

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Kalum Timber Supply Area

(Formerly Kalum South Area of Kalum Timber Supply Area)

Rationale for Allowable Annual Cut Determination

effective January 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 Kalum 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 Kalum TSA lies near the coast in the Prince Rupert Forest Region in northwestern British Columbia, and is administered from the Kalum Forest District Office in Terrace. Earlier this year, the northern component of the TSA was officially separated and renamed the Nass TSA. The remaining land base of the Kalum TSA (referred to as "Kalum South" in earlier ministry publications) now covers 549 762 hectares (ha).

The TSA is configured roughly in the shape of a cross centred on Terrace, with a small separate block lying in the lower Nass to the north-west of the main block. It shares borders with numerous other management units. Proceeding clockwise from north of Terrace these are the Nass TSA, one block of Tree Farm Licence 1 (TFL 1), the Kispiox and Bulkley TSAs, a second block of TFL 1, TFL 41, a third block of TFL 1, and the North Coast TSA.

Over half the Kalum TSA is either not forested or else covered with sparse alpine forest, leaving only 199 450 ha of productive forest—about 36 percent of the total land base. The area has quite variable topography, with fairly flat valley bottoms, rolling lower slopes, steep mid-slopes, and rugged mountainous upper slopes. Steep terrain in the upper slopes and sensitive soils in mid-slope gullies often preclude harvesting. The principal reason for considering land unavailable for harvesting is operability: over a third of the productive forest is considered economically or physically inoperable. Together with other deductions this leaves 103 878 ha—less than 19 percent of the total area—as the current timber harvesting land base. The Nass, Kitsumkalum, Kitimat and Skeena rivers are the major rivers in the TSA.

The TSA lies in a mountainous transitional area between the coastal and interior forests; hence, the climate and ecology of the area are quite diverse. Four distinct biogeoclimatic zones are present: Coastal Western Hemlock, Interior Cedar Hemlock, Mountain Hemlock, and, on the mountain tops, Alpine Tundra. The Coastal Western Hemlock zone dominates the large wide valley region extending northward from the Douglas Channel at Kitimat, west of the Coastal Mountains. The Interior Cedar-Hemlock zone is found in the Nass basin and parts of the Skeena Mountains and ranges. Moving to the higher elevations, one finds first the discontinuously forested Mountain Hemlock zone and, finally, the stunted vegetation of the Alpine Tundra.

Within the timber harvesting land base the most common tree species is western hemlock. Stands in which hemlock predominates are found on 81 percent of the current timber harvesting land base, with balsam (8 percent), lodgepole pine (6 percent) and cottonwood (3 percent) the next most common species. The stand age distribution is almost evenly split between immature (49.6 percent) and mature (50.4 percent) forests. Most of the immature stands, however, are under 30 years of age, and most of the mature stands are found on sites currently classified as having poor timber-growing potential. This is due, in part, to the historic concentration by licensees on good and medium sites.

There are over 32 000 people in the Kalum TSA, almost 23 000 of them living in Terrace and Kitimat. Other towns include Thornhill, and the First Nations communities of Kitselas, Kitsumkalum, Gitlakdamix (New Aiyansh), Gitwinksihlkw (Canyon City), and Kitamaat. Three First Nations groups living in the Kalum TSA and one based outside have submitted land claims, some of them overlapping, to different parts of the subject area.

History of AAC

The present AAC for what is now the Kalum TSA—480 000 m³, excluding harvest volumes from Timber Licences and private lands—has been in effect since 1986. The AAC is currently apportioned by the Minister of Forests as follows:

	Cubic Metres	% of AAC
Forest Licences (5)	391,800	81.6
Small Business Forest Enterprise Program	79,200	16.5
Woodlot Licences	4500	0.9
Subtotal (allocated)	475,500	99.0
Unallocated	4500	0.9
Total = current AAC	480,000	100

Prior to 1986 the AAC had been set at 450 000 m³ in 1981. The 1986 increase marked the inclusion of 30 000 m³ from the Kitimat Municipality that previously had not been considered in the AAC determination.

New AAC determination

Effective January 1, 1996, the AAC for the Kalum TSA will be 464 000 cubic metres. This determination will remain in place 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 Kalum TSA includes the following:

- Forest inventory planning file, British Columbia Forest Service (BCFS);
- Five-year timber harvesting development plans;
- Silviculture history records, BCFS;
- Licensee annual reports;
- *Procedures for Factoring Recreation Resources into Timber Supply Analysis*, Recreation Branch (BCFS), December 1993;
- *Kalum South Timber Supply Analysis*, BCFS, June 1994;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- *Kalum South Socio-Economic Analysis*, G.E. Bridges & Associates Inc. Victoria, November 1994;
- *Kalum-South Area of the Kalum Timber Supply Area: Timber Supply Review Discussion Paper* BCFS, November 1994;
- *Review of Kalum Timber Supply Analysis*, Sterling Wood Group Inc., Victoria, February 15, 1995;
- *Kalum Timber Supply Area: Summary of Public Input*, BCFS;
- Technical review and evaluation of current operating conditions through comprehensive discussions with BCFS staff, notably at the AAC determination meeting, Terrace, March 29-30, 1995.

Role and limitations of the technical information used

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

However, the analytical techniques used to assess timber supply are simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due to both site variation and ongoing science-based improvements in the understanding of ecological dynamics.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural, and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide the correct answer or solution 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 Kalum TSA, I have considered known limitations of the technical information provided. I am satisfied that this information provides a sound basis for my determination.

Statutory Framework

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

Guiding Principles

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. Two important ways of dealing with uncertainty are (i) avoiding unnecessary risk, and (ii) redetermining AACs frequently to ensure they incorporate up-to-date information and knowledge. The latter represents a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 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 Regulations were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995. Preliminary studies in selected TSAs indicate that under the Code there will be some impacts on timber supply additional to those expected under previous guidelines. In AAC determinations made since the coming into force of the Code, I have viewed with some caution the timber supply projections in the BCFS timber supply analyses for TSAs such as the Kalum, which pre-date the Code. At the same time, I am mindful that the full force of the Code may not be felt during the transition phase of its implementation, and the impacts of specific factors on timber supply may not yet have been assessed on a local basis.

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

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

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

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are

available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues changing. Moreover, in the past, waiting for improved data has created the extensive delays that have resulted in the current urgency to redetermine many outdated AACs. In any case, the data and models available today are 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 "unextinguished non-exclusive 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 TSA determination a timber supply analysis is carried out, using a data package of information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of

data and a computer simulation model (FSSIM), a series of timber supply forecasts is produced. Each forecast is based on the same set of data and reflects different decline rates, initial harvest levels, and 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 assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its theoretical estimates of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current information 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 produced.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. But once an AAC has been determined that reflects appropriate assessment of all 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.

For the Kalum TSA, the computer simulation model, FSSIM, (hereafter called the "model") would not allow the current AAC of 480 000 cubic metres to be maintained without precipitating severe future declines. Instead, the base case projected an initial harvest level of 464 000 cubic metres per year, a 3.3 percent reduction from the current AAC. After one decade the harvest level would fall again, to 418 000 cubic metres, and then reach the long-term harvest level of 400 000 cubic metres after 20 years.

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

Inventory information

- Age of the inventory

Most of the TSA land base was inventoried in 1990. Updates to reflect subsequent harvesting to the fall of 1991 were used in the BCFS timber supply analysis. Approximately 15 percent of the timber harvesting land base—predominantly immature stands in the Kitimat Valley—has not been inventoried since 1973-75; updates to 1987 were used for this area in the timber supply analysis.

BCFS staff are concerned that some immature stands may be misclassified in the Kitimat Valley since it was only updated to 1987. For instance, a few stands classified as alder in the inventory have since been converted to conifers; other areas shown as not satisfactorily restocked are now regarded as satisfactorily restocked, and vice versa. The overall impact on timber supply is not yet clear, however.

I also note that the most recent inventory data—upon which the base case projection relies—is already four years old. Moreover, harvests over the last few years have been above the average first decade harvest level shown in the base case. Accordingly, there is a high likelihood that timber supply in the short term may be somewhat less than projected in the timber supply analysis.

