

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Strathcona Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective January 1, 2000

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Strathcona timber supply area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TSA

The Strathcona TSA covers 705 071 hectares in southwestern British Columbia (B.C.), and was established in 1986 by combining three smaller management units. The TSA now extends across central Vancouver Island and includes islands in the Johnstone Strait, the northern Gulf Islands, and a large area lying between Knight and Bute Inlets on the coastal mainland. Significant portions of the TSA cover marine areas and non-productive forest. The TSA is divided into three non-contiguous timber supply blocks: the Sayward and Kyuquot blocks to the east and west respectively of Strathcona Park on Vancouver Island, and the Loughborough block on the mainland. The total productive forest area managed by the B.C. Forest Service (BCFS) is approximately 353 144 hectares, of which about half, 177 797 hectares, is currently considered available for timber harvesting.

The Strathcona TSA is administered from the BCFS Campbell River Forest District office in Campbell River. The district includes the communities of Campbell River, Courtenay, Comox, Sayward, Cumberland, Gold River, Tahsis, Zeballos, Kyuquot, and other smaller communities.

Significant large provincial parks, including Strathcona Park, Tahsish-Kwois and Brooks-Nasparti, are located partially or wholly within the timber supply area. New protected areas include Bligh Island, Catala Island, Main Lakes Chain, White Ridge and several special feature areas.

The TSA is largely a mosaic of wet, mountainous terrain dissected by streams and rivers with many estuarine areas. Six ecosections occur in the area: Western Island Mountains, Northern Island Mountains, Leeward Island Mountains, Strait of Georgia, Outer Fjordland, and Northern Pacific Ranges. Most of the forested land lies within the Coastal Western Hemlock (CWH) biogeoclimatic zone—the most productive forest ecosystem in Canada—which covers low to mid-elevations and is characterized by high rainfall, cool summers and mild winters. Western hemlock is the most common tree species in the CWH zone, and Douglas-fir, western redcedar, Sitka spruce, yellow-cedar, amabilis fir, mountain hemlock, shore pine, big-leaf maple and red alder also occur.

The other forested ecosystem in the TSA is the Mountain Hemlock (MH) biogeoclimatic zone—the coastal subalpine zone—which occurs above the CWH zone and experiences short, cool summers and long, cool, wet winters, with heavy snow for several months. Mountain hemlock, amabilis fir and yellow cedar are the most common tree species. Other frequently occurring tree species are western hemlock, western redcedar, Douglas-fir and western white pine. Except at lower elevations, forests are not continuous in the MH zone, but thin out with increasing elevation into parkland with clumps of trees interspersed with the cold, windy, snowy, treeless, alpine tundra that occurs above the MH zone.

These varied topographies and climates have produced a rich and diverse array of habitats in the TSA, for migratory and resident birds, mammals, amphibians, reptiles, and resident and ocean-run fish, as discussed below, under “Integrated Resource Management Objectives”. Of particular importance are the old-growth forests of the CWH zone and the protected, nutrient-rich estuaries. A number of species in the Strathcona TSA are considered to be regionally significant or at risk. Species of particular management concern are those that rely on old-growth forests. As these forests are converted to younger stands, habitat loss and fragmentation may occur; to help protect wildlife and the environment, current forest management practices must be consistent with the *Forest Practices Code of British Columbia Act*.

Fourteen First Nations, ten of which are located in the Strathcona TSA, have territorial interests in the TSA. Five treaties, involving eleven First Nations, are currently being negotiated. Four of the five have reached the stage of Agreement-in-Principle. First Nations' involvement in the forest sector currently includes silviculture crews, forest licences, salvage licences, shake mills, watershed restoration, cultural heritage resource assessments, and recreation. The First Nations in the western portion of the Strathcona TSA have developed a strong dependence on the forest sector. Much of the First Nations' forestry employment is linked with Forest Renewal BC funds provided in multi-year funding agreements to forest companies.

Forestry, consisting of logging, forestry services, and forest products manufacturing, is the largest combined industrial sector in the Strathcona TSA. Approximately 16 primary processing facilities operate in the area, including mills producing pulp and paper, lumber, shakes and shingles, and poles and posts. On average, approximately 58 percent of the volume of timber harvested in the Strathcona TSA is processed on Vancouver Island, and about half of this is processed within the Strathcona TSA. Facilities in the Campbell River Forest District (which also includes portions of five tree farm licences) have the capacity to process annually 2.1 million cubic metres of timber and over 2.0 million bone dry units of wood chips. From 1995 to 1997, the actual respective annual processing levels averaged 1.52 million cubic metres and 1.3 million bone dry units, respectively.

History of the AAC

In 1986 the allowable annual cut for the Strathcona TSA was determined at 1 645 030 cubic metres per year. In 1989 the AAC was raised to 1 661 030 cubic metres and a temporary timber sale licence was issued for 16 000 cubic metres per year for deciduous stands. In 1992, to account for land withdrawn from TFL 47 and allocated to the Strathcona TSA, the AAC was increased to 1 693 745 cubic metres. In 1993, to address several large study areas under the Protected Areas Strategy, the AAC was temporarily reduced by 188 000 cubic metres under Part 15 (now Part 13) of the *Forest Act*. In January 1996 the AAC was reduced under Section 7 (now Section 8) of the *Forest Act*, by approximately 16 percent from 1 693 745 cubic metres to the current level of 1 420 000 cubic metres. The AAC currently includes coniferous and deciduous components and is apportioned as follows:

Allowable Annual Cut	cubic metres/ year	percentage
Coniferous species:	1 404 000	98.9
Deciduous species	16 000	1.1
Total	1 420 000	100.0

Apportionment:

Coniferous species:	cubic metres/yr	percentage
Forest licences, replaceable (7)	1 033 038	73.6
Timber Sale Licences >10 000 m ³ , replaceable (1)	12 219	0.9
Timber Sale Licences ≤10 000 m ³ , replaceable (5)	6 919	0.5
Small Bus. Forest Ent. Prog. (any cat., Sec 20)	82 952	7.2
Small Bus. Forest Ent. Prog. (bid proposals., Sec 21)	133 221	8.2
Forest licences, non-replaceable (2)	94 314	6.7
Forest Service Reserve/woodlots*	41 337	2.9
Total	1 404 000	100.0
Deciduous species:		
Non-replaceable forest licence	16 000	100.0
Total AAC	1 420 000	100.0

* (When woodlot licence volumes are issued they are removed from the TSA and administered separately under the *Forest Act*, but are recorded here for consistency.)

New AAC determination

Effective January 1, 2000, the new AAC for the Strathcona TSA will be 1 278 000 cubic metres, a reduction of ten percent from the current AAC. This AAC volume excludes all volumes in issued woodlot licences. This AAC will remain in effect until a new AAC is determined, which must take place within five years of the present determination.

Information sources used in the AAC determination

- Forest Inventory Planning file, BCFS;
- Strathcona TSA licensee Forest Development Plans;
- Major License Silviculture Information System records; BCFS
- *Strathcona Timber Supply Area (TSA) Data Package and Information Report*, BCFS, December 1997;
- *Strathcona TSA Analysis Report*, BCFS, February 1999;
- *Strathcona TSA Public Discussion Paper*, BCFS, February 1999;
- *Strathcona TSA Summary of Public Input on Data Package and TSA Analysis Report* (draft) BCFS, June 1999;
- Licensee consortium operability mapping submission, 1996;
- 1996-1998 Harvest profile review for Strathcona TSA, BCFS;
- *Strathcona TSA Inventory Audit*, BCFS Resource Inventory Branch, March 1999;
- *Working Paper 36/1998, Site Index Adjustments for Old-growth Stands based on Veteran Trees*, Nigh, G.D., BCFS Research Branch, 1998;
- *Working Paper 37/1998, Site Index Adjustments for Old-Growth Stands Based on Paired Plots*, Nussbaum, A.F., BCFS Research Branch, 1998;
- *Deer and Elk Habitats in Coastal Forests of Southern British Columbia*, November 1990, BCFS;
- *Forest Practices Code Managing Identified Wildlife Guidebook*, 1999, MELP and BCFS;
- Campbell River Forest District Samples of Riparian Reserve Zone and Management Zone Areas within the Strathcona TSA, 1997;
- *Final Report of the Vancouver Island Resource Targets Technical Team*, November 1997, Vancouver Island Resource Targets Technical Team;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Letter from the Deputy Ministers of Forests and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts on timber supply from biodiversity management;
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS, including the AAC determination meeting held in Campbell River, June 9 and 10, 1999;
- *Strathcona Timber Supply Analysis*, BCFS, April 1994;
- *Strathcona TSA Rationale for AAC determination effective January 1, 1996*, BCFS, December 8, 1995;
- *Strathcona TSA AAC, Apportionment and Commitment listing*, January 1, 1996, BCFS;

- *A Protected Areas Strategy for British Columbia, Provincial Overview Status Report*, April 1996, Land Use Coordination Office;
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, April 1995;
- *Forest Practices Code of British Columbia* Guidebooks, BCFS and Ministry of Environment, Lands and Parks (MELP);
- *Biodiversity Guidebook*, Province of British Columbia (B.C.), September 1995;
- *Riparian Management Area Guidebook*, B.C., December 1995;
- *Community Watershed Guidebook*, B.C., October 1996; and
- *Forest Practices Code Timber Supply Analysis*, BCFS and MELP, February 1996.

Role and limitations of the technical information used

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

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

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

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

Statutory framework

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

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

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

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to *increase* the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to *reduce* the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the Forest Practices Code (the Code).

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

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

As British Columbia progresses toward the completion of strategic land use plans, the eventual timber supply impacts associated with land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy, and Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for 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 a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of 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 would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions. However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

In the Strathcona TSA, clarification on some aspects of land and resource use, including decisions and designations for a number of new protected areas, has been provided by government's approval of the Vancouver Island Land Use Plan. The Vancouver Island Resource Targets project (VIRT) is developing boundaries and resource management objectives and strategies for various zones, but these have not yet been approved by government. The Central Coast Land and Coastal Resource Management Planning Process (CCLCRMPP) which includes the Loughborough supply block of the TSA, is underway but completion is not expected until the spring of 2000.

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

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

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

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Strathcona TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

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*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TSA a timber supply analysis is carried out by BCFS staff using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (FSSIM), a series of timber supply forecasts is produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. 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 for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

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

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

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

Base case for the Strathcona TSA

The base-case analysis, described in the February, 1999 *Timber Supply Review Strathcona Timber Supply Area Analysis Report (TSAR)*, projected an initial harvest level, starting from 1996, of 1.25 million cubic metres per year—a 12-percent reduction from the current harvest level of 1.42 million cubic metres per year. Following further 12-percent declines in each of the subsequent two decades, the medium-term harvest level of 970 000 cubic metres was projected to be maintained for 80 years before rising by 10 percent in the eleventh decade to the long-term harvest level of 1.07 million cubic metres.

The report noted the following as the most important factors contributing to the projected decline in the harvest forecast over the short term:

- significant reductions in the productive forest available for timber supply, due to the creation or expansion of several parks and the completion of terrain-stability mapping;
- significant changes in forest management brought about by implementing the Forest Practices Code; and
- the harvest flow policy used in the analysis, which attempted to equalize the rate of decline in both the short and medium terms with the rise to the long-term harvest level. A slower rate of decline or an increase in the first-decade harvest level would result in a lower medium-term harvest level and an increase in the rise to the long-term harvest level.

The report also noted the following as changes occurring since the last timber supply review which have moderated the rate of decline in the base case:

- the addition of alder stands to the timber harvesting land base;
- changes in visual quality objectives;
- lower minimum harvestable ages for higher productivity stands based on a minimum volume per hectare of 350 cubic metres;
- the anticipated growth of forests, outside the timber harvesting land base, which contribute in the short term a significant portion, and in the long term, all, of the old forest requirements by biogeoclimatic variant.

The report noted further that the base case forecast was not limited at any time by the available volume—rather, the harvest rates were derived to avoid repeatedly harvesting productive stands at minimum harvestable ages significantly below their respective maximum average growth rates, which would considerably reduce the long-term harvest level.

This particular base case harvest forecast was chosen to provide a first decade harvest that is stable in the face of uncertainty and that enables a short transition to the lowest projected harvest level, while still maintaining a rise to the long-term harvest level equal to or below the decline rates used in the short term. The base case first-decade harvest level was shown to be stable with respect to all uncertainties examined, with the exception of further restricting the maximum allowable disturbance in visual quality. Sensitivity analysis showed timber supply to rely significantly on the freedom of harvest activity in the ‘visual-quality-partial-retention’ areas of the Strathcona TSA, and relative independence from the timing of when stands become harvestable.

In addition to the base case, I was also provided with a number of sensitivity analyses and projections of alternative harvest flows, carried out using the base case as a reference. Some harvest projections that were not selected for the base case forecast are discussed below under “Alternative harvest flows”. Sensitivity analyses are discussed below in the appropriate sections. All of these analyses have been of assistance to me in the considerations, described below, which have led to my determination.

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

Section 8 (8)

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

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

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

Land base contributing to timber harvest

- general comments

The total area of the Strathcona TSA, including marine areas and unproductive forest, as estimated from BCFS 1993 inventory data updated to 1996 to account for changes such as new protected areas and woodlot licences, and reported in the February 1999 timber supply analysis, is 705 071 hectares. This represents a net increase of 45 982 hectares in the overall size of the TSA estimated in the 1994 analysis, mainly due to improved precision in mapping information and changes in information on water bodies and non-productive forest. Of the total TSA area, 353 144 hectares (about 50 percent) are productive Crown forest land, a reduction of roughly 24 000 hectares from the previous analysis, reflecting the removal of protected areas.

As part of the process used to define the timber harvesting land base (i.e. the land base estimated to be economically and biologically available for harvesting), a series of deductions were made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for economic or ecological or social (e.g. recreation) reasons. In timber supply analysis, assumptions, and if necessary, projections, must be made about these factors, prior to quantifying appropriate areas to be deducted from the productive forest area, in order to derive the timber harvesting land base.

In deriving the timber harvesting land base for the Strathcona TSA, deductions totalling 175 348 hectares were made from the productive forest land base to account for numerous factors such as inoperable areas, unstable soils, areas of low productivity, riparian reserves, and others. The deducted areas are detailed in the analysis report, and summarized in Table 2 of the report. After the deductions, the current timber harvesting land base for the Strathcona TSA was estimated to be 177 797 hectares, about 50 percent of the productive forest area.

The three factors which most reduce the availability of the productive forest for timber supply are: inoperability, soil stability and low site productivity, which make up 28.5 percent, 10 percent, and 3.9 percent respectively of the productive forest area. My consideration of these and other significant deductions follows.

- inoperable areas

In deriving the timber harvesting land base, those portions of the TSA which are not physically accessible for harvesting, or which are not feasible to harvest economically, are excluded. In the analysis, a total of 90 997 hectares were excluded as inoperable.

Operability mapping in the TSA includes both physical and economic assessment current to 1997, and incorporates information submitted in 1996 by a consortium of licensees and reviewed by district staff in 1997. At the AAC meeting in Campbell River in June 1999, district staff presented to me the results of a review of various profiles of harvesting in the TSA derived from a sample of forest development plan maps from mid 1996 to the end of 1998. Blocks identified as either harvested or likely to be harvested in the review period were digitally overlaid on TSA inventory files. Harvest performance was assessed in proportion to the presence, on the timber harvesting land base, of trees occurring in stands characterized by particular age classes, height classes, leading species, types of operability, types of terrain, wildlife habitats, visual quality classes, and biogeoclimatic variants. A total of 6202 hectares were reviewed, including 4019 hectares clearcut, and 2183 hectares commercially thinned (some of which took place outside the stated review period). Results for the review of the clearcut areas were presented to me in some detail.

The review showed that in some cases the proportion of the harvest taken from trees in stands with a particular characteristic did not match precisely the proportion in which stands with that characteristic are present on the total timber harvesting land base. However, for a number of reasons—including the fact that the review identified performance over a short time period only and during a market downturn, as well as statistical bias inherent in the data—the trends so identified are likely to be of a temporary and inconclusive nature. I was presented with no evidence of a persistent, systematic over- or underestimation in operability with respect to any of the characteristics studied.

Two matters of interest but not of concern at this time were:

- (1) Fully 16 percent of the harvest in the review came from the 5 percent of the land base which is identified as accessible by helicopter. This is reasonably consistent with the base case analysis, in which 20 percent of the harvest projected for the first 20 years was obtained from such stands.
- (2) Ten percent of the entire harvest in the review came from areas mapped as “inoperable” and excluded from the timber harvesting land base. However, the review was not able to address the converse relation—i.e. how much of the land mapped as “operable” will in practice prove inoperable. Without this complementary information, and based on a small sample, it is not possible to assess any implications for the validity of the mapping of operability for the TSA as a whole.

