BRITISH COLUMBIA
MINISTRY OF FORESTS

Soo
Timber Supply Area

Rationale for
Allowable Annual Cut (AAC)
Determination

Effective October 1, 2000

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Chief Forester

Table of Contents

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 Soo 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 Soo TSA lies within the Vancouver Forest Region and is administered from the British Columbia Forest Service (BCFS) Squamish District office in Squamish. The TSA surrounds the communities of Lions Bay, Squamish, Whistler and Pemberton, and is bordered by the Fraser, Lillooet and Sunshine Coast TSAs, as well as two Tree Farm Licences (TFL 10 and TFL 38).

The TSA includes many parks, such as Porteau Cove, Shannon Falls, Murrin, Brandywine, Nairn Falls, Birkenhead Lake, Joffre Lake, Stawamus Chief, Alice Lake, Pinecone-Burke, Indian Arm and portions of Garibaldi and Golden Ears Provincial Parks. New provincial parks and protected areas created as a result of the Lower Mainland Protected Areas Strategy include the Upper Lillooet River, Callaghan Lake, Sockeye Creek (now part of Birkenhead Park), Tantalus and the Brackendale Eagle Reserve. There are 17 designated recreation sites and 18 recreation trails in the TSA.

Of the 826 160 hectares in the TSA, 43 856 hectares are not managed directly by the BCFS, including the parks, ecological reserves, private land and various special use permit areas. An additional 483 392 hectares or approximately 59 percent are non-productive including rock, swamp, alpine areas and water bodies. Productive forest land managed by the BCFS is 298 912 hectares or approximately 36 percent of the total area. Further reductions applied to the productive forest land base result in 123 392 hectares or approximately 41 percent of the productive forest land considered to be available for timber harvesting.

The Soo TSA has a variety of terrain, ranging from the rugged coastal mountains to the valley bottoms of the Pemberton valley and the Squamish river estuary. This ecologically diverse TSA contains five biogeoclimatic zones, reflecting the significant range in climate and elevation. These zones are Coastal Western Hemlock (CWH), Mountain Hemlock (MH), Englemann Spruce Subalpine Fir (ESSF), Interior Douglas-fir (IDF), and Alpine Tundra (AT). Wildlife species are abundant in the TSA, ranging from large mammals through invertebrates and birds to extensive fish stocks. The major species include grizzly bear, mountain goat, moose, deer, marbled murrelet, spotted owl, northern goshawk, bull trout and five species of salmon.

The population of the Soo TSA according to figures from the 1996 census is approximately 26 000, with more than 80 percent of the residents living in the communities of Squamish and Whistler. Tourism is the primary employment sector for the TSA, and numerous international tourists visit the resort community of Whistler on a seasonal basis. Other communities within the TSA include Lions Bay, Furry Creek, Pemberton, Britannia Beach, Brackendale and the First Nations communities of Mount Currie and D'arcy. Forestry employment is supported by harvesting, silviculture, and the processing of wood products at several local area mills. In 1997, approximately 50 percent of the timber harvested in the TSA was processed by mills in the area. Eight First Nations, most of whom are involved in treaty negotiations, have traditional lands within the TSA.

History of the AAC

The AAC for the Soo TSA was determined in 1980 at 669 635 cubic metres. An adjustment to the TSA boundary in 1982 resulted in an increased AAC of 700 000 cubic metres. In 1989, the AAC was further raised to 705 000 cubic metres to permit harvesting of some deciduous volume under a temporary licence. In January 1992, the AAC was reduced by 19 percent to 580 000 cubic metres. This remained in effect until January 1996, when it was further reduced by 13 percent to 506 000 cubic metres, the level in effect today. The 1996 AAC determination included 96 599 cubic metres allocated to the Small Business Forest Enterprise Program (SBFEP).

The 1996 AAC determination also included a partition of 2500 cubic metres per year to cottonwood-leading forest types. The harvestable volume for the area is currently apportioned by the Minister of Forests as follows:

Apportionment	cubic metres/year	Percentage
Forest Licences – replaceable (3)	376 526	74.4
Forest Licences – non-replaceable	2 359	0.5
SBFEP Any Category (s. 20)	64 398	12.7
SBFEP Bid Proposal (s. 21)	32 201	6.4
Timber Sale Licences ≤ 10 000 m^3	19 190	3.8
Forest Service Reserve	6 585	1.3
Woodlot licences	4 741	0.9
Total	**506 000**	**100.0**

New AAC determination

Effective October 1, 2000 the new AAC for the Soo TSA will be 503 000 cubic metres, which includes a partition of at least 90 000 cubic metres to the helicopter-operable land base. This volume excludes all volumes allocated to woodlot licences since the 1996 determination. This AAC will remain in effect until a new AAC is determined, which must take place within five years of the effective date of the present determination.

Information sources used in the AAC determination

Information considered in determining the AAC for the Soo TSA include the following:

- *Soo Timber Supply Area (TSA) Data Package and Information Report, BCFS,* August 1997;
- *Soo TSA Analysis Report,* BCFS, August 1999;
- *Soo TSA Public Discussion Paper,* BCFS, August 1999;
- *Soo TSA Summary of Public Input on Data Package and TSA Analysis Report,* BCFS, June 2000;
- 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 (MELP), 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 and MELP, including the AAC determination meeting held in Squamish, November 17 and 18, 1999;
- *Soo Timber Supply Analysis*, BCFS, July 1994;
- *Soo Socio-Economic Analysis*, Crane Management Consultants Ltd., December 1994;
- *Soo TSA Rationale for AAC determination*, BCFS, October 4, 1995;
- *Forest Practices Code of British Columbia Act*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP;
- *Biodiversity Guidebook*, Province of British Columbia (B.C.), September 1995;
- *Riparian Management Area Guidebook*, B.C., October 1996;
- *Community Watershed Guidebook*, B.C., October 1996;
- *Draft Riparian Assessment Study*, Wildstone Resources, 1994;
- *Forest Practices Code Timber Supply Analysis*, 1996;
- *Identified Wildlife Management Strategy*, February 1999;
- *Sustainable Forestry or Timber Mining? Environmental Factors Affecting Tree Growth in the Mountain Hemlock Zone of Southwestern B.C,* BC Wild, April 1998;
- *Landscape Unit Planning Guide*, BCFS and MELP, March 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS and MELP, December 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 Soo 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 TSAs and TFLs. 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 consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is 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 of British Columbia Act* and its associated regulations (the Forest Practices 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 Forest Practices Code has been fully implemented since 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.

The eventual timber supply impacts associated with strategic 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.

Forest Renewal British Columbia (FRBC) 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 improved from 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 judgment 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 court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those 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 Soo TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

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

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

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 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 judgment, 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 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 judgment 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. Judgments 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 Soo TSA

The base case harvest forecast presented in the August 1999 timber supply analysis report for the Soo TSA incorporated the best available information on current forest management, land base and timber yields for the TSA. It included specific assumptions related to the following: the Forest Practices Code, including provisions for both stand- and landscape-level biodiversity; parks created as a result of the Lower Mainland Protected Areas Strategy; a review of helicopter-operable areas; scenic values; the Northern Spotted Owl Management Plan; and ungulate winter range. These issues are discussed in detail in the considerations presented later in this rationale.

With these and other appropriate factors incorporated, a 'base case' was generated and submitted for public review. The base case harvest forecast, which presented a non-declining even flow harvest level, indicates that the harvest can be maintained at the current AAC of 506 000 cubic metres for the entire analysis horizon.

Several harvest forecasts would have been possible for the Soo TSA, given the current management regime and assumptions made in the analysis. Some of the alternative forecasts are discussed later in this rationale under Alternative rates of harvest. Specific considerations which led to the choice of the base case harvest forecast included the following: establishing an initial harvest level at the current AAC; setting a timber supply contribution of 2000 cubic metres per year from cottonwood volume; and, setting a limit on the volume contribution from the helicopter-operable areas.

I have considered the reasoning used to select the base case and am satisfied that it provides a suitable basis from which to evaluate the assumptions regarding land base, management practices and timber yields.

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

Section 8 (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,

Land base contributing to timber harvesting

- general comments

The total area of the Soo TSA, as estimated from the 1997 inventory file data, is 826 160 hectares. Of this, 298 912 hectares, or 36.2 percent, are productive forest land managed by the BCFS.

As part of the process used to define the timber harvesting land base, a series of deductions are 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 harvest, for economic, ecological or social (e.g. parks) reasons. In the Soo TSA, the deductions result in a timber harvesting land base of 123 392 hectares, or approximately 41 percent of the Crown productive forest land.

The conventional timber harvesting land base has decreased by 11 823 hectares since the time of the previous determination, largely as a result of the creation of new parks and protected areas. However, due to the addition of a total of 26 450 hectares of helicopter-operable land base to the area assumed available for harvesting, the total timber harvesting land base has increased by 14 600 hectares since the previous determination.

My consideration of the deductions applied in the derivation of the timber harvesting land base is presented in the following sections of this rationale.

- economic and physical operability

Those portions of the TSA which are neither physically operable nor economically feasible to harvest are categorized as inoperable, and are excluded when deriving the timber harvesting land base. Current operability mapping was completed in 1992 and adjusted by district staff in 1998. Terrain stability mapping, which provides an assessment of the operability, has been initiated but not yet completed for the TSA. As it was incomplete, the data from the terrain stability mapping was not used in the analysis.

A total of 99 075 hectares or approximately 33 percent of the productive forest, was excluded as inoperable.

1) conventional operability

For the Soo TSA, an estimated 96 942 hectares of the timber harvesting land base are considered operable for conventional harvesting systems (ground-based and cable). This area is 11 823 hectares or approximately 11 percent smaller than that assumed in the previous analysis. The reduction in the size of the conventionally operable land base is due largely to the creation of parks, and to a lesser extent to other reductions such as those for deer retention zones and wildlife tree patches.

During the delineation of the helicopter-operable land base—discussed below under *helicopter operability*—several adjustments were also applied to the conventional land base to better reflect operability. The adjustments were performed using data on past harvesting activity and access road construction.

I have considered the information regarding the conventionally operable land base in the Soo TSA, and I accept that the data used in the analysis to define this land base is the best available information and suitable for this determination. However, in consideration of findings that terrain stability mapping has provided useful information on operability in other TSAs, I encourage district staff to complete terrain stability mapping for the remainder of the Soo TSA prior to the next analysis. The operability lines can be reviewed and where appropriate revised once the terrain stability mapping is completed.

2) helicopter operability

Stands which are not considered operable using conventional harvesting technology and road networks may be operable using helicopters.

At the time of the previous determination for the Soo TSA, I requested that district staff review the area classified as operable for aerial systems. District staff have since conducted a review of helicopter operability for the Soo TSA, and delineated a revised land base. Following other reductions noted in this rationale, the helicopter-operable portion of the timber harvesting land base totals 26 450 hectares—an increase from the 1458 hectares projected at the last determination.

The stands which comprise the helicopter-operable land base were identified using a two-phased approach. First, existing operability lines were revised using aerial and ground survey information. All stands with a previous helicopter harvesting history were assigned to the helicopter-operable land base. Current forest development plans (FDPs) were reviewed and stands projected to be helicopter harvested which were within two kilometres of a suitable helicopter drop location—estimated by district staff to be a reasonable operational distance—were also added to the helicopter land base. A total of 26 percent of the helicopter-operable land base was delineated using this information.

The next step in defining the helicopter-operable area was to consider environmental sensitivity as well as productivity, volume and age data from the inventory file to exclude stands. Approximately 74 percent of the helicopter-operable land base was determined using the productivity, volume and age criteria. Prior to 1994, there was limited use of helicopter harvesting systems in the Soo TSA. Since that time, helicopter harvesting has become more prevalent. To determine an appropriate contribution to assume in the analysis, district staff evaluated past helicopter harvesting performance. This review resulted in the following base case assumptions: a maximum of 135 hectares per year for the first 20 years of the analysis horizon, and 160 hectares per year thereafter, could be harvested from the helicopter-operable land base. These constraints had the impact of reducing the maximum total annual harvest level obtained in the base case, as sensitivity analysis showed that if the constraints were not applied, the harvest flow would increase by 1.6 percent to 514 000 cubic metres per year.

Public input was received on both the data package and timber supply analysis regarding the assumptions about the helicopter-operable land base. These comments expressed concern about the economic viability of helicopter harvesting in hemlock and balsam stands, the low minimum volume constraints applied, and the potentially negative community impacts of increased reliance on helicopter harvesting.

The first source of uncertainty identified involves the economic viability of logging hemlock and balsam stands using helicopters. Approximately 30 percent of the helicopter-operable land base is comprised of such stands. District staff affirm that the majority of stands harvested to date by helicopters have had significant components of Douglas-fir or western redcedar. However,

International Forest Products Limited—the licensee with the greatest amount of experience in the district with helicopter logging—indicated that they have successfully harvested hemlock and balsam stands in the past. District staff reviewed the species composition for proposed helicopter blocks in the current FDPs, and compared the data to the profile of stands assumed to contribute to the helicopter-operable land base for the analysis. The FDP data indicated that 33 percent of the helicopter harvest is projected to occur in hemlock and balsam stands. The concern that helicopter harvesting of these species is not economically viable is therefore contradicted by the data on the proposed cutblocks in current FDPs.

The impact of removing the hemlock and balsam stands from the helicopter-operable land base was assessed through a sensitivity analysis in which the size of the helicopter land base was reduced by 50 percent, and the area harvested from that portion of the land base was restricted to 100 hectares per year for the first 20 years. The results of this sensitivity analysis indicate that the base case harvest forecast could be maintained for eighty years before decreasing by 8.6 percent to 462 500 cubic metres per year for the remainder of the analysis horizon.

Additional sensitivity analysis found that the base case harvest forecast could be maintained for ten years even if all of the helicopter land base was assumed to be unavailable for timber harvesting. In this sensitivity analysis, the harvest level drops in two steps after the first decade to a long-term level of 416 000 cubic metres per year, a reduction of 18 percent from the base case harvest level.

Another concern expressed during the public input period relates to the minimum stand volume assumed to be operable for helicopters. Several operators in the district did not believe helicopter harvesting in stands with volumes of 350 cubic metres per hectare would be viable. In the analysis, minimum stand volumes of 400 cubic metres per hectare were required for existing stands (equivalent to a site index of 15 metres), while 350 cubic metres per hectare were required for regenerated, managed stands. A review of stand volumes harvested by helicopter to date in the Soo TSA showed that, on average, stands with volumes of 650-700 cubic metres per hectare have been targeted. However, as mentioned previously, the majority of stands targeted to date have been Douglas-fir or western redcedar stands which would be higher volume stands. If the proposed cutblocks in the current FDPs—which include harvesting of hemlock and balsam stands—are indeed accurate then the average volumes would be closer to those assumed in the analysis.

It seems likely that harvesting practices in the past would have selected the most valuable, highest volume stands for helicopter harvesting, rather than the average stands. It is difficult to know with certainty the appropriate minimum stand volume required to economically conduct helicopter harvesting, as such criteria are strongly dependent on market conditions. It is similarly difficult to predict whether all hemlock and balsam stands in the helicopter-operable land base will in fact be viable for helicopter harvesting. As noted earlier, the minimum acceptable site indices for existing hemlock and balsam stands were increased to provide some accounting for merchantability concerns.

A third concern expressed through public input relates to the risk of placing heavy reliance on helicopter harvesting for timber supply. District staff reassessed the validity of the assumptions used in the analysis regarding the appropriate contribution to assume from the helicopter-operable areas, again using FDP data. Review of the FDP data from the past five years showed that an average of 100 hectares per year has been harvested by helicopter, and according to 1999-2003 FDP data, the projected harvest is 236 hectares per year. These values provide a range against which to measure the validity of the analysis assumptions. Upon review of the information, I believe that the assumptions are appropriate, and in any event the limits placed on the contribution

from these areas in the analysis reduces the associated risk. The potential contribution may indeed prove to be higher in future operational practice.

Finally, concern was expressed through public input that reliance on helicopter harvesting in the Soo TSA will lead to displacement of local workers, as small operators may not have the extensive capital or the expertise required for helicopter harvesting. I acknowledge this concern, but note that, as discussed later in this rationale under *partitions*, utilization of timber in helicopter-operable areas will likely be necessary to achieve a balance between socio-economic benefits and the constraints on the Soo TSA land base. Although sensitivity analysis showed there is no risk posed to short-term timber supply by a lack of performance in the helicopter-operable areas, the mid- and long-term harvest levels are dependent on contributions from this portion of the land base.