- Yield estimates for existing stands

District staff believe that the Variable Density Yield Prediction (VDYP) yield model used in the timber supply analysis may overestimate existing volumes. Their concerns are based on surveys of billed volumes for 1989-94 for Skeena Cellulose Inc. (the largest licensee in the TSA) and of post-April 1993 cruise volumes for all licensees. These indicated average volumes in existing stands of 496 m³/ha and 529 m³/ha, respectively. In contrast, VDYP estimated volumes of 583 m³/ha, roughly 18 and 10 percent higher than the billed and cruise figures.

These survey figures were consistent with the view of district staff that most of the high-volume sites—i.e. those located lower in the valleys and thus easier to

access—have already been harvested. Actual volumes from the higher-elevation, less productive sites that remain may thus prove even lower than indicated by the cruise and billed-volumes surveys. There was also evidence in the billed-volumes survey that there had been harvesting of grades 3 and 5 timber, which in the analysis were not assumed to be used. If these marginal volumes are deducted from the scaled volumes or added to the model estimates the gap between the two may be even larger. Decay levels (see Decay, waste and breakage below) may also be higher than modelled, thereby further contributing to an overestimate of existing volumes.

The timber supply analysis indicated considerable sensitivity in the short and medium terms to changes in existing volumes. There would be some management flexibility surrounding how to accommodate a volume reduction in this TSA, but the base case projection could not be maintained. Harvest levels could either drop immediately from the base case or else the base case initial harvest level could be maintained for one decade followed by a decline below the long-term harvest level for several decades. There would be no impact on the long-term harvest level in either case.

If existing volumes were overestimated to the extent district staff believe I would be concerned about the validity of the base case projection. However, billed volumes over one five-year period is not a definitive survey with which to compare VDYP estimates of average volumes for the TSA, particularly when the stand attributes of the areas harvested in that period are unknown. A comparison between billed volumes and VDYP estimates of existing volumes is also compromised by the fact that the 1989-91 billed-volumes figures do not account for waste and residue; separate waste and residue reports were not made for that period. Therefore, the actual volumes harvested for those years may be higher than the billed volumes would suggest.

Volume ratio-sampling will be completed in the TSA to provide an indication of the accuracy of the inventory volumes. This work should receive a high priority to ensure reliable results are available within the next two years. If the confirmed volumes are sufficiently different from current estimates, I will consider reviewing my AAC determination at that time.

There is little risk associated with waiting a year or two for these sampling results. Even in the event that the sampling results confirm that existing volumes are less than now believed by district staff, the higher harvest level during this relatively short waiting period could be offset by minor adjustments to harvest levels over the next several decades with little danger of precipitating severe future supply disruptions or jeopardizing other forest values.

In summary, there is a possibility that an overestimate of existing volumes may reduce timber supply in the short and medium terms. However, more definitive data from a volume ratio-sampling study are expected within a year or two, at which time I will decide whether the new information warrants a redetermination of the AAC.

- Age class distribution

The timber harvesting land base is evenly split between mature and immature stands (i.e. those older and younger than the minimum harvestable age), but with relatively few stands between 60 and 200 years. Most mature stands are over 300 years old, and most of those lie on poor growing sites.

In units with stand age compositions like those found in the Kalum TSA, a major timber supply question is how to "ration" currently mature merchantable stands over time until younger stands become merchantable. The transition time to the long-term harvest level is closely linked to age distribution, and the absence of significant volumes at or near the minimum harvestable age is an important factor in harvest planning. Although the Kalum TSA has relatively few stands at or approaching the minimum harvestable age, there are enough stands over 300 years of age to sustain the forest industry over the next few decades.

Thus, while age distribution is a significant factor in planning the transition to the long-term harvest level in this TSA, the lack of a balanced age distribution among the currently mature stands is not a limiting factor for this determination. (See also *Minimum harvestable ages* below.)

- Site indexes and growth and yield projections for regenerated stands

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

From 1992-94 district staff conducted silviculture surveys on 25-year-old and younger stands in the Kitimat River area. The results indicated that the inventory site indexes used for regenerated stands may underestimate actual productivity. On the basis of these observations, it was estimated that actual volumes in regenerated stands may be as much as 50 percent higher on average than those used in the timber supply analysis. Minimum harvestable ages, determined using the same criteria as in the base case, would also be 20 years lower on average.

Although the survey methodology lacked formal statistical rigour, its findings are consistent with staff impressions that the site indexes used to estimate future stand volumes are of questionable reliability on stands younger than 30 years. A paired-plot study now underway on hemlock stands in the TSA will provide a more statistically valid projection of site indexes, at least for hemlock stands. Preliminary findings do support the trend detected by field staff.

If the final results of the paired-plot study confirm that the site indexes are underestimated the implications for timber supply, at least in the long term, are considerable. A sensitivity analysis found that increasing regenerated stand volumes by 50 percent would not affect the base case in the short and medium terms, but would allow a much higher long-term harvest level of 600 000 m³/yr (instead of 400 000 m³/yr). If, however, a 20-year reduction in minimum harvestable age is also factored in, then the current harvest level of 480 000 m³/yr could be maintained for 50 years, followed by a slight dip and then a jump to the long-term harvest level of 570 000 m³/yr. With these potential gains in mind, it is important that the paired-plot study be completed on schedule.

Although the implications for timber supply are considerable and the likelihood appears high that actual site productivity is higher than current estimates,

I cannot reasonably base any adjustment to timber supply projections on changes to site index estimates until reliable values have been provided by the paired-plot study. If these values show that site productivity has been underestimated to a sufficient extent, I will examine this relative to other factors to assess how it will affect the next AAC determination.

- Minimum harvestable ages

The minimum harvestable ages used in the analysis were assumed to be the ages at which stands reach an average growth rate within 5 percent of the maximum average growth rate as measured in m³/ha/yr. This maximum is also known as the culmination of the mean annual increment (MAI). For the Kalum TSA the minimum harvestable ages ranged from 60 to 140 years, with an average of about 110 years. These figures are meant to approximate the timing of merchantability and are not legal or policy requirements; indeed, to meet visual quality and other forest cover requirements, the *actual* harvestable ages forecast in the analysis were 20 years higher, or 130 years on average throughout the TSA over the long term.

Sensitivity analyses in the timber supply analysis indicated that timber supply is highly sensitive in the short term to changes, particularly reductions, in minimum harvestable ages. A 20-year reduction in minimum harvestable ages would allow the current harvest level to be maintained for at least 20 years and possibly as long as 50 years before beginning a decline to a long-term harvest level marginally

lower than that in the base case. Conversely, a 20-year increase in minimum harvestable ages would lower the harvest level immediately to the base case initial level (464 000 m³/yr) and force it to drop within 30 years to 50 000 m³/yr below the base case long-term harvest level.

Minimum harvestable ages for this analysis were based on achieving near-maximum timber volume productivity over the long term and did not consider product objectives. However, if merchantable timber can be produced at younger ages, then the opportunity may exist to harvest more timber over the next several decades.

The timing of the falldown in this TSA is linked directly to the forecast shortage of merchantable stands 140-150 years from now. (See discussion of alternative rates of harvest under [Harvest flow](#) below.) Changes to minimum harvestable ages will change the availability of stands in the future. If future availability were greater, based on lower minimum harvestable ages, it would be possible to maintain higher harvests in the short term without causing severe timber supply shortages in the future. Further investigation on product merchantability is required, but this factor offers at least a moderate likelihood of boosting timber supply in the short term, thereby allowing the harvest level to remain at the existing level, 3.3 percent above the base case projection.

The licensee-commissioned review by Sterling Wood Group examined the most common analysis unit for coastal regenerated stands—0/2 Hemlock/Balsam on medium sites (0-140 years)—for which the BCFS identified a minimum harvestable age of 90 years. The review then argued that in the data table used, the maximum MAI occurred at age 120, and 95 percent of that would yield a practical minimum harvestable age of 114. It was argued that the BCFS had thus inadvertently used a figure far higher than that claimed in the timber supply analysis, for at least this analysis unit and, by implication, for others as well.