In the public input to the timber supply review process, a wide range of perspectives was expressed, including views that operability was over- and underestimated in particular respects. Concerns regarding the inclusion of a relatively small portion of the Mountain Hemlock biogeoclimatic zone in the timber harvesting land base are addressed below under *impediments to prompt regeneration*. One licensee’s concern that some small dispersed areas would not be economic to harvest has already been addressed by the operability mapping, which included assessment by licensees. A suggestion to include a sensitivity analysis for including uneconomic timber at times of peak market prices is reasonable, but this would not be an appropriate indicator for defining operability under normal conditions. Another suggestion, to examine including all timber stands with volumes of 300 cubic metres per hectare by age 150 years, would not reflect current practice since district staff report no harvest performance in such stands, and only rare performance in stands of 350 cubic metres per hectare. A suggestion was made to include good and medium sites from inoperable areas; however, in my judgement this would not be advisable as marginal sites can usually be found on both sides of the operability line, and including *all* sites on the margin could well introduce a bias toward overestimating operability.

In conclusion, I am satisfied that the operability mapping exercise, which was recent and which included licensee participation, provides a suitable indication of the extent of the physical and economic harvesting potential in the TSA at this time. The harvest performance review undertaken by district staff has shown no reason for adjusting the operability assumptions incorporated in the base case analysis, and I have accepted the base case as an adequate projection of the available timber supply in this regard.

- sites with low timber productivity

The originally published data package for the timber supply analysis specified that all stands which had not reached a height of 19.5 metres by age 120 would be excluded from eligibility for harvest. This was intended to exclude both minor areas of old growth, and younger stands originating from fire or windthrow, on low productivity sites in areas otherwise mapped as operable. The result was a reduction of 13 794 hectares to the timber harvesting land base.

This exclusion inadvertently removed some old growth stands which had reached the required height for harvesting but at a higher age, as well as some younger stands that had previously been logged. To address these unintended exclusions, it was decided to include in the timber harvesting land base all stands 24 metres in height regardless of age and stands which had previously been logged. Twenty-four metres represents the height at which the stands could be assumed to reach 350 cubic metres per hectare—roughly the minimum volume per hectare with demonstrated harvest performance.

District staff assessed that, of the 13 794 hectares removed, a total of 4645 hectares of young and old-growth stands, to which an incorrect (low) site index had been assigned, should properly be added back in to the timber harvesting land base to contribute to timber supply. This represents an increase of about 2.6 percent in the timber harvesting land base. However, BCFS staff noted that in the short term, the corresponding addition to the timber supply would likely be a lower percentage—possibly closer to 1 percent—of the projected level in the base case, since the sites in question are lower than average with respect to both site productivity and existing stand volumes, and roughly 20 percent of the sites would be less than 40 years of age.

A licensee suggested that site index adjustments indicated by the results of the Old-Growth Site Index (OGSI) project should be incorporated in the base case analysis, rather than in a sensitivity analysis, and noted that this would avoid inadvertent exclusion of operable old-growth sites for low productivity. As noted below in *site productivity estimates*, current ministry policy is to include such a direct adjustment in the base case for a TSA when OGSI results have been obtained directly for the TSA. In cases where results are available for areas outside a TSA, an adjustment will be included in a sensitivity analysis for consideration in the AAC determination itself. But in any case, for Strathcona, this would not result in any additional operable land base beyond the already-made adjustments for old growth with sufficient height and younger stands with logging histories, since site indexes for questionable old-growth stands will not become “OGSI-adjusted” until they have been harvested and reforested.

A suggestion to include all stands down to 300 cubic metres per hectare is discussed above in *inoperable areas*, and another suggestion, to exclude all old growth stands below height class 4 is addressed by the fact that stands of height class 3 are already included only on a site-specific basis.

In review, the timber harvesting land base was underestimated in the base case analysis by 4645 hectares of young and old-growth stands which are of lower than average productivity but in which operations are expected to take place now and in the future. This represents 2.6 percent of the timber harvesting land base and implies a somewhat smaller fractional addition to the projected total timber supply. While the projected increase cannot be assessed with precision, from the information provided it would reasonably lie in the range of 1 to 2.6 percent, with the greatest impact in the longer term, and a timing of earlier impacts dependent on the relative proportions of the affected areas of young and old stands. I have accounted for this in my determination as discussed in “Reasons for decision”.

- environmentally sensitive areas and terrain stability mapping

Environmentally sensitive areas (ESAs) in the Strathcona TSA are no longer identified from standard ministry ESA mapping from forest cover attributes. Instead, specific inventories are maintained for terrain stability (soils), forest recreation and wildlife values.

Areas in the TSA where use of the land for the purposes of wildlife habitat, recreation or community water supplies may affect timber supply are discussed below, under “Integrated resource management objectives”. Areas sensitive to regeneration issues are discussed under *impediments to prompt regeneration*. No areas in the TSA are mapped as environmentally sensitive for avalanche.

For sensitive soils, reconnaissance mapping of terrain stability was completed for the whole TSA between 1992 and 1998 by professional geoscientists, overseen by district staff. District staff have accepted the accuracy of the mapping.

In deriving the timber harvesting land base for the previous (1994) timber supply analysis, mapping for unstable areas only was considered, and all such areas were completely excluded. For the current analysis, both unstable and potentially unstable areas were excluded, on the basis of professional geotechnical advice, to the following extents: 95 percent of all unstable area was excluded throughout the TSA, and potentially unstable area was 40-percent excluded in the Kyuquot timber supply block, and 50-percent excluded in the Sayward and Loughborough supply blocks. The total area identified with either unstable or potentially unstable terrain amounted to 125 152 hectares, in respect of which in the analysis, after other overlapping deductions, a specific deduction of 35 306 hectares was made from the productive forest.

Public input on the appropriateness of this deduction ranged from recommending that all unstable and potentially unstable terrain should be completely excluded from the timber harvesting land base in view of potential impacts on a range of forest values, to recommending reductions of as low as ten percent or zero for potentially unstable terrain, given land base deductions for operability and other factors, and the potential for more helicopter harvesting.

In reviewing and assessing the suitability of the deduction for sensitive soils I have considered the following.

District staff have examined the relative proportions of the total areas in the timber harvesting land base with unstable and potentially unstable soils, and have compared these to the proportions of harvesting taking place (by clearcut only) on those areas, for the period from mid-1996 to 1998. The results showed that for this period the proportion of all operations taking place on potentially unstable terrain, which comprises 6 percent of stands of all ages on the timber harvesting land base, was 35 percent. Also, while unstable areas comprise 0.1 percent of the timber harvesting land base (all ages), 3 percent of all harvesting took place on unstable areas.

From this information it is evident that in this TSA it is feasible for some level of operations to take place in compliance with the Forest Practices Code on some areas with sensitive soil; thus their complete removal from the timber harvesting land base would be inappropriate. On the other hand, these lands have been identified as sensitive by professional geoscientists, and it is not reasonable to expect that harvesting could take place on all such areas; a zero percent reduction is thus also inappropriate. As I have noted below in *cutblock adjacency, green up and forest cover*, partial exclusion of potentially unstable lands is also supported by the findings of Coastal Watershed Assessment Procedures.

The current levels of performance in the TSA on these kinds of terrain are high in proportion to their occurrence on the land base, which could appear to imply the appropriateness of a smaller land base reduction than was applied. However, from discussions with district staff I conclude it is likely that this level of performance reflects the current harvest opportunity within higher quality stands on the more stable portions of these terrain units, and that this will not be indicative of the level of performance that can be sustained from such sites over a longer period. Moreover, areas of uncertain stability also contribute to meeting the biodiversity objectives required by the Code, and to the extent that these become logged, forest cover on other areas, with potentially higher timber value, may need to be retained instead to make up the necessary biodiversity contribution. For these reasons, I do not consider it appropriate to reduce the area deducted in the analysis with respect to sensitive soils. Rather, I consider the deductions recommended by the professional geoscientists and applied in the analysis to be within an appropriate range, and within an average range in my experience with other management units. In the absence of any conflicting, more precise information, I have therefore accepted their use for the purposes of this determination.

Nevertheless, the area identified as being of uncertain soil stability in the TSA is considerable, at 125 152 hectares, as is the specific associated land base deduction of 35 306 hectares. Advantage should be taken of the full potential for this large area of sensitive sites to contribute, through careful harvesting, to the timber supply. I have therefore noted below in my "Implementation" instructions that district staff should continue to monitor the levels of performance on the various terrain stability classes, such that any appropriate adjustments to the percentage land base reductions may be made for consideration in future determinations.

- deciduous stands

Broad-leaf deciduous forest types form an integral part of the overall land base in the Strathcona TSA. The AAC determined for the TSA effective January 1, 1996 includes a 16 000-cubic-metre partition attributable to deciduous species. A licence is in effect to harvest 8000 cubic metres annually from deciduous-leading stands, which requires a harvest area of approximately 28 hectares annually.

In the timber supply analysis, it was assumed from the inventory file that 5515 hectares of predominantly deciduous species (red alder) of all ages on all sites would contribute to the timber supply, while 253 hectares of other deciduous types such as cottonwood, which are not used in the TSA, were specifically excluded from the timber harvesting land base.

Since the last timber supply review, based on direct operational experience, district staff have revised their estimates of the potential contributions to timber supply from deciduous stands in the TSA's three supply blocks. Staff now consider that for the following reasons the current inventory significantly overstates the availability of deciduous types for harvest.

First, many deciduous stands occur in riparian areas that are unavailable for harvesting. In the analysis these stands, whether deciduous or coniferous, would have been excluded from harvesting, so this unavailability would imply no additional loss to the timber harvesting land base. Second, many alder stands possess a fir or hemlock understory to which the stand is converting either naturally or through active management. Although this understory may not be readily apparent for photointerpretation for inventory files, its volume per hectare may exceed that of the deciduous component, and so preclude harvesting the stand as a 'deciduous-leading' stand. The unavailability for harvest of stands thereby mislabelled as deciduous-leading does not affect the validity of the base case timber supply projection, as the coniferous component would validly remain in the timber harvesting land base. Third, in many cases deciduous stands that are available for harvest are dispersed from each other and interspersed with coniferous stands, which creates access problems and renders some harvest opportunities uneconomic.

District staff advise me that this situation leaves few remaining opportunities to develop logical management areas for deciduous harvests in the TSA.

No input was received from the general public or from any licensee, specific to the harvest of deciduous stands on any of the supply blocks in the TSA. From the new information provided by district staff I have therefore reasoned as follows. The new information is based on field experience and specific operational detail, and provides more reliable information from which to assess the extent of operability of these stands than does the more general information in the inventory file. In the absence of any information contradictory to, or qualifying, that provided by BCFS staff, I consider it appropriate to place more weight on this operational information than on the inventory file alone. From the description of the problems identified above, regarding inventory identification and overestimation and the access, riparian and other constraints, together with the dispersed location of remaining harvest opportunities, I am satisfied that the base case timber supply analysis has significantly overestimated the extent and availability of the contribution to timber supply from deciduous-leading species.

Since the economic value of alder declines comparatively rapidly with age, and since in some cases good forest management is served by the early conversion of declining deciduous stands to productive coniferous stands, it remains advisable to continue to harvest these stands at whatever rate meets current operational capabilities and planning requirements. However, in view of the considerable uncertainty in the extent and operability of the predominantly deciduous stands, and in view of the need for flexibility between the coniferous and deciduous harvests, at this point I see no advantage in determining a specified volume within the AAC as attributable to these stands. Moreover, a partition could present an unwarranted restriction to harvesting coniferous stands in the event that the full specified volume of a deciduous component were not harvested.

For the present determination therefore, I have decided not to specify a particular volume of the harvest as attributable to predominantly deciduous forest types, but to allow this harvest to proceed subject to the availability of suitable stands. The current licence requires only about 28 hectares annually, and in view of the identified operational constraints, I encourage district staff to work closely with the licensee to identify appropriate areas in the TSA where the harvesting of suitable and available deciduous stands may proceed in accordance with meeting the range of objectives for good forest management. It is important to note that I expect no reduction in the timber harvesting land base due to this factor, as any decrease in the area in question represents productive land that will yield either coniferous or deciduous harvests over the long term, or alternatively, land that is already assumed in the analysis to be unavailable due to exclusions for riparian areas, woodlots, and so on.

- roads, trails and landings

Existing roads: In the timber supply analysis, a deduction of 6895 hectares, or 5 percent was made from stands potentially contributing to the timber harvesting land base to account for existing logging roads, trails and landings.

District staff advise that further review, audits, monitoring measurements from 1991 to 1994, and data from the Major Licensees' and Forest Service Integrated Silviculture Information System (sometimes referred to as MLSIS/ISIS) reports, all indicate that the actual deduction on the landscape is higher than the assumed 5 percent. Of the ISIS sample of 7613 hectares, 502 hectares, or 6.6 percent, were occupied by roads trails and landings. This implies that overall an additional 2200 hectares should have been deducted in deriving the timber harvesting land base. Staff attribute this difference to actual road widths being significantly wider than the 6-metre figure assumed in the deduction for the analysis.

Future roads: In the timber supply analysis, a deduction of 2479 hectares—6 percent of the timber harvesting land base for conventional systems (requiring road access) and 0.5 percent for non-conventional (non-roaded) systems—was made to account for future logging roads, trails and landings.

Using a projection of current performance, and estimates from silviculture prescriptions from 1997 to the present obtained from data in MLSIS/ISIS reports, district staff estimate that for conventional areas the actual value should be 5 percent. For non-conventional areas, staff expect the value of 0.5 percent to account reasonably for additional helicopter log drops and service landings. Approximately 80 percent of the harvestable land base remaining to be accessed or roaded is operable by conventional systems, and 20 percent by non-conventional systems. This means the deduction for future roads, trails and landings was overestimated by roughly 300 hectares in the analysis, with respect to the conventional portion of the land base. The area-weighted deduction for future roads would thus be 4.3 percent.

Combining the findings for existing and future roads, trails and landings would mean the total deduction in the analysis was underestimated by approximately 1900 hectares, roughly one percent of the timber harvesting land base.

Public input included suggestions from licensees that deductions should be between 3 and 5.5 percent. I note that the adjusted estimate for future roads would fall in that range. For existing roads, the estimates derived by district staff were based on actual measured site loss, and thus appear reliable. District staff also advise that efforts are made in planning to reduce the overall area occupied by roads, trails and landings, such that a decline to 4.3 percent would be reasonable.

From this I am prepared to accept that the base case projection was based on a timber harvesting land base that was overestimated by about one percent with respect to roads trails and landings. This will affect the medium- and long-term timber supply, and I have accounted for this in my determination, as discussed in "Reasons for Decision".

- new protected areas

Under the provincial government's Vancouver Island Land Use Plan, the protected area on Vancouver Island has increased to 13 percent. The January 1996 AAC determination did not account explicitly for the protection of Goal 1 areas of the Protected Areas strategy, since at that time amendments had not been made to the *Park Act*. No contribution from these areas was assumed in the analysis for the present determination. A number of Goal 2 protected areas, totalling 39 717 hectares, were announced in 1996 and officially designated in 1997. These areas were also removed from the timber harvesting land base used in the current base case analysis. The gross areas involved are shown in the table below.

The transfer of one additional area to a Regional Park, Seal Bay, has been announced, but the area, totalling 564 hectares, has not yet been officially designated. Therefore, although logging is being avoided in the area, the area is still assumed to contribute to the timber supply for the TSA.

Designated Park	Gross park area formerly within TSA (hectares)
Artlish Caves	254
Big Bunsby	269
Bligh Island	1621
Brooks-Nasparti addition	22 851
Catala Island	262
Comox Lake Bluffs	42
Dixie Cove	105
Main Lakes Chain	1370
Nuchatlitz	442
Santa Gertudis Cove-Boca del Infierno Bay	357
Tahsish-Kwois (and Silburn)	10 829
White Ridge	1315
Subtotal	39 717
Park not yet designated	
Seal Bay (Regional Park)	564
Total	40 281

District staff estimate that roughly one-half of the total area removed for parks was formerly in the operable land base of the TSA, although a refined analysis on all areas has not been conducted to validate this conclusion. In any event, regardless of the exact proportion of operable land, in the analysis all the areas in question have been completely excluded from the timber harvesting land base.