District staff believe the area projected in the analysis is a reasonable estimate of the area operable using helicopters in the Soo TSA, and is a much better estimate than that available for the previous determination. However, staff expect that the delineated land base likely represents the upper limit of area operable by helicopter at this time.

I acknowledge that there is still some uncertainty associated with the assumptions regarding the size of the helicopter-operable land base. It is possible that a more precise delineation would be achievable if aerial or ground survey data was used, rather than the more general forest inventory file data, to determine the entire land base. However, while the majority of public input indicates a general impression that the size of the helicopter-operable land base has been overestimated, some of the assumptions used in the analysis could equally have resulted in an underestimation in the size of the land base. For example, the 100 percent removal of those areas classified as having high environmental sensitivity for soils—as described under *environmentally sensitive areas*—from the helicopter land base may be excessive. Concerns with instability of these areas are primarily related to road building activities rather than harvesting, and areas harvested by helicopter have a much lower concentration of road access. Secondly, for the area determined through review of aerial and ground survey information and the existing operability lines—26 percent of the helicopter-operable land base—it was assumed that stands must be within two kilometres of a suitable drop location to be included. The constraint may be conservative given that operational experiences tend to indicate 2.5 kilometres or more is possible. I will discuss these factors further in ‘Reasons for decision’.

District staff point out that a review of the data subsequent to the analysis led to the discovery that 734 hectares of age class 7/8 height class 3 stands—which should have been excluded by the minimum productivity, volume and age criteria applied—were inadvertently included in the helicopter-operable land base. I will take into account the exclusion of these stands and the impact on timber supply under my ‘Reasons for decision’.

I am mindful of the uncertainties related to the size of the helicopter-operable land base, but I believe the criteria and methods used are reasonable and I commend district staff for their efforts. In addition, the manner in which the contribution to timber supply from these areas was modelled in the analysis—whereby limits were placed on the amount of area harvested each year and in particular near the beginning of the analysis horizon—reduces the risk associated with their inclusion. In any event, the results of sensitivity analysis show that any uncertainty about the contribution of the helicopter-operable area does not present a high degree of risk to short-term timber supply. My consideration of the risk to longer term timber supply, as well as the possible interaction of this factor with others acting primarily in the longer term, will be discussed in my ‘Reasons for decision’.

I encourage district staff to monitor operational performance—in particular with respect to species and volumes harvested—during the time for which this determination is in effect. Monitoring will provide critical information for the next determination regarding the soundness of the assumptions for this portion of the land base. I also recommend additional ground verification of the area, again to provide an assessment of the ongoing reliability of the assumptions.

- sites with low timber growing potential

In order to delineate the timber harvesting land base, sites with low productivity as a result of inherent site factors such as nutrient availability, exposure, excessive moisture, or that are not fully occupied by commercial tree species are excluded from the timber harvesting land base. In the analysis for the Soo TSA, minimum volume and site productivity criteria were used to identify low sites. A total of 22 530 hectares or 7.5 percent of the productive forest land base was excluded on this account.

Sites occupied by Douglas-fir-leading stands with site indices (height in metres at age 50) of less than 16 metres, and western redcedar-, hemlock-, balsam- and spruce-leading stands with site indices of less than 13 metres were defined as low productivity sites and excluded from the timber harvesting land base. These site index thresholds were defined based on requirements for a minimum volume in existing mature stands (350 cubic metres per hectare) and minimum productivity in immature stands (at least 350 cubic metres per hectare by 140 years of age).

As mentioned earlier, the minimum site indices for existing hemlock and balsam stands on the helicopter-operable land base were increased from 13 metres to 15 metres—or 400 cubic metres per hectare—to account for the higher value timber required to offset the higher costs of harvesting, which resulted in the exclusion of 8900 hectares of existing lower volume stands.

Separate criteria were applied for lodgepole pine-leading stands, of which there are approximately 10 925 hectares in the Soo TSA. In previous timber supply analyses, lodgepole pine-leading stands were entirely excluded as harvesting rarely occurred in these stands. However, in recent years there has been some salvage in stands infested by mountain pine beetle, and BCFS staff believed it appropriate to consider contribution from some portion of the stands. Damage from the beetles limits the economic viability of harvesting in poorer stands, and thus the minimum stand volume required in the analysis was 300 cubic metres per hectare (equivalent to a site index of 20 metres). Only 223 hectares of lodgepole pine-leading stands remained in the timber harvesting land base following these and other reductions. Although current performance in these stands is limited, the analysis assumptions which excluded all but the most productive of the lodgepole-pine stands seem reasonable, and I am satisfied that the inclusion of these stands does not pose a risk to timber supply.

For sites occupied by cottonwood, the assumptions applied in the analysis resulted in the removal of stands with existing volumes of less than 150 cubic metres per hectare, which equates to site indices of less than 20 metres. Cottonwood-leading stands will be discussed later in this rationale under *deciduous species*.

Public input from International Forest Products Limited requested a sensitivity analysis to evaluate the timber supply impacts of reducing the minimum volume thresholds to 300 cubic metres per hectare for most species. District staff note that stands with volumes of 300 cubic metres per hectare tend to be lodgepole pine-leading stands, and that the analysis did assume a minimum volume threshold of this amount which resulted in some contribution to timber supply from these stands, as described above. A low site threshold of 350 cubic metres per hectare is typically used

for all coniferous species except lodgepole pine within the Vancouver Forest Region. Review of cutting permit data in other TSAs, including the adjacent Fraser TSA, has confirmed that this is a reasonable minimum volume threshold.

Public input expressed concerns about the low productivity associated with sites in the Mountain Hemlock biogeoclimatic zone, which will be discussed later in this rationale under *mountain hemlock regeneration*.

I have reviewed the information regarding sites with low timber growing potential and note that the minimum volumes applied in the analysis seem reasonable and are consistent with values applied elsewhere in the region.

For this determination, I accept that the minimum values applied to exclude sites with low timber growing potential reflect operational practices and constraints. Overall, the limits seem to provide a reasonable balance between the various considerations discussed. I encourage district staff to continue to monitor performance such that any additional information can be incorporated into the next analysis.

- environmentally sensitive areas

An environmentally sensitive area (ESA) is an area identified as sensitive to disturbance and/or that has significant value for fisheries, wildlife, water and recreation resources. ESA information is used to identify land to exclude from the land base where more specific or detailed information is not available about a particular forest resource. The ESA ratings for soil sensitivity (Es), recreation (Er), regeneration difficulties (Ep), avalanche hazard (Ea), and wildlife (Ew) for the Soo TSA were reviewed during the 1991/92 reinventory.

ESA ratings are classified as E1 (highly sensitive) or E2 (moderately sensitive), and different percentage reductions are applied for each. The reductions applied in the analysis for recreation, wildlife and regeneration will be discussed later in this rationale under the appropriate sections. The discussion in this section will be related to the reductions applied in the analysis to account for sensitive soils and avalanche hazard.

The following reductions were applied in the analysis for sensitive soils and avalanche hazard: 90 percent of Es1 areas on the conventional land base and 100 percent of Es1 areas on the helicopter land base were excluded; 60 percent of Es2 areas on both land bases were excluded; and 60 percent of Ea1 areas were excluded. If the area classified as Es1 had harvesting history, it was assumed to contribute to timber supply.

There were 44 424 hectares classified as Es1, 485 hectares of which remained in the timber harvesting land base following other reductions. As described under *helicopter operability*, there is some uncertainty regarding the 100 percent reduction applied to these areas for the helicopter-operable land base.

International Forest Products Ltd. expressed the opinion that the 60 percent reductions applied for areas moderately sensitive to soil disturbance were excessive, based on experience in the adjacent TFL 38. The licensee stated that the reduction factor for the Soo TSA should have been decreased to 40 percent for these areas instead of the 60 percent used in the analysis.

I have considered the input and I believe it is premature to assume that the values from TFL 38 can be extrapolated to the Soo TSA. District staff note that there are terrain differences between the

units and are not certain that similar reductions would be appropriate. If the licensee is able to collect data localized to the TSA which would aid in quantifying a different reduction, then this information can be used in future analyses.

I have reviewed the information presented regarding soil sensitivity. While recognizing the uncertainty about the reductions applied to areas with moderately sensitive soils, for the purposes of this determination I consider that the ESA data constitutes the best available information, in particular because it is specific to the land base of the Soo TSA. However, I encourage district staff to complete the terrain stability mapping so that the information can be incorporated in the next analysis for the TSA. In addition, monitoring of operational performance may provide a better assessment of appropriate reductions which could be considered in a future determination.

- problem forest types

Problem forest types are typically defined as stands which are physically operable and exceed low site criteria and yet are not currently utilized or have marginal merchantability. These types are either wholly or partially excluded from the timber harvesting land base in the analysis.

1) deciduous species

Deciduous species which include broad-leaved species such as alder, cottonwood, birch, maple and poplar as well as larch form a component of many coniferous-leading stands in the Soo TSA. In the analysis, all of the deciduous volume in coniferous-leading stands except for that from cottonwood was excluded from the yield curves. In addition, all deciduous-leading stands—with the exception of cottonwood-leading stands—were excluded from the timber harvesting land base, for a total reduction of 3166 hectares.

Cottonwood volume in the coniferous-leading stands was assumed to contribute to timber supply, but contributes less than one percent to the total current inventory volume on the timber harvesting land base.

There are approximately 2695 hectares of cottonwood-leading stands in the Soo TSA, which occur largely in the lower floodplain areas near the major rivers, such as the Squamish River. In the analysis, cottonwood-leading stands with site indices greater than 20 metres were assumed to contribute to timber supply, for a total of 766 hectares or 0.6 percent of the timber harvesting land base. These stands contributed approximately 2000 cubic metres per year to the harvest levels throughout the analysis horizon.

The current AAC of 506 000 cubic metres for the Soo TSA includes a partition of 2500 cubic metres to cottonwood-leading forest types. However, no volume has been charged to the deciduous partition of the AAC for several years, and a forest licence attributable to these stands was surrendered by the licensee. District staff state that there is no demand at present for the deciduous volume in the Soo TSA.

Given the lack of harvesting performance in cottonwood-leading stands, and the lack of demand for the volume, I am satisfied that these stands should not contribute to timber supply at this time, and I will take into account the impact of excluding an additional 766 hectares from the timber harvesting land base. I also believe it is appropriate to remove at this time the existing partition of 2500 cubic metres per year to cottonwood-leading forest types. However, I do not believe that the impact of excluding the additional 766 hectares is equivalent to a 2500 cubic metre per year reduction in volume. The volume contribution assumed in the analysis from cottonwood-leading

stands—2000 cubic metres per year—was less than the full partitioned volume. Further, results of sensitivity analysis show that the current AAC of 506 000 cubic metres can be maintained for the 250-year analysis horizon without any volume contribution from deciduous-leading stands. My considerations of the impact of the removal of the cottonwood-leading forest types from the timber harvesting land base are provided in my 'Reasons for decision'.

I have also considered the importance of cottonwood-leading stands for the provision of habitat for wildlife species such as moose and eagle, as well as the sensitivity of the floodplain areas on which many of the stands occur. These considerations will be discussed later in this rationale under *wildlife habitat* and *active floodplains.*

2) unmerchantable stands

A second problem forest type identified in the Soo TSA is coniferous stands 141 years of age and older (age class 8 and 9) which are between 19.5 and 28.4 metres in height (height class 3). A total of 7872 hectares are occupied by these '831' and '931' stands. In the analysis, no reduction was applied explicitly to account for the 831/931 stands, as it was assumed that they would be removed in the reductions applied for low site productivity and operability. However, a review of the timber supply analysis data showed 1035 hectares of 831 and 931 stands remain on the conventional timber harvesting land base. District staff confirm that these stands are rarely harvested and should have been excluded.

I have reviewed the information regarding unmerchantable stands and am satisfied that it is appropriate to take into account the impact of excluding these stands from the conventional timber harvesting land base, and will discuss this under 'Reasons for decision'.

- roads, trails and landings

In the analysis, a percentage of the productive forested area was excluded to account for the permanent loss of productive land to roads, trails and landings. Separate estimates are made for existing and future to reflect both potential changes in road building practices and road network requirements over time, and the access that the existing network of roads will provide for future harvesting operations. Estimates account for the area that is permanently removed from the timber harvesting land base.

To account for existing roads, trails and landings in the Soo TSA, an average right-of-way width of 15 metres was applied to 4800 kilometres of roads, resulting in a total exclusion of 7200 hectares.

It was assumed that stands 80 years of age and younger had harvesting history and existing road networks, which were accounted for as described above. For future roads, trails and landings, the accounting for loss of productive forest land was applied to stands 81 years of age and older, after the first projected harvest of each stand. Data from the Integrated Silviculture Information System (ISIS) and the Major Licence Silviculture Information System (MLSIS) were used to prepare an estimate for future roads. A review of areas harvested since 1987 provided an estimated loss factor of 5.4 percent for the conventional land base and 3 percent for the helicopter land base. The total exclusion applied to specified age classes on the timber harvesting land base over time was 2827 hectares or 2.3 percent.

District staff state that the reductions applied for future roads may overestimate actual losses, given the presence of special resource management zones (SRMZs) for spotted owl on 21.3 percent of the timber harvesting land base (discussed further under *wildlife habitat*). Staff estimate that 17 to

20 percent of SRMZs will remain unroaded, which would imply that up to 4.3 percent of the timber harvesting land base may have been subjected to an overestimation of productivity loss. However, the application of the 2.3 percent reduction to this portion of the land base would have resulted in an overestimation of productivity loss of much less than one percent. Given that the percentage of land base affected is small, and that the reduction applied for future roads is also small and acts primarily in the long-term, I make no adjustments on account of this factor.

For this determination, I am satisfied that the accounting for roads in the analysis was reasonable and reflective of current practice.

- timber licence reversions

Timber licences (TLs) 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 reach a free growing condition, all future harvesting rights revert to the Crown and future harvests from the area contribute to the harvest for that TSA which contains the TL area.

Having reviewed the information regarding TLs, I am confident that the base case adequately modelled the reversion schedule given the information available. Even if the reversion schedule were to differ slightly from that expected, the land base involved is likely to be relatively small and in any event only mid-term timber supply would be affected. I expect that as information on this area becomes available it can be incorporated into a future analysis. I accept the modelling assumptions applied in the analysis to be reasonable for consideration in this determination.

- woodlot licences

The *Forest Act* requires AACs determined for TSAs to be exclusive of the volume contribution from areas in woodlot licences. When a woodlot licence is initially issued, the associated volume is allocated from an appropriate apportionment under the AAC for the TSA which geographically contains the woodlot. In the next AAC determination for the TSA, the total land base is reduced by the area of Crown land held in woodlot licences—including those issued since the previous determination—and the volume associated with any woodlot licences issued since the previous determination is excluded from contributing to the AAC for the TSA.

There are eight existing woodlot licences in the Soo TSA which comprise a total of 3076 hectares of productive Crown forest land and a combined total AAC of 10 321 cubic metres. The area and AAC allocated to these woodlots since the previous determination for the Soo TSA totals 871 hectares and approximately 3000 cubic metres per year, respectively.

In the timber supply analysis for the Soo TSA, a reduction of 2205 hectares was applied to the gross TSA area to account for woodlot licences. There was no reduction applied to the harvest level to account for the volume allocated to the woodlots since the previous determination.

The area in issued woodlot licences does not contribute to the TSA timber harvesting land base. I am mindful that the analysis assumptions regarding woodlots were not entirely reflective of current practice, and therefore in this determination I will account for the impact of a further exclusion of 871 hectares. I am satisfied that this can be accounted for by reducing my assessment of short-term timber supply by 3000 cubic metres per year, and will discuss this further under ‘Reasons for decision’.

- newly protected areas

Government released *A Protected Areas Strategy for British Columbia* in 1993, which describes the policies and process to protect 12 percent of the province. The strategy has two goals: representativeness (Goal 1) which protects viable examples of the natural diversity of the province, and; special features (Goal 2) which protect the special natural, cultural heritage and recreational features of the province.

The Lower Mainland Protected Area Strategy (PAS) was completed and approved by government in October 1996. Of the 23 new parks and protected areas designated under the strategy, five are in the Soo TSA. The following five newly protected areas were excluded during definition of the timber harvesting land base: Upper Lillooet Protected Area, Sockeye Creek Protected Area (now part of Birkenhead Park), Callaghan Protected Area, Tantalus Protected Area, and the Brackendale Eagle Reserve. All of these new protected areas have been officially approved through orders in council. For the timber supply analysis, the productive forest was reduced by 11 221 hectares to account for these areas.