The confusion stems from a misunderstanding of the formula used. The BCFS defines the minimum harvestable age as the age at which the average growth is within 95 percent of the maximum MAI, *not*, as Sterling Wood has assumed, the age that is 95 percent of the age at which the maximum MAI occurs. Ninety-five percent of 6.91 (the maximum MAI for this analysis unit) yields 6.56, which, as shown in the table below, occurs just after age 90. Ninety-five percent of 120, the age at which the maximum MAI occurs, yields 114—a very different result.

MAIs for Analysis Unit 0/2-Hemlock/Balsam on medium sites (0-140 years)

Age	m ³ /ha	MAI (m ³ /ha/yr)
80	497	6.21
90	585	6.50
100	674	6.74
110	754	6.85
120	829	6.91*
130	894	6.88
140	949	6.78
150	1002	6.68

* Maximum MAI.

I conclude therefore that the minimum harvest ages assumed in the BCFS analysis are within a reasonable range, but that there is a potential for some increase in timber supply if minimum harvest ages are reduced, which I have considered further in "Reasons for Decision"

Land base contributing to timber harvest.*- TSA split*

Earlier this year, the northern portion of the Kalum TSA was officially separated to form the Nass TSA. Although the southern portion, formerly known as Kalum South, has long been managed as a separate unit, a small area that was included in the Kalum South timber supply analysis actually became part of the new Nass TSA. The impact of this removal on the Kalum TSA base case is a 2.8-percent area reduction in the timber harvesting land base and a 4-percent volume reduction in stands over 70 years of age.

Accordingly, the TSA split is expected to reduce timber supply for the Kalum TSA in all time frames. The reductions will likely be around 2.8 percent in the long term (under the assumption that the loss in area will eventually translate into a comparable loss in volume production) and in the range of 0-4 percent in the short term. The imprecision surrounding the short-term impact is due to the various harvest flow options available to handle changes to existing volumes. (See earlier discussion under *Yield estimates for existing stands.*)

- Operability

The timber harvesting land base used in the timber supply analysis included a non-conventional component on which helicopter logging and extended skyline systems over 700 metres were considered feasible. This component represents about six percent of the entire timber harvesting land base, 11 percent of the area

with stands above the minimum harvestable age, and 13 percent of the existing mature timber volumes.

There is considerable uncertainty about the accuracy of the boundaries of this non-conventional component, however. Very few of these non-conventional areas have been operated in, so there is little historical experience on which to base expectations. The boundaries of the non-conventional areas were estimated on the basis of terrain characteristics rather than specific economic criteria, yet it is likely that both wood volume and quality will need to be relatively high to make these areas feasible for operators. The one previous helicopter logging operation in the TSA harvested an area 23 percent smaller than originally proposed and avoided entirely the poorer quality stands. This would suggest the need for considerable caution when identifying future areas for helicopter work.

Having said that, I note that recent licensee development plans have proposed operations not only in the non-conventional areas but also in areas classified as inoperable. One licensee plans to harvest 15 percent of its volume over a five-year period in inoperable areas, almost half of that to be taken by helicopter.

A similar view was offered in the Sterling Wood review. Although no detailed evidence was given, the review suggested a 15-percent increase in operable area was possible through the use of skyline and helicopter systems and smaller-than-required streamside buffers and old-growth reserves. The latter practices would clearly contravene current forest management requirements, and the full potential of proposed helicopter areas may not be realised, but something less than 15 percent may be achievable by incorporating areas now considered physically inoperable.

In contrast, the Mayor of the City of Terrace expressed a concern that the size of the timber harvesting land base may decrease in future. He attributed this potential reduction to a greater public concern for recreation areas and visual aesthetics, the disincentive of the higher stumpage rates introduced by the Forest Renewal Plan, First Nations land claims, and constraints associated with the Forest Practices Code.

The ultimate determinant of operability will remain the price of timber. If the demand for timber continues to grow, as it is expected to, and if prices remain within or above the historically high range of recent years, as also expected, then there is very good reason to believe that the industry will be able to afford to log lower-quality stands and stands in more difficult and remote terrain.

From these considerations it is my view that , there is a moderate likelihood that the current definition of the timber harvesting land base will prove conservative. The movement of harvest operations into areas historically considered inoperable

would boost timber supply in both the short and long terms. The exact magnitude of these potential increases remains speculative, however, and they would doubtless fluctuate according to changes in future fibre prices.

- Delayed planning areas and First Nations' traditional territories

Currently there are four areas scheduled for harvesting in the future that are indefinitely set aside pending the resolution of negotiations with First Nations and, in the case of the Deep Creek Community Watershed, completion of a watershed plan. Together, the four areas hold about 15 percent of the existing timber inventory volume greater than 70 years old on the timber harvesting land base. Until this land is again available for harvesting, this represents a significant downward pressure on timber supply in the short and medium terms.

The largest area in question is in the Fiddler Creek Planning Area where the district is negotiating a Total Resource Plan with the Gitksan First Nation. Whether that agreement will lead to a reduction in the timber harvesting land base remains uncertain at this point. The Lax'skiik (Eagle Clan) of the Gitksan have contended that timber supply in Fiddler Creek will be reduced as a result of the exercise of their aboriginal rights to the area. In their letter of February 15, 1995, they further suggested that I should not consider the timber harvesting contribution of that area to the AAC at this time.

A similar view was expressed by the Allied Tsimshian Tribes Association in their letter to me of March 9, 1995. In it they stated that timber from their traditional territories should be excluded from the timber harvesting land base, pending the completion of treaty negotiations or other processes.

I must decline the requests of both groups. As with Protected Areas Strategy study areas, it is inappropriate to exclude traditional territories or land under claim by First Nations involved in treaty negotiations from the Timber Supply Review until formal decisions are in place. Although land claims have the potential to substantially reduce the area of the timber harvesting land base it would be speculative for me to attempt to estimate the area and timber volumes at stake. Further, I have no mandate to do so. As Chief Forester I am bound to consider the timber harvesting contributions of all Crown land in the provincial forest. Unless Fiddler Creek and the Tsimshian traditional areas are formally deleted from the land base by an order-in-council, or specified as designated areas by the Minister under Part 15 of the *Forest Act*, my statutory responsibility is to consider them as part of the contributing land base.

Having said this, however, it would be wrong to expect the district to sacrifice IRM objectives in another area to compensate for timber that is tied up in a deferred area. To avoid compromising the AAC determination it is important that

plans and settlements be finalized as soon as possible for Fiddler Creek and the other three planning delay areas. This may prove difficult in the case of Deep Creek where district staff estimate another two or three years may be required to reach agreement on a watershed plan. Accordingly, I urge that a high priority be given to these areas by the government agencies responsible.

- 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, all future harvesting rights revert to the Crown. Where a timber licence is surrounded by or is contiguous to a TSA, future harvests from the area will then contribute to the AAC for the TSA. Accordingly, in the BCFS analysis, timber licences in the Kalum TSA are assumed to be included in the operable land base when reversion takes place.

Within the next 10 years, timber rights on 2401 ha of Crown land are scheduled to revert to the Crown. This represents just over 2 percent of the timber harvesting land base and is expected to have only a negligible impact on timber supply in any period.

Timber supply profile

The forests in the TSA are predominantly mature hemlock and balsam stands. While the species and age characteristics of the stands being harvested (i.e. the harvest profile) conform relatively well to the composition of the timber harvesting land base (i.e. the supply profile), there is evidence that timber from medium-quality sites comprises a disproportionately large component of the harvest. Poor-quality sites, on the other hand, appear to contribute a disproportionately small percentage to the harvest. It also appears that height class 3 stands are being avoided in favour of height classes 4 and 5. These discrepancies are highlighted in the following table based on cruise data collected for lands harvested by the three Forest-License holders and licensees in the Small Business Forest Enterprise Program between 1989 and 1994.

Category	Harvest Profile (% by area)	Timber Harvesting Land Base (% by area)
Poor Site	22.4	44
Medium Site	77	48
Height Class 3	9.9	28.4
Height Class 4	63.9	50.4
Height Class 5	26.2	18.9

Harvesting out of profile over an extended period will shift the supply profile in future decades towards the economically less attractive sites, to the detriment of companies, communities and workers of that time.

