

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Kamloops Timber Supply Area

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

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

Description of the TSA

The Kamloops TSA lies in the south central part of the province and is administered from the Kamloops and Clearwater Forest District offices. It extends from just south of Kamloops to the Rocky Mountains at its northeast extremity, and is bordered in the north by Wells Grey Park. The TSA covers a total of 2 117 718 hectares (ha), of which 1 441 118 ha are productive Crown forest. Of this productive Crown forest, a significant portion of the area is presently unavailable for timber harvesting for various reasons, including inoperability, environmental sensitivity, and unmerchantability. The area that is currently considered available for timber harvesting (the "timber harvesting land base") in the Kamloops TSA is 950 832 ha — approximately 45 percent of the total land base.

The topography in the Kamloops TSA is quite varied. The southern half of the TSA is characterized by the dry climate and rolling terrain of the Thompson-Okanagan Plateau, while the northern portion features the wet climate and rugged terrain of the Monashee and Cariboo Mountains. The Columbia Mountains lie along the eastern boundary of the TSA. The North Thompson River originates at the northern extremity of the TSA and flows southward to Kamloops Lake, fed along the way by several tributary streams and rivers.

Approximately 60 percent of the timber harvesting land base is occupied by mature forests. The dominant tree species are Douglas-fir (covering approximately 38 percent of the timber harvesting land base), lodgepole pine (27 percent), spruce (20 percent), balsam (9 percent), and western redcedar and hemlock (6 percent).

Kamloops is the largest community in the TSA, with almost 69 000 residents— approximately 76 percent of the total TSA population. The remaining communities each have fewer than 2500 residents and include Logan Lake, Ashcroft, Clearwater, Barriere, and Cache Creek as well as numerous smaller unincorporated communities. There are approximately 4000 first nations members living in the TSA, belonging to 10 bands. There are also eight other bands, located outside the TSA, which maintain traditional interests inside the TSA.

The economy of the city of Kamloops is relatively diverse, with no single economic sector dominating the labour force. The surrounding areas are dependent on resource-based employment generated in the forestry, mining, ranching and agriculture sectors, with less of a dependence on the tourism and public sectors. The forestry sector alone provides 37 percent of the employment income in the areas outside the city of Kamloops.

The wood harvested from the TSA supplies approximately 70 percent of the timber used by sawmills in the TSA. Additional wood supply comes from tree farm licences (TFLs) and other sources outside the TSA.

History of the AAC

In 1981, the AAC was determined at 2 350 000 cubic metres. It was increased on January 1, 1989, to 2 412 280 cubic metres to account for the 1987 transfer of 62 280 cubic metres from the 100 Mile House TSA to the Kamloops TSA. On January 1, 1994, the AAC was raised by 4400 cubic metres with the transfer of a 2733 hectares from TFL 35 to the TSA to provide additional volume for the Small Business Forest Enterprise Program, resulting in the current AAC of 2 416 680 cubic metres. The current AAC is apportioned by the Minister of Forests as follows:

	Cubic Metres	% of total
Forest Licences	1 935 065	80.1
Replaceable Timber Sale Licenses	1 852	0.1
Small Business Forest Enterprise Program	413 544	17.1
Forest Service Reserve	25 305	1.0
Apportioned but unallocated woodlot volume	17 414	0.7
Subtotal (base case)	2 393 180	99.0
Allocated Woodlot Licence volume*	23 500	1.0
Total	2 416 680	100.0

* 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.

New AAC determination

Effective July 1, 1996, the new AAC for the Kamloops TSA will be 2 679 180 cubic metres (excluding allocated woodlot licence volumes). Of this AAC, the conventional timber supply will continue to provide 2 393 180 cubic metres. A partition of 200 000 cubic metres has been established for harvesting in old cedar and hemlock stands. To facilitate harvesting under Pulpwood Agreement 16 (PA 16), an AAC partition of 86 000 cubic metres has been created for coniferous stands not currently considered merchantable as sawlogs, for deciduous forest types, and for forest stands on many sites which are currently showing low timber growing potential. This AAC of 2 679 180 cubic metres will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for the Kamloops TSA includes the following:

- *Kamloops TSA Timber Supply Analysis Report*, British Columbia Forest Service (BCFS), May 1995;
- *Kamloops Timber Supply Area Socio-Economic Analysis*, G.E. Bridges & Associates, Victoria; May 1995;
- *Kamloops Timber Supply Area: Timber Supply Review Discussion Paper*, BCFS, May 1995;
- *Kamloops Timber Supply Area Summary of Public Input*, BCFS;
- *Forest Inventory Audit Report* (draft), Kamloops Forest District, September 13, 1995;
- *Kamloops Land and Resource Management Plan*, Vols. I and II, Province of British Columbia, February 1995;
- *Kamloops Land and Resource Management Plan Summary of Public Input*, Province of British Columbia, August 1994;
- *Kamloops Regional Integrated Resource Management Timber Harvesting Guidelines* (3rd draft), BCFS, January 1992;
- *Kamloops Timber Supply Area Analysis Report*, BCFS, 1981;
- *Kamloops Timber Supply Area Analysis Report*, BCFS, 1991;
- *Response to the Kamloops Timber Supply Review*, Kamloops TSA Group, August 15, 1995 "the licensee group analysis";
- Letter from the Minister of Forests, dated July 28, 1994, to the Chief Forester stating the Crown's economic and social objectives;
- Memo from the Minister of Forests, dated February 26, 1996, to the Chief Forester stating the Crown's economic and social objectives regarding visual resources;
- Technical review and evaluation of current operating conditions through comprehensive discussions with BCFS staff, notably at the AAC determination meeting in Kamloops on October 11 and 12, 1995;
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Regulations*, April 1995;
- *Forest Practices Code Timber Supply Analysis*, BCFS, February, 1996.

Role and limitations of the technical information used

The *Forest Act* requires me to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis and the inventory and growth and yield data used as inputs to the analysis formed the major body of technical information used in my AAC determination for the Kamloops TSA. The timber supply analysis is concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

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 problems such as AAC determination. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information I must consider in AAC determinations.

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

Statutory framework

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

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. Two important ways of dealing with uncertainty are (i) minimizing risk, 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 decision making have been recognized in the legislated requirement to redetermine AACs every five years. This principle is central to many of the guiding principles that follow.

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

The impact of the Forest Practices Code on timber supply is a matter of considerable public concern. In determinations made before the Code was brought into force, no final standards or regulations were available at the time the 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 guidelines current at the time of determination. However, I assumed that the Code would at least entrench the standards exemplified by those guidelines as statutory requirements.

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995. Studies in selected TSAs (*Forest Practices Code Timber Supply Analysis*, BCFS, February, 1996) indicate that under the Code there will be some impacts on timber supply additional to those expected under previous guidelines. In AAC determinations made since the coming into force of the Code, I have viewed with some caution the timber supply projections in BCFS timber supply analyses that pre-date the Code, as is the case in the Kamloops TSA. 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 (C.O.R.E.) process or the Land and Resource Management Planning (LRMP) process is a matter often raised in discussions of AAC determinations. In determining AACs it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from land-use decisions that have not yet been taken by government. Thus I do not consider the possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made land-use decisions, it may not always be possible to analyze or to fully incorporate their eventual timber supply impacts in an AAC determination. In the case of the Kamloops LRMP, the LRMP was approved by Cabinet on July 28, 1995, and was declared a higher level plan on January 31, 1996. An approximation of the resource management objectives and land-use decisions has been modeled. However, this analysis does not include the recommendations of the LRMP follow-up committee as these recommendations have not been approved by government. The legislated requirement for five-year AAC reviews will ensure that any outstanding impacts from the plan will be accounted for in future timber supply analysis.

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 analysis of the Kamloops TSA will be better positioned to determine how the Plan may affect timber supply.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is

constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data has created the extensive delays that have resulted in the current urgency to redetermine many outdated AACs. In any case, the data and models available today are far superior to those available in the past, and will undoubtedly provide for more reliable determinations.

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

With respect to First Nations issues, I am aware of the Crown's legal obligations resulting from the June 1993 Delgamuukw decision of the B.C. Court of Appeal regarding aboriginal rights. The AAC I determine for a TSA should not in any way be construed as limiting the Crown's obligation under the Delgamuukw decision, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the TSA. It 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 AAC determinations, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the *Forest Practices Code of British Columbia Act*.

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

The role of the base case

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

From this range of forecasts, one is chosen that 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. This is known as the "base case" forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—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 predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current information available about forest management, which—particularly during the period leading up to, and now during, the implementation of the Forest Practices Code—may well have changed since the original data package was assembled.

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

In the analysis conducted by the British Columbia Forest Service (the "BCFS analysis"), the land base allocated to woodlots was deducted to reflect their separate AAC administration. In order to maintain a correlation between the initial harvest level shown in the analysis and the timber harvesting land base, the volume associated with allocated woodlots—23 500 cubic metres—was deducted from the current harvest level of 2 416 680 cubic metres. This adjustment accounts for the 23 500 cubic metre difference between the current AAC and the base case initial harvest level of 2 393 180 cubic metres. This base case initial harvest level also includes a further unallocated woodlot apportionment of 17 414 cubic metres per year.

For the Kamloops TSA, the base case projection shows an initial rate of harvest of 2 393 180 cubic metres annually. This rate of harvest can be maintained for 20 years, before declining by 9 percent per decade for 20 years to the steady long-term harvest level of 1 958 000 cubic metres per year.

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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

- general comments

The total area of the Kamloops TSA is 2 117 718 hectares. The land base that is considered available for timber harvesting (the "timber harvesting land base") is limited by unmerchantable forest types (excluded forest types), environmentally sensitive areas, inoperability, deciduous forest types, low site productivity, and the use of the area for purposes other than timber production. Reasonable assumptions, and if necessary, projections, must be made about these factors and appropriate areas must be deducted from the productive forest area to determine the timber harvesting land base. The timber harvesting land base determined for the purposes of the BCFS analysis is 950 832 hectares.

In the timber supply analysis undertaken on behalf of the Kamloops TSA Group (the "licensee group analysis"), the timber harvesting land base was assumed to be 14 316 ha larger than in the BCFS analysis. The licensee group analyst used site index information derived from a more reliable update of the inventory file for forest growth than was available for use in the BCFS analysis. As a result, some stands considered unmerchantable in the BCFS analysis were classified as merchantable in the licensee group analysis and were included in the timber harvesting land base. I am satisfied that the site index information used in the licensee group analysis to derive the timber

harvesting land base is more accurate than the information used in the BCFS analysis, and therefore, it is reasonable to conclude that the actual timber harvesting land base is approximately 14 000 ha larger than assumed in the BCFS analysis.