I am satisfied that the change in land status for all designated provincial parks and ecological reserves has been properly accounted for in the timber supply analysis. I do not anticipate that the current avoidance of harvesting in 564 hectares or less in the Seal Bay area will significantly constrain operations in the remainder of the TSA over the next five years, and I expect this issue will be resolved before the next timber supply review.

For the purpose of this determination I therefore accept that the current base case projection has adequately accounted for the implications of the newly protected areas.

- timber licence reversions

Timber licences are old tenure arrangements that give a licensee exclusive rights to harvest merchantable timber within the licence area. Once these areas have been harvested and reforested, all future harvesting rights revert to the Crown and future harvests from the area will then contribute to the harvest for the TSA which contains the timber licence area.

The Strathcona TSA includes 18 416 hectares of land in timber licences that has been or is likely to be harvested (i.e. excluding inoperable areas, unstable soils etc.). Of this total, 13 360 hectares are less than 100 years of age, and in the analysis were assumed to have been harvested and therefore contributing to the timber supply for the TSA. The remaining 5056 hectares were assumed to revert at a consistent rate of 170 hectares per year over the next 30 years. It is thus assumed that by the end of 30 years the entire area will have reverted to the Crown, will be regenerated, and will be contributing to the timber supply in the TSA.

I consider it reasonable to assume that stands under 100 years in this area have been harvested, even though no application has been made to change the ownership status of the land. I am also advised by district staff that the rate of reversion assumed in the analysis is within the expected range of operational reality. I therefore accept the assumptions used in the analysis for the remaining areas identified as timber licences as reasonable for use in this determination.

- woodlot licences

The *Forest Act* requires AACs determined for TSAs to be exclusive of the areas and timber volumes allocated to woodlot licences. Thus, when woodlot licences are issued in a TSA, the required volumes are first allocated from an appropriate apportionment under the AAC for the TSA. Then, in the next AAC determination for the TSA, the TSA land base is reduced by the area of Crown land in all the woodlot licences issued since the previous determination, and the total volume in the issued woodlot licences is excluded from contributing to the AAC for the TSA.

In this determination, the volume required to be excluded from contributing to the AAC for the TSA is the total volume in 15 awarded woodlot licences (including ‘top-up’ volumes), which amounts to 29 063 cubic metres. However, in the current timber supply analysis, the areas and volumes for only five woodlot licences were excluded. The other 10 woodlot licences—covering 3501 hectares, of which 2800 hectares are estimated to lie in the timber harvesting land base, contributing 19 110 cubic metres annually to the timber supply—must now also be excluded from the TSA. Partially offsetting this discrepancy is the recently discovered mis-coding of the ownership of 340 hectares in Grassy Creek on Loughborough Inlet as a woodlot licence, when in fact it is part of the TSA. This area includes an estimated 272 hectares of the timber harvesting land base and is estimated by BCFS staff to contribute approximately 2040 cubic metres annually to the timber supply of the TSA.

The net result of these two factors is a required reduction of 2800 minus 272 = 2528 hectares in the timber harvesting land base assumed in the base case analysis, and 17 070 cubic metres annually in the projected timber supply.

In my determination therefore, as noted in “Reasons for Decision”, I have accounted for an overestimation of approximately 1.4 percent in the timber harvesting land base used in the base case projection. Since this would include sites of better than average productivity, this would imply an overestimation of slightly more than 1.4 percent in the timber supply throughout the forecast period.

Existing forest inventory

- current inventory

The inventory used as a basis for the timber supply analysis for the Strathcona TSA has been updated for disturbances such as harvesting and fire through two projects. In the first, forest cover in the Kyuquot supply block was reclassified using 1986 and 1987 aerial photography on a scale of 1:15 000, and forest cover disturbances were updated to 1990 from 1990 photography at 1:15 000 scale. In the second project, the Sayward and Loughborough supply blocks were reclassified using 1991 aerial photography at a scale of 1:15 000. Forest cover in the Strathcona TSA has been updated for disturbances to 1996 from 1:40 000 aerial photography, with additional control from 1:20 000 orthophoto maps. For timber supply analysis purposes the inventory file was projected to January 1998 to account for growth and aging.

Uncertainties in timber volumes identified during the previous (1994) timber supply review, particularly in the Loughborough supply block, led to an inventory audit which was completed in March 1999. The audit reviewed heights, ages and volumes for stands over 60 years old, and heights, ages and derived site indices (productivity) for immature stands.

The implications of the audit results for the projected timber supply are discussed below under *volume estimates for existing natural stands* and *site productivity estimates*.

- age-class composition

The distribution of age categories in the TSA may be summarised as follows.

In the timber harvesting land base, (using rounded numbers) about 23 percent of forest stands are older than 140 years. Forty-one percent are managed stands younger than 140 years, and 37 percent are younger than 140 years and are considered to be unmanaged. Sixty-six percent of the timber harvesting land base is currently younger than 60 years; a large proportion of this area is expected to become available for harvest during the next 20 to 30 years, and this is reflected in the timber supply analysis.

The harvest forecast is also affected by the age class distribution of forested stands excluded from the timber harvesting land base, which, although not contributing timber volumes directly, do provide desired stand conditions including old-forest attributes. Of the forest stands excluded from the timber harvesting land base, about 60 percent are older than 250 years, and 21 percent are under 60 years. The contribution of these stands to meeting non-timber management objectives affects how much and where timber harvesting can be carried out in the TSA. A large proportion of the requirements for old-forest attributes within each landscape unit in the TSA is met by forested areas that are excluded from the timber harvesting land base.

In my determination I have been mindful of the distribution of ages of the forest stands both in and outside the timber harvesting land base.

- *species profile*

The forest inventory for the Strathcona TSA currently shows that the timber harvesting land base is comprised primarily of stands of hemlock/balsam (59 percent) followed by Douglas-fir (25 percent) and cedar (12 percent) with small amounts of alder (3 percent) and spruce (1 percent). After harvest, the coniferous stands are generally expected to be regenerated to the same leading species, and about 75 percent of the predominantly-alder stands are expected to be converted after harvest to Douglas-fir stands.

- *volume estimates for existing natural stands*

The variable density yield prediction (VDYP) model version 6.4a, developed and supported by the Ministry of Forests' Resources Inventory Branch, was used for the timber supply analysis for the Strathcona TSA to estimate timber volumes for existing stands.

In my rationale for the 1996 AAC determination for the Strathcona TSA, I requested that BCFS staff investigate and resolve a reported discrepancy in the estimates for existing volumes in the Loughborough timber supply block. As noted above in *current inventory*, an inventory audit for the TSA was completed in March 1999, which addressed the uncertainties in the estimates for existing volumes in the TSA. The results of this audit were not available for inclusion in the published *Strathcona TSA Analysis Report*, BCFS, February 1999. However, prior to this determination, additional analysis of the audit results, and a related sensitivity analysis were carried out, and I have taken the resulting information into account in making my determination. The audit results are summarised as follows, and their implications for timber supply are discussed below.

For 50 random volume samples selected over both the operable and inoperable land base in the TSA, the audit showed there was zero overall bias in the inventory. However, for the 32 of these samples that were within operability lines, the audit showed a statistically significant mean difference of 77.7 cubic metres per hectare between the inventory volume of 638 cubic metres per hectare (sampling error 11.6 percent) and the audit volume of 560 cubic metres per hectare (sampling error 17.2 percent). Nine additional samples were then placed within the operable area. For all the 41 samples, the audit showed a statistically significant mean difference of 84.6 cubic metres between the inventory volume of 666 cubic metres per hectare (sampling error 9.6 percent) and the audit volume of 581 cubic metres per hectare (sampling error 13.5 percent).

The audit results were then further stratified and analysed to determine their significance to the projected timber supply. For the operable land base of the TSA as a whole, overall the audit volumes were less than the inventory volumes by a statistically significant ratio of 0.87. That is, the volumes in the inventory for trees aged 60 years or older would appear to be overestimated. To examine the timber supply implications of the overestimation, the samples in the operable land base and timber harvesting land base were stratified. For the timber harvesting land base (discounting one misleading sample in a polygon labelled 'not-satisfactorily-restocked') the ratio was 0.91, based on 33 samples. Further, the stratification showed that the majority of the discrepancy was due to a ratio of 0.7 for stands over 140 years on the east side of the TSA (i.e. the Loughborough and Sayward supply blocks) which comprise only about 5 percent of the timber harvesting land base. For equivalent stands on the west side (Kyuquot), the ratio was 1.04, which is within an acceptable range, given the sample size. For stands under 140 years, the ratios were 0.95 on the east side and 1.01 on the west side, which again are considered to be within an acceptable range and therefore not significant in terms of implications for timber supply.

Thus, with the exception of the mature volumes on the east side of the TSA, where overestimation in age and height has led to significant overestimation, the inventory volumes as a whole appear to be within an acceptable range. The low ratio for the older stands in the east side accounted for the bulk of the discrepancy between the inventory and audit volumes. Samples from old stands on the east-side comprised over one-quarter of the total number of samples, and about one-third of the samples from the timber harvesting land base—hence their substantial influence on the overall ratio. However, these east-side old stands cover only 5 percent of the timber harvesting land base. This disparity resulted because for the audit, mature stands were assumed to be those over 60 years of age, while the timber harvesting land base consists of stands of all ages. This difference therefore affected the representation of the samples and influenced the results such that for the TSA as a whole the inventory appears reliable, yet on closer examination a discrepancy can be noted for older stands on the east side, notwithstanding that they represent only a small part of the timber harvesting land base. Furthermore, the timber supply analysis showed that stands currently aged 40-60 years contribute substantially to timber supply over the next few decades. Analysis results showed that if volumes for all existing natural stands (i.e., not managed stands) were adjusted according to the area and age-specific ratios developed using all the operable samples, (those applicable to either the east or west, and under or over 140 years), the base case initial level could be achieved in the short-term, but the mid-term harvest level was reduced by 50 000 cubic metres from 970 000 cubic metres per year to approximately 920 000 cubic metres per year. In fact, the adjustments most appropriately would be applied only to stands over 60 years old, since that is the sampling frame of the audit. The analysis results therefore most likely indicate the maximum effect of errors in existing stand volumes. Conversely, if the TSA-level operable ratio of 0.87 were applied to all stand types, the short term timber supply would be lower than in the base case. The first approach is more appropriate given the differences in composition of both the Strathcona timber harvesting land base and the audit samples.

From this detailed review of the volumes in existing natural stands in the TSA, I am satisfied that implications for timber supply of uncertainty in these volumes have been adequately evaluated. While adjustment of the volumes did not require a reduction in the projected short-term supply in the base case projection, it did reduce the projected mid-term level which increases the sensitivity of the short term level to other uncertainties. This increased sensitivity has implications for the viability of maintaining the current AAC, as discussed in “Reasons for Decision”.

Expected rate of growth

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In general, in British Columbia, site indices determined from younger stands (i.e. less than 31 years old), and older stands (i.e. over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—known as the old-growth site index or OGSi project—suggest that actual site indices may be higher than those indicated by existing data from mature forests. In recent years it has been concluded consistently from such studies that site productivities have generally been underestimated; managed forest stands tend to grow faster than projected by inventory-based site index estimates from mature and old-growth stands. In the Strathcona TSA, site productivity estimates for almost one quarter of the timber harvesting land base are based on old-growth stands.

In the public input to this determination, three forest industry submissions referred to the OGSi studies, and suggested that its findings should be incorporated into the base case analysis, or at minimum considered in a sensitivity analysis. Current practice in timber supply analysis for TSAs in B.C. is to incorporate these results in a base case analysis where they have been obtained from a localized study within the TSA; where no such results are available, generalized OGSi adjustments are applied in a sensitivity analysis.

To test the sensitivity of the harvest forecast for the Strathcona TSA to changes in site indices for old-growth stands, OGSi adjustments based on the ‘maximum’ results described in the 1998 BCFS Research Branch Working Paper No. 36 were applied. These adjustments reflect the maximum site potential (productivity) given ideal management and stocking conditions. Managed stand volume estimates, green-up ages and minimum harvestable ages were also redefined, based on the site index adjustments. This resulted in a mid-term harvest level 100 000 cubic metres or 10 percent higher than in the base case, and a long-term level 14 percent higher, and achieved one decade earlier, than in the base case.

While these results show the mid and long-term supplies are significantly sensitive to uncertainty in site productivity estimates, in respect of cautions expressed in the OGSi study, the forecast should be viewed as an indication of general trends in the timber supply, rather than an accurate and precise projection of the timber supply.

The general cautions recommended in the OGSi reports are reinforced by results of the inventory audit related to both immature and mature stands. The audit suggested that while site indices derived for stands under 45 years appear to have been underestimated, the opposite is the case for stands older than 45 years. Further, the overestimation of heights and ages for older mature stands on the east side of the TSA led to an implicit upward site index adjustment for those stands. That is, if the inventory had reflected actual heights and ages, the site indices would have been lower than derived for the analysis. At this time, the precise degree to which the inventory errors and the OGSi results overlap one another is uncertain.

Research has demonstrated clearly that in general, productivity of sites currently occupied by mature or old-growth stands will most likely be higher than currently estimated. However, uncertainties related to the applicability of province-wide study results to the Strathcona TSA, to the inventory, and to the degree to which full site potential will be achieved, mean that I cannot reasonably assume that timber supplies will be as high as shown in the sensitivity analysis employing OGSi adjustments.

Thus while the sensitivity analysis indicates substantially higher timber supply projections for the mid and long terms, it is reasonable to expect that the projection in the sensitivity analysis would represent maximum anticipated increases, and that the actual response would likely be more moderate. In my determination I have therefore accepted the potential for increases of something less than 10 and 14 percent in the mid and long terms respectively, as noted in “Reasons for Decision”. If funds could be made available, a study to resolve the appropriate adjustments to make to site indices in the Strathcona TSA could potentially indicate significant future timber supply benefits.

- volume estimates for regenerated stands

About 41 percent of the timber harvesting land base in the Strathcona TSA is currently considered to support managed regenerated stands. The BCFS standard Table Interpolation Program for Stand Yields (TIPSY) (WinTIPSY version 2.1) was used to estimate regenerated stand volumes for existing and future managed stands. Initial volume predictions using TIPSY are based on the management of stocking density assuming ideal conditions including full site occupancy and the absence of significant brush competition and pests and diseases. Two ‘Operational Adjustment Factors’ (OAFs) are then applied, to account for losses in timber volume occurring due to (a) openings in stands associated with unproductive areas such as small swamps and rock outcrops (OAF1), and (b) age-dependent factors such as pests, disease, decay, waste and breakage (OAF2). In the BCFS analysis, the provincial standard reductions of 15 percent for OAF1 and 5 percent for OAF2 were applied. Volumes were assumed to remain constant after 300 years of age.

Although no work has been done to test the accuracy of the OAFs used in the analysis specifically for the Strathcona TSA, the provincial standard OAFs as used are based on the best available information, and no evidence was presented to suggest that these estimates are not reasonable for use in this determination.

BCFS staff note that in the past some stands in the TSA have been spaced to lower densities (e.g. 500 stems per hectare) than under current practice, and that the timber supply analysis was based on the assumption of the continuation of historic spacing levels. However, due to the current economic unattractiveness of aggressive spacing programs, the reduced availability of funding, and the fact that relatively low densities may in some cases negatively affect stand volume over time, areas harvested in the future will likely have somewhat higher stand densities than in the past. While the yield implications of different density regimes are not known with certainty, I am satisfied that in general, continuation of the current trend to a lower level of spacing activity in the TSA than that assumed in the analysis will result in higher stand densities and an increase in the projected mid and long-term supply of at least five percent. I have discussed this issue further under *spacing, pruning and fertilizing*.

In the analysis, no allowance was made for volume gains from the use of Class A genetically improved seed. Of the total number of regenerating trees in the Strathcona TSA that will eventually be harvested, approximately 33 percent originate from planting. About 35 percent of the trees planted are Douglas-fir, mostly from Class A genetically improved seed. Assuming an average yield increase of 10 percent, the net effect is approximately a 1-percent increase in the projected timber supply in the mid term. This number will likely increase over the long term in response to yield increases due to genetic breeding and to increased availability of Class A seed. However, the projected short-term supply will not be affected, as the timber supply in the Strathcona TSA is not constrained by requirements for cutblock adjacency that would be alleviated by faster green up (see below, *cutblock adjacency, green up and forest cover*).