The harvest profile may also indicate which types of stands actually fall in the timber harvesting land base. If the poor sites and height class 3 sites are consciously and consistently avoided over time, this would strongly suggest the timber harvesting land base and the timber supply in all periods are overstated. The AAC I have determined for the Kalum TSA is predicated upon the use of timber from all sites in the timber harvesting land base, not just the economically more attractive ones. I am unwilling to set a partitioned cut at this time, but licensees will be expected in future to focus more harvesting activity in the poor quality sites and height class 3 stands than they have done historically. Harvesting performance in these stands will be reviewed at the time of the next AAC determination.

The onus to shift the harvest profile does not rest solely on the licensees, of course. I also encourage the district to explore administrative solutions that might attract operators into the areas in question.

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

Regeneration delay

The timber supply analysis assumed an average regeneration delay of three years for planted areas and six years for naturally reforested areas. District staff indicated, however, that these figures may overestimate the true delay periods. Sites are often planted within a year—frequently with one-year-old seedlings—but not reported as restocked until a survey is performed at three years. Moreover, reforestation on naturally regenerated sites is often hastened through the use of fill-planting. Further study of this trend is necessary, and I have asked district staff to closely monitor the actual regeneration delay periods occurring in the field.

By reducing the time an area is constrained by green-up requirements, rapid regeneration can increase timber supply. (See further discussion below, under *Visual quality objectives*.) A BCFS sensitivity analysis indicated that lowering the regeneration delay period to zero—in effect, planting immediately after harvesting—would allow the current harvest level to be maintained for at least one more decade before beginning a decline to a long-term harvest level 17 000 m³/yr higher than in the base case.

Some of these gains may be offset in future, however, as harvesting moves further up the slopes into less accessible terrain. Planting will become more difficult, and the district expects to rely more upon natural regeneration supplemented by fill-planting. Currently, about half the sites are fill-planted. The attraction of this method is, of course, its low cost. The trade-off is that the regeneration delay period, while shorter than if the entire area regenerated naturally, will normally be longer than if the area were fully planted.

Such a trend would have negative implications for timber supply. A sensitivity analysis showed that if the regeneration delay period were actually five years longer than currently assumed, the initial harvest rate would begin at the base case but would decline after two decades to a point 15 000 m³/yr below the base case long-term harvest level.

In summary, there is a moderate likelihood that regeneration delay periods are actually shorter than assumed in the model. This factor should boost timber supply across all time frames although its immediate impact is not significant. It remains to be seen whether regeneration delay periods will remain low in the future or begin to increase. If the latter, then timber supply may be reduced at some point.

Impediments to prompt regeneration

Damage to young spruce by the spruce leader weevil is a concern throughout the TSA. The insect typically attacks trees between 1.5 and 10 metres in height, leading to volume losses and diminished quality (because of forked and crooked stems). Continued infestations may even allow less desirable species to become dominant within the stand. Although the district continues to plant spruce seedlings, it restricts the spruce component in any managed stand to 20 percent or below.

Approximately 5600 ha of spruce-dominated stands are currently at risk and are being converted over time to hemlock and balsam. The area in question is too small to significantly affect timber supply, however, and I have given it little weight in my determination.

Not satisfactorily restocked areas

Currently, there are 7055 ha of not satisfactorily restocked (NSR) areas. This total is broken into 3720 ha of backlog and 3335 ha of current NSR, the latter including spruce stands damaged by the spruce leader weevil. (See earlier discussion under Impediments to prompt regeneration.) The backlog NSR is scheduled to be eliminated by the turn of the century and has been accounted for in the timber supply analysis.

The timber supply analysis assumed 7978 ha of NSR areas. The discrepancy between this figure and the one above (7055 ha) is insignificant and can be attributed to reforestation activity undertaken between the compilation of the inventory and the AAC determination meeting.

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

Spacing and pruning

Juvenile spacing and pruning are currently practised in the TSA. Over 9700 ha are scheduled for spacing in the near future, at a rate of approximately 1900 ha/yr. Areas scheduled for later commercial thinning will likely be spaced to about 800 stems/ha, while the remainder will be spaced to 400-600 stems/ha. The effects of juvenile spacing on growth and yield of regenerated stands were incorporated in the analysis.

Commercial thinning

The district is currently developing a 20-year plan for commercial thinning and has targeted over 3800 ha (subject to field confirmation) as potential areas for single-entry thinning over the next decade or so. These will be supplemented in a couple of decades by the substantial numbers of stands that are now 20 years old. All good-quality growing sites (i.e. site index > 26 metres at 50 years) and some medium sites (site index = 18-26 metres) are considered suitable candidates. Actual performance will vary from year to year, depending upon market conditions and demand for the smaller pieces produced by thinning, but the district proposes to thin approximately 30 ha/yr in the beginning, increasing to perhaps 500 ha/yr after ten years.

To account for this practice the timber supply analysis assumed 1700 ha in the timber harvesting land base—i.e. 25 percent of all good-quality growing sites—would eventually be suitable for single-entry commercial thinning. Thinning was projected to remove approximately 100 m³/ha at 45 years into the rotation. The analysis did not consider the effects of multiple-entry thinning, but it is too early to assess whether that is even an economically viable option in this TSA.

A sensitivity analysis indicated some short-term benefits from commercial thinning. If thinning were not practised, the base case would immediately drop by three percent in each of the first two decades. On the other hand, if thinning were practised on 75 percent of all good sites—approximately 5100 ha, a figure which exceeds the target in the district's plan—the harvest level could rise marginally in each of the first two decades, by 5000 m³ and 4000 m³/yr, respectively. Beyond

that, however, there is no impact on harvest levels in either scenario. This is not surprising, given that single-entry commercial thinning does not significantly increase total yield over the length of the rotation. It allows greater flexibility in harvest scheduling—in the Kalum TSA the short-term harvest level can be maintained at a level slightly above what it would be otherwise—but the volumes taken early on do not reappear later in the rotation. That is to say, under a consistent management regime the total harvest (final harvest plus thinning) would not be any larger than the final harvest would be without thinning.

For this determination, then, I anticipate that the district's plans will proceed and that single-entry commercial thinning, at a level above that assumed in the timber supply analysis, offers a low-to-moderate likelihood of a slight increase in timber supply in the short and medium terms (up to 20 years).

Alternatives to clearcutting

Until recently there has been little use of silvicultural systems other than clearcutting in the TSA, but the district is actively exploring and testing opportunities to introduce alternatives and projects a continued increase in their use. In the Kitimat Valley and highway corridors, for instance, there may be many areas that lend themselves to partial cutting systems. Province-wide, there is a growing public preference for alternatives to clearcutting, a preference which appeared in several public submissions in the Kalum TSA.

The shift to alternative silvicultural systems will most likely be driven by the need to meet visual quality objectives and adjacency requirements. (See further discussion in those two sections below—*Visual quality objectives* and *Green-up and adjacency requirements*.) These situations, however, represent opportunities as well as possible constraints. Partial cutting systems may permit harvesting in areas that could not be clearcut or might otherwise be set aside for longer periods in order to meet adjacency requirements. Thus, the use of alternative systems may actually increase timber supply in some areas. The magnitude and direction of the impact of this issue on timber supply will be more evident at the time of the next timber supply analysis. At this time I do not have sufficient information to estimate the potential impacts of alternative harvesting systems and so this factor has not significantly affected my determination.

Conversion programs

As discussed earlier, under Impediments to prompt regeneration, most stands in which spruce predominates will be converted to hemlock and balsam. The proportion of the timber harvesting land base subject to conversion in the very near future is small, however, and will not affect timber supply in the short term. As a result, it has not significantly influenced my determination.

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

Utilization standards and levels

The normal utilization standards were assumed in the timber supply analysis regarding the grades of timber required to be harvested. It further assumed the normal utilization levels for those stems: i.e. the diameter of trees of all species (with the exception of cottonwood) must be at least 17.5 cm at breast height in order to be harvested, and, once felled, all wood up to a top diameter of 10 cm must be removed from the site, leaving a stump no higher than 30 cm.