The additional area identified in the licensee analysis represents 1.5 percent of the timber harvesting land base, and is primarily in the selection management zone. While the impact of a 1.5 percent increase in the size of the timber harvesting land base has not been directly quantified at this time, sensitivity analysis included in the BCFS analysis shows that if the timber harvesting land base were increased proportionately across all management zones by 10 percent, under harvest flow conditions assumed in the BCFS analysis, the initial harvest level could be maintained for 3 additional decades. The long-term harvest level would also be increased by 10 percent. District staff suggest that the impact of the 1.5 percent increase in the timber harvesting land base will be small, considering that the stands being incorporated into the timber harvesting land base will be of low volume. I consider this increase in the timber harvesting land base to slightly increase the timber supply relative to the base case projection; the initial harvest level can be maintained slightly longer, and the long-term harvest level will be slightly higher, than projected.

- operability

In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, it is stated that timber availability could be increased by conducting harvesting operations in areas not currently considered economical to harvest.

District staff determined the amount of inoperable area in the Kamloops TSA in 1991 in consultation with major licensees in the TSA. This information was used in the BCFS analysis. The licensee group has commented that harvesting is currently occurring in some of the areas considered inoperable in the BCFS analysis. Approximately 100 ha of these areas were harvested using helicopters in 1995. Some further harvesting in these areas has been proposed in development plans for the TSA.

I acknowledge that there has been some harvesting in areas that are currently characterized as inoperable. This may allow an increase in the estimate of the size of the timber harvesting land base in the future. However, the information available at this time is insufficient for me to conclude that the definition of operability in this TSA has changed. District staff should monitor the harvesting activity in areas currently considered inoperable, and if significant harvesting in these areas continues, some of the areas may be incorporated into the timber harvesting land base in future analyses. In the meantime, I am satisfied that the information used in the BCFS analysis with respect to operability is adequate for the purposes of this AAC determination.

- reductions for environmentally sensitive areas

In the BCFS analysis, 104 606 ha were considered unavailable for timber harvesting due to environmental sensitivity. Although the same land base deductions for

environmentally sensitive areas were used in the licensee group analysis, the licensee group disagreed with the deduction of 950 hectares for areas classified as environmentally sensitive due to water quality values. The licensee group suggests that the forest cover requirements for community watersheds modeled in the analysis adequately account for these environmentally sensitive areas, and that therefore, the land base deduction used for these areas in the BCFS analysis was not required. However, without further supporting analysis, this remains unproven; some of the areas classified as environmentally sensitive due to water quality values may not be located in community watersheds, and those which are may require more restrictive practices than those modeled for the community watershed management zone. Furthermore, the forest cover requirements applied to the timber harvesting land base in the community watershed management zone were adjusted in the analysis—made less stringent—to account for those areas which are not available for timber harvesting but do contribute to watershed values. Moreover, even if the licensee group's suggestion were proven to be true, the overall impact on timber supply would not be significant given the relatively small area involved. I am therefore satisfied that the deductions used in the BCFS analysis for areas that are environmentally sensitive due to water values are appropriate for use in this determination.

A terrain mapping exercise recently conducted in the Hiuihill Creek and Gold Creek areas of the Kamloops District showed that environmentally sensitive areas cover 8400 ha of the total 23 000 ha area. This is considerably higher than the amount of environmentally sensitive areas identified in previous mapping exercises. I note that some of these areas will overlap with other areas unavailable for timber harvesting due to such factors as inoperability. Furthermore, the amount of harvesting, if any, that will be allowed in these areas it is not clear at this time. It is unlikely, however, that the entire 8400 ha will be unavailable for timber harvesting. Based on the information available to me, I conclude that the timber harvesting land base in this particular area has been overestimated, and I have accounted for this under "Reasons for decision".

District staff submit that under the Forest Practices Code, the amount of area classified as environmentally sensitive will likely increase; as a result, there may be additional constraints on harvesting on steep slopes and in community watersheds.

I acknowledge that there is a risk that the amount of environmentally sensitive area in the remainder of the TSA has been underestimated in the BCFS analysis. This would limit the timber supply relative to the base case harvest forecast. However, the results from the terrain mapping exercise for the Hiuihill Creek and Gold Creek areas cannot reasonably be extrapolated to the entire timber harvesting land base of the Kamloops TSA, since this area is not representative of the TSA. Sensitivity analysis included in the BCFS analysis shows that even if the timber harvesting land base is decreased by 10 percent, the initial harvest level projected in the base case can still be maintained for one decade. Therefore, I am satisfied that even if the amount of environmentally sensitive area has been significantly underestimated, this does not pose an immediate risk to harvest levels. I expect that as more terrain mapping is completed, district staff will be better able to quantify the timber supply impacts of environmentally sensitive areas for use in the next

determination. In the meantime, I have made no adjustment on this account in my determination.

- roads, trails and landings

In the BCFS analysis, to account for existing roads, trails and landings a reduction of 12.8 percent was applied to those areas on the timber harvesting land base harvested over the past 20 years. A reduction of 1 percent was applied to the remainder of the timber harvesting land base to account for roads already established to provide access through areas that have not yet been harvested. These reductions were determined by district and regional staff, based on data collected from 1986 to 1992. A further reduction of 7.6 percent was projected in the BCFS analysis to account for future roads, trails and landings in the currently unroaded portions of the timber harvesting land base. This reduction was based on the maximum allowable degradation limits described in the Forest Practices Code.

The licensee group used these same reductions in their analysis, although the group contended that the reductions applied in the BCFS analysis to account for existing and future roads, trails and landings are too large. Using data compiled from site disturbance surveys conducted in the North Thompson, the licensee group estimated that 9.1 percent was an appropriate reduction for existing roads, trails and landings. The Kamloops regional soils specialist believes that the 9.1 percent reduction preferred by the licensee group underestimates the area affected by existing roads, trails and landings. Furthermore, district staff indicate that while the licensee group used much of the same data, they relied on data from sites characterized by lower levels of site degradation, rather than including a broad range of sites which might reflect slightly higher levels of site degradation. Accordingly, I am not convinced that the estimate provided by the licensee group is more accurate, and I am satisfied that the estimate used in the BCFS analysis is the best available at this time.

The licensee group also derived a 5.2 percent area deduction to account for future roads, trails and landings by reviewing maximum site degradation commitments made in silvicultural prescriptions for blocks harvested from October 1987 to May 1995. I acknowledge the possibility that the estimate used in the BCFS analysis may be too high, particularly if road rehabilitation is successful. However, due to the nature of deductions in the model for future roads, trails and landings—these areas currently contribute to the timber supply and are taken out of the timber harvesting land base only after they are harvested—even if the deduction has been overestimated in the BCFS analysis, the projected harvest level would not be affected in the short term. The deduction for future roads, trails and landings used in the BCFS analysis is higher than some estimates used in other TSAs throughout the province and lower than others. I believe that it is a reasonable attempt at projecting current operations as they are described under the Forest Practices Code, and I am satisfied that it is reasonable for use in this determination.

In summary, I do not believe the deductions for existing and future roads, trails and landings that were used in the BCFS analysis represent a cause for concern in this

determination. However, I do note that there is significant uncertainty about road deductions in general in the province, and I have instructed Forest Service staff to clarify provincial procedures for estimating losses of this kind and to assess their implications for timber supply throughout the province, so that improvements in estimating these losses may benefit future AAC determinations.

- Timber Licence reversion

Timber licences are old tenure arrangements that give a licensee exclusive rights to harvest merchantable timber within the licence area. Once these areas have been harvested and reforested, all future rights revert to the Crown. Accordingly, in BCFS analyses, where a timber licence is within a TSA, when reversion takes place, the area is assumed to contribute to the timber harvesting land base.

In the BCFS analysis, it was assumed that 11 639 ha of timber licences would revert to the timber harvesting land base of the Kamloops TSA over the next 30 years. However, district staff note that the rate of reversion has been slower than expected at the time the analysis was conducted, mainly due to integrated resource management concerns. Approximately 180 ha of timber licences are harvested yearly in the Kamloops TSA. Based on this reversion rate, district staff estimate that a total of 7 049 ha of timber licences will have reverted to the Crown within 30 years. If the reversion rate continues to be lower than estimated in the BCFS analysis, there may be a decrease in timber supply in the TSA at some time in the medium to long term, although short-term timber availability may be improved slightly since less of the timber harvesting land base will be in a non-greened-up condition. Considering the short-term implications of timber licence reversions, and the small area involved, I do not consider this a significant risk in this determination. I am satisfied that the approach used in the BCFS analysis for modeling the reversion of timber licences to the Crown is appropriate for use in this AAC determination.

- excluded forest types

In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, it was stated that the potential for harvesting in forest types that were excluded from the timber harvesting land base represented a timber supply opportunity in the TSA. Hemlock volumes in very old cedar and hemlock forest types, other coniferous forest types not currently merchantable as sawlogs, and deciduous forest types were not considered available for harvesting in the BCFS analysis. The discussion paper notes that with recent changes in harvesting and reforestation practices, and with increased timber values, it may be feasible to include portions of these forest types in the timber harvesting land base.

- very old cedar and hemlock forest types

There are approximately 12 million cubic metres of hemlock older than 140 years in the Kamloops TSA. In the BCFS analysis, it was assumed that very old hemlock volumes do not contribute to the timber supply of the Kamloops TSA.

However, over the past five years, an average of 133 627 cubic metres of timber have been harvested annually from very old cedar and hemlock stands. This volume has not been included as contributing to the AAC in previous determinations for the TSA.

In the BCFS analysis, old cedar and hemlock stands were treated in two ways. The portion of the land base occupied by old hemlock and cedar stands consisting of *60 percent or greater* volume in hemlock was deducted entirely from the timber harvesting land base. These stands cover approximately 12 000 ha of the TSA. For stands characterized by a hemlock composition of *less than 60 percent*, the hemlock volumes associated with the stands were deducted from the volume-projection curves for the stands. Thus, only the hemlock volumes in these stands were assumed not to contribute to the timber supply of the TSA, while the land base and the volume attributed to other species in these stands did contribute to timber supply. Approximately 39 000 ha were treated in this manner in the BCFS analysis.

As discussed in the *Timber Supply Review Discussion Paper* for the Kamloops TSA, harvesting in old cedar and hemlock forest types represents an opportunity to increase timber supply. District staff have provided me with a harvest forecast that includes the hemlock volume from the 39 000 ha of stands with less than 60 percent hemlock volume in the harvest. The harvest forecast shows that when this volume is assumed to contribute to the timber supply of the TSA, an initial harvest level of 2 612 180 can be maintained for 2 decades without causing an abrupt decline in future harvest levels.

Aside from the opportunity to increase timber supply, there may be compelling timber management reasons for harvesting these stands. These stands are located on some of the most productive forest sites in the TSA, and it has been suggested that these sites could be harvested and replanted to capture their full growing potential. Furthermore, these sites are occupied by stands which are old and susceptible to insect and disease infestation; salvage programs are required to control the level of infestation in the TSA.