Sensitivity analysis for this TSA shows that uncertainty in regenerated volumes has implications for the timber supplies projected in the base case for the middle and long terms, but not for the short term. Specifically, the sensitivity analysis was performed to assess changes in the harvest forecast that would result from a 10-percent increase or decrease in regenerated stand volumes. A 10-percent increase did not affect the base case forecast for the first 20 years, but did increase the projected mid- and long-term timber supplies. A 10-percent decrease in regenerated stand volumes reduced both the mid- and long-term levels. Thus even if the volumes in regenerated stands were over or under estimated in the base case by 10 percent, there would be no impact on the projected short-term harvest level. However, it is noteworthy that attempting to maintain the current AAC with these volume changes did result in significant mid-term timber supply impacts, with an attendant increase in sensitivity to uncertainties.

From the above I am satisfied that with respect to regenerated volumes the initial harvest level in the base case projection provides a suitable basis for my considerations in this determination. However, it is also probable that the base case projection has underestimated the timber supply in the mid and longer terms by at least five percent with respect to stand densities, and one percent with respect to the use of genetically improved seed, for a total of over six percent. I have noted this below in "Reasons for Decision". I have also been mindful in my determination of the increased sensitivity to changes in regenerated volumes associated with attempting to maintain the current AAC.

- *minimum harvestable ages*

A minimum harvestable age is an estimate of the earliest age at which a forest stand has grown to a harvestable condition. The minimum harvestable age assumption mainly affects when second growth will be available for harvest. This in turn affects how quickly existing stands may be harvested such that a stable flow of harvestable timber may be maintained.

In the data package (published December 1997) for the timber supply analysis for the Strathcona TSA, minimum harvestable ages for each species were assumed to be the age at which forest stands achieve 95 percent of their maximum average annual rate of volume production. This was consistent with the assumption used in the 1994 analysis for the previous AAC determination. However, during the public review period for the data package, district staff reviewed this criterion and noted that the volumes projected by this method for sites of poorer productivity were significantly lower—some were as low as 205 cubic metres per hectare—than would be economically viable based on past experience. Operational experience indicated that a lower limit for harvest performance for this area was generally represented by a volume of 350 cubic metres per hectare. District staff therefore decided to use this value as a more realistic criterion for minimum harvestable age. The revised criteria were therefore used in the timber supply analysis. Applying this change meant that trees on sites of poorer productivity and some unmanaged natural stands would not be considered harvestable until they had reached a greater age than under the previous criterion, but conversely, more productive sites would be harvestable sooner.

Analysis of the implications of applying each of the above criteria in the base case timber supply projection showed no difference between the two projections for 100 years. However, the projected long-term level reached after 100 years was slightly lower with the volume-based criterion. Alternatively, setting the minimum harvestable age at the age of highest growth (culmination age) produced a long-term level five percent higher, but at the cost of a deep disruption in the mid-term supply. Sensitivity analysis showed that decreasing minimum harvestable ages by ten years from those in the base case increased the timber supply available in the short term, but at the cost of disruptions in the mid and long terms. Analysis also showed that setting minimum harvestable ages 20 years higher than in the base case did not constrain the short term supply, but postponed for three decades the point at which the higher long-term level was reached. This analysis also showed that maintaining the *current* AAC would require significant reliance on the base case minimum harvestable ages as an increase in minimum harvestable ages caused timber supply to fall to 682 000 cubic meters per year after 50 years. By contrast, the base case projection, which starts with a harvest level 12 percent below the current AAC, is less reliant on harvesting stands at the minimum harvestable age.

Setting the minimum harvestable ages by the volume-based criterion did not mean that harvesting would actually occur in the short term at the minimum ages indicated; in the base case, aside from commercial thinning volumes, no stands with volumes lower than 450 cubic metres per hectare were projected to be harvested for 30 years. Some stands in the range of 350 to 450 cubic metres were harvested after that, to a maximum of 17 percent of the harvest in decade six, later declining to 3 percent. In the base case, harvest rates were derived to avoid repeatedly harvesting productive stands at the derived minimum harvestable ages, as this would significantly reduce the long-term harvest level.

Public input included the suggestion that harvesting trees at culmination age would give fibre maximization precedence over all other management objectives, and recommended instead that longer rotations be used to ensure higher quality, more valuable timber. In response to this I note that on sites of lower productivity, the age at which 350 cubic metres is reached generally exceeds the culmination age and that analysis has shown that there is not a significant reliance on harvesting at the derived minimum harvestable age. In any case no stands of less than 450 cubic metres per hectare are assumed to be harvested for 30 years. An objective of the province's Tree Improvement Program is to achieve high quality wood in second growth, with respect to knots, grain and structural capabilities. With respect to other management objectives, the base case projection includes forest cover constraints and other means for providing for a range of integrated resource management objectives.

A concern was expressed that reducing minimum harvestable ages exaggerates the available timber supply. From reviewing the harvest statistics, I am convinced that the increase in harvest opportunity has not been at the expense of the long term timber supply, as borne out by the sensitivity analysis referred to above in which minimum harvestable ages can be increased by 20 years without significantly affecting the base case forecast.

In summary I find that the minimum harvestable ages applied in the analysis are consistent with operational experience and are within a normal range for operations in other coastal management units. In consideration of the results of the sensitivity analyses provided, and of the fact that the base case does not depend on significant or prolonged harvesting of stands at ages as low as the minimum harvestable age, I am satisfied that the harvestable age criterion as applied is reasonable, and that the base case projection is reliable on this account. In my determination, as noted in "Reasons for Decision", I have taken into account the fact that maintaining the current AAC would require significant reliance on the base case minimum harvestable ages, and that repeatedly harvesting productive stands at the derived minimum harvestable ages would significantly reduce the long-term harvest level.

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

Regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In the timber supply analysis, a regeneration delay of two years was assumed for coastal Douglas-fir and deciduous stands, and three years for all other species.

In practice, in the Strathcona TSA, coastal Douglas-fir and deciduous stands are normally planted within the 2-year time frame noted in the analysis, while other species are planted or utilise natural regeneration to supplement the stocking level and species mix. Although seed sources and site conditions vary, full stocking is normally achieved for planting/natural regeneration combinations within two to four years.

Public input included a suggestion that all species be promptly planted to achieve a two-year delay for all species. However, this would ignore the important role of natural regeneration on sites ecologically suited to western hemlock and balsam.

The assumptions applied in the analysis are consistent with current practice in the TSA (as supported by current surveys, silviculture prescriptions and reports). For the purposes of this determination I am therefore satisfied that regeneration delays have been adequately accounted for in the base case timber supply analysis.

Impediments to prompt regeneration

The inventory identifies a total of 1362 hectares of productive forest comprised of predominantly Sitka spruce stands, of which 1190 hectares are within the timber harvesting land base. District staff note that these stands had not been growing well during juvenile stages, and the public input included a recommendation that all Sitka spruce stands be deleted from the timber supply. However, staff note that in many cases the stands in question are now satisfactorily stocked with other leading species and that few if any stands of predominantly Sitka spruce remain. Moreover, research suggests that the remaining Sitka spruce stands will outgrow their earlier growth defects. I am therefore satisfied that neither the formerly poorly-growing nor the currently misidentified spruce stands pose a significant risk to the base case timber supply projection.

Public input also included concern about the regeneration and productivity of stands in the Mountain Hemlock Biogeoclimatic zone. Productive forest land within the MH zone covers 18 698 hectares, or about 5 percent of the total productive forest land in the TSA. About 2218 hectares of these productive MH stands are included in, and comprise only 1.2 percent of, the timber harvesting land base. Since 1982, 519 hectares of these stands have been harvested.

Current scientific literature, referred to in my April 1999 AAC determination for the Fraser TSA, concludes that while there are some deficiencies in the existing knowledge of mountain hemlock ecosystems that warrant a conservative approach, sufficient information exists to support rational management decisions in the Mountain Hemlock zone. In practice, the history of harvesting and regeneration in this zone indicates that a prudent and reasonable level of development can be sustained; all stands harvested to date in this zone in the Strathcona TSA have met regeneration delay and are expected to meet free-growing standards. Future logging in this zone is unlikely to be in large clearcuts but will feature group selection and patch cuts with some degree of stand retention. These changes in management appropriately recognize the sensitivity of these sites. District staff are working with licensees in the design and modification of suitable blocks for harvesting, and any remaining difficulties on these sites will be in the form of constraints on management options rather than on timber supply. Finally, I note that the area in question represents only a very small portion of the timber harvesting land base, and as such, the focus should continue to be on best management practices—noting that the timber supply forecast is more or less insensitive to the small inclusions from this zone (or to varying the practices as required).

Thus, while district staff acknowledge, and I agree, that harvesting in the Mountain Hemlock zone must be subject to careful management, I have personally reviewed the condition of the regenerating forests in this zone, and I am satisfied that, with appropriate care it is both ecologically and operationally feasible to harvest and regenerate suitable areas of this zone in the TSA.

Not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Areas where the standard regeneration delay has not yet elapsed since harvesting are considered “current” NSR. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is “backlog” NSR.

In the Strathcona TSA, 366 hectares are classified as ‘backlog’ NSR. However, surveys show all such areas have been planted and are stocked. A further 10 840 hectares that remain classified as NSR in the inventory await updating on forest cover maps. All the remaining NSR area, 5 400 hectares, is ‘current’—about 2200 hectares are harvested annually in the TSA—and is anticipated to be satisfactorily stocked when the accepted regeneration delay period has elapsed. I am therefore satisfied that a productive forest is becoming re-established within an acceptable time on the available and suitable land in the TSA and will contribute appropriately to the timber supply.

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

Silvicultural systems

In the Strathcona timber supply analysis, all harvesting was assumed to be by clearcutting except for the commercial thinning of 45 000 cubic metres per year for the first 10 years of the forecast and 30 000 cubic metres per year for the following ten years.

Currently in the TSA approximately 99 percent of all harvesting is by clearcut or clearcut with reserves, although major licensees have planned alternative silvicultural systems on current forest development plans for high elevation areas and areas within special management zones. Some major licensees including one active in the TSA have recently announced an expected future increase in reliance on partial cutting systems; and while no plans have been submitted to date, this may introduce some uncertainty to the timber supply. This situation should be reviewed regularly. With this caution, I am satisfied that for the purposes of this determination the timber supply analysis base case projection adequately reflects the silvicultural systems currently in use in the TSA.

Incremental silviculture

In general, incremental silviculture includes activities, such as commercial thinning, juvenile spacing, pruning, fertilizing and genetic improvement, that are beyond the basic silviculture activities required to establish a free-growing forest stand.

- commercial thinning

In the Campbell River Forest District which includes the Strathcona TSA, the SBFEP has pursued an aggressive commercial thinning (CT) program for 20 years. In my rationale for the 1996 AAC determination for the Strathcona TSA, I requested staff to monitor and evaluate the timber supply impact of the CT program in the district.

To date, 1750 hectares have been commercially thinned in the TSA, and a further 1440 hectares sold in timber sale licences are planned for CT. Revised plans indicate sales of approximately 180 hectares per year for CT for the next five years, i.e. roughly 30 000 cubic metres per year, or 15 000 less than the 45 000 cubic metres per year assumed in the analysis for the first ten years. At present, CT is carried out only in the Sayward Forest, which has a preponderance of forest younger than 60 years old and there are no plans to extend the program to the Kyuquot or Loughborough blocks. Stands 44 to 55 years of age are targeted for harvesting, about half of which were juvenile spaced 20 years ago. This has created an economic opportunity by allowing some harvesting of stands that were considered unavailable under the minimum harvestable age criteria in the last timber supply review. However, the re-evaluation of the criteria for minimum harvestable ages has lowered the harvestable age on these same stands, such that merchantable clearcut operations could be performed, rather than commercial thinning. As a result, the program is now expected to decline in favour of small clearcuts.

Despite its many advantages, the CT program is currently not expected to influence the overall available timber supply in the TSA significantly. However, the area involved is small, and I accept that only minimal implications are expected for timber supply, if the program continues on at 180 hectares per year. For the purposes of this determination I note the strategic benefits of the program in relation to harvesting in the Sayward area, with its sensitivity to the urban interface, but I do not expect this additional operational flexibility, nor the small reduction in planned CT operations, to significantly affect the base case timber supply projection.

- spacing, pruning and fertilizing

Historic levels of treatment are estimated at 1000 hectares per year each for fertilising and spacing, and 100 hectares per year for pruning. Recent treatment levels have decreased significantly, and spacing is now expected on only 100 hectares per year, with pruning restricted to 'second lift' treatments only.

Juvenile spacing is the cutting of undesirable trees within a young stand to reduce competition among the residual trees for water, nutrients and sunlight. Trees cut during juvenile spacing are not usually removed from the site. Spacing can have many potential benefits, including meeting biodiversity or wildlife habitat objectives, maintaining or enhancing forest health, managing species composition and stand structure, increasing stand value, offering opportunities for small operators, and preparing for anticipated changes in market structure. As noted and accounted for in *volume estimates for regenerated stands*, in accordance with recent trends in information, the expected lower levels of spacing activity in the TSA are likely to result in higher regenerated volumes.

Fertilization is expected to continue at 200 hectares per year in combination with commercial thinning, and 800 hectares per year in spaced, managed stands. The timber supply implications from fertilization will include the effects of past treatments already in the ground, and the later results of future applications, if these are made. Some volume benefits will be captured earlier on fertilized areas that will be commercially thinned than under conventional harvest. BCFS staff have estimated the cumulative total volume increase as a result of fertilization to date at 990 000 cubic metres, of which 44 percent are assumed to be already captured through higher site indices derived in the last re-inventory (as a result of the fertilization). This leaves outstanding 555 000 cubic metres of additional volume from fertilization that will be available as early as 10 years from now, given the volume-based criteria used to define minimum harvestable ages. I have accounted for an increase in volume of this magnitude in the near to mid term, as noted in “Reasons for Decision”.

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

Utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. In the timber supply analysis, the regional standards were applied—a 12.5-centimetre diameter at breast height (dbh) for stands up to 140 years; a 17.5-centimetre dbh for stands older than 140 years; 30-centimetre maximum stump height and 10-centimetre minimum top diameter inside bark. While the criteria used in the analysis thus accurately reflect the regional utilization standards, for older forests in the Strathcona TSA the top diameter is relaxed operationally to 15 centimetres. Resources Inventory Branch has assessed the resulting difference in yield as negligible.

Public input included a comment that the volume difference between 10-centimetre and 15-centimetre tops would be significant for second growth stands. This may be true, but the relaxation is applied operationally to old-growth stands only, not to second growth.

Since this practice results in an insignificant overestimation in the projected timber supply, and since even this small volume is likely to be accounted for and billed in waste surveys, I accept the assumptions used in the base case as a reasonable representation of utilization standards.

Decay, waste and breakage

The VDYP model used to project volumes for natural stands incorporates estimates of the volumes of wood lost to decay, waste and breakage. Decay losses are built into the volume estimates, while standard waste and breakage factors are applied to the analysis in the development of VDYP yield curves. These estimates of losses have been developed for different areas of the province based on field samples. For regenerated stands, as previously discussed (see *volume estimates for regenerated stands*), the TIPS model incorporates OAFs that account for anticipated decay, waste and breakage.

In my rationale for the 1996 AAC determination for the Strathcona TSA, I noted that staff were concerned over potentially incorrect decay, waste and breakage factors for old-growth western redcedar, particularly in the Kyuquot supply block, and I requested that BCFS staff investigate and resolve this uncertainty. Other priorities have prevented this work from being carried out, but BCFS staff and licensees remain concerned that these losses are overestimated. Scale volumes for the species are reported to exceed cruise volumes.

While I accept these professional opinions and anecdotal evidence as indicative of a possible overestimation in the losses to decay, waste and breakage for old-growth cedar, without completion of appropriate field studies and analysis I cannot make a valid specific adjustment to any of the loss factors used in the timber supply analysis. For this determination, therefore, I accept the existing factors as applied, and again I recommend that staff from the district and Resources Inventory Branch undertake the studies necessary to resolve this uncertainty. I have therefore made no adjustment to the base case timber supply projection on this account.

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

Integrated resource management objectives

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

- cutblock adjacency, forest cover and green-up

To manage for resources such as water quality, wildlife and aesthetics, and to avoid concentrating harvesting-related disturbance in particular areas, operational practices limit the size and shape of cutblocks and maximum disturbances (areas covered by stands of less than a specified height), and prescribe minimum green-up heights required for regeneration on harvested areas before adjacent areas may be harvested. Green-up requirements ensure maintenance of water quality, wildlife habitat, soil stability and aesthetics. Adjacency, green-up and forest cover objectives guide harvesting practices to provide for a distribution of harvested areas and retained forest cover in a variety of age classes across the landscape

In the timber supply analysis for the Strathcona TSA, differing cover constraints were applied to six distinct management areas occupying the following respective percentages of the timber harvesting land base: 'Cutblock adjacency only', 66 percent; 'visual partial retention', 25.8 percent; 'visual retention', 6.2 percent, 'wildlife habitat' (in addition to land base exclusions for high value habitat), 1.5 percent; both 'visual partial retention and wildlife', 0.4 percent; and both 'visual retention and wildlife', 0.2 percent.

