for harvesting in areas classed as inoperable.

Local objectives

The Minister's letter suggested 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 process, where these are consistent with the government's broader objectives. The Lillooet Forest District received 9 completed response forms from the 47 individuals who attended the information sessions and open houses, and also 15 written submissions (Appendix 5 summarizes this public input).

Many suggestions were provided on whether, or how, the AAC should be adjusted in the Lillooet TSA. Most public responses, including those by First Nations, suggested that the current harvest levels should be immediately reduced, although some, including that of the forest industry, supported maintaining current harvest levels. Common reasons given for reducing current harvest levels included the desire to better protect tourism values, aboriginal interests, biodiversity and

environmental values, and to account for land base uncertainties (particularly with respect to the Stein Valley and Spruce Lake areas). Reasons for maintaining current harvest levels included recognition of the many uncertainties in the timber supply analysis, such as the size of the timber harvesting land base, and the extent to which non-timber values can be addressed by productive forest land located outside the timber harvesting land base.

In my determination, I have taken the diverse public input into account. I recognize the many uncertainties associated with the timber supply analysis, which some have used to suggest the AAC should be lowered, and some that the AAC should be maintained. In accordance with my "Guiding principles for AAC determinations", I have applied my judgement to the available information, taking the uncertainties into account.

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 (see above discussion under Harvest flow alternatives).

The Minister's memo of February 26, 1996 asks that pre-Code constraints applied to timber supplies in order to meet visual quality objectives be re-examined when determining AACs in order to ensure that they do not unreasonably restrict timber supplies. I have discussed this above, under *visual quality*.

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

Abnormal infestations and major salvage programs

A total annual allowance of 26 487 m³ for all non-recoverable losses was made in the timber supply analysis. This represents about 4 percent of the current harvest level. Losses are attributed to insects (43 percent), disease (20 percent), fire (18 percent) and to other factors, primarily windthrow (19 percent).

District staff report that good road access coupled with programs to salvage beetle-killed pine enable the recovery of many potential losses, which is principally why this allowance is much lower than assumed in the previous timber supply analysis for this TSA. The estimates are based on district surveys of insect, disease and windthrow, and on 10-year average fire losses. I consider the information used in developing the assumptions supporting the base case to be reliable and acceptable for use in this determination.

Reasons for decision

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

For the Lillooet TSA, the corrected base case projection in the BCFS timber supply analysis indicated that harvests could be maintained at 650 000 cubic metres for three decades, but then must decline by about 8 percent per decade before reaching the long-term harvest level of 362 600 cubic metres per year, 90 years from now. The 8-percent-per-decade decline in timber supply projected in the base case is a relatively low rate of decline in comparison with projections in some other TSAs, which indicates some ability to buffer downward influences on timber supply. Sensitivity analysis indicates a relatively high degree of stability in the existing timber supply. For example, a 10-percent reduction in the timber harvesting land base does not necessitate an immediate reduction in the initial harvest level, but does shorten its duration from 30 to 20 years.

My considerations have identified a number of factors, that were not accounted for in the base case due to changes in practice or in information since the completion of the analysis, that limit or increase the timber supply relative to the base case projection.

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

- *land base*: a reduction in the timber harvesting land base by about five percent due primarily to the removal of the Stein Valley as a provincial park; the park decision reduces available mature timber volumes by about seven percent;
- *age of inventory*: the inventory is about 7-8 years out of date for harvesting and natural disturbance and therefore the TSA is already well into the first decade of the harvest forecast;
- *riparian habitats*: an approximately one-percent reduction to the timber harvesting land base is required to account for riparian reserves and management areas;
- *stand-level biodiversity*: an approximately 5000 m³ reduction annually in timber supply is required to account for stand-level biodiversity;

In addition:

- unquantified potential reductions are indicated in the future to account for:
 - landscape level biodiversity, and
 - management for wildlife habitat such as deer winter range;
- an unquantified, but most likely very small, reduction is indicated to account for special management requirements in newly designated community watersheds.

With respect to these latter two points, there is a great deal of uncertainty about their likely implications for timber supply, as plans have not yet been approved for the management of these values and there is a great deal of unproven speculation about potential outcomes. Until more definitive information is available to me on these factors, in view of the stability in the timber supply in this TSA, I am considering that they can be adequately accommodated within the determination as discussed below. I expect these matters will be given further direction through the LRMP process, such that a quantifiable accounting may be incorporated in future determinations. In the meantime, based on the flexibility of the timber supply analysis, in my judgement any emerging risk associated with these factors will be manageable within the five-year period before the next determination without jeopardizing environmental objectives or the integrity of the subsequently projected timber supply.