The question of how to manage these old cedar and hemlock forest types prompted a great deal of public input. A wide range of comments were received from the licensee group, individual licensees, First Nations, the Ministry of Environment, Lands and Parks, the Kamloops Naturalist Club, and the general public. Many respondents emphasized the importance of maintaining or increasing opportunities to harvest in excluded forest types. Others expressed concern that harvesting in these stands may have an adverse effect on biodiversity and wildlife habitat, and could deplete old-growth timber in the TSA. I have considered the public input received and in my determination I have been mindful of the many views which were brought forward.

Following consideration of the demand that exists for harvesting in very old cedar and hemlock forest types, of the aforementioned opportunities and forest management considerations for these forest types, and of the public input received, I have accounted for the contribution of some of the volumes from these forest types to the AAC for this TSA in "Reasons for decision".

- other excluded coniferous forest types

There are approximately 153 000 ha of coniferous stands (excluding the hemlock and cedar stands discussed above) which are not currently considered merchantable for sawlogs in the Kamloops TSA. In the BCFS analysis, these stands were not included in the timber harvesting land base. Changing economic conditions now provide an opportunity to use these coniferous forest types, as discussed in Pulpwood Agreements below. I have accounted for the contribution of some of these forest types to the AAC for the TSA in "Reasons for decision".

- deciduous forest types

There are approximately 46 000 ha of deciduous forest types in the Kamloops TSA. It was assumed in the BCFS analysis that these forest types do not contribute to the timber supply of the TSA. In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, it is stated that new technologies may make it more feasible to harvest these forests. BCFS staff indicate that a very small portion of these forest types is currently harvested and processed in the TSA. I note that these forest types are expected to provide some of the timber supply for Pulpwood Agreement 16, and I have taken this into consideration below under Pulpwood Agreements and "Reasons for decision".

Existing forest inventory

-general comments

Inventory information for the TSA was collected between 1967 and 1991. This information has been updated to between 1990 and 1993 to account for changes to the forest, including depletions resulting from harvesting and fires, that have occurred since the last inventory was conducted. However, the inventory does not reflect any harvesting or other depletions to the forest that have occurred since these updates. The inventory was also updated to 1994 to account for any growth that had occurred in the forests to that date. This updated inventory information was used in the BCFS analysis.

Both the Kamloops and Clearwater Forest Districts are currently being re-inventoried. Also, as discussed below under *volume estimates for existing stands*, volume-ratio

sampling studies are underway in the TSA; these will provide an indication of the reliability of the inventory information. For now, I am satisfied that the current inventory information is the most appropriate for use in determining harvest levels for this TSA. The results of the re-inventory will be taken into account in future determinations.

- volume estimates for existing stands

As noted in the *Timber Supply Review Discussion Paper* for the Kamloops TSA, the timber supply of the Kamloops TSA is very sensitive to decreases or increases in volume estimates for existing stands. Concern has been expressed through the public input process that if these volumes have been overestimated significantly, then the initial harvest level projected in the base case could only be maintained by allowing future harvest levels to decline below the long-term harvest level for several decades.

BCFS staff have compared scaled volumes from 32 cutting permits in the TSA to the harvested volumes per hectare that are projected in the BCFS analysis. This comparison shows that, on average, scaled volumes are 3.5 percent higher than those used in the BCFS analysis (which would imply a small degree of *underestimation* in the BCFS analysis). Nonetheless, Clearwater Forest District staff are concerned that volumes for existing stands in their district have been *overestimated* for some sites occupied by older spruce stands. However, no reliable conclusion regarding under- or overestimation of existing volumes in the analysis can be drawn from cruise or scale volumes, particularly since samples taken from sites recently harvested or about to be harvested are not necessarily representative of the timber harvesting land base as a whole.

Volume-ratio sampling studies are underway in the Kamloops TSA to examine the accuracy of the volume estimates for the TSA. These studies are expected to be completed by the end of this year. Findings from the volume-ratio sampling study undertaken in the Kamloops Forest District show that the audit volumes are not statistically different from the volumes used in the BCFS analysis for that portion of the TSA. Results from the volume-ratio sampling study being conducted in the Clearwater Forest District are not available at this time. However, BCFS staff estimate that even if all existing stand volume estimates in the Clearwater District were overestimated by up to 25 percent, the initial harvest level projected in the base case could still be maintained for one decade.

I have not seen adequate evidence to cause me to conclude that existing stand volumes have been overestimated. If the results of the volume-ratio sampling studies indicate that the volumes in existing stands have been significantly overestimated, then studies should be undertaken to resolve any uncertainty prior to the next AAC determination. In the meantime, I am satisfied that this does not represent a significant concern in this determination, and I believe that it is appropriate to rely on the volume estimates for existing stands provided by the BCFS analysis.

Expected rate of growth

- *site productivity estimates*

Site indexes, determined from the ages and heights of trees, are used to estimate the productivity (growth potential) of tree-growing sites. As discussed in the *Timber Supply Review Discussion Paper* for the Kamloops TSA, site indexes determined from both young stands (less than 30 years), and old stands (over 150 years) may not accurately reflect potential site productivity.

While there is no direct evidence showing that site indexes in the Kamloops TSA have been underestimated, I am aware that there is some evidence indicating that site indexes in other areas of the province have been underestimated. A provincial paired-plot survey is expected to provide statistically sound information to assess site indexes in the Kamloops TSA. The results are expected to be available by the end of 1997, and can be incorporated into future timber supply analysis.

In the meantime, I note that if site indexes have been underestimated in old-growth stands, projections about the time required to reach green-up, the volumes in regenerated stands, and minimum harvestable ages could be affected; however, there would be no effect on the volume estimates for existing stands. The possibility that the site indexes for some existing old-growth stands are underestimated in the BCFS analysis provides some optimism for the medium- and long-term timber supply, and suggests some flexibility to offset downward impacts in the short to medium term. Sensitivity analysis related to green-up periods and minimum harvestable ages shows that if site indexes have been underestimated, under the harvest flow assumptions used in the BCFS analysis, it would be possible to extend the initial harvest level projected in the base case. However, I have no statistically valid evidence as a basis for varying the site index estimates used in the BCFS analysis, which represent the best available information for the purposes of this determination.

- *volume estimates for regenerated stands*

Estimates of volumes for most regenerated stands were projected in the BCFS timber supply analysis using the Table Interpolation Program for Stand Yields (TIPSY), which was designed for use with managed stands. TIPSY is generally accepted in B.C. as an appropriate model for these types of stands.

TIPSY was not applied to stands in the selection management zone, since stands regenerating under a selection management regime are not expected to have the same growth characteristics as stands regenerated from clearcuts. Instead, VDYP projections for the original existing stands were retained for future stands. I am satisfied that the application of VDYP for these stands is more appropriate for the purposes of this determination. In the future, as information improves, I would expect these stands to be projected using an appropriately-calibrated, uneven-aged stand model. Work is ongoing in this particular field of study, and as new information becomes available, it will be reflected in future determinations.

Operational adjustment factors (OAFs) are applied to TIPSy yield predictions for regenerated stands in order to account for the loss of timber productivity due to such factors as openings in stands (OAF1), as well as age-dependent factors such as pests, decay, waste and breakage (OAF2). The BCFS analysis used the standard operational adjustment factors of 15 and 5 percent respectively. The licensee group believes that the OAF1 used in the BCFS analysis overestimates the amount of natural openings in regenerated stands, arguing that non-productive areas as small as 1 ha will have been mapped and excluded from the timber harvesting land base in the analysis. While I acknowledge that there may be a relationship between these stand openings and reductions for non-productive land, the TSA has not been mapped to the level of detail that all non-productive areas greater than 1 ha have been accounted for through deductions in the BCFS analysis. I am therefore not convinced that the OAF1 used in the BCFS analysis should be adjusted on this account, and I am satisfied that the OAFs used in the BCFS analysis are appropriate for this determination.

The licensee group also suggests that regenerated stand volumes have been underestimated in the BCFS analysis as a result of an underestimation of site indexes in older stands. However, as discussed above under Site productivity estimates, there is no conclusive evidence that the productivity of these stands has been underestimated in the Kamloops TSA. The results of the paired-plot survey examining site indexes in the Kamloops TSA will be incorporated into future timber supply analysis.

In addition, the licensee group asserts that the amount of regeneration to balsam, cedar and hemlock species assumed in the BCFS analysis exceeds current practice. In the licensee group analysis, it was assumed that the species composition of regenerated stands would remain the same as when the stands are planted. Conversely, BCFS staff attempted to approximate the expected changes in the species composition of stands as different species gain dominance over time, based on field experience in the TSA. As a result, the regenerated stand volume estimates used in the licensee group analysis are slightly different from those used in the BCFS analysis. I acknowledge that there is some uncertainty about the species to which future stands will regenerate, but in the absence of more complete information, I am satisfied that the assumptions used in the BCFS analysis regarding the regeneration of these stands are reasonable for use in this determination.

I am also mindful that the presence of root rot (primarily *Armillaria ostoyae* and *Phellinus weirii*) affects stand establishment and growth in many stands within the Kamloops TSA. Therefore, any potential increase in timber supply resulting from underestimated site productivity could be counteracted to some degree by the presence of root rot. 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.

Sensitivity analysis shows that if estimates of regenerated stand volumes are increased or decreased by 10 percent, there is no impact on the short- or medium-term timber supply projected in the base case. Therefore, I am confident that any uncertainty in estimates of regenerated stand volumes presents no significant pressure on the short-term harvest

level, either upward or downward. I am satisfied that regenerated stand volumes have been suitably modelled, and that the uncertainty about these volume estimates does not introduce any unacceptable risk to this determination.

- minimum harvestable ages

Minimum harvestable age is the average time required for trees to reach the minimum harvestable size. In the BCFS analysis, district staff determined the minimum harvestable ages, based on forest district cutting priorities, to be 81 years for lodgepole pine and wet-belt Douglas-fir stands and 101 years for all other species.

Sensitivity analysis shows that the harvest forecast is very sensitive to changes in minimum harvestable ages. In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, minimum harvestable ages were identified as a critical factor affecting timber supply, and concern was expressed through the public input process about the minimum harvestable ages used in the BCFS analysis. Sensitivity analysis shows that if minimum harvestable ages are 20 years higher than assumed in the BCFS analysis, then the initial harvest level projected in the base case cannot be maintained without allowing harvest levels to decline below the long-term harvest level for 9 decades. If minimum harvestable ages are 20 years lower than assumed, sensitivity analysis shows that the projected initial harvest level can be maintained 2 decades longer than in the base case. District staff indicate that while the minimum harvestable ages used in the analysis are reasonable, occasionally stands that are lower than the minimum harvestable ages are harvested. Considering the results of the sensitivity analysis, if minimum harvestable ages have been slightly overestimated, there may be added flexibility to the timber supply.