In the least constraining of these on timber supply, the ‘cutblock-adjacency-only’ areas, no more than 25 percent of the timber harvesting land base in each draft landscape unit was permitted to be covered by stands below a green-up height of three metres, measured as the average top height of the tallest 100 trees. In the ‘visual partial retention’ area, the maximum allowable disturbance was 15 percent; in the ‘visual retention’ area, five percent; and in the ‘wildlife’ area, specific constraints were applied as discussed below under *wildlife habitat*. In the ‘visual partial retention and wildlife’ area, and in the ‘visual retention and wildlife’ area, the combined constraints as listed here under each heading were applied.

The estimated time required to reach green-up ranged from 10 to 15 years in the ‘cutblock adjacency only’ area, with a weighted average for all landscape units in that area of 12.5 years. Sensitivity analysis showed that increasing or decreasing the green-up age by five years in all management emphasis areas did not affect the projected base case harvest levels for ten decades, although harvest scheduling between supply blocks would be affected, and the long term level would be affected slightly.

To help in assessing the extent to which changes in the applied forest cover constraints might affect the availability of the timber supply, a sensitivity analysis was carried out in which the area permitted to be below green-up height was reduced from 25 percent to 16 percent in each landscape unit in the ‘cutblock adjacency only’ area. Under this constraint the projected harvest level for the base case was not affected in the short term, but the highest short-term harvest level achievable would be 1.279 million cubic metres per year, well below the current AAC.

Public input included a comment that 83 percent of the operable land base could be harvested with 50 percent of each landscape unit permitted to be below green-up height (i.e. 2 harvest ‘passes’, rather than the 4 implied by the 25-percent constraint), due to the extent of inoperable areas and areas constrained for other objectives. While this could be true in some drainages, others, for instance in the Sayward block, would not have sufficient areas in those categories to provide the requisite forest cover. In any case, the strategic timber supply is not dependent on this issue, since the area permitted to be below green up can be reduced from the 25 percent applied in the analysis to only 16 percent, with essentially no effect on the base case short or mid-term supply—this means the cover constraint as modelled is not a limiting condition on the short-term supply. Similarly, the green-up age as modelled in the base case can be increased or decreased by five years with no effect on the supply for ten decades. The supply is therefore not limited by this modelling assumption.

I accept that individual watersheds may be constrained further than was modelled, for instance by Coastal Watershed Assessment Procedures (CWAPS). Approximately 20 CWAPS have been completed in the TSA, mostly in the Kyuquot supply block, several of which recommend harvesting restrictions. (Some of these restrictions were against harvesting on unstable or potentially unstable terrain, which supports the partial, but not complete, inclusion of terrain class four areas, as discussed above in *environmentally sensitive areas and terrain stability mapping*.) However, the sensitivity analysis noted above indicates that increasing the cover constraint by permitting only 16 percent to be disturbed did not reduce the base case initial harvest level. Also, while in the analysis the oldest forest stands were assumed to be harvested first, on a random basis, it is not expected that such a sequence would necessarily be followed operationally, and the analysis showed that many other patterns of harvest sequencing on the landscape would be equally feasible.

Since the cover constraints as modelled have not directly limited the availability of timber in the short term as projected in the base case initial harvest level, and since they are within an average range for coastal management units, I consider them to be within an acceptable range. In view of the general insensitivity of the timber supply to changes in the forest cover assumptions, I accept the constraints as applied in the analysis as satisfactory for use in this determination.

- community watersheds

The Strathcona TSA currently contains two areas, 18.1 hectares and 125.9 hectares, officially designated under the Forest Practices Code as Community Watersheds. At this time CWAPs have not been carried out for these watersheds, and no logging is being carried out in either area. Other domestic water sources affect small areas only, and District staff advise that they have no impact on the timber supply in the TSA. In view of the small areas involved, the currently designated Community Watersheds will have negligible impact on the overall timber supply for the TSA.

- visually sensitive areas

Careful management of scenic areas visible from communities, public use areas and travel corridors is an important IRM objective. The Code enables the management of visual resources by providing for scenic areas to be identified and made known, and by providing for the establishment of visual quality objectives (VQOs). To achieve this, visual landscape inventories are carried out to identify, classify and record visually sensitive areas. On completion of such an inventory, a specialist may derive recommended visual quality classes (RVQCs, i.e.: 'Preservation'; 'Retention'; 'Partial retention'; 'Modification' or 'Maximum Modification' to identify levels of alteration that would be appropriate for particular areas. The Code requires these areas to be identified, by the district manager or in a higher level plan, and to be made known to licensees. When this has been done and an RVQC has become current practice, it may be incorporated into a timber supply analysis, preferably as a VQO established by the district manager or contained in a higher level plan. Established VQOs reflect the desired level of visual quality, based on the physical characteristics and social concern for an area, and seek to balance the perceptions and needs of people with the social and economic needs of the Province.

To achieve VQOs, constraints are placed on timber harvesting, road building and other forest practices. The constraints, which are based on experience, research findings and public preferences, are expressed in terms of "forest cover" requirements that relate to the maximum percentage of a "viewshed" that may be harvested at any one time, and to 'visually effective green-up' (VEG)—the stage at which a stand of reforested timber is perceived by the public to be satisfactorily "greened-up" from a visual standpoint.

In the Strathcona TSA, a total of 144 454 hectares of visually sensitive areas in productive forest have been identified and made known, 70 528 hectares of which are in the timber harvesting land base. The location and distribution of these areas is essentially the same as in the 1996 AAC determination. However, due to the correction of inventory digitization errors, the number of hectares associated with these areas has been revised, resulting in an overall reduction of 13 438 hectares to the area used in the 1996 determination.

Also, after support was received during public review of a VQO management strategy, staff have implemented measures to optimise the timber harvest in the TSA consistent with good visual management, in accordance with policy direction from the Minister of Forests. The forest cover requirement in visually sensitive areas is now modelled at the 'maximum' level of permitted disturbance, rather than the 'mid-point' level applied in the previous analysis, which helps to avoid an otherwise projected three-percent decrease in timber supply in forty years' time. This modelling change reflects the fact that staff of the BCFS and licensees are now better trained in visual landscape design. The current analysis maintains the assumption of a 5-metre green-up height in visual zones, as used in the previous analysis, and district staff advise that this is reflective of operational reality. As noted above in *adjacency, forest cover and green-up*, sensitivity analysis showed that increasing or decreasing the green-up age by five years did not affect the base case projected harvest levels for ten decades.

It is notable that in the current analysis the RVQC 'Partial Retention' does not constrain the timber supply, but in fact provides flexibility for harvest scheduling as well as opportunities to offset uncertainties in other factors affecting timber supply, without extending the assumed harvestable ages. There is some constraint in the BCFS analysis from 'Retention' areas but in most cases these areas also provide for a range of other forest management objectives. Likewise, 'Preservation' areas, which were completely excluded from the timber harvesting land base, occur mostly in areas such as riparian areas that are already excluded from the timber harvesting land base and thus meet a range of objectives. In these areas there will be some extension of minimum harvestable ages, but less than was assumed in the previous timber supply review.

Public input included the comment that although there has been a reduction of 25 percent in the timber harvesting land base, the AAC is being maintained by reducing standards for visual quality and weakening the Code. The Ministry of Small Business, Tourism and Culture was concerned with what it considered to be a reduction in the visual constraints on harvesting, which gives an unrealistic impression of the harvestable fibre. It is true that visual standards have been altered since the previous review, but only where justified and where public support for the changes was received during public review of the VQO management strategy. I note that the changes that have been implemented and reflected in this analysis are primarily the result of better planning and more accurate definition of how to meet the RVQCs, rather than reflective of less importance being placed on managing visual resources.

Various comments were received in the public input to this determination, on the need for changes to the inventory of visually sensitive areas. However, the adjustments to visually sensitive areas made in the VQO management strategy were made in consultation with licensees, and I am advised the strategy is now considered complete. It was also suggested that VEG height should be 7 metres rather than 5, but again I note the insensitivity of the timber supply to changes in green-up age.

In reviewing these considerations, I note the following. Analysis suggests that due to existing constraints for other objectives, visual landscape management imposes minimal constraint on the timber supply, and in fact the management of 'Partial Retention' areas provides flexibility for future harvesting. The training in visual landscape design validates the application of the maximum allowable disturbance, instead of the mid-point, for each visual quality class, which helps to avoid a shortage in forty years' time. A careful review of the visual landscape inventory has identified errors and reduced the area constrained by visual management objectives, and sensitivity has been rated higher in some areas, and lower in others.

In my view, district staff have worked hard with public support to responsibly integrate the attainment of objectives for both visual management and timber harvesting. It is possible that the changes in visual emphasis resulting from the VQO management strategy, which were not complete for incorporation in the BCFS analysis, may represent an underestimation to some degree in the base case projection. However, in view of the considerable uncertainty associated with operational application of partial cutting systems, for the purpose of the present determination I consider it prudent to accept the visual management assumptions as modelled, and to review the achievement of expected harvest levels in the next timber supply analysis and AAC determination.

- recreation values

Recreation areas such as campgrounds, trails and lookout sites are identified in the inventory file through feature significance and management class codes. These identifiers were used in the analysis to exclude areas with high recreation values from the timber harvesting land base because they are more current than designations for environmentally sensitive areas. Areas that are managed exclusively for recreation were assumed to be removed entirely from contributing to the timber supply, as were areas with an RVQC of 'Preservation'. Areas requiring special management for recreation were 50-percent excluded, and karst areas (see next section) were 8-percent excluded. After other exclusions for overlapping objectives, a total of 6910 hectares were excluded specifically for areas with high recreation value, and 690 hectares for karst features.

Public input included comments that forest cover constraints, rather than land base exclusions, should be used in modelling recreation management. This would result in a lower impact on the timber supply, but would reflect current operational management less accurately. Other comments suggested that too high a harvest level would negatively affect tourism values; however, it is in part to account for tourism values that management objectives for recreation and visual quality are both established in practice and represented in the analysis.

District staff consider the representation of recreation objectives in the analysis to be consistent with current operational management. Although there is overlap in some cases between areas suitable for recreation and areas deducted for example for riparian areas and lakefront areas, still a significant reduction of 6910 hectares—two percent of the Crown forest land in the TSA—was made on this account in the analysis. From these considerations I conclude that tourism and recreational values have been adequately accounted for in the base case timber supply projection.

- karst features

Karst is a distinctive topography that develops from the dissolving action of water on carbonate bedrock—usually limestone, dolomite or marble. This geological process, occurring over thousands of years, results in features that include fluted rock surfaces, vertical shafts, sinkholes, sinking streams, springs, complex sub-surface drainage systems and caves. In areas dominated by karst environments, timber harvesting must be managed with additional care or, in some areas, avoided.

The Strathcona TSA has been inventoried at a scale of 1:250 000 for potential karst development, and this inventory is refined in accordance with operational experience and adjusted to reflect the appropriate management class and feature significance. Much of the karst area in the TSA lies in areas that are inoperable or that are excluded from the timber harvesting land base for other objectives. In the analysis, a total of 14 624 hectares of productive forest areas were identified as having potential karst values, and approximately half this area was accounted for by exclusions for other objectives. For the remaining half, areas specifically identified for karst management which were not overlapped by exclusions for other constraints were subjected to an 8-percent exclusion from the timber harvesting land base. After the deductions noted above for other objectives, a total of 690 additional hectares of productive forest were excluded from the timber harvesting land base to account for karst features.

Public input included both suggestions that karst could be managed with a much smaller (0.5 percent) land base reduction or by application of a forest cover constraint, and conversely that the removal of only 8 percent of karst areas is inadequate and that 33 percent should be removed pending a more intensive survey.

In considering this issue I note that the 8-percent reduction is based on empirical data from operational management, and is applied only to inventory polygons L5, which is a designation that describes karst features on the inventory file that have not already been designated as requiring special management for recreation and 'netted down' in the timber supply analysis. I am advised that operational experience shows the application of cover constraints would be insufficient to provide adequate protection for karst areas, and that a 33-percent reduction would underestimate the potential opportunity for harvesting by careful means.

It is likely there will continue to be contention over how best to manage and model karst areas. However, from BCFS staff attendance at international fora to discuss karst management, it is apparent that our approach in British Columbia is not only reasonable, but with our use of ground-penetrating radar, our methods are actually in the forefront of management internationally. In the Strathcona TSA, much of the sensitive karst area is excluded under recreation objectives and does not show as a karst exclusion per se, or lies in inoperable areas, and in practice a much larger area than the 690 hectares removed specifically for karst is actively managed for karst. In view of this, and of the empirical basis for the 8-percent reduction factor applied in the analysis, I am satisfied that the requirement to manage karst environments with sensitivity is appropriately reflected in the base case timber supply projection.

- cultural heritage resources

Cultural heritage resources are defined in the *Forest Act* and include archaeological sites, traditional use sites and objects such as culturally modified trees (CMTs). Archaeological sites and CMTs that predate 1846 are protected under the *Heritage Conservation Act*. The nature and extent of required protection of archaeological sites are detailed under this legislation.

CMTs are the most commonly found cultural heritage resource in the TSA. In most cases, with the agreement of First Nations, the CMTs are dated, but are not protected, and to date, the timber harvesting land base has not been significantly affected. Archaeological Overview Assessments (AOAs) have been completed for the Kyuquot and Loughborough supply blocks, and will likely result in an increase in the number of subsequent Archaeological Impact Assessments conducted. The recently initiated Central Coast Land and Coastal Resources Management Planning (CCLCRMP) process is also likely to produce additional cultural heritage information. A Traditional Use Study (TUS) has been recently completed in the traditional territories of the Ehattesaht and Kwakiutl nations, and any implications for the timber harvesting land base will be identified through consultation. The Mowachaht Muchalaht and Ka:'yu:'k't'h'/Che:k:les7et'h' nations have also identified the need for a TUS in their traditional territories.

First Nations have expressed concern regarding the assumptions made about rotation age in the timber supply analysis and the AAC determination, and their continued access to cedar of a suitable size for house poles and canoes. District staff advise that to date, First Nations have been able to obtain cedar logs of sufficient quantity and quality by working in co-operation with the forest licensees. However, demands to access wood for traditional purposes are increasing. District staff will continue to assess the requests by First Nations to ensure suitable cedar is available.

At present, managing for cultural heritage resources in the TSA has not created a measurable impact on timber supply, and no specific accounting for these resources was made in the timber supply analysis. However, large numbers of CMTs have been identified on the West Coast and I am advised that the First Nations involved are no longer supportive of altering these CMT sites. In addition, uncertainty exists because in some instances licensees may occasionally adjust cutblock boundaries to avoid CMTs but the extent of this action is not fully known. District staff believe that a tracking process to monitor impacts of CMT management would be helpful both to making necessary adjustments to the AOA model and in refining the assumptions used in the timber supply analysis.

For this AAC determination I accept that the base case timber supply projection has appropriately reflected the absence of measurable impacts on timber supply to date from managing cultural heritage resources, and any emerging information from the CCLCRMP or other processes can be accounted for in the next AAC determination. I have made some further comments regarding treaties and other matters below, in "Other First Nations considerations".

Whether CMTs are recorded and removed, or whether they are noted and maintained on the landscape, will not exert significant influence on the timber supply at this time. I agree that district staff should continue to track and monitor the extent of and practices associated with CMTs. The results of this will be further reviewed at the time of the next timber supply analysis, and any new information will be taken into account at that time. In the meantime, I have reminded district staff that, as noted above in my "Guiding principles...", "the AAC that I determine should not in any way be construed as limiting the Crown's obligations" to First Nations.

- wildlife habitat

More than 300 species of migratory and resident birds, 45 species of mammals and 13 species of amphibians and reptiles occur in the Strathcona TSA. Native mammals include black-tailed deer, Roosevelt elk, black and grizzly bear, mountain goat, wolf, beaver, pine marten, wolverine and weasel. Native and migratory birds in the forests of the area include species of management concern such as marbled murrelets, Queen Charlotte Island goshawks (coastal sub-species of northern goshawks), great blue herons and pileated woodpeckers. Adjacent marine habitats and estuaries support populations of species such as Peale's peregrine falcons, bald eagles, trumpeter swans, harlequin ducks and over-wintering birds.