I have reviewed the information presented and I am satisfied that there has been an appropriate accounting for newly protected areas in the timber supply analysis. I note that the amount of land base excluded to account for newly created protected areas is approximately 9 percent of the size of the timber harvesting land base in the Soo TSA. Upon review of the harvest forecasts presented for the purposes of this and my previous determination, I am mindful that the removal of the hectares associated with these newly protected areas has had a significant impact on timber supply which has only been mitigated by the additional contribution to timber supply from helicopter-operable areas, and will discuss this further under 'Reasons for decision'.

Existing forest inventory

The inventory data used for the timber supply analysis is based on a forest inventory completed in 1992 for the Soo TSA. For the analysis, the inventory was updated to 1997 to account for growth, disturbances such as harvesting and fire, and for silvicultural treatments.

To address uncertainties in the last AAC determination, I directed BCFS staff to complete an inventory audit prior to this analysis, which has been done. The audit reviewed the following: the mature component of the inventory, assessing differences between the existing inventory's estimate of mean mature volume per hectare for the TSA and a new estimate obtained from the audit samples; and the site index assignment for the immature component of the inventory. I will discuss the results of the audit under *volume estimates for existing stands* and *site productivity estimates.*

I have considered the information regarding current forest inventory and am satisfied that the data used in the timber supply analysis, subject to the discussion in the following sections, forms an acceptable basis for this determination.

- harvest rules and harvest profile

At the time of the previous determination, district staff had concerns about harvesting performance in poorer quality stands. The management strategy for the district prior to the implementation of the Forest Practices Code—which still formed a basis for operational practice at the time of the previous determination—placed a harvest priority on 'difficult' stands including poor quality

hemlock balsam stands. No specific harvest scheduling requirements for these stands were modelled in the 1999 analysis.

Public input on the analysis report from a consultant expressed concern about the elimination of the difficult stand requirements. District staff respond that the lack of performance in poorer quality stands which was present at the time of the 1995 determination no longer exists. Several factors, including the implementation of the Forest Practices Code, have acted to eliminate the concerns. Staff believe that the profile of stands on the timber harvesting land base is being harvested over time.

However, district staff express some uncertainty about the harvest rule used in the timber supply analysis. In the timber supply analysis, the harvest rule applied was relative oldest first, whereby harvest priority is placed on those stands which have aged furthest beyond their minimum harvestable age. Staff believe that this may not always reflect current practice, as different portions of the TSA are subject to varying management constraints which tend to dictate the choice of stands harvested. The district's forest management strategy includes an attempt to disperse the harvest over the available land base, and staff believe that current practice might be better reflected by applying different harvest rules to different portions of the land base.

However, while BCFS timber supply branch staff acknowledge that the relative oldest first harvest rule may provide an upper bound to timber supply, they also believe that a purely random rule may not accurately reflect actual harvest planning and operations. Timber supply branch staff note that many additional harvest constraints on the land base act in combination with the relative oldest first harvest rule, and the resulting harvest priorities may better emulate operational constraints than district staff believe. Forest cover constraints applied for various management emphases—such as visual quality, community watersheds, and spotted owl habitat—in combination with the analysis rules governing harvest from helicopter and conventional areas, also influence how the harvest rules select stands for harvest in the modelling.

Sensitivity analyses which evaluated the impact of applying random or youngest first harvest rules showed the base case harvest level declined after nine decades. Although it is uncertain which harvest rule should be applied to which portion of the land base, these results indicate that uncertainties regarding the appropriate harvest rule may reduce long-term timber supply. Application of a random harvest rule to the entire timber harvesting land base resulted in a 9 percent reduction to long-term harvest levels.

These results provide an assessment of the risk posed to timber supply by uncertainties in this factor. I have reviewed the information on harvest rules and believe that only monitoring and further analysis will provide the information necessary to determine which harvest rule best reflects current practice. Although the sensitivity analysis indicates short-term timber supply is not affected and that the initial harvest levels can be maintained regardless of uncertainties in this factor, I am mindful that long-term timber supply is sensitive to harvest rules, and will discuss this further in my 'Reasons for decision'.

I encourage district staff to monitor current practice over the term of this determination, to obtain more quantified information regarding harvest rules for the Soo TSA which might be useful for future analyses.

Two additional issues related to harvest profile are the lack of harvesting in cottonwood stands and uncertainties related to helicopter operability. These factors are discussed elsewhere in this rationale under *deciduous species* and *helicopter operability*.

- volume estimates for existing stands

Volumes for existing natural stands (in which species and stocking have not been managed) were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model (version 6.4a), which was developed by the BCFS Resources Inventory Branch. After a stand was projected for harvest for the first time in the analysis, future growth and yield was projected using managed stand yield tables. The exception to this was for the cottonwood-leading stands, where existing as well as future volumes were projected using VDYP.

As mentioned under Existing forest inventory, an audit was conducted on the mature component of the inventory which assessed differences between the existing inventory's estimate of mean mature volume per hectare for the TSA and a new estimate obtained from the audit samples. The results of the audit for the mature component of the inventory suggest that the inventory volumes, which reflect those used in the analysis are statistically acceptable for the land base as a whole. For the operable portion of the land base—as defined for the 1994 timber supply analysis—the volumes estimated by the inventory were closely matched by the audit results.

I have reviewed the information presented, including the results of the inventory audit and conclude that the existing natural stand yields as projected using the inventory and VDYP are suitable for this determination. I accept that the best available information was used in the analysis.

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. 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, which 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—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification System (SIBEC) suggest that actual site indices may be higher than those indicated by existing data from mature forests. In recent years it has been concluded from such studies that site productivity has generally been underestimated by the inventory file data; managed stands tend to grow faster than projected by inventory-based site index estimates from mature and old-growth stands.

In the Soo TSA, site productivity estimates for 41 percent of the timber harvesting land base are derived from data from stands older than 140 years of age. Approximately 20 percent of the timber harvesting land base is older than 250 years of age. No local studies have been conducted in the TSA to assess the accuracy of the site productivity estimates. As a result, no site productivity

adjustments were applied in the base case of the analysis. The potential impacts to timber supply from adjusted site indices were assessed by applying generalized site index adjustments in sensitivity analyses.

Three sensitivity analyses were performed to test the sensitivity of the base case harvest forecast to uncertainty about site index estimates. In the first analysis, site indices of Douglas-fir stands older than 140 years of age were adjusted using the generalized paired plot information. The second sensitivity analysis involved the application of paired plot adjustments, plus adjustments to the other species using the veteran tree study results. In the third sensitivity analysis, SIBEC information was used to re-assign site indices to all stands in the timber harvesting land base. In each sensitivity analysis, timber supply analysis inputs affected by changes in site productivity—managed stand volume estimates, green-up ages and minimum harvestable ages—were recalculated based on adjusted average site productivity.

For both the paired plot and SIBEC-adjusted sensitivity analyses, the harvest level immediately increased to 542 000 cubic metres per year, seven percent higher than in the base case. The long-term harvest level in both cases was 11 to 12 percent higher than in the base case. The sensitivity analysis in which the veteran study results—in addition to the paired plot results—were applied indicated an immediate increase of 13.8 percent to 576 000 cubic metres per year, and a long-term harvest level 28 percent higher than in the base case.

While these results show that timber supply in the Soo TSA is significantly sensitive to uncertainty in site productivity estimates, in respect of cautions expressed in the OGSI study, the forecasts provide an indication of general trends in the timber supply, rather than an accurate and precise projection of the timber supply. There are uncertainties related to the applicability of province-wide study results to the Soo TSA, to the inventory, and to the degree to which full site potential will be achieved. Although research has demonstrated that productivity of sites currently occupied by mature or old-growth stands will most likely be higher than currently estimated, results from studies specific to the Soo TSA are needed to provide a true assessment.

There is also uncertainty regarding the site index assignments on the inventory file for the younger stands in the TSA. The audit conducted in the Soo TSA assessed the accuracy of the data for the immature component of the inventory. Because the audit involved measurement of heights and ages for immature stands, which are used to calculate site indices, it indirectly provides an assessment of the accuracy of site index assignment. The audit results suggest that the site indices in the inventory file for stands between 21 and 60 years of age may be underestimated. For the 20 plots sampled in the audit, it was found that inventory site indices were accurate within 5 metres in only nine of the plots, and within 3 metres in only three of the plots. Stands aged between 21 and 60 years currently occupy approximately 23 percent of the timber harvesting land base in the Soo TSA. Again, local studies would provide valuable information regarding the current site index assignment for these stands.

No specific sensitivity analysis was conducted to assess the impact of increasing site indices for stands 21 to 60 years of age by 3 metres. The standard sensitivity analysis which evaluates the impact of under- or overestimations in managed stand yields, found that applying a 10 percent volume increase to all managed stands increased the base case harvest level by 6 percent to 534 000 cubic metres per year for the first 13 decades, where it reached a long-term level of 562 000 cubic metres per year. The results of the sensitivity analysis indicate that timber supply is quite sensitive to uncertainties in managed stand yields.

From these findings, I am confident that site productivity for older stands in the Soo TSA is underestimated to some extent by the inventory file data. However, the uncertainties around the degree to which the existing old-growth studies apply to this TSA make it difficult to predict the amount by which site productivity could be underestimated. My considerations of the implications for timber supply will be discussed further in my 'Reasons for decision'.

A study to derive the appropriate site index adjustments for the Soo TSA could potentially indicate significant timber supply benefits. The high probability that site productivity is currently underestimated, the strong potential for greater management flexibility and the immediate potential benefits to short-term timber supply all indicate a strong need for localized data for the Soo TSA that can be factored into future timber supply analyses.

- volume estimates for managed stands

To estimate volumes for managed stands, the BCFS uses the Table Interpolation Program for Stand Yields (TIPSY), developed by the BCFS Research Branch. For the Soo TSA analysis, managed stands were defined as all Douglas-fir-leading stands less than 30 years of age, all hemlock/balsam-leading stands less than 20 years of age, all other stands less than 10 years of age, and all stands which will be harvested in the future.

TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition in the stand. Operational adjustment factors (OAFs) are applied to account for small stocking gaps in stands (OAF1), as well as for 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.

Subject to the considerations discussed under *impediments to prompt regeneration*, I am satisfied that reasonable procedures were followed in the derivation of managed stand yield estimates.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has met minimum merchantability criteria. The minimum harvestable age assumption largely affects when second growth stands will be available for harvest. This in turn affects how quickly existing stands may be harvested such that a stable flow of timber harvest may be maintained. In practice, many forest stands are harvested beyond the minimum harvestable age due to economic considerations and constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife and water quality.

In the analysis for the Soo TSA, minimum harvestable ages were set at 90 percent of the age at which culmination of volume was expected to be reached, and varied depending on species and silvicultural treatment regimes.

In the previous timber supply review for the Soo TSA, minimum harvestable ages were set based on a series of product objectives. At the time of that determination, I encouraged district staff to further assess the economic viability of these product objectives prior to the next timber supply analysis. District staff have since reviewed the criteria for defining minimum harvestable ages, and note that current practices do not consider product objectives. Operationally, managed stands are harvested at a variety of ages depending on the specific resource values for the area.

Sensitivity analysis results show that harvest levels projected in the base case are relatively insensitive to changes in the minimum harvestable age.

Public input from two environmental organizations—the Association of Whistler Area Residents for the Environment (AWARE) and the Western Canada Wilderness Committee—stated that much longer rotation lengths should be considered to protect non-timber values. I note that the base case projection reflects forest cover constraints and other means for providing for a range of integrated resource management objectives. Subject to the various factors discussed throughout this rationale, I am satisfied that the timber supply analysis provides adequate accounting for riparian, wildlife habitat, soils, recreation, visual quality, water quality, biodiversity and other values, without a need to explicitly model longer rotation ages to protect these values.

Having reviewed the information presented regarding minimum harvestable ages, I am satisfied that the assumptions applied in the analysis were appropriate and suitable for use in this determination.

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

Expected time for forest to be re-established following harvest

- 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 timber supply analysis, regeneration delay is used to determine the starting point of tree growth for the yield curves which project volumes over time.

In the analysis for the Soo TSA, assumptions employed in the growth and yield and forest-level modelling reflected that operationally all planting was expected to occur within three years of harvest using two-year-old stock.

Subsequent to the analysis, a further assessment of current field conditions indicates that regeneration delay may be slightly shorter on 85 percent of the land base (planted areas) and slightly longer on 15 percent of the land base (naturally regenerated areas) than was assumed in the analysis. Additional review of operational records by district staff supports the assumption of a regeneration delay that varies between two and four years. I note that a review of the amount of area assumed in the analysis to be currently not-satisfactorily-restocked also supports this assumption. Sensitivity analysis results show timber supply in this unit is not sensitive to uncertainties in either green-up or minimum harvestable ages, which are the two measures directly affected by the assumptions about regeneration delay.

Although the data reviewed indicates that the analysis assumptions may have slightly overestimated the overall time to regenerate stands, the discrepancy is less than one year, and in any event timber supply is not sensitive to this difference. I am satisfied that there is no need to further account in this determination for this factor.

- impediments to prompt regeneration

Impediments to prompt regeneration not accounted for in the analysis could increase the uncertainty in the assumptions related to growth and yield which were used in the timber supply analysis.

The ESA data identified a total of 52 427 hectares in the Soo TSA as having a high likelihood of regeneration problems (Ep1). One hundred percent of these areas on the helicopter-operable land base, and 90 percent of the areas on the conventional land base, did not contribute to timber supply in the analysis.

According to district staff, the major impediment to prompt regeneration and free growing attainment in the Soo TSA is a moisture deficit resulting from a combination of either summer drought or high brush competition. District staff estimate that up to 80 percent of sites experience some brush competition, and this competition contributes to a moisture deficit for the regenerating trees. Staff state that, although the impediment does not generally impact regeneration delay for these stands, it does affect the initial growth.

Staff express concern that as a result of the brush hazard, the yields projected by the growth and yield model TIPSY may not be realized for all stands in the Soo TSA. As stated under *volume estimates for managed stands*, TIPSY projections are initially based on assumptions of full site occupancy and the absence of pests, diseases and significant brush competition in the stand. Although OAFs are applied in the modelling to account for the majority of these factors, no adjustments are applied to account for brush competition. Managed stand yield tables in TIPSY assume a base level of stand tending activity, including brushing, to reflect requirements under the Forest Practices Code to establish a stand free from competition (i.e. free growing).

District staff believe that some stands will exhibit a continuous lag in volume as a result of the brush, although the stands do ultimately achieve free growing status. The first measure of the concern occurs at the assessment of free growing compliance. District staff note that the first openings in the TSA have reached the late free growing date, and that extensions have been required for approximately 50 percent of the openings. Currently, approximately 20 percent of the sites in the TSA are brushed, and district staff estimate that 80 percent of sites require brushing treatment. A review of operational data from the past nine years shows brushing tends to occur after the third growing season, which staff believe is too late to realize a maximum response. BCFS Research Branch staff are aware of the concern but note that the problem is not well quantified to date, and expect information will improve before the next determination. Sensitivity analysis which evaluated the impact of a 10 percent reduction in managed stand yields showed no impact to the base case harvest level for the first 70 years. The impact of any uncertainties in managed stand yield estimates on timber supply is in the mid- to long-term, which assures me that there is time to find resolution on this issue without posing an immediate risk to timber supply.

The issues surrounding establishment of free growing stands are not isolated to the Soo TSA, and I note that some level of reconciliation will occur provincially between Forest Practices Code targets for these areas and operational practice. I expect there will be some resolution of the issues, including those around brush hazard, prior to the next determination for this TSA. Any considerations affecting timber supply can be factored into future analyses..

Although mindful that this is a provincial issue for which to a large extent clarity will come provincially, I encourage district staff to continue to monitor operational practices and to turn their

minds to the development of some stand management regimes which will assist in meeting targets considered to be more in line with the potential of their sites. District staff should work with BCFS Research Branch staff to better quantify their local concern and collect the appropriate data required, so that the growth and yield model can be adjusted if necessary to describe the conditions and practices of the Soo TSA. I am confident that the impacts can be modelled if the correct information is assembled to do so.

I am mindful that short-term timber supply is sufficiently stable that there is no risk posed to this determination from this factor, although there are potential impacts to timber supply in the mid- to long-term. I will discuss this further in my 'Reasons for decision'.

- mountain hemlock regeneration

The Mountain Hemlock (MH) zone comprises 62 470 hectares in the Soo TSA. Approximately 9200 hectares, or 15 percent of the forests in the MH zone, were included in the timber harvesting land base for the analysis. Approximately 7.5 percent of the timber harvesting land base in the TSA lies in the MH biogeoclimatic zone.