District staff believe that utilization was modelled appropriately in the timber supply analysis as these standards and levels are being achieved in the field. In fact, licensees are actually harvesting and being billed for grades 3 and 5 timber, which are assumed not to contribute to timber supply, i.e. they are normally not required to be harvested. Between 1990-94 this component of the harvest represented 2.7 percent of all billed volumes. This is an encouraging trend, but since the volume involved is small, and the sample time period so short, I have not considered it as a significant factor for this determination.

Decay, waste and breakage

For managed stands within the Kalum TSA, an operational adjustment factor of 15 percent was applied in the BCFS analysis to wood volumes of all ages in order to account for non-productive areas within stands. A further factor of five percent per 100 years was used to model volume losses after stand establishment, e.g. losses to decay and pests.

The VDYP model used for existing stands has factors built in to account for decay. From the volumes initially generated by VDYP, in which decay has already been accounted for, waste and breakage factors are subsequently deducted. The percentage deductions vary by species, site and age, and it would be misleading to attempt to specify an average reduction.

As discussed earlier, in *Yield estimates for existing stands*, district staff believe the decay allowances used by VDYP for existing stands may underestimate actual decay. Their concerns are echoed by licensees, who commonly lower the cruise volume figures for their own planning purposes in order to avoid over-estimating timber supply for their processing facilities. The informal billed-volumes survey undertaken by the district (see discussion in *Yield estimates for existing stands*) found that the sums of the billed volumes and the volumes stated in the residue and waste reports were generally lower than the net cruise volumes that supposedly account for losses to decay, waste and breakage. If true, this would

suggest that timber supply in the short and medium terms may be overestimated in the timber supply analysis.

While I have considered the district's concerns, however, I do not view the evidence as a conclusive indication that decay, waste and breakage have been underestimated throughout the TSA. In fact, a 1990-91 decay factor study for the TSA suggested the opposite: decay may actually be less than predicted by existing decay factors. This question should be resolved in the new decay and waste factors presently being developed by Resources Inventory Branch for the province on a broad zonal basis. This development work is scheduled to be completed by early 1996, and the new tables may therefore be in place in time for the next timber supply analysis. For now, I will assume these factors were modelled appropriately in this timber supply analysis, but I am prepared to reconsider that view if evidence to the contrary arises from the new decay and waste information.

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

Integrated Resource Management (IRM) objectives

The BCFS is required by the *Ministry of Forests Act* to "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." The extent to which integrated management objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

Although the BCFS has long had this policy of integrated resource management, the number and complexity of the resources to be considered has expanded markedly in recent years in response to changing public demands and to public and professional concerns for other forest values. The timber supply implications of those demands and concerns are difficult to gauge but are potentially very significant.

- Visual quality objectives

Visual quality objectives (VQOs) have been set for approximately 32 percent of the timber harvesting land base. Three classifications are used by the district and were modelled in the timber supply analysis:

- modification (occupies 66 percent of all VQO areas)—minimally restrictive of timber supply;
- partial retention (27 percent)—more restrictive; and
- retention (7 percent)—most restrictive. (The TSA also includes small areas with a preservation VQO. For the purposes of the analysis, however, these were included with areas having a retention VQO.)

VQOs have been approved by the District Manager for most areas visible from Highways 16 and 37, but not for portions of the Nisga'a highway or the Douglas Channel. For the purposes of the timber supply analysis those latter areas—representing about 17 percent of the VQO areas and 5.5 percent of the total timber harvesting land base—were assigned modification classifications.

Timber supply is expected to be quite sensitive to visual quality management. Two sensitivity analyses weighed the impacts of shifting 50 percent of the area within each classification into less and more restrictive categories. That is, for less restrictive, retention became partial retention, and partial retention became modification (modification was unchanged); for more restrictive, modification became partial retention, and partial retention became retention (retention was unchanged). A shift to less restrictive classifications would have virtually no impact on the short-term harvest level and would boost the long-term level by only 1 percent.

The shift to more restrictive classifications had the greater impact, which is not surprising given that the base case assumed most areas would have the least restrictive classification of modification. Two scenarios were possible. In one, the harvest level would drop immediately to 374 000 m³/yr and move back up after five decades to a level about 2 percent lower than in the base case. Alternatively, the initial harvest level would be maintained at the current level for one decade before beginning a decline to 350 000 m³/yr where it would remain for almost four decades. It would then rise to a level just below the base case long-term level.

Considerable uncertainty surrounds this issue for two reasons. First, the complete range of forest practice options capable of achieving specific VQOs, and the amount of forest cover required to be retained under all possible silvicultural systems to meet different VQOs, are not fully defined. For instance, partial cutting systems and smaller clearcuts may provide harvesting opportunities in some cases where the VQO would preclude clearcutting.

Second, it is not yet clear what VQOs will be in effect in the TSA in the future. It is important to note that the classifications in place now are interim ones that have not received public review through the Kalum South Land and Resource Management Plan (LRMP) process currently underway. In fact, as noted above,

the Nisga'a Highway and Douglas Channel VQOs have not yet received management approval. District staff expect that current classifications will be made more restrictive by the LRMP. Scenic issues are important in this TSA, particularly to the tourist and outdoor recreation industries, and public submissions were received that emphasized this sentiment.

However, at this time I must regard the outcome of the LRMP as uncertain. The forest industry remains a substantial employer in the TSA, and I would expect that individuals whose livelihoods depend upon timber harvesting or processing might well have different views from those in other sectors of society. That debate belongs in a public process such as the LRMP, and until it is complete it would be premature to base a reduction in timber supply on the assumption that VQOs will become more restrictive than assumed in the timber supply analysis base case. By the time of the next determination, the extent, if any, to which LRMP-approved VQOs may affect timber supply will be more apparent. For now, I accept that this factor has been adequately modelled in the analysis.

- Green-up and adjacency requirements

The *Interim Regional Timber Harvesting Guidelines for the Interior Portion of the Prince Rupert Forest Region* prohibit harvesting in an area until trees in any adjacent logged areas have reached a height of at least three metres. Further restrictions limit the actual area harvested to 40 percent of the operable area in a landscape unit during the first pass and no more than 30 percent in subsequent passes. A three-pass system was modelled in the timber supply analysis for integrated resource management (IRM) areas without VQOs, although there is some question whether this practice meets green-up and adjacency requirements in those areas. For areas with community watershed concerns and specific recreation values a five-metre green-up requirement and a four-pass system were modelled.

To avoid checkerboard patterns with touching cutblocks, the district currently requires a 400-metre buffer between blocks in IRM areas. Although these buffers will be available for harvesting in future, staff believe that their inclusion means they are actually practicing a four-pass system and, in some areas, a five-pass system now. The true average is thus probably between four and five passes.

Sensitivity analyses in the timber supply analysis indicated the implementation of a four-pass system throughout the TSA would require a slight reduction in harvest level from the base case in the second decade to 406 000 m³/yr. A five-pass system, in contrast, would require a dramatic reduction in the second decade to below 300 000 m³/yr before rising in the third decade back to the base case long-term harvest level.

However, five-pass harvesting, taking comparable volumes from evenly dispersed cutblocks is unlikely to occur throughout the TSA in the near future, due largely to the way harvesting has been carried out historically. The past concentration of operations within watersheds—in some areas leaving only a small proportion of mature timber for future passes—means that implementing a five-pass system would not further IRM goals and would, therefore, constrain timber supply unnecessarily.

In summary, there is a high probability that the modelled three-pass system no longer reflects current management and that four passes will be required in many areas. The timber supply impact, however, will likely be minimal and restricted to the short term. It has been suggested that a five-pass system may be required in a small number of areas, but I expect that the short-term impact will be far less than indicated in the sensitivity analysis which assumed a five-pass system throughout the TSA.

- Environmentally sensitive areas and non-timber inventories

To account for sensitive soils, wildlife values, recreation values, areas with regeneration problems, and avalanche-prone areas, the timber supply analysis identified 16 360 ha of environmentally sensitive areas on the physically operable forested land base. Depending upon the classification these areas were then either partially or completely excluded from the timber harvesting land base, resulting in a total deduction of 8157 ha.