The licensee group agrees with the minimum harvestable ages used in the BCFS analysis. However, the group submits that in future analyses, a combination of minimum volume per hectare, minimum average tree diameter, and biological culmination age—the harvest age at which the total volume harvested over the long term is maximized—should be used to estimate minimum harvestable ages. I am satisfied that the minimum harvestable ages used in the BCFS analysis are reasonable. However, the use of product objectives suggested by the licensee group may provide a more appropriate estimate of minimum harvestable ages. I encourage district staff to consider the applicability of these product objectives for use in the next timber supply analysis.

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

Not-satisfactorily-restocked area

Approximately 20 100 ha of the TSA are considered to be current not-satisfactorily-restocked (NSR) area. Most of this consists of recently harvested areas that are not covered by a sufficient number of tree stems of desirable species, but that are expected to be reforested within the acceptable regeneration delay period. There is also currently a

total of 53 661 ha of backlog not-satisfactory-restocked area in the Kamloops TSA. Of this backlog NSR area, 22 850 ha have been harvested under a selection management regime. While these areas are considered sufficiently stocked, the different management regime has not been recognized in the inventory file and these areas have been incorrectly classified as NSR. A further 3841 ha of the total backlog NSR are considered untreatable because the areas are inaccessible, uneconomical to reforest, or because the areas are subject to intensive cattle use (discussed below, under *impediments to prompt regeneration*). The remaining 27 740 ha of backlog NSR have either already been restocked (the inventory file has not been updated to reflect the changed status of these areas), or will be restocked by the year 2000. District staff indicate that reforestation of backlog NSR areas is proceeding along planned timelines, and I am satisfied that the districts are meeting their regeneration obligations.

There is some question as to which species and stocking levels are the most appropriate to reflect the expected outcome from managing regeneration on the backlog sites. However, the range of uncertainty does not have a significant influence on overall timber supply in my estimation, and is primarily an issue affecting the long term. This matter should be given further consideration prior to the next determination. In the meantime, I am satisfied that the manner in which the backlog NSR was modelled is reasonable for use in this determination.

Regeneration delay

Regeneration delay is the time required after harvesting before an area becomes occupied by a specified minimum number of acceptable, well-spaced trees. For the purposes of the BCFS analysis, regeneration delays in the Kamloops TSA were assumed to range from 2 to 5 years, depending on the regeneration methods used for various sites.

The licensee group agreed with most of the regeneration delays used in the BCFS analysis, although they assumed the regeneration delays for some areas are shorter. District staff indicate that over time, they expect more stands to be reforested by planting immediately after harvesting, rather than being allowed to regenerate naturally. Therefore, regeneration delays are expected to decrease in the future. If regeneration delays decrease, the amount of time required for stands to meet adjacency requirements and to achieve green-up conditions would be shorter. This would increase the availability of timber in the short term. However, district staff indicate that the regeneration delays used in the BCFS analysis are a reflection of current practice. If new information confirms that regeneration delays have decreased, it will be incorporated into future timber supply analyses.

- impediments to prompt regeneration

In the Kamloops TSA, there are four main impediments to prompt regeneration: cattle grazing, vegetative competition, high elevations, and pests.

Damage to young seedlings by cattle is a concern in the Kamloops TSA, particularly in the Kamloops Forest District. Cattle grazing can result in damage from trampling, and as a result, the establishment of forest stands can be delayed. District staff indicate that this has been reflected in the regeneration delays and in the estimates of unsalvaged losses used in the BCFS analysis (discussed below, under Unsalvaged losses). Cattle grazing is a particular problem on backlog NSR areas, which have often become areas of concentrated cattle use. Therefore, in the BCFS analysis, it was assumed that backlog NSR areas with concentrated cattle use are untreatable, and would not be satisfactorily restocked. I am satisfied that what was modeled in the BCFS analysis adequately reflects the impacts of cattle grazing on stand establishment in the TSA. Recent use of obstacle planting and different site preparation techniques in combination with better planning and cooperation between the BCFS, major licensees and range tenure holders should reduce the impacts of cattle grazing on stand establishment to a manageable level.

Brush competition can be an impediment to reforestation, mainly in the Clearwater district portion of the TSA. To overcome this impediment, sites prone to brush growth are currently given a high priority for treatment. District staff have expressed a concern that brush problems may escalate somewhat as the use of broadcast burning—an effective tool for brush control—is limited due to environmental concerns and risks of damage to adjacent stands. If increased brush problems become evident, this will be reflected in future analyses. In the meantime, the effect of brush competition in the TSA was incorporated in the BCFS analysis through the use of regeneration delay and this reflects the best available information for use in this determination.

Some difficulty has been experienced in the past in regenerating stands after harvesting in high-elevation areas. District staff indicate that the use of new high-elevation site preparation techniques, appropriate timing of reforestation, and improved planting stock have become largely successful in overcoming difficulties associated with reforesting these sites. I am satisfied that the regeneration of high-elevation sites does not introduce risk to this decision.

District staff note that there are also some regeneration problems in the TSA caused by pests such as root rot, terminal weevil, western gall rust, spruce budworm, tussock moth, and aphids. Various practices, such as stump pulling, mixed species plantations and juvenile spacing, are used to manage these pests. It is evident to me that additional information is required to further refine the timber supply implications of these forest health problems beyond that used in this analysis. As new information becomes available, it will be incorporated into future analysis. For the purposes of this determination, I am satisfied that the assumptions used in the BCFS analysis about regeneration delay reflect the best available information on the impact of pests on reforestation and that the noted impediments do not introduce unacceptable risk to this decision. I accept the regeneration assumptions in the BCFS base case harvest forecast as reasonable for consideration in this determination.

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

Silvicultural systems

In the BCFS analysis for the Kamloops TSA, it was assumed that approximately 16.5 percent of the timber harvesting land base—predominantly occupied by dry-belt Douglas-fir forests—is managed under a selection harvesting system. The remainder of the timber harvesting land base was assumed to be managed under a clearcut harvesting system. However, much of the timber harvesting land base outside the selection management zone is subject to management objectives for caribou habitat, visual quality and community watersheds. To manage for these objectives, partial cutting harvesting systems are used on approximately 8.7 percent of the timber harvesting land base normally managed using clearcut harvesting systems. The use of partial cutting harvesting systems outside the selection management zone was not identified by BCFS staff at the time the analysis was conducted, and therefore was not accounted for in the BCFS analysis.

For this additional portion of the land base where partial cutting systems are used, the harvested volumes for a given area have been overestimated in the BCFS analysis, as it was assumed that these areas would be managed exclusively under a clearcut harvesting system. However, district staff indicate that partially cut stands would likely meet the requirements for cutblock adjacency. Therefore, even if partial cutting reduces the yield expected from these stands in the short term, it may increase overall timber availability. While the above argument is theoretically correct, the timber supply implications of this practice have not been analysed or proven at this time. I am satisfied, however, that this does not represent a risk to short-term timber supply, and I have not made any adjustment to the AAC on this account.

District staff note that the use of alternative harvesting systems may have an impact on the productivity of stands; the presence of an overstory may limit the growth of regenerating trees since they may not be growing under optimum light conditions. Conversely, the licensee group believes that the BCFS analysis has underestimated the volumes that will be realized from the selection management zone. There is evidently some uncertainty about the regenerated stand volumes that will be achieved on areas harvested under these systems. As previously mentioned under *volume estimates for regenerated stands*, development is underway to model alternative silviculture systems, as is the research of growth and yield for these systems. For this determination, I have no information to suggest that current levels of use of alternative silviculture systems will affect short-term harvest levels. However, as new research information becomes available, it will be reflected in future timber supply analysis for this TSA.

The Ministry of Environment, Lands and Parks has expressed a concern with the way in which Douglas-fir stands were assigned to management zones in the BCFS analysis. They contend that some of the dry-belt Douglas-fir stands have been incorrectly classified in the inventory file as wet-belt Douglas-fir. As a result, some dry-belt Douglas-fir stands may have been modeled as being managed under clearcut harvesting systems, rather than selection management. However, they have not specified the location of these stands or how much area they believe has been affected. I have examined this submission, and

while I agree that some of the dry-belt Douglas-fir stands may have been incorrectly classified, it is also likely that some of the wet-belt Douglas-fir stands have been classified as dry-belt Douglas-fir and included in the selection management zone. Obviously, without definitive analysis, the matter remains too speculative for me to assign any specific weight in this determination, and in any event the impact on timber supply is unknown. In the absence of more precise information, I believe that, on balance, the classification of wet- and dry-belt Douglas-fir is appropriate for use in the BCFS analysis, and the potential uncertainties are not known to introduce any specific risk to the maintenance of timber supply as projected in the base case.

Commercial thinning

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

In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, it was noted that approximately 14 percent of the timber harvesting land base is occupied by stands between the ages of 30 and 80 years which could be commercially thinned. However, very little commercial thinning is currently practiced in this TSA, and there is no strategy in place at this time for the development of commercial thinning. Furthermore, commercial thinning is not required in this TSA to provide flexibility in timber supply at this time. Therefore, I have not considered commercial thinning to have any impact on timber supply in this determination.

Incremental silviculture

In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, it is stated that incremental silvicultural treatments could provide an opportunity to offset any possible reductions in timber supply. In addition, public input expressed the view that incremental silviculture practices will increase timber supply. Most current research indicates that while such practices improve the *quality* of timber within a forest stand, they have little effect on the actual *volume* of timber produced, in most cases.

Approximately 2400 ha are spaced annually, and approximately 180 ha are pruned each year in the TSA; however, these activities improve the quality rather than increase the quantity of timber produced. Therefore, I have made no adjustment to account for these activities in my determination.

On average, approximately 165 ha of spaced lodgepole pine stands are fertilized annually in the Kamloops TSA. The volume response attributable to fertilization has not been quantified at this time, and fertilization was therefore not taken into account in the BCFS

analysis. The area currently being fertilized is relatively small and would only affect the medium- and long-term timber supply. Therefore, in this determination I have assumed no contribution to timber supplies from fertilization. However, I expect that future analyses will be able to evaluate the positive impact of fertilization on timber supply harvest levels.

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

Utilization and compliance

In the BCFS analysis, the utilization standards for sawlogs are 12.5-cm diameter at breast height (dbh) for lodgepole pine and 17.5-cm dbh for other species, with a 30-cm stump height, and 10-cm top diameter (15 cm for cedar older than 140 years). I am satisfied that the BCFS analysis reflects the utilization currently practiced in the Kamloops TSA, and that there is compliance with utilization standards in this TSA.

I do note that higher utilization is currently required for any harvesting conducted in stands harvested under Pulpwood Agreement (PA) 16. If this level of utilization is applied throughout the TSA, it would represent additional timber supply beyond that assumed in the BCFS analysis. However, this level of utilization is not common practice outside PA 16, and I have no reason to project that either the standards or the level of compliance will change. I will not consider the timber supply implications of higher utilization until this becomes standard practice in the TSA.

I also note that by removing more wood from a harvested site, higher utilization may conflict with requirements for biodiversity with respect to the retention of coarse woody debris. Potential conflicts between these objectives should be considered before higher utilization standards are applied throughout the TSA.