As noted under *Stein Valley* and Harvest flow alternatives, the case of the Stein Valley park is somewhat different from other newly created parks I have considered in other recent AAC determinations. In most cases to date, the PAS has been integrated into a land-use planning process, and in these determinations I did not consider it appropriate to attempt to account for the timber supply impact of the newly created park in isolation from the rest of a land use plan where the plan included ongoing implementation of elements intended to augment the timber supply, such as zones for intensive timber production. In contrast, the creation of the Stein Valley park was not part of a CORE or LRMP process; an LRMP process has only recently been initiated in the Lillooet TSA. Therefore, in considering the effect of the designation of the Stein in the absence of any countervailing elements of a land use plan, I have considered it appropriate in this AAC determination to account for the full impact on timber supply of the designation of the park.

The main factors suggesting that the short-term timber supply may be greater than projected in the BCFS analysis base are:

- *volume estimates for existing mature stands*: an inventory audit indicates that the total mature timber inventory volume for the TSA was significantly underestimated in the BCFS analysis;
- *minimum harvestable ages*: a slight increase in supply may be possible from the harvesting of trees in the TSA at ages below assumed minimum harvestable ages.

The results of the inventory audit identify the likelihood that a new timber supply analysis, based on a complete re-inventory but given the same management regime and land base as used in the BCFS base case analysis, would show a significant increase in available mature timber volumes on the timber harvesting land base. However, without further analysis it is difficult to predict with accuracy what the magnitude of such an increase in timber supply would be. Nonetheless, it is evident that the additional volumes will contribute substantially to the stability of the projected timber supply.

In assessing the factors identified above which work to increase or decrease the timber supply from that projected in the base case, I note the following. The corrected BCFS base case projection shows that although the timber supply is forecast to decline in the mid term, there is considerable stability in the short term, with an initial harvest level projected to be maintained for three decades. As noted, sensitivity analysis shows that the removal of ten percent of the timber harvesting land base shortens by one decade the duration for which this initial level can be maintained, but does not necessitate an immediate harvest level reduction. Thus the designation of the Stein Valley provincial park—which removes a smaller fraction, about five percent of the timber harvesting land base or seven percent of the existing mature volume—does not of itself necessitate an immediate AAC reduction; considered alone, the Stein designation would still allow the projected initial harvest level to be maintained for more than two decades.

Several other factors discussed above further limit the projected timber supply. Of these, the major influence is that of the age of the inventory, which effectively reduces the projected duration of the initial harvest level by more than half a decade. Management of riparian habitats and requirements for stand-level biodiversity, together with the other factors identified, will also limit the short-term supply to a lesser extent as indicated. From the sensitivity analyses provided, in my judgement, the total identified constraints on timber supply additional to those considered in the corrected base case analysis will reduce the achievable duration of the projected initial harvest level by a maximum of two decades. Therefore, particularly in view of the strong probability of a substantial underestimation in the inventory volumes incorporated in the BCFS analysis, as identified by the inventory audit, and the associated likelihood of additional timber supplies, as well as the potential for some flexibility in minimum harvestable ages, I am satisfied that the initial harvest level projected in the corrected BCFS base case analysis can be maintained for a period of at least one decade from today.

I am aware that there is uncertainty in a number of the factors considered, and that land use and management regimes may change. While I therefore recognize that there will be harvest level reductions in future determinations, the timing of these reductions is subject to some uncertainty, both from the future downward pressures discussed above, and from the additional volumes identified by the inventory audit. However, I am satisfied that in this determination no immediate AAC reduction is required for biophysical reasons, and that to make such a reduction at this time would be inconsistent with the socio-economic objectives of the Crown as expressed by the Minister of Forests in his letter of July 28, 1994, (see Appendix 4).