The Resort Municipality of Whistler expressed concern that stands in the MH zone were assumed to contribute to timber supply, noting the reforestation concerns with the zone. Their input recommended conservative harvest projections from the sites.

Concerns about the MH zone were also raised prior to the 1999 determination for the adjacent Fraser TSA. The environmental organization BC Wild in an April 1998 report stated that due to a number of factors which they consider to limit the suitability of mountain hemlock as a harvestable species, the entire MH zone should be removed from the timber harvesting land base in the Fraser TSA until the sustainability of management in this zone could be proved or disproved.

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 MH zone. In practice, the history of harvesting and regeneration in this zone indicates that a prudent and reasonable level of development can be sustained. District staff note that the majority of areas harvested to date in this zone in the Soo TSA have been successfully regenerated.

As stated in the rationale for the 1999 Fraser TSA determination, I have personally reviewed the condition of regenerating forests in the MH zone in that TSA. 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 Soo TSA. Based on the scientific study, district experience and my own observations, I believe that careful harvesting and management in the MH zone will address the concerns expressed in the BC Wild report and in public comments. I am confident that partial cutting and other management techniques will also continue to improve, thereby helping to address the concerns.

- 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. Where a suitable stand has not been regenerated and the site was denuded prior to 1987, the classification is 'backlog' NSR. All other NSR is considered 'current' NSR.

The Soo TSA has 572 hectares of backlog NSR and 2944 hectares of current NSR. The base case in the timber supply analysis assumed that all current NSR would be restocked within the regeneration delay time limits, and that the backlog NSR would be restocked within the next ten years.

District staff believe the assumptions regarding current NSR reflect current practice. However, they note that approximately 300 hectares of the backlog NSR is not economically feasible to treat, and will ultimately be reclassified to a lower stocking class. The remaining 272 hectares will be treated over the next five years.

I have reviewed the backlog NSR issues with the district staff. The 300 hectares, although not sufficiently restocked with commercial coniferous species, will have some level of stocking present even if these areas are left largely untreated in the future. I therefore conclude that the reduced stocking on these areas will place less than a 0.2 percent downward pressure on the long-term timber supply, and will discuss this further under my 'Reasons for decision'.

I encourage district staff to clarify the management objectives for these areas prior to the next timber supply analysis. Although the area is small, it would be desirable to have better information regarding the anticipated forest cover (i.e. species, stocking) for these areas in order to quantify how they might contribute to future timber supply and other values in the Soo TSA.

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

Silvicultural treatments to be applied

- silvicultural systems

In the analysis, it was assumed that all harvesting would be done using clearcutting silvicultural systems. Other requirements under the Forest Practices Code for riparian reserves and wildlife tree patch areas, as well as forest cover constraints related to green-up were also factored into the analysis and are discussed in the appropriate sections of this rationale. Reductions to account for wildlife tree patches included a reduction of 1.45 percent applied to the majority of the timber harvesting land base, and a reduction of 5 percent applied to those areas designated as spotted owl candidate areas.

The majority of harvesting in the Soo TSA has occurred through the use of clearcut silvicultural systems. However, district staff note that use of partial cutting systems in the TSA is increasing. In the 1999-2003 FDP, the SBFEP has committed to ensuring that at least 50 percent of the volume apportioned to the program will be harvested using partial cutting systems. Other licensees have committed that at least 10 percent—and in the case of International Forest Products Ltd., approximately 40 percent—of their volume will be harvested through partial cutting.

Current FDPs contain commitments to partially cut approximately 20 percent of the current AAC. Inclusion of the requirements in the special resource management zones (SRMZs)—where all harvest must employ partial cutting systems—brings the total harvest attributable to partial cutting in the Soo TSA to between 25 and 30 percent of the current AAC. District staff note that this percentage is expected to increase over time.

Although no specific studies have assessed the volume of merchantable timber retained on partially cut areas, district staff estimate that 10 percent of the volume is reserved following harvest.

Volumes retained serve to meet social expectations, provide habitat and refuge for fauna and flora, and increase structural complexity of managed stands.

Upon review of the information provided, I am satisfied that the assumptions applied in the analysis do not entirely account for the increased use of partial cutting silvicultural systems in the Soo TSA. In operational practice, it is expected that 10 percent of the volume will be retained on approximately 30 percent of the area in the short-term, which would equate to a 3 percent reduction to the timber harvesting land base.

There was no specific analysis to assess the impact of increased partial cutting on timber supply. However, the results of the sensitivity analysis in which existing stand volumes were reduced by 10 percent provides a measure of the impact of the increased volume retention in the areas. The results indicated that the current AAC could be maintained for two decades before dropping by 4.3 percent to 484 000 cubic metres per year until decade 14, when levels returned to the base case harvest level. I do not believe that the impact of increased partial cutting on timber supply would be of the same magnitude reflected in this sensitivity analysis. I am mindful that reductions applied in the analysis—such as those for wildlife tree patches, which equate to approximately 1.7 percent of the area—provide some accounting for the increased use of partial cutting.

In consideration of this information, I believe that the impact to short-term timber supply is most likely between 1.5 and 3 percent, if operational practices equate to 30 percent of the area harvested through partial cutting. In the longer term, if trends continue and the combination of pressures on the land base were to lead to exclusive use of partial cutting systems, the impact to timber supply would be as great as between 4.5 and 9 percent. I am mindful of this downward pressure and will account for it under my ‘Reasons for decision’.

- incremental silviculture

Incremental silviculture includes activities such as commercial thinning, juvenile spacing, pruning, fertilization, and the use of improved seed that are beyond the silviculture activities required to establish a free-growing forest stand.

There is minimal pruning activity in the Soo TSA—approximately 180 hectares annually—which was not factored into the analysis. The area involved is very small and in any event, pruning has been shown to improve quality of timber but not to impact on timber supply significantly. I am satisfied that no adjustment is required.

1) improved seed

The Forest Practices Code requires the use of improved (class A) seed from seed orchards for regeneration where available. Class A seed is the product of B.C.'s forest genetics program, which uses standard domestication/breeding techniques to select naturally occurring well performing trees.

The analysis for the Soo TSA assumed a 3 percent yield gain from the use of improved Douglas-fir seed. The adjustment was applied to the majority of the Douglas-fir yield curves, resulting in approximately 25 percent of the timber harvesting land base projected to be restocked with improved Douglas-fir over the entire analysis horizon. District staff note that class A seed is used for planting programs when it is available, and that the analysis assumptions regarding its use adequately reflect current practice.

As I have noted during determinations for other units, the use of improved seed has been shown to increase mid- and long-term timber supply. Sensitivity analysis for the Soo TSA which evaluated the impact of a 10 percent increase in managed stand yields showed an immediate 5.5 percent increase to harvest levels. The production, availability and usage of class A seed does not presently warrant the level of consideration shown by the sensitivity analysis. However, as the program expands, it does provide cause for optimism that timber supply could benefit from the further usage of class A seed. I accept that current practice has been adequately reflected in the analysis, and I encourage staff to continue to monitor trends such that any additional information can be used in future determinations.

2) fertilization and juvenile spacing

Fertilization is the application of nutrients in a stand to enhance the growth of individual trees. Over the analysis horizon, approximately 21 000 hectares of Douglas-fir stands—17 percent of the timber harvesting land base—were assumed to receive fertilization applications at 20, 30 and 40 years of age. District staff believe that the analysis assumptions regarding fertilization are reflective of current practice, noting that the current fertilization program in the Soo TSA treats approximately 1000 hectares annually.

Juvenile spacing involves cutting less desirable 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, and the volume does not contribute to timber supply. 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 and offering employment opportunities for small operators. The base case for the analysis assumed that all stands on good and medium sites, as well as some of the Douglas-fir stands on poor sites, would be juvenile spaced at a top height of six metres to between 500 and 700 stems per hectare.

An average of 900 hectares has been spaced annually in the Soo TSA over the past ten years. However, funding for juvenile spacing as well as other incremental silviculture work has been declining. District staff state that the assumptions in the analysis overestimate the area that will be juvenile spaced in the future.

Yield tables that assumed no juvenile spacing or fertilization activity were generated and compared to the yield tables used in the base case for the analysis. Very little difference between the treated and untreated regimes was found in the projected yield at the minimum harvestable age. Based on the results of this review, I accept that there is little risk posed to timber supply as a result of this uncertainty.

Incremental silvicultural activities, where rigorous economic analysis shows them to be appropriate, are integral components to a good forest management to achieve both timber and non-timber objectives. There are many potential benefits and I encourage staff to pursue their silvicultural goals where funding is available.

3) commercial thinning

Commercial thinning is a partial cutting silvicultural system in which some volume is removed from an immature stand after components of the stand have reached a merchantable size. The volume removed during the commercial thinning is sold and therefore contributes to timber supply.

Commercial thinning activity may not significantly affect overall timber supply but does increase flexibility with respect to timing and location of harvest.

No commercial thinning was assumed in the timber supply analysis, as there is very little conducted operationally in the Soo TSA. Commercial thinning is most appropriately conducted in 40 to 60 year old stands, and currently less than 10 percent of the Soo TSA timber harvesting land base is occupied by stands in this age class. District staff predict that commercial thinning will become a more appropriate consideration in 10 to 15 years, when more of the second growth stands approach the suitable age class. I note that the future implementation of a commercial thinning program, to the extent that markets are available, would be consistent with the district's strategic forest management objectives. As with all incremental silviculture activities, I recommend that district staff ensure that commercial thinning activities are subjected to ongoing and rigorous economic analysis to ensure that the cost of any program is offset by the benefits provided.

For the present determination, I accept that current practice has been appropriately reflected.

(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:

Timber harvesting

- timber utilization

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. The standards used in the timber supply analysis were consistent with values applied regionally and in other coastal units. District staff note that operationally for existing older stands the utilization standard for minimum top diameter inside bark is relaxed by 5 centimetres. However, I note that assessments in other coastal units have shown this variation in top diameter to have a negligible impact on yield at harvest.

Public input received from the Soo Coalition stated that the minimum dbh utilization standard in operational practice is 22.5 centimetres for existing stands, which is not reflected in the analysis assumptions. District staff disagree, noting that while all licensees may not fully utilize timber volumes to the minimum standard of 17.5 centimetres, it is the standard against which performance is measured. Any volumes above the minimum utilization standards that are left on site are noted during waste surveys and are billed to the AAC.

I have reviewed the information regarding utilization standards and am satisfied that the assumptions used in the base case are a reasonable representation of current practice.

- decay, waste and breakage

The VDYP model, which is used to project volume for existing stands, incorporates estimates of volume of wood lost to decay, waste and breakage. Decay losses are built into the volume estimates, while standard waste and breakage factors are incorporated into the analysis when developing VDYP yield curves. These estimates of losses have been developed for different areas of the province based on field samples.

District staff express uncertainty about the applicability of the standard decay, waste and breakage estimates to the older existing stands in the Pemberton Supply Block, which comprises a total area of 21 700 hectares and lies in the interior transition zone. The hemlock and balsam stands in

question are 250 years of age and older, and staff believe they have high levels of decay which are not accounted for in the standard provincial values. Field observations indicate levels of decay might be as much as 30 percent above the decay, waste and breakage factors used in the analysis.

No statistically valid data has been collected to determine the variance from the provincial values which occurs in these areas. These stands occupy 3505 hectares, or approximately 3 percent of the timber harvesting land base. None of the 831/931 stands inadvertently left in the timber harvesting land base—as discussed earlier in this rationale under *problem forest types*—are included in this area.

In the previous timber supply analysis for the TSA, the volume curves for the hemlock and balsam stands in the Pemberton Supply Block were reduced by 30 percent to account for this high level of decay. This adjustment was not applied in the base case of this analysis. Instead, a sensitivity analysis was performed which applied a 30 percent volume reduction to the stands in question, and timber supply was found to be unaffected. These results reflect the small timber supply contribution of these stands due to their lower volumes, and the small portion of the timber harvesting land base involved.

I am satisfied that the decay, waste and breakage factors used for the majority of the Soo TSA—with the possible exception of the Pemberton Supply Block—represent the best information available and are suitable for use in this determination.

With respect to the uncertainty about loss factors applied to the Pemberton Supply Block, I will take into account a small unquantified downward pressure on timber supply over the medium term, with a maximum value of one percent, and will discuss this further in my 'Reasons for decision'.

For future timber supply analyses, I encourage district staff to work with BCFS Resources Inventory Branch to refine the available data for these forest types. A province-wide study into decay estimates is being conducted in response to similar concerns in other management units regarding the applicability of the current estimates. The results of this study may result in better estimates of decay for the interior transition forest types in the Soo TSA.

(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/green-up

To manage for resources such as water quality and aesthetics, current harvesting 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 provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

The FSSIM timber supply analysis model does not represent the adjacency constraints explicitly. Rather, constraints are modelled implicitly by limiting the amount of area on which trees may be below a specified green-up height. Constraints were developed for each resource emphasis within the Soo TSA and applied in the timber supply analysis. For some portions of the TSA, forest outside the timber harvesting land base can still be expected to contribute towards forest cover requirements.

In the analysis for the Soo TSA, the IRM zone which was modelled covered 76.6 percent of the timber harvesting land base. In this zone, the restrictions for green-up were applied to the timber harvesting land base only, as these zones tend to be contiguous areas of primarily operable forest. The minimum green-up height used in the base case was 3 metres. No more than 33 percent of the timber harvesting land base in the IRM portion of each landscape unit could be less than 3 metres in height at any one time.

Some portions of the IRM zone were subject to greater constraints in the analysis to account for management considerations for visual quality, community watersheds, botanical forest products, spotted owl habitat and ungulate winter range, and these considerations are discussed separately in this rationale under the appropriate sections.

A number of sensitivity analyses were performed to assess the impact of the forest cover requirements used to approximate the effects of cutblock adjacency within the IRM zone. Sensitivity analysis showed that the area with trees less than 3 metres tall could be reduced from the 33 percent in the base case to as low as 20 percent with no impact on timber supply. An additional sensitivity analysis, in which green-up height was increased or decreased by one metre also showed no impact to timber supply. All of the sensitivity analyses suggested that within the range tested, any uncertainty regarding the application of the forest cover guidelines used in the model to represent adjacency requirements does not greatly affect timber supply.

District staff have reviewed the assumptions regarding green-up and adjacency in the IRM zone not subject to the other constraints mentioned above, and found the assumptions to be reflective of current practice in these areas. For this determination, I consider the assumptions regarding green-up and cutblock adjacency to be reasonable.

- visually sensitive areas

Careful management of scenic areas along travel corridors and near recreational sites is an important IRM objective. The Forest Practices 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 around the province. Managing for VQOs is significant in the Soo TSA due to the importance of tourism to the region.

To achieve VQOs, limits are placed on the amount of visible disturbance that is acceptable in visually sensitive areas. Guidelines to meet VQOs include setting a maximum percentage of a visual landscape allowed to be in a disturbed state at any one time, and setting visually effective green-up (VEG) targets that must be achieved before additional harvesting is permitted. VEG refers to the stage at which a stand of forested timber is perceived by the public to be satisfactorily greened-up from a visual standpoint.

In the Soo TSA, the Sea-to-Sky Highway Corridor (which covers the Highway 99 corridor from Vancouver through Whistler to Pemberton and Joffre Lake Provincial Park) has been made known under the Forest Practices Code by the district manager as a scenic area with established VQOs. The 3-Corridors Scenic Area—which includes the Birkenhead and Blackwater areas—has also been made known, but does not yet have established VQOs. There are several additional small scenic areas which have been made officially known in the TSA, including Fire Lake and Meager Creek, but which do not yet have established VQOs.

In the timber supply analysis, approximately 67 228 hectares, or 20.8 percent of the entire productive forest, and 23.4 percent of the timber harvesting land base, was assumed to be managed for VQOs. Zones were created for the areas with retention, partial retention and modification VQOs, and the constraints were applied as the maximum percentage of productive forest area in each landscape unit that could be occupied by stands less than 5 metres in height. The restrictions for green-up were applied to the entire productive forest land base because disturbance restrictions in visual areas apply to the entire viewscape regardless of operability. Values for maximum percentage of disturbance which would reflect current practice were determined using provincial guidelines for factoring visual resources into timber supply analyses. The percentage of the productive forest area which could be less than 5 metres in height at any one time was as follows:

- for the retention VQO zone, no more than 5 percent of the area;
- for the partial retention VQO zone, no more than 15 percent of the area; and
- for the modification VQO zone, no more than 25 percent of the area.