Decay, waste and breakage

The BCFS analysis for the Kamloops TSA used standard provincial factors to estimate timber volume losses due to decay, waste and breakage. One submission received through the public input process stated the concern that the loss factors used were based on information from stands characterized by smaller amounts of decay, waste and breakage. However, loss factors are determined using standard provincial methodology and information from all stands. At this time, the factors used in the BCFS analysis constitute the most complete estimates available and I consider them to be reasonable for use in this determination.

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

As provided in the *Ministry of Forests Act*, the purpose and function of the Ministry of Forests is to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources to ensure production and harvesting of timber and the 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.

Integrated Resource Management (IRM) objectives

- *green-up period*

Stands of timber adjacent to harvested cutblocks are not available for harvest until the harvested cutblocks have regenerated, and the regenerated stands have attained an acceptable "green-up" height. The number of years required to reach the green-up height is referred to as the "green-up period".

In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, green-up period was identified as a critical factor which could act to either increase or decrease short-term timber supply. Currently in the Kamloops TSA, green-up heights vary from 3 metres in the wildlife winter range and standard management zones to 6 metres in the landscape management zone. In the timber supply analysis, it was estimated that 16 to 25 years would be required for forests to reach from 3 to 6 metres in height, respectively. The discussion paper notes that there is some uncertainty about these estimates because the defined minimum height may not provide the forest conditions required to meet the management objectives for visual quality or wildlife winter range, and because it may take regenerated forests more or less time than estimated to reach the minimum height.

The BCFS analysis includes a sensitivity analysis examining the timber supply impacts of uncertainty about the length of the green-up period. This shows that if green-up periods are 5 years longer than assumed in the base case, to avoid future timber supply shortages, the projected initial harvest level would have to decline immediately by 5 percent, and the long-term harvest level would be slightly lower than in the base case. If green-up periods are 5 years shorter than in the base case, the projected initial harvest level can be maintained an additional decade before declining to a slightly higher long-term harvest level than in the base case.

I acknowledge that the timber supply of the Kamloops TSA is sensitive to changes in the length of the green-up period. However, I believe that what was modeled in the BCFS analysis provides the best available approximation of the green-up requirements at the time the analysis was conducted. I have no information at this time to suggest that the BCFS analysis assumptions about green-up are inappropriate. I do note that with the completion of the Kamloops Land and Resource Management Plan, there have been some changes in how several of the integrated resource management objectives are to be met; these changes and their implications will be dealt with in the relevant sections below

under *visually sensitive areas*, *wildlife habitat*, and particularly under *Kamloops Land and Resource Management Plan (LRMP)*.

There is an additional consideration regarding green-up periods. As discussed in Site productivity estimates above, if site indexes are underestimated, forest stands will reach green-up conditions at younger ages than assumed in timber supply analysis. This would increase short-term timber availability in the Kamloops TSA. However, as noted above, there is no conclusive information at this time to confirm that site productivity has been underestimated in the TSA. In the event that statistically-based information shows that site indexes should be adjusted, future timber supply analysis should account for the corresponding change in green-up periods.

- *cutblock adjacency*

In order to protect non-timber resources such as wildlife, water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks and prescribe a minimum green-up height for adjacent cutblocks. This provides for a distribution of harvested areas and retained forest cover across the landscape, which helps to meet several forest management objectives. Cutblock adjacency guidelines are commonly expressed in terms of the number of harvesting entries, or "passes," required to harvest the entire area of the timber harvesting land base.

The standard resource management zone, which covers approximately 40 percent of the timber harvesting land base, is subject to cutblock adjacency guidelines for general integrated resource management. In the BCFS analysis, the standard resource management zone was modeled as requiring a 4-pass harvesting regime in the Kamloops district portion of the TSA, and a 3-pass harvesting regime in the Clearwater portion. Overall, these objectives require that at any time, no more than 28 percent of a broad area may be under cover of stands that are, on average, shorter than 3 metres tall. District staff indicate that these objectives have not changed under the Kamloops LRMP. I am satisfied that the forest cover requirements used for the standard management zone in the BCFS analysis reflect current management.

The remainder of the timber harvesting land base is managed according to objectives for specific forest resources, such as visually sensitive areas and caribou habitat. The management of these resources is discussed under the relevant sections below.

- *visually sensitive areas*

Forest resources managed by the BCFS include recreation resources. "Recreation resource" is defined in the *Forest Practices Code of British Columbia Act* to include "scenic or wilderness features or settings that have recreational significance or value". In order to manage such scenic features, visual landscape foresters in B.C., in collaboration with specialists in other parts of the world, have developed procedures for identifying and managing "visually sensitive areas". These procedures incorporate both biophysical and social factors—including visual sensitivity ratings based on topography, slope and other

biophysical factors, and social factors such as numbers of viewers and their perceptions—and provide recommended visual quality objectives (VQOs) for visually sensitive areas. These objectives limit the amount of visible disturbance that is acceptable in such areas.

In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, visually sensitive areas are identified as a critical factor that could act to either increase or decrease short-term timber supply. The BCFS analysis shows that the harvest forecast is very sensitive to changes in forest cover requirements, and much of the impact on the projected timber supply is attributed to the requirements for the landscape management zone, which occupies approximately 22 percent of the timber harvesting land base.

To date, the Kamloops LRMP has approved the existing visual quality objectives modeled in the BCFS analysis. However, under the LRMP there is recognition that different harvesting systems have different visual impacts. Areas that have been harvested using partial cutting harvesting systems, such as single tree selection and group selection, continue to meet requirements for visual quality. Therefore, more area can be made available for harvesting using alternative harvesting systems than if clearcut harvesting systems were used, while still meeting objectives for visual quality. The choice of harvesting systems set out in the Kamloops LRMP provides more flexibility for management of VQOs than the harvesting systems that were accepted for use in visually sensitive areas at the time of the BCFS analysis. The timber supply implications of this are discussed under *Kamloops Land and Resource Management Plan (LRMP)*. This "new" approach is consistent with recent direction from the Minister of Forests and is discussed further under social and economic objectives of the Crown, below.

District staff note that approximately 10 percent of the TSA has not been mapped for visual sensitivity. A process is being established to review and complete identification of areas subject to VQOs, and the information from this process will be incorporated into future analyses. In the meantime, I do not consider this to represent a significant risk to short-term timber supply, since the major visually sensitive areas in the TSA have been identified, and only a small portion of the land base remains to be mapped. For the present, I am satisfied that the visual quality objectives approved under the Kamloops LRMP represent the best approximation of current management in the Kamloops TSA, and indeed show a more favourable and flexible approach in balance with timber supply objectives than what has been projected in many other areas of the province.

- *wildlife habitat*

Requirements for wildlife and caribou habitat were identified in the *Timber Supply Review Discussion Paper* for the Kamloops TSA as critical factors that could act to either increase or decrease short-term timber supply. These requirements were modeled in the BCFS analysis, and addressed in the Kamloops LRMP as follows:

- *caribou habitat*

In the BCFS analysis, it was assumed that 53 589 ha of the timber harvesting land base (approximately 5 percent) are specifically managed for late winter caribou habitat, whereby a maximum of 33 percent of the late winter caribou habitat areas may be under cover of stands that have not reached green-up conditions, and a minimum of 12 percent of these areas must be covered by stands older than 200 years. It was also assumed that 63 598 ha of the timber harvesting land base (approximately 7 percent) are managed specifically for early winter habitat, whereby a maximum of 32 percent of the early winter caribou habitat areas may be under cover of stands that have not reached green-up conditions, and a minimum of 30 percent of these areas must be covered by stands older than 92 years. The management requirements modeled for these areas are based on guidelines established in consultation with the Ministry of Environment, Lands and Parks.

Comments were received from the general public and from the Ministry of Environment, Lands and Parks regarding caribou habitat. Concern was expressed both about the ability of the guidelines that were in place at the time the analysis was conducted to adequately provide for the habitat required by caribou, and about the way these guidelines were modeled in the BCFS analysis. Under the Kamloops LRMP agreement, the guidelines for caribou habitat have changed. The areas of the timber harvesting land base designated as early and late winter caribou habitat have been adjusted; some areas have been removed from this designation and others have been added. Overall, under the Kamloops LRMP, areas managed specifically as caribou habitat have increased by about 500 ha. In addition, the forest cover requirements for these areas have changed under the LRMP. For late winter habitat, a maximum of 33 percent of the habitat area may be under cover of stands that have not reached green-up conditions, and a minimum of 33 percent of the area must be covered by stands at least 150 years of age managed for old-growth attributes. For early winter caribou habitat, a maximum of 33 percent of the area may be under cover of stands that have not reached green-up conditions, and a minimum of 20 percent of the area must be covered by stands at least 150 years in age. The timber supply implications of these changes in the management of caribou habitat under the LRMP are discussed under *Kamloops Land and Resource Management Plan (LRMP)*.

- *other ungulates*

In the BCFS analysis, it was assumed that 49 906 ha of the timber harvesting land base (approximately 5 percent) is specifically managed for the deer and moose winter range, whereby a maximum of 20 percent of the these ungulate winter range areas may be under cover of stands that have not reached green-up conditions, and a minimum of 40 percent of these areas must be covered by stands greater than 20 metres in height. In addition, cutblock sizes were assumed to be limited to 5 ha with 300 metre buffers.

Under the Kamloops LRMP, the forest cover requirements for these areas have changed. To manage for ungulate winter range, a maximum of 20 percent of the habitat area may be under cover of stands that have not reached green-up conditions, and a minimum of 25 percent of the area must be covered by stands at least 10 metres in height. As discussed below under *wildlife trees*, the retention of approximately 10 cubic metres per hectare of wildlife trees on portions of the ungulate winter range areas is a new requirement under the LRMP. The timber supply implications of these changes in the management of ungulate habitat under the LRMP are discussed under *Kamloops Land and Resource Management Plan (LRMP)*.

The licensee group suggests that the green-up forest cover requirement used in the BCFS analysis overstates the harvesting guideline it is intended to approximate. However, I note that sensitivity analyses illustrate that relaxing the forest cover requirements throughout the timber harvesting land base by 5 percent does not affect the initial harvest level. Therefore, I conclude that relaxing cover requirements in the ungulate management zone by a significant amount would not impact the initial harvest level projected in the base case. Accordingly, I am satisfied that this does not represent a cause for concern in this determination.

- *community watersheds*

Community watersheds are identified in the *Timber Supply Review Discussion Paper* for the Kamloops TSA as a critical factor that may limit the available timber supply in the short term.

In the BCFS analysis, the community watershed management zone was assumed to cover 41 730 ha (approximately 4 percent) of the timber harvesting land base. To model management of watersheds in the TSA, it was assumed that a maximum of 22 percent of a watershed area could be covered by stands below a green-up height of 5.4 metres. This requirement was based on a 7-metre green-up requirement applied to the upper 60 percent of community watersheds, and a 3-metre green-up requirement applied to the lower 40 percent of community watersheds. The equivalent clearcut area percentage recommended in the guidelines was adjusted to account for those areas within a watershed that contribute to hydrologic recovery but are not considered part of the timber harvesting land base.