In the timber supply analysis, to account for wildlife habitat requirements, land base exclusions—for example for ungulate winter range and bald eagle shoreline nesting—as well as requirements for retained forest cover, were applied to the appropriate identified sensitive areas in the inventory. Exclusions and constraints were applied to a total of 24 323 hectares of productive forest in the TSA. Areas with high wildlife value, primarily for ungulate winter range, were excluded 100 percent in EW1 areas, and 50 percent in identified EW2 areas, for a total reduction of 7448 hectares. In addition, deer winter range requirements were met by ensuring that 50 percent of the timber harvesting land base in the Sayward and Salmon landscape units are maintained in forest stands over five metres in height, and simultaneously allowing no more than 25 percent of the timber harvesting land base to be covered by stands less than three metres in height. This requirement was applied to 2.1 percent of the timber harvesting land base in the TSA.

Public input included concern with how the Code's riparian and biodiversity guidebooks interact with the land base exclusions for wildlife noted in the data package for the analysis. These exclusions will certainly overlap in some areas with biodiversity requirements for retained old growth in landscape units, and riparian management and reserve areas. However, the overlaps are accounted for in the analysis, and not 'double-counted' since land base deductions are dealt with separately and sequentially.

It was also suggested that the BCFS should follow the modelling and management strategies outlined in "Deer and Elk Habitats in Coastal Forests of Southern BC", which I am advised was in fact the basis for identifying the sensitive wildlife areas and ungulate winter ranges incorporated in the BCFS analysis.

With the exception of 1194 hectares of timber harvesting land base identified as moderately sensitive for wildlife habitat, but for which no management objectives were specified, I accept that the BCFS analysis has adequately accounted for the wildlife habitat areas identified in the inventory. The appropriate regime for the 1194 hectares is uncertain, but if a 50-percent land base exclusion were applied (as is often the case for this type of area), the resulting maximum 500-hectare deduction would not significantly affect the projected timber supply. Moreover, some of the area mapped as moderately sensitive is not available for harvest due to other considerations, which would reduce even this maximum discrepancy. Nevertheless, the source of this mapping anomaly should be investigated operationally and the inventory adjusted appropriately for the next analysis.

For the purposes of this AAC determination therefore—noting that some further provision may be required for species considered ‘at risk’ or ‘regionally significant’, as discussed below under *identified wildlife*, and having noted some uncertainty with the small area of moderately sensitive habitat—I consider that the base case projection accounts adequately for constraints on the timber supply that may reasonably be expected from appropriate management of wildlife habitat in the TSA.

- *identified wildlife*

Under the *Forest Practices Code of British Columbia Act*, Identified Wildlife are those wildlife species and plant communities that have been approved by the chief forester and deputy minister of Environment, Lands and Parks or designate as requiring special management. The province’s Identified Wildlife Management Strategy (IWMS) for dealing with endangered, threatened, vulnerable, and regionally significant species which have not been accounted for with existing management strategies, was announced February 19, 1999.

The following table is a November 1998 listing by the BC Conservation Data Centre of species that occur or may potentially occur in the Strathcona TSA, that are considered at risk or regionally significant:

Endangered/threatened (red-listed)	Vulnerable (blue-listed)	Regionally significant (yellow-listed)
Northern Goshawk* (<i>laingi</i>)	Great Blue Heron	Grizzly Bear*
Marbled Murrelet*	American Bittern*	Roosevelt Elk
Common Murre	Green Heron	Townsend’s Big-Eared
Sea Otter	Tufted Puffin	Bat
Northern Sea Lion	Vancouver Island	Wolverine (<i>luscus</i>)
Wolverine	Pygmy Owl	Fisher*
Vancouver Island	White-Tailed Ptarmigan	Vancouver Island
Marmot	(<i>saxatilis</i>)	Ermine
(<i>Vancouver-ensis</i>)	Surf Scoter	Orca (3 eco-types)
Keen’s Long-Eared	Western Screech-Owl	Tailed Frog* (coastal)
Myotis*	(<i>saturatus</i>)	
Vancouver Island	Pine Grosbeak (<i>carlottae</i>)	
Water Shrew*	Cassin’s Auklet	

Species with an asterisk* in the above table—as well as the Bull trout, Mountain Goat, Queen Charlotte Goshawk, and Sandhill Crane—are identified in the Strategy’s Volume 1 species list, occur in the TSA, and will require future consideration.

Identified Wildlife will be managed through the establishment of Wildlife Habitat Areas (WHAs) and the implementation of general wildlife measures, or through other management practices specified in higher level plans. Government has not yet established specific wildlife habitat areas or management strategies for particular identified wildlife species in the Strathcona TSA, but has set a one-percent limit to the provincial impact of managing for Identified Wildlife. Inventory work is underway in the Campbell River Forest District, with most effort currently directed toward the Queen Charlotte Goshawk, Marbled Murrelet, and Grizzly Bear. Mapping critical habitats for these species, and implementing WHAs for known locations will improve management of these species and reduce uncertainty for future timber supply analyses.

Public input included a request that management ensure all native species be maintained throughout their normal range and that no extirpations occur, without considering habitat provisions in proximate parks. In response, British Columbia's Forest Practices Code was established to help achieve responsible forest management objectives, which include maintaining species across their ranges and avoiding extirpations. The IWMS and the extensive combinations of forest cover requirements and winter range and riparian exclusions provided for in current management and accounted for in the timber supply analysis are intended to address these concerns.

Other public input, expressing concern that the base case did not account for Identified Wildlife, indicated dissatisfaction with the one-percent provincial limit on timber supply impact and requested that this impact at least be taken into account in the determination. In response, I note that in a recent study which projected the management impacts from expected occurrences of all species in Volume 1 of the Strategy, the total provincial impact on timber supply amounted to only one-half of one percent.

For this determination, it is not possible to specify the exact location or precise amount of habitat area that will be required within the timber harvesting land base to implement the Identified Wildlife Management Strategy. However, given the Province's commitment to implementing the IWMS, and given the policy decisions and projected one-percent impact—and noting the expected occurrence of identified wildlife in this TSA—it is necessary and appropriate to account for an expected but not fully quantified impact on the timber supply. Therefore I am accounting for a reduction of up to one percent in the timber harvesting land base throughout the forecast period, and I have taken this into account in my determination as discussed in "Reasons for Decision".

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The many rivers and streams of the Strathcona TSA are used for spawning and rearing by five species of salmon. These watercourses also support significant numbers of resident and ocean-run trout, including cutthroat and rainbow trout, as well as dolly varden. Steelhead is a particularly famed game fish. Vancouver Island has over 200 rivers containing steelhead, each run genetically unique, but the overall numbers of fish are small.

The Forest Practices Code requires the establishment of riparian reserve zones that exclude timber harvesting, and riparian management zones that restrict timber harvesting in order to protect riparian and aquatic habitats. Stream classes described in the *Riparian Management Area Guidebook* are determined, to estimate the area needed in riparian reserves and riparian management zones.

To support the Strathcona TSA timber supply analysis, BCFS staff reviewed a sample set of 13 forest cover map sheets, covering a total forested land base of 137 356 hectares, on which the presence of fish was indicated. The reserves and constraints specified in the Forest Practices Code *Riparian Management Area Guidebook* were applied and measured. After excluding inoperable and other areas unlikely to possess significant riparian considerations, a GIS-based approach resulted in a required riparian area reduction of 4470 hectares, or 4.6 percent on a forested land base of 96 985 hectares. Applying this ratio to the timber harvesting land base resulted in a total land base exclusion for riparian habitat in the TSA of 8370 hectares.

In public input, two licensees suggested the current riparian estimate may be too low, in comparison with figures derived for their tree farm licences. However, I note that the current riparian reduction represents a significant increase over the figure of 3092 hectares estimated for the previous (1994) analysis. Furthermore, the reductions are unique to the characteristics of any given area, and for the Strathcona TSA, the study method involved a large sample and in my view was quite comprehensive. Another licensee questioned the application of the 'S1' stream classification in the calculation, but district staff have reviewed the process and are confident the application is warranted.

I have discussed the estimation procedure in detail with district staff, including the district manager. Considering the substantial sample size, I am satisfied that the digitized accounting for widths and lengths of reserves and management areas is appropriate. Each of the 'S1' to 'S6' stream classes has produced a good approximation of the requirements to be anticipated, and I am advised that the results are consistent with current field experience. Since the figure derived for this analysis also includes riparian habitat for lakes and wetlands, whereas the previous analysis did not, the larger current figure is to be expected. I therefore consider the estimate for riparian habitat requirements as incorporated in the base case timber supply projection to be the best currently available information for the TSA, and appropriate for use in this determination.

- stand-level biodiversity

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

Stand-level biodiversity is managed in part by retaining reserves of mature timber or wildlife tree patches (WTP) within cutblocks to provide structural diversity and wildlife habitat. In considering stand-level biodiversity for this analysis, Table 20a of the *Biodiversity Guidebook* was used to derive an estimate of the required area of WTPs. In the data package, based on an assumed availability of 60 percent of the crown forest in the TSA for harvest, and on 50 percent of this area having already been harvested without WTP retention, a retained area of 8 percent for WTPs was assumed. In accordance with the *Forest Practices Code Timber Supply Analysis, February 1996*, it was then assumed that 75 percent of the WTP requirements will likely be met in unmerchantable or otherwise constrained forest types, and the 8-percent figure was reduced by 75 percent, to 2

percent. Thus in the analysis it was assumed that 2 percent of the area otherwise suitable for harvest in the TSA will be unavailable throughout the forecast period, to account for the contribution of WTPs toward managing for stand-level biodiversity.

Data recently acquired by district staff indicate that when the actual area available for harvest is derived by landscape unit, (once landscape unit objectives are designated), the weighted mean WTP requirement for the Campbell River Forest District is expected to be 9.6 percent. I am advised this figure can also be appropriately applied to the Strathcona TSA. Allowing for 75 percent of the WTP requirement in the TSA to be met from areas unavailable for harvest, results in an area requirement of 2.4 percent for WTP retention which is an increase of 0.4 percent over that assumed in the base case projection.

Public input on stand-level biodiversity included a comment that WTPs should be eliminated in favour of seral stage representation. However, WTPs contribute to biodiversity requirements at the stand-level, while seral stage representation contributes at the landscape level, and management at both scales is required. Another comment suggested that WTP requirements could be met entirely from outside cutblocks, but I am not satisfied that this would provide an adequate distribution of forest structure. It was also suggested that merchantable deciduous species and pine in mixed species stands should contribute either to volume counts or to stand-level biodiversity, and this is in fact the case, as the contributions of these species to biodiversity are already addressed in on-the-ground operations.

In review, considering that the original approach was based on a generalised TSA average, I am satisfied that the district's second approach, which is more refined and more geographically resolved, gives a more reliable result. I therefore accept that the base case projection has overestimated the size of the timber harvesting land base by 0.4 percent with respect to WTP requirements throughout the forecast period, and I have accounted for this in my determination as discussed in "Reasons for Decision".

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that this—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives as discussed throughout this document—will provide for the habitat needs of most forest and range organisms. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests.

Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices is needed to represent the different natural disturbance patterns under which ecosystems have evolved. Natural disturbance types (NDTs) vary from frequent wildfires in the dry interior regions to rare stand-initiating events (from wind, fire, and landslides) in the wetter coastal regions. In accounting for landscape level biodiversity in the analysis, a number of modeling assumptions were made which are discussed below.

biodiversity emphasis options:

Delineating and formally designating “landscape units” is a key component in the strategic management of biodiversity at the sub-regional level. *The Forest Practices Code of B.C. Biodiversity Guidebook* outlines three biodiversity emphasis options—low, intermediate and high—for application in establishing biodiversity management objectives (BEOs) for a landscape unit. Each option is designed to provide a different level of natural biodiversity, and a different risk to the maintenance of elements of natural biodiversity, when finding an appropriate balance between biodiversity and timber supply in establishing the objectives.

In the absence of approved BEOs, in order to balance social and economic impacts against risk to biodiversity, the provincial policy identified in the *Biodiversity Guidebook* and currently incorporated in timber supply analyses is to create a weighted representation of old forest retention for each landscape unit or biogeoclimatic variant by weighting approximately 45 percent of the requirement for old forest area in the lower, approximately 45 percent in the intermediate, and approximately 10 percent in the higher BEO. Since final BEOs have not been formally designated for landscape units in the Strathcona TSA, this 45-45-10-approach was used in the base case analysis.

The Vancouver Regional Landscape Unit Planning Strategy has indicated recommended BEOs for each landscape unit, but these are still in draft form. For the landscape units located in the TSA, the proportions of low, intermediate and high BEO are 33.6 percent, 62 percent, and 4.5 percent, respectively. These percentages, although not yet formally approved, would change the weighted average old seral stage requirement (see immediately below) by less than 1 percent.

In public input, licensees suggested that since landscape units and BEOs have not been finalised, the impacts of managing for landscape biodiversity should be included not in the base case analysis, but in a sensitivity analysis. However, it is for just these circumstances that the default emphases of 45,45, and 10 percent are prescribed, to enable the timber supply projection to account for a reasonable distribution of the old-growth forest across the TSA.

seral stage requirements

Government policy as documented in the *Biodiversity Guidebook* and the August, 1997 direction from the deputy ministers of the ministries of MELP and MoF, requires that to the extent possible, the requisite areas of retained cover for landscape-level biodiversity management should be located in areas that are already constrained from harvesting, for example in inoperable areas or riparian reserves. Government policy also permits old forest requirements for areas with low BEOs to be met within three 70-year rotations, phased in one-third at a time.

In the base case analysis, weighted average old-seral requirements were applied to each landscape unit, based on the assumed 45-45-10 proportions for low, intermediate and higher BEOs. For most of the Strathcona TSA, forest outside the timber harvesting land base is expected to provide most, if not all, of the requirements for old or mature seral stage forest cover by the end of the forecast period. The base case forecast is also relatively insensitive in the short and mid terms to different applications of biodiversity requirements, although some effects appear in the long term, when the early, mature-plus-old, and old seral stage guidelines by biodiversity option are applied. Because of the potential for these impacts the meeting of old forest requirements for low BEOs within three 70-year rotations, phased in one-third at a time, with no application of early seral guidelines for low BEO areas, was examined in a sensitivity analysis. This analysis showed that such a “drawdown” would result in only negligible benefits to the timber supply, in the long term.

In the Strathcona TSA, there are very few areas where the old growth outside the timber harvesting land base is insufficient to meet requirements, when measured at the biogeoclimatic variant level. In fact, many areas on the western side of the TSA will retain significantly more old forest than the minimum, due to contributions from inoperable areas. Also, landscape units that need to recruit a large number of hectares of old forest to meet biodiversity requirements, as in the Sayward supply block on the east side of the TSA, either have a large area of mature forest in inoperable areas, as in the Fulmore landscape unit, or, if they have no significant areas of old growth, and thus need to recruit from younger age classes, as in the Sayward landscape unit, they have sufficient areas of younger age classes in non-contributing forest types. Thus the “drawing-down” of old-growth retention targets in low BEO areas where insufficient cover is present, so as to meet the target progressively over three rotations, may not be operationally required in the TSA.

In the public input, a licensee suggested that a “ramping-up” of seral stage targets—i.e. the “drawing-down” of old-growth retention targets referred to above—is only permitted in areas of low-BEO, and should not be applied to areas of intermediate or higher BEO. This is in fact ministry policy operationally, as noted in the Deputies’ letter of August 25, 1997, and the analysis attempted to approximate this condition. In this case, as noted above, no drawdown may be required operationally in the TSA.

Public input also included a comment that non-timber values have not been protected, since protection of biodiversity may not impact timber supply by more than 4 percent, and the biodiversity provisions of the Forest Practices Code have been waived for hundreds of years, which presumably refers to the potential “draw-down” provision noted above. While the Code analysis report showed about a 4-percent provincial reduction to the timber supply due to landscape-level biodiversity considerations, local variations are expected. On the second point, I reiterate that it is likely the permitted “draw-down” in areas of low BEO will not be required. In addition in many landscape unit/variants combinations, a significant amount of forest above the minimum requirement will be retained as older forest on land outside the timber harvesting land base.

In summary, while the proportions of the areas in the recommended BEOs are not identical to the default values assumed in the analysis, because the base case projection was not dependent on the ‘drawdown’, the changes in BEOs are not expected to significantly affect the base case. Since forested areas outside the timber harvesting land base are expected to provide most of the requirements for old or mature seral stage forest cover by the end of the forecast period, maintenance of the required areas of old growth is not constraining to timber supply.