Consistent with provincial policy, the areas with established VQOs—such as the Sea-to-Sky Highway Corridor—were modelled with the visually sensitive area constraints applied. Several of the small unofficial scenic areas mentioned above had recommended VQOs delineated in the inventory file and were also included in the VQO zone. The 3-Corridors Scenic Area was modelled with IRM forest cover requirements because VQOs are not yet established for this area, and the recommended VQOs in the inventory file were not reflective of current practice.

The current policy in timber supply analysis is to model the permissible disturbances to the midpoint rather than the maximum of the ranges indicated in the guidelines, where there is no current practice—such as visual landscape design—to indicate otherwise. In the Soo analysis, permissible disturbance was modelled at the maximum of the indicated ranges to best reflect current practice. District staff now estimate that current operational practices indicate an average allowable disturbance somewhere between the midpoint and the maximum end of the range. However, a sensitivity analysis conducted to evaluate the impact of applying the forest cover requirements at the mid point for each VQO zone, instead of the maximum of the range (e.g., for partial retention allowing only 10 percent of the area to be covered with trees less than 5 metres in height, instead of 15 percent), indicates that timber supply is not sensitive in the short- or mid-term to uncertainties around this factor.

Public input from the Resort Municipality of Whistler recommended that green-up heights around Whistler be based on visually effective green-up in the presence of snow cover, given the high winter recreation values in the area. They note that snow packs often exceed 7 metres, and that a green-up height of 5 metres is not sufficient to protect the visual resource. District staff confirm that for portions of the Sea-to-Sky Scenic Corridor, future management will likely be more constraining than what was modelled, primarily as longer green-up times are contemplated. However, there have been no specific assessments yet conducted to assess an appropriate green up height to accommodate winter VEG concerns. Sensitivity analysis which tested the impact of

increasing VEG heights to six metres for the entire VQO area showed no impact to timber supply. As the Whistler area of influence is a small portion of the entire VQO area, it is unlikely that increasing the VEG height for that area to 7 metres would have an impact.

Although the 3-Corridors Scenic area was modelled with IRM constraints, rather than specific VQO constraints, district staff believe that this is reflective of current practice for the majority of the area. Staff anticipate that management in this area will continue to be consistent with the forest cover constraints applied for the IRM zone. In particular, the regional strategy to manage visual resource impacts on timber supply recommended less constraint in these areas in light of the increasing constraints in other more visually sensitive portions of the TSA.

Within the 3-Corridors Scenic Area lies the Harrison Lillooet Gold Rush trail, a heritage trail established under the *Heritage Conservation Act*. A management plan for the trail was recently finalized which commits the district to manage the visual resource along the trail according to the VQOs proposed in the 3-Corridors landscape inventory. Operational practice along this trail is therefore likely to be somewhat more constraining than modelled in the analysis; however, the trail covers a small area and there is not anticipated to be any impact to timber supply.

The Callaghan Valley was not considered visually sensitive in the analysis but district staff note there is increasing pressure to manage for visual resources in the area, in particular in relation to the bid for the 2010 Olympics which is discussed further under *new ski developments*. Future management in this area may require increased constraints in subsequent timber supply analyses.

Overall, district staff believe that the assumptions applied in the analysis regarding visually sensitive areas were appropriate and reasonably reflective of current practice. I have reviewed the information and am mindful that more area will likely become visually sensitive in the Soo TSA, given the increasing importance of the area as a tourism destination. However, I am also aware that the expected increased use of partial cutting systems will provide for increased management flexibility in these areas. In any event, I am confident that the harvest levels projected by the analysis are sufficiently stable in the short-term to not be affected by any increased constraints resulting from visual resource management. Furthermore, I am accounting for the increased levels of retention resulting from increasing the use of partial cutting in the TSA, as described previously under *silvicultural systems*, and this would at least partially mitigate, or already account for some of the impact of increasing visual objectives in the TSA.

I strongly encourage district staff to monitor the objectives for visual quality in the Soo TSA. Any additional information available over time can be factored into the next analysis.

- recreation

Recreation is an important use of the forests in the Soo TSA given the proximity to the Greater Vancouver area, the large number of parks in the area and the intensive use of the ski facilities in the Resort Municipality of Whistler. Recreation use includes backcountry and heli skiing, downhill skiing, hiking, rock climbing, fishing and hunting. Recreation use in the Soo TSA is very extensive and largely unregulated, and in recent years the level of use has begun to impact on other resource values of the area, including wildlife populations. Recently a licensing system was introduced in an attempt to regulate ecotourism and other commercial recreation activities.

In the analysis, data from both the ESA inventory and the recreation features inventory were used to account for recreation values. A 90 percent reduction was applied to areas classified in the ESA data as having a high risk of disruption to recreation values as a result of timber harvesting. Using

the 1995 recreation features inventory data, areas with high or very high feature significance were 100 percent removed from the productive forest land base. Areas classified with a recreation management class code of 1 (moderate sensitivity) in the inventory file were determined to be predominantly visually sensitive areas, and were modelled by applying the forest cover constraints for visual quality objectives.

The inventory file also delineated 3152 hectares of area under the outdated UREP designation (Use, Recreation, Enjoyment of the Public) which were excluded in the analysis. District staff believe that the majority of the area with this classification is no longer associated with recreational use and should not have been excluded.

District staff also indicate that there are a small number of hectares associated with recreation trails which were not explicitly accounted for in the analysis. However, I note that the area involved is very small and is not expected to impact timber supply, and thus I have made no adjustments on this account.

Recreation is a significant and increasing value in the TSA and as a result, there is some uncertainty as to whether recreation management activities modelled in the analysis will adequately represent future demands. The *1996 Recreation Management Strategy and Analysis Report* documents the increasing demands for both front- and backcountry recreation, largely related to population growth in the Greater Vancouver and Squamish Lillooet Regional Districts. A new recreation features inventory incorporating the results of this strategy is expected to provide an updated assessment of the impact to the timber supply prior to the next determination.

The Resort Municipality of Whistler suggests recreation requires special management in the Sea-to-Sky Corridor and wants to see greater emphasis placed on forest recreation planning by the BCFS. Discussion with district staff indicates to me that land base exclusions based on the ESA and recreation inventory data alone do not entirely account for the impact of recreation activities on the timber harvesting land base. However, there is also the matter of the exclusion of approximately 3152 hectares based on a now outdated classification as UREP areas. Although this classification is outdated, it is consistent with provincial policy to exclude such areas from contributing to timber supply, and I will not provide any adjustment to the timber harvesting land base on this account for this determination. I believe that the additional 3152 hectares excluded in the analysis provide greater assurance that recreation resource values have been reasonably well accounted for in this determination, in the absence of more recent recreation inventories.

I strongly encourage district staff to refine their information regarding recreation, including review of the UREP areas, so that better information can be incorporated into the next analysis. Given the rapidly growing demand in the Soo TSA, it will be important to update recreation features inventory data regularly.

- range

District staff note that range is not considered a major use in the TSA. The area near Pemberton is the only portion of the Soo TSA where range is a use of the Crown forest land. The timber supply analysis did not account explicitly for potential impacts to timber supply due to range considerations, and district staff state that the requirements for range values do not impact on timber supply. I accept the assessment of district staff and make no adjustments on this account.

- community watersheds

The Forest Practices Code provides a definition and management considerations for community watersheds. Approximately 3960 hectares or 3.2 percent of the timber harvesting land base is contained in 23 community watersheds. The areas were assigned forest cover requirements in the analysis consistent with the recommendations in the *Community Watershed Guidebook.* A constraint was applied as a maximum of ten percent of the productive forest area allowed to be harvested within a ten-year period, to reflect expected practices for all of the watersheds.

District staff note that the operational practices for three of the watershed areas—Pemberton Creek, Stawamus River and Mashiter Creek—may vary slightly from the assumptions in the analysis. These three community watersheds are now covered by two Integrated Watershed Management Plans (IWMPs). Both IWMPs contain requirements which exceed those under the Forest Practices Code, including 7 metre green-up heights, wider riparian reserve zones and 20 hectare maximum cutblock sizes. There has been little harvesting activity in these watersheds in the past few years, operational practices for these three areas are expected to follow the recommendations of the plans. The three watersheds comprise 2054 hectares, or 1.6 percent, of the total timber harvesting land base.

Public input from Western Canada Wilderness Committee expressed the opinion that none of the area associated with the 23 community watersheds should be assumed available for timber harvesting. However, district staff note that this would not reflect current practice which allows for harvesting in the community watershed areas in compliance with the Forest Practices Code management restrictions to protect water quality.

In the analysis, only 35 percent of the area in community watersheds are assumed to contribute to timber supply, and in any event the harvest levels in these areas were constrained to a maximum rate of 1 percent of the area per year. As I am not aware of any information to suggest that protection of water quality in the TSA's community watersheds is dependent on complete exclusion of these areas from harvest, I am satisfied that management according to IWMPs and the requirements under the Forest Practices Code will adequately protect water values in the areas.

I am satisfied that the constraints applied in the base case account to a large extent for the management required in community watersheds. There is a possibility that the requirements resulting from the IWMPs may result in additional constraints for those areas covered by the plans. However, the extent to which any additional constraints may affect timber supply is uncertain, and in any event it impacts only 1.6 percent of the timber harvesting land base. I will not make any adjustments on this account in this determination. I encourage district staff to work with licensees and other stakeholders to implement existing watershed plans, so that any additional timber supply impacts which may become apparent can be factored into future analyses.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting, in order to protect riparian and aquatic habitats. For a stream, lake or wetland, the RMZ and RRZ make up the entire riparian management area. For streams, stream classes (e.g., S1) described in the *Riparian Management Area Guidebook* are determined based on presence of fish, occurrence in a community watershed and average channel width criteria. The stream class is used to estimate the area required to be

retained in the RRZ and the area or volume required to be retained in the RMZ. Similar criteria are used to classify and estimate RRZ and RMZ retention rates for lakes and wetlands.

In the analysis for the Soo TSA, average coastal figures from the *1996 Forest Practices Code Timber Supply Analysis Report*—which were derived using data from the *Wildstone Report*—were used to estimate the land base reductions required to account for RRZs. A total reduction of 6326 hectares or 4.8 percent of the timber harvesting land base was applied.

Comprehensive local stream and fish habitat inventories are not currently available for the Soo TSA. District staff believe that the reductions applied for RRZs in the analysis adequately reflect current practice. I am familiar with the data upon which the values used in the analysis were based, and note that the average coastal values have been found to correlate well for RRZs in other coastal units. I am therefore satisfied that the analysis used the best available information for estimating reserve zones, and make no adjustments on this account.

No reduction factors were applied in the timber supply analysis to account for RMZs. The *Riparian Management Area Guidebook* recommends an average 4.2 percent volume reduction applied to all yield tables to represent volume retention in RMZs. However, district staff believe that a 4.2 percent volume reduction is not reflective of the current practice for RMZs in the Soo TSA, estimating that practices would be better represented by applying an area reduction, since for many stream classes the RMZ is either entirely clearcut or a portion of it is entirely reserved. In the absence of specific local data, district staff are uncertain as to what area reduction would be reflective. I note that it is typically difficult to extrapolate values from one unit to another for RMZs because management practices can vary greatly.

While MELP staff agree that a percent area reduction somewhat less than 4.2 percent is reflective of current practice, they do not believe that the level of retention practiced adequately protects riparian resource values. In their opinion, past practices have not been consistent with the intent of the *Riparian Management Area Guidebook* for best management to protect riparian habitat. They believe that the timber supply review should provide accounting for RMZs consistent with the intent of the Forest Practices Code, and adequate to protect the resource values, even if this is in excess of the protection provided in current practice.

I am mindful that there is uncertainty regarding an appropriate reduction to account for retention in RMZs which would both reflect current practice and ensure adequate protection of the resource. Sensitivity analysis shows that there is little risk posed to short-term timber supply resulting from uncertainties in this factor, although mid- and long-term timber supply may be affected. It is clear to me that management in RMZs was not adequately represented in the base case, but some uncertainty remains as to the exact reduction which would be appropriate given current practices and the resource values associated with the riparian areas. This uncertainty will only be resolved by obtaining localized data. Given that resource values are anticipated to be high—in particular with respect to active floodplains and both moose and eagle habitat, as discussed elsewhere in this rationale—I will take into account the impact of an additional exclusion of 4.2 percent of the area, and will discuss this in my ‘Reasons for decision’.

I recommend that district staff ensure that the appropriate local stream and fish habitat inventories are completed prior to the next determination for the Soo TSA, so that greater certainty can be provided around this factor for the future. I also suggest that district staff should continue to review riparian management practices in the Soo TSA to ensure adequate resource protection.

- active floodplains

The *Riparian Management Area Guidebook* provides a definition of active floodplains, describes criteria for forest management in such areas and recommends that RMZs be extended to include the outer limit of the active floodplain. High water tables, frequent ponding and a complex network of sidechannels and backchannels create a very sensitive landscape for harvesting and a challenge for silviculture. The guidebook also recommends that the active floodplain be either entirely reserved from timber harvesting or that timber harvesting activities be heavily constrained.

The Squamish River and Upper Lillooet River—which are both classified as S1—have large active floodplains, although the total area is unknown. District staff believe that portions of the riparian area for both rivers likely meet the criteria for active floodplains under the Forest Practices Code, as the entire floodplain is subject to flooding on at least a five-year interval and the stream channels are very unstable.

No specific reductions were applied in the analysis to account for special management practices in the active floodplains in the Soo TSA. District staff believe that there has been limited harvesting to date in the active floodplain area of either river system. Should harvesting be proposed, staff believe it likely that RRZ requirements would be consistent with the classification of the S1 stream class, and management in RMZs would be determined based on the identified resource values.

As mentioned previously, the active floodplain areas tend to be occupied by cottonwood stands and also provide habitat for wildlife species such as bald eagle or moose. Given the importance of the area as habitat, as well as the likelihood that the stands consist largely of species not currently considered merchantable, I believe it likely that the active floodplain areas will not contribute to timber supply. I note that a large proportion of cottonwood stands are already excluded from the timber harvesting land base in the analysis. Having reviewed the available information, I am satisfied that the accounting for RRZs in the analysis, in combination with the additional accounting in this determination for cottonwood stands, RMZs and moose habitat, will adequately address the impacts of expected management and resource values in the floodplain, and I will make no further adjustments on this account.

I encourage district staff to clarify the management objectives for the floodplain areas around the Squamish and Upper Lillooet Rivers prior to the next determination.

- wildlife habitat

The Soo TSA supports numerous wildlife species, including approximately 130 species dependent on the characteristics of older forests. These include four species of amphibians, five species of reptiles, 93 species of birds and 28 species of mammals. Grizzly bear, black bear, black-tailed deer, mountain goat, cougar and gray wolf are among the species found in the TSA.

The Conservation Data Centre of BC maintains forest district tracking lists, which name those species and plant associations which are known to occur, strongly expected to occur, or which have occurred in the past within a given forest district. The Identified Wildlife Management Strategy (IWMS) addresses habitat management for certain of these at risk species, as described in the next section.

1) identified wildlife

'Identified wildlife' refers to species at risk (red- and blue-listed) and to regionally significant species which are potentially affected by forest management activities and which have not been adequately accounted for with existing management strategies, such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover constraints. Species at risk as defined under the Forest Practices Code also includes those species that are not considered at risk provincially but which have regional populations that may be threatened. The intent is that by addressing the habitat needs of 'regionally important wildlife' early on, the possibility that they will become listed provincially as threatened or endangered at a later date may be avoided.

Volume I of the IWMS was released in February 1999 and details several species which may occur and which require future consideration in the TSA, including the following: bull trout, tailed frog, rubber boa, American bittern, northern goshawk, marbled murrelet, pacific water shrew, Keen's long-eared myotis, fisher, grizzly bear, and mountain goat. Volume II, which has yet to be released, may identify additional species. The species identified in Volume I will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in higher level plans. Specific WHAs and GWMs for identified wildlife species have not yet been established in the Soo TSA. Based on data accumulated on the habitat requirements for the identified species, the estimated impact of management was projected at one percent of the short-term harvest level for the province. Government has committed to limiting the impact of management for identified wildlife to this level in the short-term.

The 1999 timber supply analysis did not account for identified wildlife in the base case, as no wildlife habitat areas have yet been established. When WHAs are established, and GWMs are implemented, the information can be incorporated into future analyses.

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 IWMS. However, given the Province's commitment both to implement the IWMS, and to limit short-term timber supply impacts to one-percent province wide, as well as the expected occurrence of identified wildlife in this TSA, it is appropriate to account for an impact on timber supply.