Although the licensee analysis used the same management assumptions as the BCFS analysis for community watersheds, the licensee group suggests that the green-up height used in the analysis (5.4 metres) is too high, and that a green-up height of 4.8 metres is more appropriate. This alternative green-up height is based partially on the assumption that a stand reaches 50 percent hydrological recovery at 6 metres in height. However, under the *Forest Practices Code of B.C. Act*, 7 to 9 metres in height is the acceptable range for hydrological green-up in the upper 60 percent of community watersheds. Therefore, I am unable to accept the alternative green-up height presented by the licensee group. I am satisfied that the community watershed assumptions used in the BCFS

analysis, which are based on a hydrological green-up height of 7 metres, are appropriate for this determination. However, I acknowledge that there is some uncertainty about the appropriate heights to meet requirements for hydrological recovery, and I expect that further study will be undertaken and will clarify hydrological requirements prior to the next AAC determination.

Watersheds with important fisheries values cover approximately 300 000 ha of the total land base of the Kamloops TSA. District staff note that while current practices in these watersheds were modeled in the BCFS analysis, community watershed management requirements may also be applied to watersheds with important fisheries values at some time in the future. If this is the case, timber availability may be more restricted than modeled in the BCFS analysis. Forest cover requirements for these watersheds were not specifically modeled in the BCFS analysis. However, forest cover requirements for other values—such as visual quality, integrated resource management, community watersheds, and ungulate winter range—apply to these areas in the analysis. Therefore, some representation of the forest cover requirements for these areas will have been taken into account. Accordingly, I do not consider this to represent a significant risk to timber supply in the short term. I note that watershed assessments are a requirement under the *Forest Practices Code of B.C. Act* for certain areas. Once these assessments are complete, I will be in a better position to assess the timber supply implications of managing those designated watersheds with high fisheries values. In the meantime, I am satisfied that the BCFS analysis incorporated the best information available on this matter.

- lakeshore management areas

The modeling of lakeshore management areas in the BCFS analysis was based on standards developed through the Lakes Local Resource Use Plans (LRUPs) conducted throughout both the Clearwater and Kamloops Forest Districts. In the BCFS analysis, approximately 965 ha were excluded from the timber harvesting land base to account for 22 Class A lakes (as defined in the Lakes LRUP, i.e. where classes A to E represent a range of values from high to low respectively, applied to lakes from an integrated resource management viewpoint, and corresponding to a range of management from more to less restrictive) for which a 200-metre no-harvesting buffer is required. In addition, it was assumed that some harvesting would occur around Class B to E lakes, consistent with the requirements for visual quality management. Accordingly, the management areas around these lakes were modeled as part of the landscape management zone in the BCFS analysis. District staff indicate that these standards are consistent with the Forest Practices Code Guidebook.

I note that approximately 1000 lakes have been classified under the LRUP; those lakes that have not yet been classified through the LRUP were assumed in the analysis to be Class C lakes, and were therefore included in the landscape management zone. The remainder of the lakes will be classified for incorporation in the next timber supply analysis. In the meantime, I am satisfied that current knowledge on lakeshore management areas has been adequately modeled in the BCFS analysis.

- riparian habitat

The assumptions used in the BCFS analysis to model riparian habitat requirements were based on the 1994 Kamloops TSA Riparian Guidelines. In the analysis, 18 597 ha were excluded from the timber harvesting land base to account for riparian reserve areas. This area exclusion was determined by studying 21 randomly chosen map sheets. A 10-metre no-harvest buffer was applied around all lakes, wetlands and streams with resident fish populations, and a 20-metre no-harvest buffer was applied to streams with anadromous and regionally significant fish populations. From this analysis, it was determined that riparian reserves represent an exclusion of approximately 1.2 percent of the timber harvesting land base.

Since the completion of the BCFS analysis, riparian habitat requirements have been described in the Forest Practices Code regulations which differ from the riparian guidelines modeled in the analysis. Accordingly, district staff re-examined the same 21 mapsheets. They found that under the Code regulations, riparian reserves should represent an exclusion of approximately 1.3 percent of the timber harvesting land base. In addition, riparian management zones, in which some limited harvesting would be allowed, account for approximately 5.7 percent of the total land base. Based on the information presented to me, and based on discussions with district staff, I consider riparian habitat to represent a further 1 to 1.5 percent downward influence on the timber supply of the Kamloops TSA. This is accounted for under "Reasons for decision".

- biodiversity

In the *Timber Supply Review Discussion Paper* for the Kamloops TSA, biodiversity was identified as a critical factor which could affect short-term timber supply. Biodiversity was not specifically accounted for in the BCFS analysis. However, other provisions—such as the use of alternative silviculture systems, the exclusion of areas from the timber harvesting land base, landscape management, riparian guidelines, guidelines for wildlife habitat and lakeshore management areas and the selection management zone—do contribute to meeting requirements for biodiversity.

Similarly, specific biodiversity provisions have not yet been finalized under the Kamloops LRMP, although the LRMP does include provisions such as caribou corridors and protected areas that will contribute to biodiversity. When biodiversity guidelines have been finalized under the Kamloops LRMP, they will be incorporated into future analyses. In the meantime, I am satisfied that this does not present a significant risk to the short-term timber supply since district staff have made a reasonable approximation of current provisions for biodiversity.

- old-growth retention

Several comments were received through the public input process regarding the retention of old-growth. Currently in the Kamloops TSA, there is a requirement to maintain at least 10 percent of the land base in old-growth stands. This

requirement was not modeled in the BCFS analysis; however, district staff suggest that this requirement may be mostly met by areas of the TSA that are not included in the timber harvesting land base, such as environmentally sensitive and riparian areas. Even if these areas did not contribute to achieving the old-growth requirement, sensitivity analysis shows that if mature forest cover requirements are increased by 10 percent on the timber harvesting land base, the initial harvest level projected in the base case can still be maintained for a decade before declining to a slightly lower long-term harvest level than in the base case. Furthermore, the BCFS analysis shows that the old-growth requirement is met at the current harvest level. Therefore, I am satisfied that the retention of old growth does not represent a serious risk to short-term timber supply in this TSA. The requirements for old growth will be developed as part of the biodiversity strategy, and will be further assessed in the next analysis.

- *wildlife trees*

Currently in the Kamloops TSA, wildlife trees are maintained to provide critical wildlife habitat: Douglas-fir trees are reserved from cutting in stands with a lodgepole pine component of greater than 90 percent; 5-metre stubs are created on cutblocks; and trees with little or no merchantable value are retained. The retention of wildlife trees was accounted for in the BCFS analysis. It was assumed that approximately 6000 cubic metres of wildlife trees would be retained annually throughout the timber harvesting land base.

Under the Kamloops LRMP, there is a requirement to maintain approximately 10 cubic metres per hectare of wildlife trees in portions of the ungulate winter range areas. BCFS staff indicate that this will result in the retention of an additional 2500 cubic metres of merchantable timber per year for wildlife trees in the TSA. The timber supply implications of these additional wildlife trees are examined under *Kamloops Land and Resource Management Plan (LRMP)*.

District staff indicate it is likely that other biodiversity provisions will contribute to meeting wildlife tree requirements. With the finalization of a biodiversity strategy, I expect this matter to be assessed for incorporation in future timber supply analyses. In the meantime, I am satisfied that the assumptions used in the BCFS analysis and the requirements from the LRMP represent the best estimate of the volume of timber retained as wildlife trees in the TSA.

Significant input was received from members of the general public, the Shuswap Nation Tribal Council, the Kamloops Naturalist Club, and the Ministry of Environment, Lands and Parks, emphasizing the importance of biodiversity and expressing concerns about the effect of harvesting on biodiversity. I am aware of the concerns about biodiversity, and as indicated above, a biodiversity strategy for the TSA is currently being developed under the Kamloops LRMP. Until the strategy is developed and implemented, I accept the assumptions that have been used in the LRMP harvest forecast, which is described below under *Kamloops Land and Resource Management Plan (LRMP)*, as the best

representation of current practices regarding the management of biodiversity available for consideration in this determination. Given the many provisions in this analysis for managing stands and landscapes, it is not clear whether the provisions of the Forest Practices Code will have any further impact on timber supply beyond what was modelled. This matter will be more explicitly examined and modelled in the next timber supply analysis. For the purposes of this determination, I am satisfied that this does not present a significant risk to the short-term timber supply.

- recreation

Seventy-two hectares have been alienated from the TSA as private land for the Sun Peaks Resort, and to account for this, 72 ha were excluded from the timber harvesting land base in the BCFS analysis. Under the Kamloops LRMP, a total of 895 ha around Sun Peaks Resort has been approved as a settlement zone, and the Thompson-Nicola Regional District has rezoned this area for development. However, timber harvesting is permitted on Crown land under this zoning. I am aware that Sun Peaks Resort has requested that an additional 235 ha be removed from the timber harvesting land base for the resort. However, as noted above, under "Guiding Principles for AAC determinations" until this area is removed from the land base of the TSA, I must consider this area to contribute to the timber supply for the TSA. I am therefore satisfied that current management of this area has been modeled in the BCFS analysis. If additional area is deducted from the timber harvesting land base in the future, it will be reflected in future AAC determinations. In the meantime, I note that the magnitude of this issue does not represent a significant risk to overall timber supply.

- areas of cultural or archaeological significance, and traditional uses

As I have indicated above, in "Guiding Principles...", as far as possible I will take into account specific identified activities in traditional areas, in my considerations under section 7(3)(a)(v).

An archaeological overview assessment was conducted for the Kamloops LRMP. To date, an archaeological impact assessment has been conducted on a small, non-representative portion of the TSA. This assessment showed evidence of lithic scatterings, for which a 20-metre no-harvest buffer is required. As a result, approximately 6 ha have been excluded from the area to be developed. While these results indicate to me that a very small portion of the timber harvesting land base is affected by areas of cultural or archaeological significance, current information is insufficient to determine if this has an impact on the timber supply of the TSA, and I cannot reasonably make an adjustment to timber supply in this regard in this determination. District staff have been directed to conduct impact assessments on all areas identified as medium- and high-potential sites through the archaeological overview assessment, and the information from these impact assessments will be incorporated into future determinations. For the present determination I have no indication that this factor will result in a significant adjustment to timber supply. However, as noted above in "Guiding Principles for AAC determinations", I anticipate that areas of cultural or archaeological significance and

traditional uses will be considered by the district manager in his administration of the AAC determined.