In this regard, before making my determination, I considered the possibility of an immediate proportional reduction to the AAC to account for the designation of the Stein Valley park, to explore the premise that, when land-use decisions affect timber supply in the medium and long term, maintaining the harvest on the reduced TSA area raises questions about intergenerational equity. Immediately reducing the AAC now to account for the Stein decision would reduce the timber supply impacts projected for the medium term. Reducing the AAC at this time, however, would immediately affect existing forest-

dependent employment and provincial revenues, which can also affect our ability to sustain a healthy environment and economy for the next generation. These important considerations are implicit in the Minister's letter expressing the social and economic objectives of the Crown.

Since in this case the evidence before me shows that the timber supply impacts of the park designation can be fully taken into account without an immediate AAC reduction and without placing future timber supply at risk or unnecessarily compromising non-timber values, then, particularly in view of the Minister's expressed social and economic objectives, I have reasoned that maintaining the AAC at this time is the preferred alternative.

It must be noted that in the case of other park designations in areas in which the timber supply is not as stable in the short term as is currently the case in the Lillooet TSA, it may not be possible to account fully for the impacts on timber supply of the associated withdrawal from the timber harvesting land base without an immediate reduction in the AAC.

The Stein land-use decision has resulted in greater clarity regarding deferrals, by creating the park in conjunction with reducing the area in deferrals related to the protected areas strategy. Nevertheless, a large portion of the timber harvesting land base (about 13 percent) is still under various deferrals and delays in the TSA. In keeping with my guiding principles, I have not taken this into account in this determination as I will not speculate on the outcome of future land use decisions. I also recognize in my determination that there is uncertainty about appropriate management practices in the TSA that account for biodiversity, wildlife habitat and visually sensitive areas in relation to their impacts on timber supply, employment and local communities. The Lillooet LRMP process should tackle these important issues, which can then help guide the timber supply analysis that supports the next determination.

In the meantime, if issues remain unresolved and at some point the district manager becomes concerned that the allowable harvest level cannot be met on the remaining available land base while continuing to meet integrated resource management objectives, the district manager may wish to take steps towards an application to Cabinet for the specification of designated areas that would allow for a temporary AAC reduction under Part 15 of the *Forest Act*.

Determination

Effective August 1, 1996, the allowable annual cut for the Lillooet TSA will be maintained at 643 500 cubic metres. This will remain in effect until a new AAC is determined, which must take place within five years of this determination. The new AAC does not include allocated woodlot licence volumes.

Implementation of decision

During the time for which this determination is in effect, the BC Forest Service, in preparation for the next determination, should undertake a number of tasks including:

- soil/terrain studies to clarify the large area currently mapped as environmentally sensitive due to soil conditions and the extent to which these areas constrain timber supply;
- root disease studies to examine impacts on timber growth and yield;
- measures to ensure that planting densities match target levels since lower densities can affect long term timber supplies;
- a determination of the relationship between trees identified for high stumping as wildlife trees and assumed losses due to decay, waste and breakage;
- the development of more precise estimates of areas in riparian reserves and riparian management zones;
- an assessment of VDYP to verify its appropriateness for use in the TSA and to examine ways of localizing VDYP so that it more accurately models forest growth in the TSA.

As noted, the Lillooet LRMP process has been recently initiated, and it is hoped that this process will provide direction on the appropriate management objectives for biodiversity, wildlife habitat, and visual resources for incorporation into the next timber supply analysis, as well as recommendations to government on protected areas, which could help to resolve some of the outstanding deferrals and delays in the TSA.



Larry Pedersen
Chief Forester

June 19, 1996

Appendix 1: Section 7 of the *Forest Act*

The B.C. *Forest Act* Section 7 reads as follows:

Allowable annual cut

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

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

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

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

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

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

(1.11) If

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

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

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

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

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

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

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

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

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

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

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

Purposes and functions of ministry

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

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994 to Chief Forester, re social and economic objectives of the Crown.

Appendix 4: Minister of Forests' memo of February 26, 1996, to Chief Forester, re social and economic objectives of the Crown—visual resources.

Appendix 5: 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

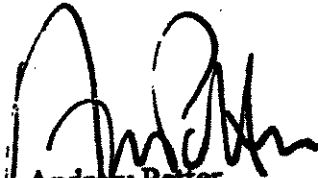
Minister of
Forests

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



File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

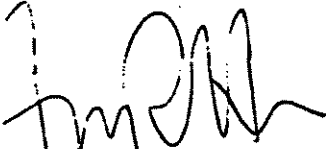
Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

Larry Pedersen
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In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.



Andrew Petter
Minister of Forests