Of the 8157-ha total, 1340 ha were specifically removed to account for wildlife values. Since the timber supply analysis, buffer zones of 30-50 metres have been placed on either side of avalanche tracks, to provide cover for animals such as bears, goats and moose that feed on the young vegetation typically found in the tracks. However, district staff inform me that there are relatively few avalanche tracks on the timber harvesting land base in this TSA, and I do not expect that this change in management will materially affect the validity of the assumptions used in the timber supply analysis. Nonetheless, I recommend that the district continue to monitor the actual areas used for buffer zones.

No definitive information was presented regarding archaeological values, although it is acknowledged that these do exist and it is expected that they will be respected in the administration of the AAC.

While acknowledging that new information may lead to future changes in land-base reductions to account for environmentally sensitive areas, I am satisfied that this factor has been appropriately modelled for this determination.

- Riparian habitat

At the time of the BCFS timber supply analysis, district staff followed the British Columbia Coastal Fisheries/Forestry Guidelines in preserving 10-metre no-harvest buffers along Class A and B streams of less than 10 metres in width, and 30-metre buffers along streams over 30 metres in width and around larger lakes. Buffer widths varied for streams between those sizes but were generally 30 metres for streams over 20 metres in width. No buffers were in place for Class C streams. These buffers were modelled in the timber supply analysis.

Under the Operational Planning Regulation, brought into force on June 15, 1995, as part of the Forest Practices Code, stream classifications have changed, and the no-harvest buffers have increased for what were Class A and B streams. District staff estimate that new requirements may deduct a further one percent of the timber harvesting land base. This is a change from the area modelled in the BCFS analysis, but the impact on timber supply may be mitigated by overlaps with areas currently set aside for other reasons such as protection of old-growth values (see discussion under *Biodiversity* below). The net reduction in the timber harvesting land base is thus expected to be minimal.

Since it appears likely that any changes to the area in riparian buffers will be small, I believe that waiting for more complete information will not introduce large risks to either riparian values or future timber flows. The next timber supply analysis will be better situated to assess the impact of the new riparian area buffer requirements. For this determination, then, I am satisfied that this factor has been adequately modelled.

- *Biodiversity*

In accordance with the *Interim Regional Timber Harvesting Guidelines for the Interior Portion of the Prince Rupert Forest Region*, district staff include biodiversity requirements in their planning by maintaining 12 percent of each major forest type as old growth (i.e. >150 years). Where this objective is not met by existing deductions for other reasons—e.g. environmentally sensitive areas, non-merchantable forest types, streamside buffers and old-growth reserves—the district requires that an area representing the appropriate balance remain older than 150 years at all times. Overall, some 1681 ha, or 1.6 percent of the timber harvesting land base, fall into this category. While these areas are not permanently preserved from harvesting, they can only be logged if they are replaced by other suitable areas over 150 years old.

These practices were assumed in the BCFS timber supply analysis. However, on some larger cutblocks over 40 ha, B.C. Environment staff have also requested that wildlife trees and residual patches be left—a practice that was not modelled. In other TSAs the leaving of wildlife trees and residual patches can reduce timber

supply in the short term, but given that most new cutblocks in this TSA are less than 40 ha I do not anticipate that it will have a large impact here.

The *Interim Regional Timber Harvesting Guidelines for the Interior Portion of the Prince Rupert Forest Region* were developed in cooperation with B.C. Environment staff and have been largely incorporated into the Code. This should accommodate much of the biodiversity requirements likely to arise from implementation of the Code

While some additional timber supply impacts may well result from full implementation of the Code, the evidence before me shows the timber supply in this area provides sufficient flexibility to absorb expected changes without introducing unacceptable risk by waiting until the next timber supply analysis to incorporate these impacts.

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

Partitioned component of the harvest

There is currently no partitioned AAC in this TSA but the opportunity exists to use one to encourage harvesting in poor-quality and height-class 3 stands. As discussed earlier, under Timber supply profile, this determination is predicated on an increased contribution from those stands. If they continue to be ignored, a partitioned cut or possible deletion from the timber harvesting land base may have to be considered at the next determination.

(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 a large old-growth component, such as the Kalum. In the short term, the presence of large volumes of older wood permits harvesting above long-term levels without jeopardizing the future productivity of the forest land. 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. That is, timber supplies should remain sufficiently stable 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 as to cause undue social and economic impacts now.

The base case for this TSA represented an orderly decline. Other projections tested the possibility of maintaining the current harvest level for one and two decades before beginning the decline. In the former, the projected harvest level would have to drop by 16.7 percent after the first decade to reach the long-term level. A minor shortfall in supply would also be evident at 140-150 years, as in the base case. Extending the current harvest level for two decades would have more serious consequences. Although the subsequent decline to the long-term harvest level could be staggered over two decades instead of one, there would be a serious shortfall in supply after 14 decades.

I have reviewed the socio-economic analysis, which examined the community implications of these three harvest flow projections. The analysis assumed that employment and other economic impacts change in direct proportion to changes in harvest levels—e.g. a 10-percent drop in harvest levels would translate into a 10-percent drop in employment and revenue. Skeena Cellulose Inc. pointed out in their response to the socio-economic analysis that the actual relationships are more complex. There are, for instance, thresholds below and above which a small change in harvest levels has a disproportionately large effect on revenue and employment. Below a certain harvest level processing facilities may reduce production or become uneconomical and close down entirely. Conversely, if harvest levels are raised above a certain point, it may become feasible for a plant owner to add an extra shift or even build a second mill.

BCFS staff are well aware of this complexity. However, more sophisticated analyses would take longer and might be of questionable value, given the current volatility in fibre prices and the differing ways firms adjust to changes in fibre flow. The assumption of proportional impacts is probably reliable over the long term, and allows the provision of the timely, practical information required by the Timber Supply Review.

In his review of the socio-economic analysis, the Mayor of the City of Terrace expressed a preference for the third scenario—that of maintaining the current AAC of 480 000 m³ for two decades. His reasoning was that more accurate and reliable data will become available during that period that will permit the Chief Forester to make a better-informed determination. In the interim, he believed it would be safest to maintain the status quo.

I agree that future analyses will have the benefit of improved information. By the time of the next determination the impacts of the issues he raised—volumes of existing stands, productivity of regenerated stands, the size of the timber harvesting land base, aboriginal land claims, the Forest Renewal Plan and the

Forest Practices Code—will be far more evident. Nonetheless, I expect the net outcome to be either maintenance of or a further reduction in the timber supply.

I also note that his argument implies that while current information is inadequate to support a reduction in the AAC, it is somehow sufficient to maintain the existing AAC. I cannot agree with this logic. As stated earlier, under **Guiding principles**, the data and methods used in the current timber supply analysis are superior to those used in previous years. I would rather use this newer information to make a new decision than rely on old information to reaffirm a past decision.

Beyond the three scenarios depicted, a further option exists to lower the initial harvest level to a point near or at the long-term level. While this has been urged by some members of the public, I do not think this is appropriate for two reasons. First, it would involve unnecessarily severe economic and social consequences now. Second, it would mean that surplus merchantable timber would be left beyond both the forest cover objectives of current management and the timber harvest targets. And this, in my mind, would run contrary to the ministry's mandate under Section 4 of the *Ministry of Forests Act* to "encourage maximum productivity of the forest and range resources of the Province."

In summary, I am satisfied that the socio-economic analysis provides a useful and reliable indication of the socio-economic implications of alternative rates of harvest in this TSA.

Difference between AAC and actual harvest

During the last cut control period (1987-91) all major licensees harvested within cut control limits. During the first three years of the current period (1992-96) Skeena Cellulose Inc. has harvested only 86 percent of its allocation. This undercut can be attributed in part to their inability to access certain lands. Skeena Cellulose Inc. originally planned to harvest in the Fiddler Creek Planning Area in 1994 but, as discussed in *Delayed planning areas and First Nations' traditional territories* above, development in that area is delayed pending completion of the Total Resource Plan. Again, I must emphasize the importance of resolving these issues as soon as possible and determining the extent to which areas such as Fiddler Creek will contribute to the timber harvesting land base.