The timber supply reduction is expected to be less than or equal to one percent, although at this time the exact impact is uncertain. Although no specific sensitivity analyses were conducted to evaluate the impact of this reduction, other results, such as those assessing the impact of uncertainties in the size of the timber harvesting land base, indicate that there is not likely to be any impact to short-term timber supply due to this factor alone. For this determination, I am mindful of the downward pressure and will take this into account under 'Reasons for decision'.

Public input regarding northern goshawks stated that some constraints should have been applied in the analysis to account for the impacts of management for this species. District and MELP staff indicate that there has been a lack of resources to perform inventory work for wildlife species, and as a result goshawk nests are usually found late in the operational planning stage. This tends to have a significant impact operationally on licensees, although the restrictions are usually short-term in any one area. I note that this species is identified in the IWMS and thus the impacts to timber supply of its management will be within the one percent for which I am accounting in this determination.

I acknowledge the importance of established WHAs to assist with planning and to reduce operational conflicts between wildlife and harvesting. I encourage district and MELP staff to work together to improve the data available on northern goshawks and other wildlife species, such that WHAs can be delineated prior to the next determination.

2) bald eagle habitat

Bald eagles are a relatively common species in the Soo TSA and the Brackendale Eagles Reserve was set aside as part of the Lower Mainland PAS to provide habitat protection for the species. The rivers of the TSA provide habitat both for resident (year-round) and overwintering birds. The species is considered regionally significant in the Squamish Forest District but is not currently part of the IWMS.

There was no explicit accounting in the timber supply analysis for bald eagle overwintering habitat, as it was assumed that it would be largely accounted for through the reductions applied for riparian management areas and stand level biodiversity as well as through forest cover constraints and the protected areas.

An inventory conducted in 1996 and 1997 by MELP for the Squamish River watershed suggests that most prime overwintering habitat occurs along the major rivers in the TSA. It is likely that eagle habitat largely overlaps with RRZs, which were represented in the analysis, and RMZs, for which I am making an adjustment in this determination. BCFS staff indicate that specific management regimes have not yet been developed for eagle roosting areas. In current operational practice, no harvesting is permitted within the entire riparian management area of any stream that overlaps with a roosting area.

With respect to the resident bald eagles in the TSA, no nests have yet been identified in active harvesting areas. It is expected that operational buffers would be located around any nests should they be found, or alternatively that nests would be incorporated into riparian or wildlife tree reserves.

I have reviewed the information presented regarding bald eagles and note that it is clear a management strategy is needed for this regionally significant species. Completion of the inventory initiated by MELP may provide for better information for future determinations. That said, I believe that the exclusions applied in the base case for RRZs, wildlife tree patches, and cottonwood stands, combined with adjustments to be made in this determination for RMZs, moose habitat and cottonwood-leading stands will provide adequate accounting for the management to protect eagle habitat. I am satisfied that no additional adjustments are required on account of this factor.

3) spotted owl habitat

The northern spotted owl is found exclusively within the temperate coniferous forests of western North America, with its entire Canadian distribution limited to southwestern British Columbia. In 1986, the spotted owl was designated by the Committee on the Status of Endangered Wildlife in Canada as ‘endangered’, i.e. the owl is ‘threatened with imminent extirpation throughout all or a significant portion of its Canadian range’. Some of the estimated 100 pairs of owls identified in southwestern BC occur in the Soo TSA.

An extensive planning process for the management of spotted owl habitat was conducted jointly by the BCFS and MELP, which culminated in the release of the Cabinet-approved Northern Spotted Owl Management Plan (SOMP) in May 1997. The SOMP includes permanent protection of

potentially suitable owl habitat in existing and new protected areas, as well as Special Resource Management Zones (SRMZs) that are intended to allow for constrained timber harvesting in order to meet owl habitat objectives. The SOMP also applies to 'matrix' areas—those areas outside the SRMZs and protected areas that contain existing owls—which will be phased out over the next 50 years.

In the Soo TSA, the SOMP provides direction to establish eight SRMZs as well as two additional matrix areas. The SOMP requires Resource Management Plans (RMPs) to be developed for the majority of the SRMZ areas. Additionally, the SOMP specified that the long-term timber supply impacts resulting from approved RMPs was not to exceed 10 percent, based on the harvest levels projected for the Soo TSA during the timber supply review process completed in 1996.

One of the SRMZs identified in the SOMP falls within the boundary of Garibaldi Park. This area was assumed in the analysis to contribute to forest cover requirements only and did not contribute to timber supply.

In the timber supply analysis, four of the SRMZ areas covering 19 496 hectares, or 15.8 percent of the timber harvesting land base, were subjected to a forest cover constraint that required a minimum of 67 percent of the area to be covered at all times with trees at least 100 years of age. These areas were also subjected to specific wildlife tree patch constraints (as discussed under *stand level biodiversity*). The SOMP specified that RMPs are required for each of these four SRMZs.

The remaining three SRMZs, which cover 6787 hectares or 5.5 percent of the timber harvesting land base, were described as 'candidate areas' in the analysis, to reflect the intention under the SOMP that these areas be considered future candidates for the provision of owl habitat. In the analysis, the forest cover constraints for the IRM zone were applied to these candidate areas, and an additional five percent wildlife tree patch requirement was also applied.

The two matrix areas identified by the SOMP—also known as activity centres—are operationally subject to reduced rates of harvest for the next 50 years, after which they will no longer be managed for spotted owl habitat. In the preparation of information for the timber supply analysis, it was determined that the adjacency and green-up requirements of the IRM zone would adequately address the management constraints for these areas, and they were modelled as a separate analysis unit with the IRM zone constraints.

In total, approximately 26 000 hectares or 21.3 percent of the timber harvesting land base in the Soo TSA was subjected in the analysis to specific management constraints for spotted owl habitat. Since the timber supply analysis was completed, four SRMZ RMPs, as required under the SOMP, have been prepared. These RMPs were approved by the district manager and designated environmental official in July 1999. It must be noted that the SOMP and the approved RMPs currently have no legal standing under the Forest Practices Code, and a higher level plan still needs to be completed. Also, it is not clear to BCFS staff that the RMP requirements will be economically feasible to implement. The RMPs may be revised, if necessary, upon declaration of higher level plan objectives, and as their impact on timber supply is evaluated. District staff note that approval of the RMPs has allowed operational planning in the SRMZs to resume after 5 years of no harvesting. In the past year two blocks have been harvested according to the management guidelines outlined in the draft RMPs. Prior to this, no harvest had occurred in spotted owl areas since 1994. Due to the very limited harvest that has occurred under the direction of the RMPs, and very little experience which has been gained on the benefits of the RMPs, I cannot reasonably interpret the RMPs to represent current practice.

The RMPs detail management requirements that, according to district staff, are more restrictive than those modelled in the analysis. Timber supply branch staff agree that the requirements in the RMPs are likely more restrictive than the constraints applied in the analysis for the spotted owl areas. However, timber supply branch staff indicate that what was modelled in the analysis closely approximated the requirements of the Cabinet-approved SOMP. In fact, they believe the analysis might have been slightly more constraining for these areas than the requirements under the SOMP. In the SOMP, provision is made for limited partial harvesting in the SRMZs. The analysis modelled the SOMP by requiring 67 percent of the SRMZ land base to be covered at all times with stands at least 100 years of age, and no partial cutting was modelled. Partial cutting in the SRMZs is prescribed in the existing RMPs and is occurring operationally, although limited areas have been harvested to date. As noted previously, the economic feasibility of this method of harvesting in SRMZs will be clarified as the RMPs are implemented.

I am mindful that the candidate areas were subjected in the analysis to a WTP requirement of 5 percent in order to meet stand level biodiversity needs. This is likely in excess of the requirements of the SOMP, in particular given the other constraints on the SRMZ land base. I am also aware that the SOMP recommendations include a maximum impact to long-term timber supply of 10 percent. Upon review of the analysis assumptions, I am satisfied that they are reasonably consistent with the recommendations of the SOMP. Any constraints in the analysis additional to the requirements of the SOMP are small enough to be insignificant in terms of assessing the timber supply from these areas**.** As noted previously, the RMPs may require revision as their impacts on timber supply are monitored, and upon declaration of the higher level plan objectives. These revisions may be required to ensure that the direction provided by the higher level plan objectives are, in fact, being followed. From the information presented to me regarding the RMPs, I believe that the management regime arising from their implementation may well result in a timber supply impact in excess of 10 percent. In view of the current direction indicated in the SOMP, the RMPs may therefore require revisions once the higher level plan objectives are declared.

The information presented to me regarding the spotted owl indicates that planning and habitat management for this species are exceedingly complex. I believe that the requirements for spotted owl habitat modelled in the analysis accurately reflect the intent of the Cabinet-approved SOMP. It is not clear to me that timber supply will be more constrained than assumed in the analysis, with the continued implementation of RMPs, in particular because it is apparent that the current requirements in the RMPs are in excess of the allowable impacts under the SOMP. I am also mindful that in this determination I am accounting for the anticipated use of partial cutting in the owl habitat areas, as discussed under *silvicultural systems,* and I am satisfied that this will also account for the use of these systems in the SRMZs. In consideration of all of this, and also of the many constraints already applied to the timber harvesting land base within the SRMZs, I am not convinced it is necessary to account at this time for any additional constraints indicated by the current RMP requirements.

In conclusion, I am satisfied that the analysis has provided adequate and appropriate accounting for spotted owl habitat, and will make no further adjustments on this account. As better information becomes available through the declaration and implementation of the higher level plan, and the resulting implementation of RMPs in whatever form is consistent with the higher level plan objectives, then this can be reflected in future analyses.

4) mountain goat habitat

Mountain goats are relatively numerous in the Soo TSA and require specific management consideration, as they depend on patches of mature forest adjacent to escape terrain for their winter survival. To account for goat habitat, a reduction factor of 90 percent was applied in the analysis to both highly and moderately sensitive areas using ESA data.

Both MELP and BCFS district staff believe that the ESA inventory data understates the amount of goat habitat in the Soo TSA. MELP staff conducted aerial inventory work during 1997 and 1998 which they believe has provided better data on mountain goat habitat requirements. Data from the new aerial inventory indicates that the extent of habitat is substantially underestimated by the ESA data; for example, 228 mountain goat winter ranges were identified in the new inventory, only four of which currently have the ESA designation. MELP estimates that the TSA currently supports an overall mountain goat population of between 1000 and 1250 animals, and estimate that the area associated with the identified winter ranges could be up to 3000 hectares of primarily helicopter-operable timber harvesting land base. The management regime required to protect goat habitat is uncertain at this time.

BCFS staff have not been involved to date in any of the inventory work related to mountain goats and their habitat, and are uncertain about the implications to timber supply of managing for this species. They anticipate that a combination of land base exclusions with more constraining forest cover requirements would apply to these areas. Landscape- and stand-level biodiversity requirements may account for some portion of the habitat needs for mountain goats. Although goat natal areas are expected to be included under the IWMS, mountain goat wintering needs will not be addressed through the strategy.

Current operations in the Soo TSA have not encountered many goat habitat areas, given that they are largely located in the higher elevation areas where not much harvest has occurred. Where harvesting operations do overlap with known goat winter range areas, measures—such as imposing restrictions on the timing of operations—are taken to provide protection.

In April 1998, revisions to the Forest Practices Code Operation Planning Regulation (OPR) provided procedures for identifying and approving existing ungulate winter ranges through a process known as grandparenting. Operationally, areas identified in the ESA inventory as highly sensitive for goats (E1) have been grandparented as 'known' under the OPR section 68 provisions; however, no moderately sensitive areas have been grandparented. BCFS and MELP staff will be updating all ungulate winter ranges by October 2003.

I acknowledge the possibility that timber supply impacts resulting from mountain goat habitat management have not been fully accounted for in the base case. I am mindful that the resource values for this species in the Soo TSA are likely to be high, and that some accounting for anticipated impacts on timber supply is appropriate. However, given the preliminary status of the inventory, uncertainties about the overlap with the timber harvesting land base and the practices needed to ensure habitat protection, and the need to develop a plan, I will consider this as an unquantified downward pressure on timber supply, and I will discuss this further in 'Reasons for decision'.

I expect that development of management objectives will provide some clarity, and encourage MELP and district staff to pursue the development of a plan.

5) deer habitat

Since the previous determination, a draft deer habitat management plan was prepared for the Soo TSA by district and MELP staff. The district manager in October 1997 recommended to licensees that they use the draft plan as guidance when preparing operational plans in areas covered by the plan, pending its final approval.

For the analysis, the draft deer habitat management plan was assumed to be the best available information and reflective of current practice, and data from the plan was used in the base case instead of the older ESA data. The draft deer habitat management plan applies to a total productive forest area of approximately 21 000 hectares. It includes provisions for a retention zone which covers 5780 hectares of the productive forest land which was excluded in the analysis. The remaining area is contained in four additional zones—migration, selection, rotation and spring range—to which various forest cover constraints were applied in the analysis.

Some uncertainty has arisen since the analysis was initiated as to whether the draft deer habitat management plan will be implemented in its entirety. The grandparenting process for deer winter range under the 1998 OPR revisions was conducted in the district based on data from ESA mapping and the draft deer plan. A total of 3110 hectares were assigned to a retention zone, and various forest cover constraints were applied over an additional 1965 hectares under the grandparenting.

MELP staff compared the provisions in the draft deer plan to those in the grandparented deer winter range areas, and state that there are significant differences: the grandparented retention areas are approximately 47 percent of those proposed in the plan, while the grandparented area to which forest cover constraints apply was approximately 16 percent of that in the plan. In total, the grandparented areas cover approximately 24 percent of the area proposed in the draft deer habitat management plan.

The difference in the areas of retention between the draft deer management plan and the grandparenting process suggests that the timber harvesting land base is 1670 hectares larger than assumed in the base case. A sensitivity analysis which evaluated the impact of adding these 1670 hectares into the timber harvesting land base in combination with the reduced forest cover constraints associated with the grandparented area, found timber supply under a non-declining harvest rule could be increased by 6000 cubic metres per year over the entire analysis horizon.

International Forest Products Ltd. expressed concern that the provisions in the draft deer management plan were incorporated into the timber supply analysis without formal approval, indicating that they disagree with the extent and management of deer habitat projected by the plan. District staff note that little harvesting has occurred in the areas identified for retention in the draft plan since the district manager provided his recommendation to consider the draft plan when preparing operational plans. Recently, operational development has been approved in both the retention and forest cover constraint areas. MELP staff believe that the requirements in the draft deer management plan more accurately reflect current practice and more adequately protect the habitat values, than those laid out by the grandparented deer winter range areas. District staff believe that current practice is likely somewhere between the requirements in the draft deer plan and those under the grandparented winter ranges.

I have reviewed the information regarding deer habitat in the Soo TSA, and I acknowledge the uncertainty regarding what constitutes current practice for the management of deer habitat in the Soo TSA, as well as the status of the as yet unapproved deer habitat management plan. In any

event, I am satisfied that the constraints applied in the base case provide a reasonable accounting of deer habitat in the interim while plans are finalized. Base case harvest forecasts indicate that the current AAC can be maintained even with the additional constraints of the draft plan, and so I make no adjustment on this account. I will discuss my considerations of this in 'Reasons for decision'.

The OPR requires that ungulate winter range areas be reviewed and updated by district and MELP staff prior to October 2003. I strongly recommend that plans for deer winter range be finalized and implemented expediently so that the best possible reflection of current practice can be incorporated into the next timber supply analysis.

6) moose habitat

The Soo TSA represents the extreme southwestern edge of moose distribution within the province and contains a small moose population. Moose rely upon mature and old seral forest close to suitable floodplain forage areas for winter survival.

In the base case, 90 percent of the areas identified by the ESA inventory as highly sensitive for moose habitat (Ewm1) were excluded. None of the identified as moderately sensitive for moose habitat (Ewm2) were excluded during the analysis.

District staff estimate that approximately 75 percent of moose habitat delineated by the ESA data lies in riparian areas and/or cottonwood-leading stands. They believe that the reductions applied in the analysis for RRZs, in combination with the additional accounting in this determination for cottonwood stands and RMZs should adequately account for the majority of moose habitat. However, MELP staff state that preliminary inventory results indicate that the ESA areas—even if they had been entirely excluded in the analysis—do not adequately account for moose habitat in the TSA. In the absence of a completed habitat inventory, MELP staff accept that the exclusion of both highly and moderately sensitive areas would provide a better accounting for the habitat, which equates to exclusion of an additional 311 hectares from the timber harvesting land base.