From these considerations I conclude that the representation in the base case of the provisions for management of biodiversity at the landscape level are consistent with the *Biodiversity Guidebook* and with provincial policy direction, and I do not anticipate any significant risk to the projected timber supply from implementation of the regional landscape unit planning strategy. On this basis, I am satisfied that the accounting for the management of biodiversity at the landscape level is suitable for use in this AAC determination.

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

Land use plans for Vancouver Island and the central coast

Vancouver Island Land Use Plan:

As noted above in *new protected areas*, with the exception of the relatively small area of Seal Bay which awaits formal designation, all new protected areas under the VILUP were accounted for in the timber supply analysis. The remaining zoning under the plan—for Special Management Zones (SMZ), General Management Zones (GMZ), and Enhanced Forestry Zones (EFZ)—and the associated objectives and strategies, are still in draft form pending presentation to Cabinet for consideration and approval.

Some of the proposed objectives for SMZs and EFZs are at variance with or incremental to Code requirements. In the event that such objectives become designated in a Higher Level Plan, potential timber supply impacts could result. To investigate these possible impacts, an analysis was completed in September 1998 by BCFS staff combining the proposed VILUP zones and objectives with the data used in generating the Strathcona base case. The analysis showed that timber supply reductions in SMZs were offset by timber supply gains in the EFZs, resulting in a forecast at the TSA level that was unchanged from the base case projection.

In another report, commissioned by the Vancouver Forest Region, the short-term implications for timber supply were examined for two draft landscape units in the Campbell River Forest District under the proposed zonation and landscape unit objectives for the VILUP. This report predicted that, for these two areas, the proposed zonation and objectives would lead to large short-term increases in timber availability in the EFZ, and small decreases in the SMZ. However, no correlation was provided from the two landscape units studied to the base case projection for the TSA, and the final stages of the VILUP zonation, strategies and objectives have not yet been formally approved. Therefore, while the study results provide an interesting review of some of the potential spatial and operational implications for timber supply of implementing the VILUP in these two areas, in consistency with the “Guiding Principles...” expressed earlier in this document

I will not attempt to extrapolate from these results to the Strathcona TSA as a whole, or to make any related adjustment to the base case projection for the TSA.

Public input included suggestions that the impacts of the plan should be included in a sensitivity analysis, and the two studies referred to above do provide some information in that regard. In my determination I have viewed the two studies as interim indications that the VILUP, if approved and implemented as proposed, may result in little overall change in the timber supply projected for the TSA as a whole, although some localized impacts may occur in particular areas, depending on the operational implementation of the resource management objectives for each SMZ, GMZ and EFZ. At this time I have made no adjustments to the base case projection in anticipation of any particular aspect of the plan.

Central Coast Land and Coastal Resources Management Plan:

The Loughborough supply block forms part of the area included in the CCLCRMP process, which could eventually affect the timber supply contribution of two small study areas in the TSA. These areas currently support younger, second-growth stands. Until the planning process is complete and approved I will not speculate on the associated implications for timber supply beyond noting that since the areas involved are relatively small it is reasonable to expect there will be no significant overall impact.

When more detailed information becomes available from formal approval of the VILUP and CCLCRMP processes, this can be accounted for in future timber supply analyses.

Other First Nations considerations

In addition to the information considered above in *cultural heritage resources*, I have also considered the following. As noted earlier, fourteen First Nations, ten of which are located in the TSA, have territorial interests in the Strathcona TSA. Five treaties, involving eleven First Nations, are currently being negotiated, and four of the five have reached the stage of Agreement-in-Principle (AIP). Of these, the Kwakiutl Laich-Kwil-Tach and the Homalco negotiations which relate to the Loughborough and Sayward supply blocks, and the Nuuchahnulth negotiations which relate to the Kyuquot supply block, could most directly affect the land base and timber supply of the Strathcona TSA. The Nuuchahnulth negotiations are currently in the land selection phase with an AIP expected to be complete by December 2000.

AIPs typically include provisions on forest resources, wildlife, fisheries and access as well as environmental assessment and protection on First Nations' traditional territories. To date, alterations to harvest plans to accommodate cultural heritage sites of significance to First Nations have not measurably affected the Strathcona timber supply. However, it is anticipated that the combined progress of the several treaty processes and related formal and informal interim agreements could very soon begin to affect the timber supply in the TSA.

As I have noted above in “Guiding Principles...”, in determining AACs under section 8 of the *Forest Act* it is inappropriate for me to speculate on land base and timber supply impacts that may ensue from either land use decisions or treaty agreements until such decisions or agreements are formally complete and implemented. Nevertheless, no AAC that I determine should be construed as limiting in any way the Crown’s obligations with respect to the conclusion of a treaty process, and no BCFS timber supply analysis or associated AAC determination should be interpreted as prescribing any particular pattern of harvesting activity in a TSA.

Input from the Ehattesaht First Nation included a request that any future reductions in the harvestable volumes of licences, that may result from AAC determinations, be taken from forest tenures with AACs in excess of 100 000 cubic metres or from the SBFEP allocation. While I understand the nature and cause of this concern in relation to the economic viability of a specific joint venture operation, under the *Forest Act* the responsibility for these matters lies with the Minister of Forests and I have no authority in this respect beyond the determination of the AAC for the whole TSA.

For the Strathcona TSA, I understand from discussions with district staff that there is a potential for imminent and significant timber supply impacts to result from informal ‘log-arounds’ related to expectations for interim agreements to protect land selections, well before the treaty processes are complete. It might appear reasonable to expect to account to some degree for such anticipated impacts in the current AAC determination. Again, I refer to my ‘Guiding Principles’. At this time I cannot speculate in this determination on anticipated impacts from any interim agreements arising from negotiations related to the forthcoming treaty agreements. I remind district staff of the possible utility of Part 13 of the *Forest Act* with respect to the potential for designating areas affected by AIPs. Otherwise, I will reflect the implications of any final treaty, once it is fully ratified, in a future determination.

Distribution of harvest levels among the three supply blocks

In my rationale for the January 1996 AAC determination for the Strathcona TSA, I included an instruction to monitor the distribution of the harvest levels among the three geographically distinct supply blocks in the TSA. Harvesting had historically focused on the Loughborough and Sayward timber supply blocks on the mainland and east coast of Vancouver Island, and most of the stands there are now relatively young and not fully available to harvest. Subsequently, harvesting operations had shifted to the Kyuquot timber supply block on the west coast of Vancouver Island, where most of the remaining mature (old-growth) stands were found. The timber supply analysis for the 1996 determination showed that as a result of this relatively recent concentration of operations in the Kyuquot supply block, harvest levels there would need to begin to be reduced, and correspondingly, increased in the Sayward and Loughborough blocks, in order to meet the overall timber supply projections for the TSA. That analysis indicated a first-decade harvest level in the Kyuquot block of 800 000 cubic metres, beginning in 1992. The actual harvest levels in the Kyuquot from 1992 to 1996 averaged about 1 000 000 cubic metres annually, but the current annual harvest commitment there has now been reduced to 865 314 cubic metres, which is clearly closer to the projected level of activity for the area.

The current timber supply analysis also examined the contributions from the three supply blocks. Although the harvest in the Kyuquot has already been reduced, much greater reductions are still required. Any projection for the Kyuquot which permitted maintenance of the base case in the short term leads inevitably at some point in the next five decades to an abrupt drop in the Kyuquot harvest to a small fraction (about 10 percent) of the present level, as harvests increase in the other two supply blocks. Analytically, the transfer of harvest from Kyuquot to the other two supply blocks in order to maintain continuity in the overall harvest level for the TSA appears straightforward. However, the pace at which this transfer of harvest proceeds, and the administrative means by which it is achieved, are matters of considerable socio-economic consequence with important implications for the licensing arrangements for timber harvesting in the TSA.

The relevance of these matters to this AAC determination lies in the need to assess the suitability of the scales at which sustainability in forest management may be applied in this area. For the TSA as a whole, a timber supply projection has been produced that includes a transition toward a long-term harvest level involving predictable reductions but without serious disruption. However, the acceptability of this overall projection relies on the acceptance of a rapid and significant dislocation of activity in one part of the TSA, and presumes the ability of the other areas to quickly absorb large increases in harvest. This raises the following problems.

In the Kyuquot, management options for reducing the harvest are constrained. Two separate licence agreements with First Nations are tied to activity in traditional territories that cannot reasonably be relocated elsewhere. Operational flexibility for the remainder of the harvest is restricted both by an agreement between a licensee and a First Nation on a sustainable rate of cut in a particular area, and by difficulty in locating cutblocks in watersheds in which CWAPS have been completed. Some watersheds with a high number of fish-bearing streams remain to be assessed.

In the Sayward and Loughborough blocks, difficulties with raising the harvest levels quickly include the complex urban interface and high recreational levels in the Sayward supply block, which require comprehensive planning, and the long history of harvesting in the Loughborough supply block, which has left the remaining old growth in dispersed areas that could be operationally complex to access.

These issues have aroused public interest and concern which was expressed in the input to this determination. Licensees and others have suggested that a partitioned component of the harvest in the TSA should be specified as attributable to the Kyuquot area, to achieve a sustainable harvest in that geographic area. In order to consider this option, I requested that analysis be undertaken to determine a level of harvest that could be sustained over the long term in the Kyuquot supply block alone. The results showed an even-flow, long-term harvest level of 425 000 cubic metres—about half the current level. To specify a partitioned cut for the area at that level in this determination would imply a very serious disruption in current operations, as well as either harvest increases in the other supply blocks that could not realistically occur, or a reduction in the base case projection for the TSA as a whole.

I have considered establishing a partitioned cut for the area at one of a number of higher levels up to the present harvest level, but any such determination could be considered arbitrary to some extent.

I have also considered the proportional reductions that would be expected to apply to the individual licences in the Kyuquot supply block through the provisions of the *Forest Act*, from an AAC reduction at this time for the TSA as a whole. For a reduction in the order of that projected in the base case, the harvest level in the Kyuquot supply block would be reduced to within the range projected in the base case for the area.

All these considerations may be summarised as follows. Due to the current age-distribution in the TSA, the maintenance of the harvest level in the TSA as a whole is dependent on relocating operations, and thus redistributing socio-economic benefits, between areas with geographically distinct communities. Analysis shows that even with this relocation, significant further reductions must occur at some point in the next forty to fifty years. The timing of these reductions is bound up with licensing arrangements, comprehensive planning, and issues of socio-economic equity. Establishing a specific partitioned harvest level for the Kyuquot would mean either setting a slightly reduced, arbitrary level that would not necessarily be consistent with licensing arrangements, or imposing a large reduction to achieve a locally sustainable level that would also significantly reduce the harvest level for the whole TSA.

From this I have concluded that the best option is not to impose a partitioned harvest level for the Kyuquot block, but rather to encourage district staff and licensees to co-operate in defining a strategy for an early and planned transfer of operations from that area, that will also accommodate requirements for First Nations to continue to operate in their traditional territories. I reiterate that the ability to achieve the harvest levels projected in the base case inevitably depends on the success of this transfer, which in turn also depends on the expedient completion of comprehensive planning in the Sayward and Loughborough supply blocks. In order to ensure the validity of the base case projection, I have therefore requested district staff to proceed at once with the requisite planning in those areas, as noted below under "Implementation of Decision".

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

Alternative harvest flows

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

The base case harvest forecast for the Strathcona TSA was defined according the above criteria, avoiding excessive changes from decade to decade and significant timber shortages in the future, either of which might limit future options. As noted in the analysis report, this base case forecast is dependent more on harvest flow choices than on available harvestable volume. Sufficient flexibility is provided in the definition of minimum harvestable age to enable a wide range of

possible harvest forecasts. The particular base case harvest forecast chosen represents a short-term harvest that is insensitive to a number of uncertainties and enables a short transition to the lowest projected harvest level while still maintaining a rise to the long-term harvest level equal to or less than the decline rates in the short term.

To assist me in my AAC determination, in addition to this base case harvest forecast, BCFS staff produced and assessed other harvest flow alternatives, which I have reviewed and from which I note the following.

Analysis showed that a technically feasible base case forecast would be to start at the current AAC, followed by reductions of 12 percent per decade for the next three decades, and one 8-percent reduction, to a medium-term harvest level 8 percent lower than that in the chosen base case. The subsequent rise to the long-term harvest level would then be 19 percent, compared to 10 percent in the chosen base case. While a first-decade harvest level at the current AAC would thus be feasible, it would also be far more sensitive to uncertainties and risks than the base case, and would depend on harvesting at the derived minimum harvestable ages to an extent that could compromise the long term harvest level.

In another projection, the harvest level was reduced immediately to the base case long-term level, a 25-percent reduction from the current AAC. Attempting to maintain an even flow at this level throughout the forecast period was not possible; major disruptions resulted in decades 11 and 12, as well as in the long term. To maintain a constant timber supply over the first 100 years, avoid the disruptions, and achieve the base case long-term level, the short-term level had to be set immediately at just over one million cubic metres per year; this is 29 percent below the current AAC and only slightly above the base case mid-term level. This analysis showed that significantly reducing short-term harvests can actually reduce mid-term supply by reducing the rate at which areas are brought under silvicultural management regimes that are projected to increase timber productivity.

In addition to these analyses of alternate harvest flows, a number of sensitivity analyses were performed which identified the highest achievable starting level under the conditions being examined in each case.

In making my determination, I have taken into account the feasibility of a higher starting level than that projected in the base case, together with careful assessments of the range of uncertainties related to specific considerations laid out in this document, as noted in "Reasons for Decision".

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

Timber processing facilities

Existing facilities: There are currently three medium-to-large sawmills in the Strathcona TSA. In total they employ 580 people and process about 960 000 cubic metres of timber annually, about 20-to-30 percent of which originates in the Strathcona TSA. Within the past year the Campbell River Mills operation, formerly employing 125 people, closed down. In the Campbell River-Courtenay area there are currently five to ten small sawmills, a pole yard and several shake and shingle mills, which together process annually 180 000 cubic metres, about 20 percent of which comes from the Strathcona TSA. Timber for a large pulp mill near Campbell River is obtained mainly from tree farm licences and private land. The Bowater Pulp Mill near Gold River, which formerly employed 320 people and processed annually approximately 260 metric tonnes of pulp, closed earlier this year. District staff estimate roughly 20 to 30 percent of the mill's input came from the TSA. On average a maximum of about 30 percent of the TSA timber is actually processed in the TSA. Thus any socio-economic impacts from an AAC reduction would be more regional than local in nature.

Proposed facilities: District staff report that the demand to process more timber locally is growing, and that with the closure of Campbell River Mills and the Bowater pulp mill, municipalities are looking for ways to regenerate employment in the milling industries. However, so far only a small fraction of the 1.4 million cubic metres sold under the SBFEP Value-Added program has remained in the area for local processing. A recently awarded Value-Added timber sale in the Port McNeill Forest District is expected to employ 60 people in a new remanufacturing plant in Campbell River. Various opportunities for timber related industrial activity in the Gold River area, to replace that lost with the closure of the Bowater mill, are being considered, but these face problems from the already fully allocated harvest in nearby portions of the Strathcona TSA, and no definitive proposals have yet been announced.

To review, the current AAC exceeds the existing mill requirements in the TSA, and an AAC reduction in the order of that implied by the base case projection would thus have a greater socio-economic impact regionally than locally.

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

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4).

This letter and memorandum together include references to forest investments, forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

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

I have reviewed the opportunities for commercial thinning, and, as discussed under “Incremental silviculture”, an active program has been underway in the TSA for many years. As noted there, this program has strategic benefits for operations in the Sayward area, but is currently not expected to significantly influence the overall available timber supply in the TSA. With respect to harvesting in previously uneconomic areas, as discussed under *inoperable areas*, I am satisfied that a recent operability mapping exercise, which included licensee participation, provides a suitable indication of the extent of the physical and economic harvesting potential in the TSA at this time, and this was reflected in the base case projection.

The Minister’s memorandum addressed the effects of visual resource management on timber supply. It asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. As discussed under *visually sensitive areas*, after support was received during public review of a VQO management strategy, district staff have already implemented measures to optimise the timber harvest in the TSA consistent with good visual management, in accordance with this policy direction from the Minister of Forests, and these measures were fully reflected in the base case analysis.