Community dependence on forest industry

The overall economy of the Kalum Forest District is fairly diverse. Recent information indicates that about 25 percent of the local economy is based on the public sector, 21 percent on the forest industry, 16 percent on mineral processing, 8 percent on tourism and 7 percent on the construction industry. In Kitimat, the

Alcan aluminum smelter and Eurocan pulp mill are the largest sources of employment, while in Terrace employment is spread among the service sector, government administration and the forest industry. Within the First Nations communities, forestry, commercial fishing, the service sector and carpentry account for the bulk of employment.

Although timber from the Kalum TSA contributes substantially to the local economy, the TSA harvest is actually outweighed by that of TFLs 1 and 41, which have a cumulative AAC of 1 120 000 m³/yr. Considerable wood also comes from the nearby Nass, Kispiox and Bulkley TSAs. Most of the jobs supported by the forest industry are in harvesting and processing, with some employment in silviculture, road building, and transportation.

In their letter to me, the Allied Tsimshian Tribes Association raised concerns over the current apportionment of licences, and the perceived lack of consultation with First Nations during the awarding and renewal of those tenure agreements. Their letter indicated a desire to become more involved in forest management on their traditional territories, by which I infer they are seeking more tenure opportunities for their people. This issue, however, falls outside my mandate: in setting an AAC I cannot direct any portion of the harvest to a specific group.

I will also speak to a point discussed in other management units and raised here by the Mayor of Terrace. In his letter of January 17, 1995, the Mayor asked that I consider the impact on surrounding TSAs in making my determination for the Kalum TSA, the implication being that, within a larger economic region, a reduction in one unit might be offset by an increase in another, or vice-versa, based on the overall regional timber supply situation.

Regional rationalization of harvest levels might help stabilize local economies, but could lead to drastic and unforeseen biological consequences. Maintaining high harvest levels in one unit to compensate for reducing the AAC in a neighbouring unit could unnecessarily damage forest values and IRM objectives in the first unit. Such a policy would also be tantamount to dissolving individual TSA boundaries and managing a much larger area as one unit. Regardless of whatever economic logic this might hold, it would be a highly inappropriate biological strategy in a region such as the northwest which has a tremendous diversity of geographic and climatic conditions.

Finally, as noted above, balancing timber supply between TSAs would amount to changing the boundaries of TSAs—a responsibility that rests solely with the Minister of Forests under Section 6 of the *Forest Act*. While Sections 7 (b) and (d) of the *Forest Act* do require that I consider the impact outside the immediate area covered by an AAC determination, a regional rationalization of harvest levels would lend a disproportionate weight to those two provisions.

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

Timber processing facilities

The timber harvest in the Kalum TSA yields an approximate 60/40 split between sawlogs and pulp logs, a reflection of the generally poor quality timber in the old-growth stands currently being harvested. Nearly all of this timber is processed at two large Terrace sawmills, the Kitimat pulp mill, and the Port Edward pulp mill near Prince Rupert. West Fraser Mills Ltd. has recently opened a custom-cut mill in Prince Rupert that is also expected to draw more wood from the Kalum TSA in future. As well, there are four smaller facilities in Terrace, including the new Forwest value-added plant, Terrace Pre-Cut, and several other small-scale facilities around the TSA.

Given the complexity of fibre supply relationships and movement throughout the entire region it is not possible to predict confidently the impact upon any particular facility of changes in the AAC. It is generally acknowledged, however, that there is a sawmill processing over-capacity in the region. Thus, any reduction in the AAC for one TSA will worsen the overall supply situation and affect even mills that do not directly rely upon fibre from that TSA. While this is a concern to me, it is not appropriate for me to adjust my determination to accommodate the fibre supply situations in adjacent TSAs if this would mean not meeting other forest management objectives as evaluated throughout this rationale. (See earlier discussion under Community dependence on forest industry and next under Minister's letter.)

- (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

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

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

end he asked that the Chief Forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. The latter would likely require the use of alternative harvesting systems, and to encourage this the Minister suggested consideration of partitioned AACs.

The employment and community impact issues are discussed in detail in the *Kalum South Timber Supply Area Socio-Economic Analysis*, and I am familiar with the varying impacts of different harvest levels. (See discussion under Harvest flow). The use of commercial thinning has been discussed in Commercial thinning, above. There I noted that the practice is being planned for and offers a low-to-moderate possibility of a slight increase in timber supply in the first two decades.

In *Operability*, above, I concluded that there is a moderate likelihood that the area considered operable will likely expand in future, thereby enhancing timber supply in both the short and long terms. However, the magnitude of those increases is uncertain at this time.

The possibility of a partitioned AAC was discussed earlier under Timber supply profile and Partitioned component of the harvest, where I indicated that such a measure is not appropriate at this time. However, this AAC is based in part on a contribution from height class 3 stands and stands on poor quality sites heretofore ignored by the forest industry. If future performance in those areas fails to meet these expectations I may impose a partitioned AAC at some future determination.

Different initial harvest levels were discussed above, under Harvest flow. Two scenarios proposed maintaining the current harvest level for one or two more decades, while the base case indicated a slightly lowered initial harvest level. The feasibility of even lower levels was also discussed in that section. As I understand the Minister's letter, the Crown's objective is to maintain as high a harvest level as possible that will still safeguard the inherent values and resources managed by the BCFS. I have borne this in mind while reaching my determination and feel that the AAC I have set is appropriately sensitive to the Crown's objective.

- Local objectives

The Minister's letter also asked the Chief Forester to consider important local social and economic objectives that may be derived from the public input in the timber supply review. Public input was relatively limited. A submission by a licensee-contracted consultant (Sterling Wood Group) raised questions about the methodology of the timber supply analysis and suggested that the current harvest level need not be reduced. I addressed their comments in *Minimum harvestable ages* and *Operability*. The Mayor of the City of Terrace similarly requested maintenance of the current level, albeit he also suggested there might be future

reductions to the timber harvesting land base. These and other submissions from Skeena Cellulose Inc., B.C. Environment and two local citizens have been discussed in the appropriate sections. The Mayor of Terrace also raised the possibility of regionally sensitive AACs, and I have addressed this issue in Community dependence on forest industry.

Throughout the Timber Supply Review process, the BCFS has actively sought First Nations input. Submissions received from the Kitamaat Village Council dealt primarily with issues of consultation and attribution in the socio-economic analysis. The Allied Tsimshian Tribes Association and the Gitksan Lax'skiik expressed their concerns that their aboriginal rights in their traditional territories not be infringed and that timber in those areas be excluded from the Timber Supply Review. I have discussed these topics in **Guiding Principles** and *Delayed planning areas and First Nations traditional territories* above. The Tsimshian letter also questioned the propriety of the current apportionment system, but, as noted in Community dependence on forest industry, this lies outside my jurisdiction. First Nations concerns about wildlife values, biodiversity, overcutting and other issues—concerns that are often shared by interest groups in the general public—have been discussed, where possible, in the appropriate sections of this document.

Two submissions from the Mayor of the District of Stewart dealt almost exclusively with a request for a new TSA to be created around that municipality and with issues of timber flow within the Kalum Forest District. While these are consequential matters they are not appropriate for consideration under Section 7 of the *Forest Act*.

I am mindful of the many views which were brought forward and, where possible, I have attempted in this rationale to respond briefly to specific concerns. The consideration of this input has been an important component of this determination.

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

Unsalvaged losses

Unsalvaged losses are being kept to a minimum via a rigorous timber salvage program for windfall and fire-damaged stands. The timber supply analysis assumed non-recoverable losses of 9500 m³/yr, primarily to wind damage. Losses to fire are minimal, due to climatic conditions and the efficiency of the protection program. Other possible sources of loss exist but are difficult to assess confidently at this time.

The spruce leader weevil (see also the earlier discussion under Impediments to prompt regeneration) was assumed to be handled through stand conversion and was modelled as such in the timber supply analysis. Porcupines pose a threat to immature western hemlock stands but little data yet exists from which estimates of current or potential losses can be made. The animals prefer the new growth arising in larger openings, and the district feels their numbers may drop off as harvesting operations employ smaller clearcuts and leave more trees behind as residuals. Pruning may also offer a solution: by removing the lower branches on which porcupines like to climb and feed, they may be encouraged to seek other food sources. Given the problems this animal is causing in the adjacent North Coast Forest District, however, the district will continue to monitor population levels.