I have considered the information and am mindful of the uncertainties around both the extent of moose habitat in the Soo TSA, and the overlap between the habitat areas and other reductions applied in defining the timber harvesting land base. I anticipate that the level of uncertainty will be reduced as better inventory information becomes available. District staff note that some portion of the areas identified in the ESA data as sensitive for moose were grandparented under the provisions in the OPR. These areas will be updated by district and MELP staff prior to October 2003.

For this determination, I will take into account the impact of an additional reduction based on the ESA data of up to 311 hectares, or 0.2 percent of the timber harvesting land base, and am satisfied that this will provide adequately for moose habitat. I will discuss this further in my 'Reasons for decision'.

I encourage district and MELP staff to determine objectives for the management of moose habitat prior to the next determination.

- botanical forest products

Botanical forest products are defined under the Forest Practices Code as any prescribed plant or fungus that occurs naturally on Crown forest land. In the Soo TSA, several areas are considered to be valuable habitat for pine mushrooms, where habitat management is conducted concurrently with

timber harvesting. The largest area is the Blackwater Pine Mushroom Management Area (BPMMA) near D'arcy, covering 867 hectares. The management plan developed for this area permits only selection harvesting.

In the analysis, the recommended management practices for pine mushrooms were simulated by applying forest cover constraints to a pine mushroom special management zone. District staff believe that the constraints applied in the analysis are a good approximation of the management required. However, they note that no harvesting has occurred within the BPMMA since 1992, largely because the area overlaps significantly with spotted owl habitat.

I note that—as discussed under *spotted owl habitat*—the constraints modelled for spotted owl areas are representative of the approved SOMP, and there has been an accounting for the specific management required in those areas. There is no reason for me to believe that these areas will not contribute to timber supply over the longer term. Having reviewed the information on pine mushrooms, I am satisfied that the management required was appropriately accounted for in the analysis. I commend the district staff for their efforts to approximate the specific management constraints for the analysis.

- cultural heritage resources

Cultural heritage resources include archaeological and traditional use sites. Archaeological sites contain physical evidence of past human activity, whereas traditional use sites may not necessarily contain historical physical evidence but may indicate current use by a First Nation. To help manage for unrecorded archaeological sites, archaeological overview mapping may be conducted to assign high, moderate or low ratings for archaeological potential within an area. An archaeological overview assessment (AOA) has been completed for the Soo TSA. In addition, some First Nations are currently conducting traditional use studies in the TSA.

District staff note that archaeological impact assessments are conducted for areas where cutblocks are proposed and the AOA identified high or moderate archaeological potential. So far, impact assessments have found few archaeological sites. Where sites are found—and the primary feature has been culturally modified trees (CMTs)—operations have avoided the sites, either by including the feature in a wildlife tree patch or riparian reserve, or by adjusting the cutblock boundary around the feature.

There was no explicit reduction applied in the timber supply analysis to account for cultural heritage values. It was anticipated that other reductions applied to derive the timber harvesting land base, such as those for riparian values or wildlife tree patches, would provide adequate accounting for these resource values. District staff note that approximately 55 hectares of archaeological significance in the vicinity of Ure Creek was excluded under the UREP reductions applied in the analysis, and state that the exclusion is consistent with current management for the area.

I have considered the information regarding cultural heritage resources and am satisfied that other exclusions applied in the analysis provide adequate accounting such that no explicit reduction is required to account for this factor. Any additional information which becomes available over time can be incorporated into future determinations.

- biodiversity

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 both the stand and landscape levels.

1) stand-level biodiversity

Stand-level biodiversity management includes retaining wildlife tree patches (WTPs), within or adjacent to cutblocks to provide structural diversity and wildlife habitat. Where landscape unit planning has not been completed and objectives have not been set, table A3.1 in the *Landscape Unit Planning Guide* recommends retention rates for WTPs. District staff estimated the percentage of the area available for harvesting that had already been harvested without any retention of WTPs, as well as the percentage of biogeoclimatic subzones within landscape units available for harvest. This information was compiled for the district as a whole and it was determined that the wildlife tree patch requirement overall was 5.8 percent.

District staff also concluded that 75 percent of wildlife tree patch requirements would be met from the non-contributing land base (i.e. areas which are already removed from the timber harvesting land base for such considerations as riparian habitat or operability). For the purposes of the analysis, the overall impact to the timber harvesting land base was thus assumed to be 25 percent of the 5.8 percent figure, or 1.45 percent. This reduction was applied to the majority of the timber harvesting land base in the analysis, for a total removal of 2072 hectares. No reductions were applied to the community watershed areas for WTPs as it was assumed that these areas were already sufficiently constrained.

The assumptions varied somewhat for the areas under specific management for spotted owls. For spotted owl SRMZs which overlapped with areas subject to retention or partial retention VQOs, it was assumed that constraints were sufficient and that additional WTPs would not be required. Within the spotted owl candidate areas, a 5 percent reduction was applied. BCFS staff indicate that the majority of the forest cover constraints applied to the SRMZ areas in the analysis are expected to adequately reflect the intentions of the SOMP.

To test the assumptions regarding stand-level biodiversity against current practice, district staff reviewed silviculture prescription data from 1998 and 1999. The review showed that significantly more timber harvesting land base was being set aside for WTPs than expected. If this data was assumed to reflect current practice, and if the values summarized were independent of other factors, district staff believe that an additional 8.5 percent of the timber harvesting land base than assumed in the analysis is constrained by stand-level biodiversity requirements.

District staff note that over 50 percent of the areas retained according to the prescriptions were within riparian management areas, and additionally some areas may represent lower productivity sites. There is uncertainty to what extent the additional WTPs have been already accounted for with the other reductions applied in the analysis, such as those for riparian habitat, operability, ESAs and low sites.

I have considered the information regarding stand level biodiversity, and I believe that the assumptions applied in the analysis were consistent with the provincial policy intended to ensure that adequate accounting for the biological needs for stand level biodiversity. The district review

of operational data implies that retention of larger percentages of contributing area in WTPs is occurring in current practice. However, review of two years' of silviculture data does not on its own provide adequate validation of current practice. The WTP requirements in existing silvicultural prescriptions may provide for stand-level biodiversity needs in adjacent unharvested areas. As mentioned elsewhere in this rationale, I am accounting for the increasing use of partial harvesting silvicultural systems, which also provides some accounting for the increased retention indicated by the operational plans. Therefore, I accept for this determination that stand-level biodiversity has been adequately accounted for in the analysis, and will make no further adjustments in this regard.

I recommend that district staff continue to assess requirements for stand-level biodiversity in the TSA, such that biodiversity objectives can be clearly defined within the scope of the current policy framework.

2) 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. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on or are strongly associated with old-growth forests.

The delineation and formal designation of ‘landscape units’ is a key component of a sub-regional biodiversity management strategy. In the Soo TSA, interim landscape unit boundaries were delineated by the district manager and approved by the designated environmental official in June 1999, and these interim boundaries were used in the analysis. Formal designation of landscape units has not yet occurred in the Soo TSA.

The *Landscape Unit Planning Guide* outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—which may be employed when establishing biodiversity management objectives for a landscape unit. The guide outlines the proportions of each subregional planning area that should be assigned to each of the three BEOs. The proportions in lower and intermediate biodiversity emphasis can range from 30 to 55 percent, but the average is approximately 45 percent of the area in lower, 45 percent in intermediate, and 10 percent in the higher BEO. The policy generally followed for timber supply analyses—and in the analysis for the Soo—when landscape units and BEOs have not been formally established is to model the distribution of BEOs using a weighted average forest cover requirement.

In the Soo analysis, the forest cover constraints for old-seral forest including the phase in of the requirements for lower BEOs, were applied in accordance with the *Landscape Unit Planning Guide*. Forest cover requirements for old seral forest were applied at the biogeoclimatic variant level within each landscape unit as a minimum percentage of the productive forest to be retained in stands at least 250 years of age. Depending on the natural disturbance type and biogeoclimatic unit, the minimum area retained varied in the lower and intermediate BEO areas between 9 and 19 percent, and in the higher BEO areas between 13 and 28 percent.

Approximately 57 percent of the stands outside the timber harvesting land base in the Soo TSA are less than 250 years of age. As a result, in order to meet the old seral stage biodiversity requirements, a portion of the timber harvesting land base had to be held at the beginning of the analysis horizon. Over time, as the forests aged in the modelling, an increasing proportion of the

biodiversity requirements were forecast to be met from the non-contributing forest. In the long-term, only 25 hectares of the timber harvesting land base was permanently reserved from harvest.

For landscape units subject to lower BEOs, the *Landscape Unit Planning Guide* allows for the old seral requirement to be phased in over time. For these areas in the analysis, one third of the old-seral forest retention objective described in the guide was retained immediately, and the full requirement achieved within three rotations (approximately 210 years). A sensitivity analysis showed that immediate full application of the old-seral requirements for the lower BEO areas did not impact timber supply.

Draft BEOs have been described for the interim landscape units, and sensitivity analysis was used to evaluate the impacts of modelling these draft requirements. The sensitivity analysis found that applying these draft BEO requirements—41.3 percent in the lower BEO, 46.1 percent in the intermediate BEO and 12.5 percent in the higher BEO—to each landscape unit, rather than the weighted averages used in the base case had no impact to timber supply.

I conclude that the analysis assumptions regarding landscape level biodiversity represent the best information available and are reasonable for consideration in this determination.

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

Other information

- strategic plans

Strategic plans establish the broader context for operational plans, providing objectives that determine the mix of forest resources to be managed in a given area. Several types of planning processes are described as strategic in relation to operational planning processes. Higher level plans as defined by the Forest Practices Code are distinct from strategic land use planning processes such as regional or subregional planning (land and resource management planning). Strategic plans such as local resource use plans, once signed off by the district manager or another appropriate authority, become policy direction but are not legally binding unless portions of them are declared as higher level plan objectives under the Forest Practices Code.

1) local resource use plans

There are three LRUPs in the Soo TSA: Whistler, Sea-to-Sky, and Ivey Lake. Objectives for only one of these—the Sea-to-Sky LRUP—have been incorporated into scenic area designation and have attained legal status under the Forest Practices Code. The Sea-to-Sky LRUP details visual quality objectives for the Sea-to-Sky highway corridor, and the visual quality constraints from this plan were modelled in the base case for the analysis, as discussed under *visually sensitive areas*.

Status as Special Management Zones (SMZs) under the Forest Practices Code for both the Ivey Lake and Whistler LRUPs is being sought by the associated communities. The Whistler LRUP covers approximately 14 300 hectares and the Ivey Lake LRUP covers 464 hectares. Current management in these areas follows the recommendations in the LRUPs and involves some constraints on timber supply. The management implications for these two plans were not explicitly modelled in the analysis. District staff state that although harvesting is expected to still occur in these areas, there may be additional impacts to timber supply which were not accounted for in the base case. In particular, the green-up constraints for these areas are anticipated by district staff to

be more restrictive than those modelled in the base case. Staff estimate that the management constraints arising from these two LRUPs apply to approximately 1200 hectares of the timber harvesting land base.

I have considered the information regarding LRUPs, and am satisfied that the constraints arising from the Sea-to-Sky LRUP were appropriately reflected in the analysis. I also believe that the constraints from the other two plans may result in some small timber supply impacts, which I will discuss further in my 'Reasons for decision'.

2) other strategic planning processes

Land and Resource Management Planning (LRMP) is an integrated sub-regional process requiring public participation that produces a land and resource management plan for review and approval by government. Completed and approved plans establish direction for land use and specify broad resource management objectives and strategies. The objectives defined through an LRMP process can reach higher level plan status under the Forest Practices Code if officially declared as such by government.

Some preliminary work has been conducted for a Sea to Sky Public Land Strategy, but a formal planning process has not yet been initiated. It is not clear whether government will choose to proceed with an LRMP for the area. If and when such a planning process is completed and a plan approved in the future, it can be reflected in future analyses.

- First Nations considerations

Eight First Nations either occupy reserve lands or claim traditional territories within the Soo TSA. These First Nations are: Mount Currie Indian Band (Stl'atl'imx), N'Quatqua First Nation (Anderson Lake Band), Squamish Nation (Skxwumish7ulh), Tsleil-Waututh First Nation (Burrard Band), the Sto:lo Nation, and the In-SHUCK-ch, which represents the Douglas, Samahquam and Skatin (Skookumchuck) First Nations. The Mount Currie Band is currently the only band within the Soo TSA not involved in the treaty process. The other First Nations are at various stages in the negotiations of land claims.

Public input expressed concern that impacts to timber supply as a result of First Nations negotiations are potentially significant, and requested analysis to evaluate these impacts. Some analysis was conducted to assess the impacts on timber supply based on the preliminary figures available as of October 1999 for the In-SHUCK-ch/N'Quatqua treaty process. Based on this information—approximately 16 000 hectares of the gross TSA area may be excluded from contributing to timber supply in addition to the exclusions made for the base case—it is estimated that mid- to long-term timber supply would decrease by 20 000 to 30 000 cubic metres per year. However, I note that the treaty negotiations are not finalized at the time of this determination, and therefore these potential impacts are presented only for perspective. While I believe it is reasonable to expect some impact to timber supply of approximately this magnitude once agreements are finalized, in accordance with my guiding principles, it would be inappropriate for me to speculate on the timber supply impacts resulting from decisions yet to be taken by government. When any agreements are reached, they can be appropriately reflected in a future determination.

- ski area developments

Whistler Mountain and Blackcomb Mountain are internationally recognized downhill ski developments in the Soo TSA. Two new ski development proposals in the TSA are also currently under consideration by government: the Garibaldi at Squamish Mountain Resort proposal in the Brohm Ridge area; and a proposed expansion of Whistler Mountain.

The retention of ski development land within the provincial forest is contrary to the British Columbia Assets and Land Corporation's (BCAL) Commercial Alpine Ski Policy (CASP). In the timber supply analysis, the land associated with the existing ski developments did not contribute to timber supply. However, no reductions were applied to account for the future removal of forested land base to accommodate proposed developments.

District staff and the proponent for the Brohm Ridge proposal are working on a Memorandum of Understanding (MOU) with BCAL which would allow for much of the forested land—estimated to comprise approximately 800 hectares—associated with the resort to remain in the provincial forest. The BCFS and BCAL have recently signed a similar MOU for the Whistler Mountain expansion, which allows for forested lands to be retained in the provincial forest, although subject to specific management constraints such as exclusive use of partial cutting silvicultural systems, and consideration of longer rotation periods where appropriate. A similar agreement between the BCFS and BCAL for the Brohm Ridge development could also result in some portion of the forested lands remaining in the provincial forest. Future impacts to timber supply resulting from either proposal would be less than that which would occur should the land be entirely removed from the TSA.

At this time, it is uncertain whether either proposal will proceed, and if so, by how much the Soo TSA timber harvesting land base would be reduced to accommodate the developments.

I am also aware that Vancouver and Whistler have submitted a bid to be awarded the downhill ski component of the 2010 Winter Olympic Games, which if successful, will result in further ski development in the Callaghan Valley. Public input from Shapiro, Hankinson & Knutson—the solicitors of Powder Mountain Resorts—express the opinion that the BCFS cannot pursue any land use options in the Soo TSA that might conflict with their pre-existing rights to develop the Callaghan Valley, the claim for which is the subject of ongoing legal action against the province.

I note that my determination of an AAC for the Soo TSA is not a strategic planning process, and neither prescribes nor precludes any particular activity for any portion of the TSA. In accordance with my guiding principles, should a settlement occur and a decision be reached by government or by the courts on the status of the Callaghan Valley, or a decision reached by government on any other ski development proposal, I will account for any timber supply impacts in a future determination.

- partitions

The current AAC for the Soo TSA contains a partition of 2500 cubic metres to cottonwood stands, which—as discussed under *deciduous species*—I will remove in this determination.

My other consideration for a partition at this time is to areas operable for helicopter harvesting. I am aware that there is some current performance in helicopter-operable areas, providing an indication of the feasibility of helicopter harvesting in the Soo TSA. As discussed under *helicopter operability*, sensitivity analysis results indicate that under the constraints modelled in the base case,

the short-term timber supply is not dependent on contributions from the helicopter-operable land base. However, I am mindful that there are many additional constraints acting on the land base of the TSA, and therefore I believe that establishing a partition in helicopter-operable areas would both support current practice and ensure that harvesting is not overly concentrated on the conventionally operable land base.

In considering the level of partition to establish, I have compared the constraints applied in the analysis for contributions from the helicopter-operable areas to the actual and projected harvests from these areas according to operational plan data. Given that the analysis assumptions are consistent with current practice, I conclude that an appropriate level at which to establish a partition would be based on the assumptions in the analysis, and have determined this level to be at least 90 000 cubic metres per year.