- *Kamloops Land and Resource Management Plan (LRMP)*

The Kamloops LRMP was approved by Cabinet on July 28, 1995, and was declared a higher level plan on January 31, 1996. The BCFS analysis included a sensitivity analysis approximating the impacts of the Kamloops LRMP, based on the LRMP information that was available at the time of the analysis. Subsequent to the completion of the BCFS analysis, BCFS staff produced a new sensitivity analysis that incorporated updated information from the completed LRMP. This sensitivity analysis, which does not include the recommendations of the LRMP follow-up committee, as these recommendations have not yet been approved by government, was based on the same management assumptions as the BCFS analysis base case, with the following adjustments:

- areas were deducted from the timber harvesting land base used in the base case to account for protected areas, and other areas considered unavailable for harvesting in the BCFS analysis were added to the timber harvesting land base, with an overall decrease in the timber harvesting land base of approximately 32 000 ha;
- the forest cover requirements applied to the caribou habitat management zones were changed (see discussion under *caribou habitat*);
- wildlife trees were assumed to be retained in portions of ungulate habitat, and the forest cover requirements applied to the ungulate winter range management zone were changed (see discussion above under *other ungulates* and *wildlife trees*); and
- the forest cover requirements applied to the landscape zone were changed (see discussion above under *visually sensitive areas*).

This sensitivity analysis shows that the projected initial harvest level could be maintained for an additional 4 decades compared to the base case, and the long-term harvest level could be increased to 2 119 000 cubic metres. While the size of the timber harvesting land base has decreased under the LRMP agreement, timber supply is increased because the new management requirements for caribou habitat, ungulate habitat, and visual quality provide additional flexibility. The licensee group also provided a sensitivity analysis to model the impact of the LRMP. While the licensee group used a different analytic technique in modeling the LRMP agreement, the resulting harvest forecast was not significantly different from the BCFS sensitivity analysis harvest forecast, particularly in the short term. Based on the results of the sensitivity analyses conducted by both the BCFS and the licensee group, I am satisfied that the initial harvest level projected in the BCFS analysis base case can still be maintained under the management direction described in the Kamloops LRMP agreement.

I note, however, that some small protected areas and some management assumptions—such as specific biodiversity requirements identified by the LRMP follow-up committee—have not been explicitly incorporated into the LRMP sensitivity analysis since they have not yet been approved by Cabinet. When these aspects of the agreement

are finalized, they will be incorporated into future timber supply analyses. In the meantime, I am satisfied that the LRMP sensitivity analysis conducted by the BCFS is a good approximation of the impacts of the requirements currently outlined in the Kamloops LRMP, and I have taken this into account in my determination.

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

Deferrals

Currently in the Kamloops TSA, harvesting is deferred on approximately 45 000 ha of the total land base due to issues related to watershed management, wildlife and first nations concerns, the establishment of growth and yield permanent sample plots, and other causes. Some of these issues are additional to those addressed by the Kamloops LRMP process, but others, such as wildlife concerns, will become resolved as the LRMP is implemented. Although harvesting is not presently carried out in these deferred areas, 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 lack of harvesting operations in these deferred areas of the TSA is causing increasing harvesting pressure on the remainder of the timber harvesting land base. I am concerned that under these circumstances, for harvesting to continue in the TSA at the level indicated by the AAC, the continued avoidance of harvesting in contentious areas means that 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 in order to meet forest cover objectives. District staff indicate that these deferrals are not currently limiting the ability to meet operational plans, and I am satisfied that timber availability in the Kamloops TSA is sufficiently flexible that continuing this deferral strategy *in the short term* will not conflict with integrated management objectives or good forest management in this TSA. Nevertheless, if these 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, he 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*.

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

Harvest flow

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

The BCFS timber supply analysis base case for the Kamloops TSA shows that the current AAC of 2 393 180 cubic metres could be maintained for 2 decades without causing a disruption in future harvest levels. After 20 years, the harvest level would decline by 9 percent per decade for two decades to reach the long-term harvest level of 1 958 000 cubic metres per year 4 decades from now.

The BCFS analysis also examined alternative harvest projections. The analysis shows that the initial harvest level could be increased by 10 percent to 2 632 498 cubic metres per year for one decade before declining to the long-term harvest level. However, the timber supply would be disrupted in 90 to 100 years from now; the harvest level would have to be reduced to approximately 22 percent below the long-term harvest level.

The analysis also examined an initial harvest level decreased to within 10 percent of the long-term harvest level. The resulting harvest forecast has an initial harvest level of 2 153 800 cubic metres that can be maintained for 4 decades, when the harvest level is projected to decrease by 9 percent to the long-term harvest level.

The analysis also projected that it is also possible to maintain the current AAC for 6 decades; however, harvest levels over the following 4 decades would fluctuate, reaching a low of 34 percent below the base case harvest forecast between 70 and 80 years from now.

The "licensee base case" harvest forecast presented in the licensee group analysis shows that the current AAC can only be maintained for one decade. After 10 years, the harvest level would decline gradually to the long-term harvest level of 1 841 550 cubic metres per year. Some of the assumptions used in this harvest forecast are different from the assumptions used in the BCFS analysis base case; notably, some of the land base changes under the LRMP are incorporated, different analysis units are used, and different assumptions about regeneration are used in the licensee group base case. In addition, a different model was used in the licensee group analysis. Although I do not support all the assumptions used in the licensee group analysis (as discussed in previous sections of this

rationale), I consider this analysis to provide reasonable support for the initial harvest level projected in the BCFS analysis.

A socio-economic analysis (SEA) report for the Kamloops TSA was prepared by G.E. Bridges and Associates Inc. for the BCFS. This report details the importance of the forest industry to local economies, and describes the community impacts associated with various timber supply scenarios. The analysis reports that the economy of the city of Kamloops is relatively diverse, with no one economic sector dominating the labour force. However, in the remaining portion of the TSA, the forest sector is the dominant employer, providing 37 percent of employment income. Timber harvesting from the TSA currently provides approximately 1 675 person-years of direct employment and an additional 1 075 person-years of indirect and induced employment. The TSA harvest also supports a further 3 270 person-years of direct, indirect and induced employment throughout the province. I have reviewed the economic development impacts described in the SEA report, which details the community impacts associated with the base case described above. I am aware of the dependence of local communities on timber harvesting and processing, and I have considered this, along with the social and economic objectives of the Crown (discussed below) in my determination.

In its revenue projections, the SEA did not include the higher stumpage rates set in April 1994 in conjunction with the Forest Renewal Plan. It is safe to assume that those projections now underestimate the true stumpage revenue accruing to the province, but this does not affect the ability to make valid comparisons between the socio-economic implications of differing rates of harvesting under various scenarios.

Significant public input was received regarding alternative rates of harvesting in the Kamloops TSA. Some of the comments favoured maintenance of current harvest levels. Others emphasized that the allowable harvest level should be immediately reduced by a significant amount, but I do not consider this to be a responsible option at this time, given the ability of the TSA to maintain present harvest levels without causing severe timber supply shortages in the future, and given the reliance of local communities on the forest sector.

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

Harvest profile for mill requirements

Six major sawmills, one plywood and veneer mill, one pulp mill and several small sawmills and value-added wood manufacturers are located in the Kamloops TSA. The major sawmills secure about 71 percent of their timber supply from the Kamloops TSA; the remainder of the supply for these mills comes from tree farm licenses, timber licenses, private lands inside the TSA, and Crown and private lands outside the TSA. The reliance of local mills on fibre supply from the TSA ranges between 59 and 89 percent of their annual production. The pulp mill obtains about 50 percent of its fibre requirement in the form of wood chips from the processing of timber by mills located within the TSA.

From this, it is evident to me that an AAC reduction could have significant implications for the viability of local processing facilities.

Pulpwood Agreements

Two pulpwood agreements have been issued—PA 2 and PA 16—which cover part of the Kamloops TSA. While no plans are in place to begin harvesting under PA 2, the two forest regions administering PA 16 (the Kamloops and Cariboo Forest Regions) have already approved a management plan for PA 16, and the licensee anticipates using the wood available to meet over half of the operating requirements for a recently constructed oriented strandboard processing facility. It is expected that PA 16, which is a non-replaceable 25-year licence, will enable an annual harvest, as need is demonstrated, of up to 86 000 cubic metres of forest types not currently considered merchantable for sawlogs for the next five years from this TSA.

The summary of public input shows a range of perspectives about how the volume attributable to PA 16 should be considered. I have considered the perspectives presented, along with information provided by the district, and have concluded that my AAC determination should include an accounting for the harvesting occurring under PA 16 in this TSA. The forest types described in PA 16—coniferous forest types not currently considered merchantable for sawlogs, deciduous forest types and some sites which are currently showing low timber growing potential—were not included in the BCFS timber supply analysis. In recognition of the harvesting of these forest types and to move towards a complete accounting in the AAC of all harvesting within the TSA, I have considered them as contributing to the AAC as discussed in "Reasons for decision".

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

Minister's letter and memo

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 Kamloops TSA. They are consistent with the objectives stated in the Forest Renewal Plan and include forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest level changes in a managed transition from old growth- to second-growth forests, so as to provide for continuity of employment.

The Minister also stated in his letter that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of 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.

Issues related to employment and community are discussed in detail in the SEA report, and I am familiar with the varying potential impacts of different harvest levels. The use of commercial thinning is discussed above under Commercial thinning, where I noted that while commercial thinning may provide some flexibility in harvest scheduling, there is no commercial thinning strategy currently in place. Furthermore, there is little or no additional volume to be captured using commercial thinning. The possibility of expanding the timber harvesting land base was explored primarily in *excluded forest types*. There I discussed the likelihood that substantial volumes of excluded forest types can be added to the timber harvesting land base. To account for the contribution of older cedar and hemlock volumes to the timber supply of the TSA and for the volume of excluded forest types harvestable under PA 16, I have established a partitioned AAC, as described in "Reasons for decision".

Finally, most recently, the Minister has asked that pre-Code constraints applied to timber supplies in order to meet visual quality objectives be re-examined when setting AACs in order to ensure that they do not unreasonably restrict timber supplies when considered in conjunction with other requirements under the Code. I have given this matter further consideration as noted below under "Reasons for decision".

Local objectives

The Minister's letter suggests that the Chief Forester should consider important local social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. Submissions were received from the general public, the Shuswap Nation Tribal Council, the Neskonalith Indian Band, the Kamloops Naturalists Club, the Ministry of Environment, Lands and Parks, the Interior Lumber Manufacturer's Association, Gilbert Smith Forest Products Ltd., the Kamloops TSA group, Weyerhaeuser Canada, Tolko Industries, Interfor, and Ainsworth in response to the BCFS timber supply analysis report, the SEA and the discussion paper. Comments were also received at open houses conducted in Kamloops and Clearwater.

Throughout the timber supply review process, BCFS staff actively sought First Nations input. There are 10 First Nations bands located within the boundary of the Kamloops TSA, and an additional 8 bands located outside the TSA maintain traditional interests inside the TSA. The North Thompson Band operates a small sawmill in the TSA; other bands have expressed an interest in establishing similar operations. Furthermore, some bands have requested timber harvesting rights in the Kamloops TSA. I am mindful that there is a strong interest in the economic development of forest resources. However, it is not within my legislative mandate to allocate tenure rights. As provided by the *Forest*

Act, tenure allocation and AAC apportionment are the responsibility of the Minister of Forests.