Voles periodically damage young seedlings in significant numbers but, again, little data exists on which to assess the magnitude of the problem. Studies are underway with licensees that will hopefully allow the district to better predict years of high vole populations and adjust the timing of planting operations accordingly.

Despite the uncertainty surrounding the risk posed by porcupines and voles, the overall effect on timber supply is likely to be marginal. Even in the unlikely event unsalvaged losses are actually 50 percent higher than modelled, the increment would represent less than 1 percent of the current harvest level. For this determination then, unsalvaged losses are not a significant factor.

Reasons for Decision

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

The social and economic objectives of the Crown encourage me to maintain existing harvest levels unless reductions are necessary to avoid compromising long-run sustainability. The current AAC is 480 000 cubic metres. The timber supply analysis indicates that this level can only be maintained at the cost of a sharp 16.7 percent reduction after one decade or, if maintained for two decades, a dramatic shortfall in timber supply further into the future. Under Harvest flow I have already explained my preference for a more gradual rate of decline, similar to that projected in the base case.

Factors that indicate that the timber supply may be larger than projected in the base case are:

1. a possible underestimation in site indexes for regenerated stands;
2. a possible overestimation of minimum harvestable ages;
3. a possible expansion of the timber harvesting land base;
4. a possible overestimation of regeneration delay periods; and
5. an underestimation in the amount of planned commercial thinning.

Only two of these—a reduction in the minimum harvestable age and an expansion of the timber harvesting land base—could significantly affect short-term harvest levels. Commercial thinning and shortened regeneration delay periods offer the promise of a small increment in the initial harvest level while increased site indexes for regenerated stands hold implications for timber supply in the medium and long terms only.

A reduction in the minimum harvestable age by 20 years would allow the current AAC to be maintained for 50 years. In conjunction with higher regenerated stand volumes this would also help to eliminate both the abrupt falldown and the shortfall further into the future. As discussed in *Minimum harvestable ages*, there is at least a moderate likelihood that minimum harvestable ages will be lower than estimated.

The other factor that might affect short-term harvest levels is the potential for an expansion of the timber harvesting land base. As discussed in *Operability* there is a moderate likelihood that the changing economic conditions may open new areas to helicopter and other alternative forms of harvesting as well as encourage logging in lower-quality stands that have previously been ignored. The extent of this possible expansion remains uncertain, but a sensitivity analysis did measure the impact of adding 15 percent more old-growth stands on poor and medium sites to the land base. This allowed the current harvest level to be maintained for 30 years before declining to a long-term harvest level slightly above the base case.

The impact of increased operability is tempered by other considerations, however. The first is that it is not clear how long the expanded land base would survive any downturn in fibre prices. It would be premature to assume a permanently larger operable area based on the volatile economic climate of recent years. My second concern is that, although licensee plans do show intentions of moving into these traditionally inoperable areas, performance in proportion their contribution to the timber supply remains unproven. Indeed, I note that poor quality stands already in the existing timber harvesting land base have traditionally not been harvested by the industry. Finally, there is already a real 2.8 percent loss to the land base—caused by the separation of the Nass TSA and not accounted for in the timber supply analysis—that must be overcome before any net gains due to expanded operability can be achieved.

In contrast to the above factors are several that tend to reduce timber supply from that shown in the base case. They are:

1. the length of time already elapsed since the beginning of the base case projection;
2. an alleged overestimate of existing volumes;
3. the unaccounted reduction in the land base caused by the creation of the Nass TSA;
4. commercial thinning if it is not practised as assumed in the timber supply analysis;
5. the possible use of four- or five-pass harvesting systems to meet adjacency requirements; and
6. additional requirements for riparian protection.

Each of these factors has potential short-term consequences. As noted in *Age of the inventory* the inventory data supporting the base case is already four years old. I believe there are harvest flow options available to accommodate this factor over the longer term that do not require a lowered initial harvest level.

Discussion of the second factor in *Yield estimates for existing stands* identified an unquantified likelihood of an overestimate of existing volumes. In that section I explained my reluctance to allow this factor to influence my decision until the uncertainty is resolved by the results of inventory audit work—the volume-ratio analysis—scheduled for completion in the near future.

The third factor is already in effect. As noted in *TSA Split*, the merchantable timber inventory is likely 4 percent smaller than assumed in the BCFS analysis, although the short-term impact will vary according to the harvest flow strategy chosen. I believe that the reduction in existing volumes would be better accommodated through a small lowering of harvest levels over a longer term than through a simple deduction from the initial harvest level.

The fourth factor was discussed under Commercial thinning where I explained how the timber supply analysis assumed commercial thinning would take place; should this not happen, timber supply might decline by three percent from the base case in the short term,

or an equivalent amount further into the future. I fully expect commercial thinning to proceed, as planned by the district, but I am aware that its feasibility may be compromised by changing market demands for the thinned logs.

The fifth factor could reduce timber supply significantly in the second decade only if a five-pass harvesting system is instituted on a broad scale. However, as explained in *Green-up and adjacency requirements*, the history of harvesting in the TSA suggests that only a few areas would likely be subject to a fifth pass. Consequently, this factor should have a minimal effect.

The sixth factor, additional riparian protection, is not expected to constrain timber supply to an unacceptable extent before better information becomes available for use in the next timber supply analysis.

In summary, there is evidence that persuades me that maintaining the current AAC would result in an undesirable future timber supply disruption. I am not persuaded, however, that the base case projection is optimistic. While there are factors that may modify the assumptions in the base case—the most notable being an alleged overestimate of existing volumes—they remain unsubstantiated at this time. Given the Crown's social and economic objectives, in the absence of more compelling and rigorous evidence of additional constraints on timber supply, I am unwilling to reduce the AAC any further than the reduction already projected in the base case. If such evidence appears with the conclusion of the ratio-sampling work on existing volumes, the AAC will be revisited. A 3.3-percent reduction from the current AAC to the base case level will minimize the impact on industry and the communities while allowing the district sufficient flexibility to adapt to a lower level, if a further reduction should prove necessary.

Determination

It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that ensures longer-term IRM objectives can be met, that reflects current management practices, that avoids severe curtailment of locally established patterns of socio-economic activity based on timber harvesting, and that avoids disruptive shortfalls in future wood supply, can best be achieved in this TSA at this time by establishment of an AAC of 464 000 cubic metres.

Implementation

This determination comes into effect on January 1, 1996, and will remain in place until a new AAC is determined, which must take place within five years. During the period before the next determination, Kalum Forest District staff will undertake a number of measures and monitor several factors that currently affect timber supply or have the potential to do so. District staff will:

1. assess the results of the ratio-sampling work for its impact on existing stand volumes;
2. assess the results of the paired-plot study for its implications for regenerated stand volumes and site productivity;
3. investigate the product requirements of local and regional facilities to determine the likelihood of implementing lower minimum harvestable ages;
4. encourage and monitor industry performance in poor quality sites and height class 3 stands;
5. encourage and monitor industry performance in non-conventional and inoperable areas;
6. determine the actual regeneration delay periods occurring in the field, and explore options for reducing them further;
7. strive to resolve issues that have led to the deferral of four planning areas representing 15 percent of the available mature volume; and
8. encourage and monitor the use of alternative silvicultural systems to reduce areas constrained in future by visual quality objectives.

As discussed earlier, the first factor holds potentially significant implications for timber supply in the short term. If the results of the ratio-sampling work support the district's concerns that existing volumes are substantially overestimated, then I will revisit this determination at that time.

A handwritten signature in black ink, appearing to read 'J. Pedersen' with a stylized flourish at the end.

Larry Pedersen
Chief Forester

September 25, 1995

Appendix 1: Section 7 of the *Forest Act*

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

Allowable annual cut

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

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

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

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

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

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

(1.11) If

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

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

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

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

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

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

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

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

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Appendix 2: 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.

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