Local objectives

The Minister’s letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government’s broader objectives. The BCFS took a number of steps to provide opportunities for public review through the timber supply review process for the Strathcona TSA, including public opportunities to review the data package and the timber supply review analysis, and to respond to a public discussion paper. Numerous open houses and meetings were held to obtain feedback. In response, submissions were received from municipal and district representatives, licensees, First Nations, interest groups, and individuals.

Wherever possible, I have attempted in this rationale to respond briefly to the views expressed in the public input, and consideration of this input has been an important component of this determination. In particular, public input commonly included expressions of concern for the future of communities dependent upon timber harvesting in the Kyuquot supply block. The partitioning of a sustainable harvest for this area was proposed by several respondents and I have discussed this alternative in “Distribution of harvest levels among the three supply blocks”. Some of the concerns expressed in the public input are beyond my mandate for consideration under the *Forest Act*; for instance, under the Act the nature and viability of specific tenure arrangements are the responsibility of the Minister of Forests. First Nations requested that I establish sustainable and separate levels of cut by traditional territory. While it may be possible to identify a theoretically sustainable cut for a portion of a TSA, if implemented this could significantly affect the scale of operations in other parts of the TSA, and under the *Forest Act* I have the authority to determine AACs for entire TSAs or TFLs only. The District of Campbell River did not support the base case

projection which represents a large reduction when taken in combination with the reduction in the previous timber supply review. On the other hand, an environmental interest group maintained the base case “grossly overstates” what can be considered a sustainable rate of cut.

In review, the main themes represented in the input and to which I have responded were: Lowering or raising the AAC (see “Alternative harvest flows” and “Reasons for Decision”; separating out the harvest for the Kyuquot supply block (see previous paragraph); and maintaining opportunities for the non-forest-products economy (e.g. tourism, discussed in *visually sensitive areas*).

Regarding the definition of objectives for the area by the VILUP, as noted earlier, the protected areas under the plan are taken into account in this determination, but the objectives and strategies for management of the other various zones are still in draft form pending presentation to Cabinet for consideration. Cabinet’s decision will confirm what these objectives and strategies are to be, and these can then be taken into account in the next determination.

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

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire and disease that are not recovered through salvage operations. In regenerated forests, a number of parasites, fungi or plants can kill trees or degrade the quality and value of logs.

Estimates for unsalvaged losses account for epidemic (abnormal) infestations and for factors that result in losses that are not recovered through salvage harvest programs and are not recognized in yield estimates. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or through other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted under *volume estimates for regenerated stands*.

The estimates of unsalvaged losses in the Strathcona TSA used in the analysis were based on district records of events and subsequent salvage programs, and were as follows.

Cause of loss	Total loss (cubic metres/year)	Annual unsalvaged loss (cubic metres per year)
Fire	2500	1750
Windthrow	60 000	30 000
Disease	11 400	11 400
Total	73 900	43 150

The total estimated annual unsalvaged volume losses were deducted from the timber supply forecast in the analysis.

Public input included a citation of a devastating windstorm that hit north-west Vancouver Island in 1908, causing widespread blowdown. From this it was suggested that in view of the periodic nature of such events, the estimate of unsalvaged volumes was too low and should be raised. If such a catastrophic event were to occur on the timber harvesting land base, such 'losses' would largely be recovered, given the improved levels of access on the landscape today. Furthermore, given the unpredictable nature of any such event, the implications would have to be reassessed following salvage efforts. Since the figures used in the analysis are derived from actual losses, and are consistent with the estimates used in the previous (1996) timber supply review, I accept them as the best information currently available for use in this determination.

Reasons for Decision

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

The timber supply analysis base case projected an initial harvest level, starting from 1996, of 1.25 million cubic metres per year, a 12-percent reduction from the current harvest level of 1.42 million cubic metres per year. Following further 12-percent declines in each of the subsequent two decades, the medium-term harvest level of 970 000 cubic metres was projected to be maintained for 80 years before rising by 10 percent in the eleventh decade to the long-term harvest level of 1.07 million cubic metres.

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

The following factors have been identified in my considerations as reasons why the timber supply projected in the base case may have been underestimated to a degree that may be quantified:

- *Low-productivity sites:* Underestimation of the timber harvesting land base with respect to stands of lower than average productivity in which operations are expected to take place implies an underestimation in the timber supply in a range from 1 to 2.6 percent throughout the forecast period, with the greater impact in the longer term, and a timing of earlier impacts dependent on the relative proportions of the affected areas of young and old stands.
- *Regenerated volumes in managed stands:* The difference between current practice and the assumptions in the analysis with respect to spacing and stand densities is expected to result in higher stands volumes at the time of harvest than projected in the analysis, with a corresponding increase of at least five percent in the mid and longer term timber supply. The use of genetically improved seed, which was not accounted for in the analysis, will also affect regenerated volumes, and implies an underestimation of the timber supply by one percent in the mid and long terms. The combined implication from these two factors is an underestimation in the base case of over six percent in the mid and long terms.

- *Fertilization:* A one-time inventory increase of 555 000 cubic metres of additional volume from fertilization treatments, beyond that accounted for in the analysis, will be available beginning in 10 years' time.

The following factors have been identified as indicative of potential underestimations of the timber supply to degrees that currently cannot be quantified with accuracy:

- *Old-growth site index adjustments:* Applying the results of OGSi studies indicates the potential for substantial increases in the projected timber supply in the mid and long terms, in the ranges of something less than 10 and 14 percent respectively.

The following factors have been identified as reasons why the timber supply projected in the base case may have been overestimated to degrees that may be quantified:

- *Roads, trails and landings:* The base case projection was based on a timber harvesting land base that was overestimated by about one percent with respect to roads trails and landings. This affects the timber supply in the medium and long terms.
- *Woodlots:* Excluding the requisite area from the timber harvesting land base to account for awarded woodlot licences, and correcting for miscoded areas, leaves a net overestimation of approximately 1.4 percent in the timber harvesting land base used in the base case projection, on sites of better than average productivity, implying an overestimation in the timber supply of slightly more than 1.4 percent throughout the forecast period.
- *Identified Wildlife Management Strategy:* The base case analysis did not account for up to one percent of the timber harvesting land base that could be required throughout the forecast period to manage Identified Wildlife.
- *Wildlife Tree Patches:* Recent information shows the retention of WTPs will exclude an additional 0.4 percent of the timber harvesting land base from harvesting throughout the forecast period.
- *Existing stand volumes/Inventory audit:* The audit results indicate that the timber supply will be lower than projected in the mid term by approximately 50 000 cubic metres.

From reviewing my considerations related to the above list of factors identifying under- and overestimations at various periods in the projected timber supply, I have reasoned and concluded as follows.

The number of factors I have identified as influential in qualifying the validity of the base case chosen for my consideration for this TSA is in the higher range in comparison with many of the numerous determinations I have made in recent years. While the individual over- and underestimations are each identified separately as having a discreet implication for the timber supply, in fact some of these implications are interactive, and in combination are more complex to evaluate than would be implied by direct arithmetical treatment. In such cases, the outcome must be interpreted through professional judgement, taking into account the reasonableness of a range of subtle but important assumptions about these interactions. In the present case, some of the identified factors affect the size of the timber harvesting land base, and some affect the size and timing of the volumes available for harvest. In this situation, without relying on explicit calculation, in assessing the overall effect of the identified combination of factors on the timber

supply projection, I have attempted below to clarify the implications for the land base and for timber volumes, to relate these to the short, medium and long terms, and to note important interactions.

Rectifying the exclusion of low-productivity sites increases the derived timber harvesting land base by from 1 to 2.6 percent. On the other hand, the required removal of awarded woodlot licence areas reduces the harvestable land base by 1.4 percent. Managing Identified Wildlife may reduce the harvestable land base by 1 percent, and providing for wildlife tree patches may reduce it a further 0.4 percent. The apparent arithmetical result of these adjustments would be a very small reduction to the timber harvesting land base derived for the base case, which affects the short term timber supply. Correcting the deduction for roads, trails and landings decreases the harvestable land base for the mid and long terms by 1 percent.

Considering next the factors which directly affect projected timber volumes, adjusting the existing stand volumes following the inventory audit shows a mid-term timber supply reduction of 50 000 cubic metres from the base case projection, but this does not generally affect the long term level, which is a function of managed stand yield tables. On the other hand, adjusting site indexes to reflect the results of OGSi studies produces substantial increases, potentially up to 10 and 14 percent in the mid and long terms, though these figures are only indicative of trends and are likely to represent the maximum effects. The relationship between the OGSi implications and the mid-term adjustment to existing stand volumes is too complex for precise quantification, but from the information presented and from discussion with BCFS staff I consider it likely that a substantial increase in the mid and long terms will result, likely in the order of up to roughly 5 and 14 percent respectively. This would correspond to projected mid- and long-term levels of roughly 1.02 million and 1.23 million cubic metres respectively. Also, accounting for current practice which will lead to higher stand densities than modelled, as well as the use of genetically improved seed, results in mid- and longer-term volumes (or timber supply) at least six percent higher than projected in the base case. On top of this, a one-time inventory volume increase of 555 000 cubic metres from fertilization will become available in 10 years.

To the extent that those factors which directly affect the short term—i.e. low productivity sites, woodlots, and the identified wildlife management, and wildlife tree patches—may be meaningfully treated arithmetically, and to provide a perspective of the order of magnitude of the interaction of these factors, the net result would be a starting timber supply that is a small fraction of a percentage lower than that chosen for the base case projection. It is my judgement that these changes, on their own merit, are in fact insignificant.

Those factors which affect the mid term—low-productivity land base adjustment, old-growth site index adjustments, regenerated volumes, fertilization, roads trails and landings, woodlots, identified wildlife, wildlife tree patches, and the existing volumes as adjusted by the inventory audit—indicate in combination that the mid-term harvest level will be substantially higher, perhaps in the order of 8 percent or so, than projected in the base case.

Of those factors which affect the long-term supply, those indicating an overestimation in the base case (adjustments for roads, woodlots, identified wildlife, and wildlife tree patches) are easily outweighed by the magnitude of those indicating an underestimation (adjustments for low-productivity sites, old growth site indexes, regenerated volumes, stand density, and genetically improved seed), resulting in a substantial increase in the timber supply projected for the long term.

From my review thus far of the respective contributions of all the factors identified, and from detailed discussions with BCFS staff from the Campbell River Forest District and the Timber Supply Branch, I have concluded that there is a potential for additional contribution to the supply in the long term in the order of up to 20 percent in comparison to that projected in the base case timber supply projection. I have also concluded that the supply in the mid term is likely to be much more stable than projected. This information is highly significant in assessing the validity of determining the AAC at this time at the initial harvest level of the base case projection, a reduction of 12 percent from the current AAC.

As I have noted in “Alternative harvest flows”, analysis demonstrated that while it would have been possible to project a forecast with an initial harvest level set at the same level as the current AAC for ten years, this would require an 8-percent drop below the base case for 60 years in the mid-term. This projection was also much more sensitive to uncertainties in information than the projection starting 12 percent below that level (as shown in Table 3 of the *Strathcona TSA Analysis Report*). As explained in *volume estimates for existing natural stands*, this sensitivity is heightened by the mid-term implications of the inventory audit. I have also noted in *minimum harvestable ages* that maintaining the current AAC would require significant reliance on the base case minimum harvestable ages, and that repeatedly harvesting productive stands at the derived minimum harvestable ages would significantly reduce the long-term harvest level. In addition, as I have discussed, achieving the AAC in the TSA over the near to mid terms is dependent upon a satisfactory relocation of operations from the Kyuquot supply block to the eastern parts of the TSA. Maintaining the current AAC could reduce the operational flexibility required to resolve this complex issue. From these considerations I am satisfied that attempting to maintain the current AAC at this time would pose unacceptable risk to the short and mid term timber supplies.

However, the particular initial harvest level chosen for use in the base case, at 12 percent below the current AAC, was predicated on a planned series of reductions to a mid-term level that was lower than that which may now be reasonably expected. My considerations have identified that, in the transition to the mid term level, the overall harvest level reduction is likely to be smaller than projected in the base case. From this, I conclude that the initial harvest level in the base case represents the maximum reduction that would be appropriate to contemplate at this time.

From these considerations, I am satisfied that an appropriate AAC may be established somewhere between the current AAC and the base case initial harvest level. However, in moving from the base case to the current AAC, the risk to timber supply, in both the short and mid terms, increases in rough proportion to the increase above the base case level. I am also mindful that the timber harvesting land base has been reduced since the last analysis, through protected areas and the provisions of the Forest Practices Code, such that much of the area and volume used to support the current AAC is no longer available to do so. I must therefore remain cautious in my assessment of the degree to which the risks to timber supply are reduced. Accordingly, I must be cautious in assessing the appropriateness of a smaller immediate reduction than projected in the base case initial harvest level.

From all these considerations, I am convinced that the risk of maintaining the current AAC at this time is too high, but also that it is not absolutely necessary to reduce by the full amount shown in the base case. Any lessening of the AAC reduction to be applied at this point will beneficially affect the projected socio-economic impact, and will be consistent with the social and economic objectives of the Crown for the province as expressed by the Minister of Forests. From the information before me it appears reasonable to conclude that with the likelihood of a higher long-term harvest level than projected, and a more stable mid-term supply, it is possible to manage this stage of the transition from the current AAC toward the mid and long-term levels with only a 10-percent reduction at this time, rather than the 12-percent reduction chosen for the base case. This determination will in any case be reviewed within five years, and any new information regarding the management of the TSA at this harvest level can be taken into account at that time.

With respect to the deciduous component of the AAC, I have noted the high degree of uncertainty in the availability of suitable stands that are both environmentally acceptable and economically viable for harvest. Some of the stands previously considered as deciduous are now reassessed as either existing or potential coniferous stands, and their overall availability appears considerably reduced from earlier expectations based in inventory projections. From the assessment of these stands with which I have been provided, I am concerned that it may not be possible to meet the currently specified harvest level attributable to deciduous species, which is currently a partition of 16 000 cubic metres annually. In view of this, and since it is not my intention to unreasonably constrain the coniferous component of the harvest in this TSA, but rather to provide flexibility between the deciduous and coniferous harvests, I have decided to remove the partition specifying a particular harvest level for deciduous species. District staff should continue to work with the licensee to identify suitable stands where it is both environmentally appropriate, and possible to take economic advantage of the relatively short opportunity associated with the healthy lifespan of these species.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the Strathcona TSA at this time by establishing an AAC of 1 278 000 cubic metres, a reduction of 10 percent from the current AAC.

This determination becomes effective January 1, 2000, and will remain in effect until a new AAC is determined, which must take place within five years of the effective date of this determination.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important in helping to reduce the risk and uncertainty associated with key factors that affect the timber supply in the TSA.

- Continue to monitor the levels of performance on the various terrain stability classes, such that any appropriate adjustments to the percentage land base reductions may be made for consideration in future determinations;
- Study and report on the specific implications of old growth site index adjustments in the TSA, and the extent to which these have already been accounted for in the inventory;
- Continue to work closely with the licensee to identify economically viable and environmentally suitable opportunities for harvesting deciduous species.
- An early and comprehensive approach to land use and operational planning in the Sayward and Loughborough supply blocks is urgently required to accommodate the additional harvesting that must begin to take place in these areas consistent with the planned decline in the level of operations in the Kyuquot area.
- Resolve issues related to the mapping of 1194 hectares of wildlife habitat areas in the TSA.

A handwritten signature in dark ink, appearing to read 'L. Pedersen', followed by a horizontal line extending to the right.

Larry Pedersen
Chief Forester

September 28, 1999

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1996, Ministry of Forests Consolidation 1999, reads as follows:

8. Allowable annual cut

- (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for
 - (a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest agreement areas and woodlot licence areas, and
 - (b) each tree farm licence area.
- (2) If the minister
 - (a) makes an order under section 7 (b) respecting a timber supply area, or
 - (b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (1) (a) to (d),the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area
 - (c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
 - (d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.
- (3) If
 - (a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
 - (b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).
- (4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).
- (5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to
 - (a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area,

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

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

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

Purposes and functions of ministry

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

Documents attached:

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

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

Appendix 5: Summary of Public Information



File: 10100-01

JUL 28 1994

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

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

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

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

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

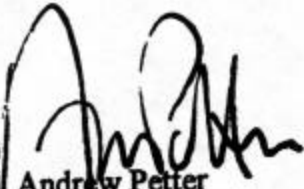
Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time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

.../2

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

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

Yours truly,



Andrew Petter
Minister



File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

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

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

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

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

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

.../2

Larry Pedersen
Page 2

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

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



Andrew Petter
Minister of Forests

Appendix 5: Summary of Public Information