The comments received are summarized in the attached Summary of Public Input. I have considered the input received and I am mindful of the many views which were brought forward. Where possible I have attempted in this rationale to respond briefly to many of those views, and this information has been thoroughly considered in this determination.

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

Non-recoverable losses

Non-recoverable losses are timber volumes destroyed or damaged by natural causes such as fire and disease, that are not recovered through salvage operations. In the Kamloops TSA, annual non-recoverable losses resulting from insect, wind and fire damage, wildlife trees, and damage to immature plantations from cattle, insects and disease, were estimated to be 43 400 cubic metres and .

As discussed above under *volume estimates for regenerated stands*, additional study is needed regarding the impacts of root rots on immature plantations. Research into root disease is currently underway throughout the province, and the information from this research will be incorporated into future analyses. I also note that there is significant uncertainty about the impacts on stand productivity from cattle grazing . I expect further analysis to be undertaken in the future to confirm or better quantify estimates of non-recoverable losses attributable to cattle grazing, in conjunction with consideration being given to new management practices currently being implemented which should improve the integration of the needs of the cattle industry with regeneration objectives.

The licensee group suggests that the non-recoverable losses have been overestimated in the BCFS analysis. They submit that too much volume has been deducted from the analysis for wildlife trees, since some of these trees are deciduous trees and snags which would not contribute to the harvest. As discussed above under *wildlife trees*, the assumption used in the BCFS analysis represents the best available estimate of the volume of timber retained as wildlife trees in the TSA at the time the analysis was conducted. Under the Kamloops LRMP agreement, an additional 2500 cubic metres of merchantable timber is required annually for wildlife trees. Accordingly, I do not believe that the amount of wildlife trees has been overestimated in the BCFS analysis. In addition, the licensee group argues that the losses to hemlock looper have been counted twice since the infestations occur in very old stands and the hemlock volume from these stands has been excluded from the analysis. However, district staff indicate that the hemlock looper losses accounted for in the BCFS analysis are for the loss of non-hemlock species such as cedar, and younger hemlock trees, to hemlock looper. The licensee group also believes that non-recoverable losses will decrease over time as more of the timber harvesting land base is accessed. While this may be a reasonable assumption, there is no

information available at this time to convince me that this is the case. In summary, I am not convinced that non-salvaged losses have been overestimated in the BCFS analysis.

In fact, the estimate of non-salvaged losses for the Kamloops TSA is somewhat lower than losses experienced in similar areas of the province. However, district staff indicate that many larger fires in the TSA occur in the grassland or low productivity forests; fires occurring on the timber harvesting land base are often small and are frequently salvaged. In addition, district staff note that spray programs have minimized losses to defoliating insects, and aggressive programs to control mountain pine beetle, spruce bark beetle and Douglas-fir beetle have minimized losses to these pests as well. Furthermore, only approximately 26 percent of the stands on the timber harvesting land base are older than 140 years of age, which is the age group in which most losses to insects, disease and wind would occur. If further information becomes available on non-recoverable losses, it will be accounted for in future analyses. In the meantime, I am satisfied that this is a reasonable estimate of what is currently experienced in this TSA and is therefore suitable for use in this determination.

Reasons for decision

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

The BCFS timber supply analysis shows that the current AAC of 2 393 180 cubic metres can be maintained for 2 decades, followed by a decline at a rate of 9 percent per decade, reaching the long-term harvest level of 1 958 000 cubic metres per year 4 decades from now. This forecast conforms, as much as possible, to the principles discussed in 7(3)(b) above, regarding the transition from old- to second-growth harvesting, and from my review of implications to the province of alternative harvest rates, lies within an acceptable range of harvest forecasts for the Kamloops TSA at this time.

My considerations have identified a number of factors that exert upward or downward influences on the timber supply projected in the base case and that were not accounted for in the initial harvest level in the base case forecast, due to changes in practice or information made available since completion of the analysis in early 1995.

Factors which restrict timber supply over the short to medium term and which reduce the length of time the initial harvest level can be maintained include the following:

- A terrain mapping exercise recently conducted in the Hiuihill Creek and Gold Creek areas of the Kamloops district showed that environmentally sensitive areas cover 8400 ha of this 23 000 ha area. It is not known at this time how much of the timber harvesting land base is affected, since some of these areas will overlap with areas that are unavailable for timber harvesting due to other factors, such as inoperability. Furthermore, it is not clear at this time what level of harvesting, if any, will be allowed in these environmentally sensitive areas. For these reasons it is difficult to assess the timber supply impacts at this

time. However, it is evident that the timber harvesting land base in this particular area has been overestimated by something less than 8400 ha.

- Riparian allowances now required under the Forest Practices Code are more stringent than those modeled in the BCFS analysis. I consider the additional riparian management requirements to represent a restriction on the timber supply of the Kamloops TSA throughout the forecast period, with a short term timber supply impact probably in the order of less than 2 percent.

Factors indicating that the timber supply may be greater than projected in the base case are as follows:

- The use of more accurate site index information than was available at the time the BCFS analysis was conducted indicates that approximately 14 316 ha of stands considered unmerchantable in the BCFS analysis are actually merchantable. Therefore, the timber harvesting land base in the BCFS analysis has been underestimated by approximately 1.5 percent.
- The Kamloops LRMP has outlined changes to the land base, caribou habitat management, ungulate winter range management, and landscape requirements which result in an increase in timber availability. In particular, I find the handling of the landscape requirements in the Kamloops TSA to be consistent with the direction given by the Minister of Forests in his expression of the socio-economic objectives of the Crown regarding visual resources.

In the BCFS sensitivity analysis showing the timber supply implications of the LRMP, the initial harvest level can be maintained for an additional 4 decades compared to the base case, and the long-term harvest level can be increased to 2 119 000 cubic metres.

In addition, it is possible that the site productivity of older stands is underestimated in the BCFS analysis. As a result, the long-term harvest level may be higher than forecast in the BCFS analysis. Moreover, higher site productivity would result in shorter green-up periods, which could improve timber availability in the short term. However, until more reliable information based on the provincial paired-plot survey is available, the magnitude of this improvement remains speculative.

From my review of these restricting and augmenting influences on the projected timber supply, it is my judgement at this time that the existing harvest level remains supported by a stable timber supply and under the management outlined in the approved LRMP is biophysically maintainable at this level for a period of several decades. In this situation, given the Crown's economic and social objectives for the province, which encourage minimizing AAC reductions consistent with maintaining long-term productivity, I do not find any reason to lower the AAC at this time.

There is, however, an outstanding consideration exerting an upward influence on the timber supply of the Kamloops TSA. As discussed above under *excluded forest types*, approximately 12 000 ha of the TSA are covered by very old hemlock and cedar stands in which the proportion

of hemlock exceeds 60 percent by volume. These stands were not included in the timber harvesting land base in the BCFS analysis. An additional 39 000 ha of the timber harvesting land base are occupied by old cedar and hemlock stands with less than 60 percent hemlock by volume. The hemlock volume from these stands was not included in the timber supply of the TSA in the BCFS analysis. Sensitivity analysis provided by BCFS staff shows that if the hemlock volume from just the 39 000 ha of stands with lower than 60 percent hemlock by volume is included in the timber supply for the TSA—i.e. with no contribution from the 12 000 ha of higher-volume hemlock stands—then an initial harvest level of 2 612 180 cubic metres per year (219 000 cubic metres above the current AAC) could be supported for 2 decades without causing an abrupt decline in future harvest levels.

Currently an average of 130 000 cubic metres of timber is being harvested annually from very old cedar and hemlock stands (greater than 140 years of age). This harvest is not tallied for cut control purposes, and the hemlock volumes from these stands were not considered to contribute to the timber supply in the BCFS analysis. Comments received through the public input process indicate to me that there is additional demand to harvest these forest types. Considering the results of the sensitivity analysis, I am satisfied that harvesting from these very old cedar and hemlock stands could be increased to at least 200 000 cubic metres per year while still meeting integrated resource management requirements as incorporated in the BCFS base case analysis and adjusted for management under the approved LRMP. Therefore, I am establishing a partitioned AAC in which 200 000 cubic metres are attributable to both old cedar and hemlock stands with greater than 60 percent hemlock by volume and stands with less than 60 percent hemlock by volume.

The sensitivity analysis showed that a harvest level increase of 200 000 cubic metres per year can be achieved without any harvesting in the stands on these 12 000 ha. For this reason I consider this 12 000 ha to represent a buffer to ensure that the long-term productivity of the land base is not jeopardized. I am therefore satisfied that a harvest level of 200 000 cubic metres can be maintained responsibly from very old cedar and hemlock forest types in the Kamloops TSA.

I note that there are approximately 153 000 ha of coniferous forest types currently considered unmerchantable as sawlogs, and approximately 46 000 ha of deciduous forest types in the Kamloops TSA. These forest types, which were excluded from the timber supply in the BCFS analysis as unmerchantable timber, constitute the type of timber supply which led to the award of Pulpwood Agreement 16 (PA16). It is expected that PA 16 will enable harvesting, as necessary, of up to 86 000 cubic metres of excluded forest types annually for the next five years from this TSA. Considering the significant area covered by these forest types, I am satisfied that this level of harvesting can be maintained without introducing undue risks to timber supply across the TSA. Therefore, I am establishing an AAC partition of 86 000 cubic metres attributable to these excluded forest types. If improved information becomes available, or the amount to be harvested under the PA in the Kamloops TSA changes, this partition will be re-examined.

Determination

From a careful evaluation of the assumptions incorporated in the BCFS timber supply analysis, from my review of public input, and from all the foregoing considerations and reasoning, it is my

determination that a suitable harvest level for the Kamloops TSA at this time can be achieved by establishing an AAC at 2 679 180 cubic metres. A partition of 200 000 cubic metres has been established for harvesting from very old cedar and hemlock forest types. To provide for harvesting under PA 16, an additional partition of 86 000 cubic metres has been established, attributable to: coniferous stands not currently considered merchantable as sawlogs; deciduous forest types; and for forest stands on many sites which are currently showing low timber growing potential. The new AAC of 2 679 180 cubic metres includes the unallocated woodlot apportionment of 17 414 cubic metres.

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

Implementation of Decision

In preparation for the next AAC determination, district staff will:

- monitor the harvesting activity in areas currently considered inoperable to determine if some of these areas should be included in the timber harvesting land base in the future;
- undertake additional terrain mapping in the TSA before the next determination to provide a quantification of the impact of environmentally sensitive areas;
- review the objectives for determining minimum harvestable ages;
- quantify the medium to long-term impacts of deferrals; and
- better quantify estimates of unsalvaged losses.



Larry Pedersen
Chief Forester

March 12, 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.