To assess the appropriateness of this harvest level, I look to the results of the sensitivity analysis which reviewed the long-term harvest level attainable from the helicopter-operable land base alone. The results showed that the long-term harvest level from that portion of the land base was 103 200 cubic metres per year, with an initial harvest level of 200 000 cubic metres per year. The initial harvest level could be maintained for 20 years from the start of the analysis horizon before beginning a series of declines to the long-term harvest level. From the results of this sensitivity analysis, I conclude that there is flexibility in the harvest levels attainable from the helicopter-operable areas, and I am satisfied that 90 000 cubic metres per year does not represent the upper limit of timber supply from this area. In fact, in establishing a partition I am considering 90 000 cubic metres per year to be the minimum attainable from this area. The timber supply analysis results indicate that levels of harvest which produce volumes of greater than 90 000 cubic metres per year from the helicopter-operable portion of the land base could lead to a more stable timber supply on the conventional land base.

Given the constraints on the land base and timber supply for the TSA, as described throughout this rationale, I consider that a partition is applicable and will discuss this further in my ‘Reasons for decision’.

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

Alternative rates of harvest

- harvest flow

The nature of the transition from harvesting old growth forests to harvesting second growth forests is a major consideration in determining AACs in many parts of the province. In the short-term, the presence of large timber volumes in 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.

In the analysis for the Soo TSA, several alternative rates of harvest were evaluated in the process of selecting the base case harvest forecast. The first forecast prepared, which tested an even-flow harvest forecast at the current AAC level, illustrated that the current AAC of 506 000 cubic metres could be maintained for the entire analysis horizon, with even flow contributions of 504 000 cubic metres from the coniferous component and 2000 cubic metres from the deciduous component, and the constraints around the contribution from helicopter-operable areas as described under *helicopter operability*. In the first alternative harvest flow projection, the constraints around the contribution from the helicopter-operable areas were removed, and it was shown that an even flow forecast 8000 cubic metres per year higher than the base case could be achieved. Contributions from the helicopter areas to this forecast varied between 41 000 cubic metres per year and 219 000 cubic metres per year. However, it was assumed that this wide variation would not be practical operationally, given the relatively high cost and operating logistics of helicopter harvesting.

Analysis was also conducted to assess if the current harvest level could be supported from the conventional land base only. This analysis found that the current level could be supported for one decade, following which timber supply declined over two decades before reaching a long-term harvest level of 416 000 cubic metres per year. Finally, a harvest projection in which the non-declining harvest flow rule was not applied showed that the initial harvest level could be 20 percent higher than that projected in the base case, if mid-term declines were accepted.

I have evaluated the alternative which assumes a greater contribution from the helicopter-operable land base, and do not believe it is reasonable that the helicopter contribution to harvest levels fluctuate widely. Although I note that analysis indicates it is possible to increase short-term harvest levels above the current AAC, I will not choose to increase the AAC if it is likely that harvest levels must decrease again in the future, unless there is a sound and compelling management reason to do so. I am unaware of such a reason, and in addition a relatively large number of constraints act on the Soo TSA timber harvesting land base and I do not expect these constraints to lessen over time.

I am satisfied that the base case harvest forecast relies on sound assumptions regarding the expected contribution from the helicopter-operable areas, recognizes the socio-economic benefits of a stable forecast, and provides some scheduling flexibility in the short- and medium terms. I believe it an appropriate basis from which to evaluate timber supply in the TSA.

- community dependence on the forest industry

The socio-economic analysis for the Soo TSA details the impact of timber supply adjustments on local communities and the provincial economy. During the analysis, the level of forestry activity currently supported by timber harvesting in the TSA was evaluated. The current AAC of 506 000 cubic metres can support 263 person years of direct employment and 157 person years of indirect/induced employment within the TSA, and 683 person years of direct employment and 840 person years of indirect/induced employment province-wide. Annual provincial revenues associated with this AAC including provincial income tax, royalties, stumpage and rent total approximately 20.8 million dollars.

The three most significant contributors to the economy of the Squamish Forest District are tourism, the public sector (including government-employed forestry workers) and the forestry sector. In 1996, the forestry sector supported approximately 2000 direct, indirect and induced jobs in the district, or approximately 12 percent of the total labour force, and 13 percent of the forest district's total employment income. Public input from Western Canada Wilderness Committee stated that maintaining fibre flow for community economic stability is misguided given that tourism

contributes more to overall employment and economic stability than does forestry. While I acknowledge that the tourism sector does provide 37 percent of the total employment and 25 percent of the employment income in the TSA, I note that this does not reduce the contribution to employment and community stability provided by the forestry sector. It would be inappropriate and inconsistent with my guiding principles to base my decision solely on the economic contribution that any one sector provides to the local area or to the province.

Several other public comments pertained to the potential impact of forestry activities on the tourism values in the TSA. I note that the timber supply review process strives to ensure adequate protection for all resource values, including visual quality, wildlife habitat, recreation, and other values on which tourism is in part dependent. I am satisfied that an appropriate accounting for these resource values has been made in this determination, either in the timber supply analysis assumptions, or as a result of the adjustments I am making to the base case forecast.

I have reviewed the socio-economic analysis that used an established and sound methodology to evaluate the community dependencies for the Soo TSA. I am mindful that the communities within the Soo TSA have dependencies on the timber supply from the TSA, and that any reductions to timber supply will have an impact on these communities.

- difference between AAC and actual harvest

The average annual harvest in the Soo TSA for 1996, 1997 and 1998 was 437 188 cubic metres per year, or approximately 86 percent of the AAC for each of those years. District staff indicate that the lower harvests were as a result of several factors no longer exerting the same level of influence, and expect licencees to meet the requirements for the current cut control period. They also expect that future harvests will be close to the current AAC of 506 000 cubic metres.

I have reviewed the information presented and am satisfied that the relationship between the AAC and current harvest levels in the Soo TSA does not highlight any concerns which would impact on this determination.

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

Timber processing facilities

- existing mills

The timber harvested in the Soo TSA supplies mills within the TSA as well as mills elsewhere in the province, particularly in the lower mainland and on Vancouver Island. In 1997, approximately 50 percent of timber harvested in the TSA was processed by local mills into a variety of products, including lumber, veneer, log homes, poles and posts and shakes and shingles. The processing facilities in the Soo TSA also rely on other TSAs, TFLs, woodlots and private lands for their timber supply.

Mills within the TSA include the International Forest Products Ltd. sawmill in Squamish, which was temporarily shut down but has since reopened. Other sawmills are operated by A.J. Forest Products in Brackendale and Continental Pole in Pemberton. In 1998, the processing facilities within the Soo TSA processed approximately 216 000 cubic metres of logs. About half of the

primary capacity for mills—excluding pulp mills—in the Soo TSA comes from the wood harvested in the TSA.

I have reviewed the information presented regarding timber processing facilities and conclude that there is a high level of demand from both within and outside the Soo TSA for the majority of the timber harvested.

- pulpwood facilities

The Western Pulp Limited Partnership pulp mill at Woodfibre near Squamish is the only pulpwood facility in the Soo TSA. It is the largest single forest products manufacturer in the Soo TSA, employing 350 individuals. In 1998, the pulp mill consumed approximately 600 000 bone dry units of chips (approximately 1.7 million cubic metres) and produced 220 000 metric tonnes of pulp.

(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,

Economic and social objectives

- 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). The letter and memorandum include objectives for 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 considered the contents of the letter and memorandum in my determination of an AAC for the Soo TSA. As discussed under *commercial thinning*, I have concluded that there are limited opportunities for commercial thinning at this time. As the second growth stands in the TSA age, opportunities will likely increase and I may consider this further at a future determination. As discussed under *partitions*, I believe that a partition to those areas of the land base determined to be operable for helicopter harvesting is warranted in the TSA.

- 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. There were many public responses received to the information report and data package, and to the timber supply and socio-economic analyses. The summary of public input is reproduced in full as Appendix 5.

Many of the public responses commented on the harvest levels in the district and the Soo TSA. Some of the responses received expressed the opinion that the district has as a whole experienced overcutting and that curtailment of harvesting should occur, in particular in areas with high visual, First Nations, fishing or other values. Similar input expressed the opinion that harvest levels exceed the current AAC and are not compatible with the Forest Practices Code. Some respondents recommended immediate reductions ranging from 20 percent to 70 percent of the current levels, to either avoid future fall downs or to allow for adequate protection of resource values. As discussed elsewhere in this document, the available information indicates that harvest levels are within the current AAC and that the analysis accounts for management under the Forest Practices Code. I make appropriate adjustments in my determination where it appears that this is not the case. With respect to calls for substantial immediate AAC reductions, in my considerations throughout this document I have attempted to account for the need to balance socio-economic and environmental benefits and risks both now and over time. I do not believe an arbitrary timber supply reduction would be appropriate nor recognize the importance of all values.

I am mindful of the public input received and where possible in this rationale, I have attempted to respond briefly to specific concerns. Consideration of public input has been an important component of the determination for the Soo TSA. I note that some of the public input received relates to items beyond my mandate for consideration under the *Forest Act*, which relates specifically to the determination of AACs for timber supply areas and tree farm licences.

I note that local objectives have been an important consideration in my determination of an AAC for the Soo TSA.

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

Abnormal infestations and salvage

- unsalvaged losses and salvage program

Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire and disease that are not recovered through salvage operations. 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 on the timber harvesting land base that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are generally accounted for in inventory sampling for existing timber yield estimation or though other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted under *volume estimates for managed stands.*

The timber supply analysis for the Soo TSA assumed a total of 34 000 cubic metres per year in unsalvaged losses, of which 4000 cubic metres was attributable to insects and 30 000 cubic metres to fire. The losses resulting from insect epidemics were derived for the previous timber supply analysis by applying a loss factor to the volumes of stands in the timber harvesting land base under attack at that time. District staff confirm that the values are still applicable, although they do not account for losses in the lodgepole pine stands included in the timber harvesting land base (since these areas were excluded for the last analysis). Due to the very small contribution of these stands to timber supply, I will make no adjustment on this account. The loss estimates for fire were based on data from ten years of district fire reports, which district staff indicate are still applicable.

For this determination, I accept that the figures used in the analysis constitute the best available information and adequately account for unsalvaged losses. I encourage district staff to continue to monitor trends such that any additional information can be incorporated into future timber supply analyses.

Reasons for Decision

In this determination, given the complexity and number of the factors affecting timber supply, I have grouped them according to whether they indicate timber supply may be higher or lower than projected in the base case.

At present, there is only one significant factor of which I am aware—*site productivity estimates*—which indicates that the timber supply as projected in the base case may be underestimated. I believe that site productivity is likely underestimated in the Soo TSA, but neither the magnitude of the underestimation, nor the extent of the land base to which it might apply is known at this time. As discussed earlier in this rationale, I am confident that second growth stands in the Soo TSA will indeed exhibit better growth and higher yields than projected by the base case. Although it is not possible at this time to accurately quantify the timber supply impact of this underestimation, sensitivity analysis provides me with an assessment of possible outcomes using values from the provincial studies. If the information available provincially is applicable to the stands in the Soo TSA, potential impacts are a 7 – 13 percent increase in short-term timber supply, and up to a 28-percent increase in long-term timber supply.

In addition, both BCFS and MELP staff believe that the base case incorporated assumptions for deer winter range which likely represent the maximum requirements for habitat management. However, current operational practice is guided by the requirements in the draft deer plan as modelled in the base case. This information, in combination with the information that the initial harvest level can be maintained at the current AAC with the inclusion of the management requirements of the draft plan, is of high significance in my reasoning. For this determination, I accept that current practice has been appropriately reflected and that there has been adequate accounting for the biological resource, and encourage district and MELP staff to resolve any outstanding issues with the management plan prior to the next determination.

I am mindful that there are a significant number of factors which have been identified in my considerations as indications that the timber supply projected in the base case may have been overestimated. The number of these factors relative to those present in some other TSAs is representative of the complex nature of forest management in the Soo TSA. These factors are as follows:

- *helicopter operability* - 734 hectares of low productivity stands (approximately 0.6 percent of the timber harvesting land base) should be excluded from the helicopter-operable land base;
- *deciduous species* –766 hectares of cottonwood-leading stands (approximately 0.6 percent of the timber harvesting land base) should be excluded, and the 2500 cubic metre per year contribution of these stands should be removed from harvest levels;
- *unmerchantable stands* – 1035 hectares of ‘831/931’ stands (approximately 0.8 percent of the timber harvesting land base) should be excluded;
- *woodlot licences* - a reduction of 3000 cubic metres per year should be applied to the base case harvest level, which will also account for 871 hectares of land excluded from the TSA land base and placed into woodlot licences;

- *harvest rules* – uncertainty exists as to whether the use of a relative-oldest-first harvest rule best represents the likely pattern for setting harvest priorities over the Soo TSA land base. Uncertainties in this factor could lead to possible reductions in long-term timber supply, which at the highest level of impact could be up to 9 percent;
- *impediments to prompt regeneration* – uncertainty exists as to what extent long-term yields from managed stands might be impacted by initial suppressed growth resulting from high brush hazard, potentially indicating an unquantified downward pressure on mid- to long-term timber supply;
- *not-satisfactorily restocked areas* – 300 hectares (approximately 0.2 percent of the timber harvesting land base) of backlog NSR areas will have reduced levels of stocking, leading to a very small downward influence on long-term timber supply;
- *silvicultural systems* – the increased use of partial cutting systems is expected to result in an impact of between 1.5 and 3 percent on short-term timber supply, and up to 4.5 to 9 percent in the mid- to longer term;
- *decay, waste and breakage* – 3505 hectares of hemlock and balsam stands in the Pemberton Supply Block likely have 30 percent higher incidence of decay than reflected in the analysis, equating to a one-percent impact to short-term timber supply;
- *riparian habitat* – an additional area exclusion of 4.2 percent is required to provide accounting for practices and resource values in RMZs;
- *identified wildlife* – an additional impact of up to 1 percent on harvest levels is expected to account for implementation of the IWMS;
- *mountain goat habitat* – additional management constraints for protection of mountain goat habitat may result in up to 3000 hectares of the timber harvesting land base being subjected to additional forest cover constraints, or additional land base exclusions;
- *moose habitat* – management constraints for provision of moose habitat are anticipated to lead to exclusion of an additional 311 hectares (0.2 percent of the timber harvesting land base); and
- *local resource use plans* – additional constraints arising from implementation of LRUP requirements could apply to up to 1200 hectares of the timber harvesting land base.

Evaluating each of these factors on its own, without consideration of possible interactions, indicates that timber supply in the Soo TSA is more constrained than indicated in the base case. The trend is clear—even if the exact impacts are not—that the land base will become more constrained over time to account for the various resource values in the TSA, including visual quality, recreation, tourism and the habitat needs of the numerous wildlife species. For the majority of the factors listed above, there is enough uncertainty with respect to their timber supply impacts that it is not possible to precisely quantify them at this time. However, I am able to describe the range of uncertainty within which harvest levels can be assessed.

Addition of the largest possible impact for each of the factors exerting downward influence on timber supply could possibly lead to a 22 percent reduction in available timber supply at some point in time. If this were indeed reflective of the actual immediate constraints on the timber harvesting land base, then in the face of such additional constraints it would be difficult to maintain current harvest levels in the Soo TSA for longer than 5 years before a reduction. However, I am not convinced that this upper bound of constraint is currently influencing short-term timber supply nor is likely to over time. For example, the selection of an appropriate harvest rule to represent current practice in the TSA could indicate up to a 9 percent impact on harvest levels in the long-term, but does not impact short-term or mid-term supplies, and in any event the magnitude of

impact is subject to uncertainty. If one conducts a similar summation at the lower end of possible impacts as a result of these factors, the estimated impact to timber supply would be 10 percent over the entire analysis horizon. While I do not believe that this level of impact is reasonable to assume, given the various factors exerting downward influences on timber supply as discussed in this rationale, I believe that the bounds of uncertainty for additional constraints in the Soo TSA represent a reduction to timber supply of between 10 and 22 percent.

Some of these factors which act to reduce timber supply are constraints on the size of the timber harvesting land base, and some are volume constraints. With this in mind, at the determination meeting I requested a sensitivity analysis in which an additional 10 percent of the timber harvesting land base was excluded, and the volume of the existing stands on the remaining timber harvesting land base was reduced by 10 percent. I believe that this sensitivity analysis provides me with an assessment of the influence of a set of constraints potentially impacting timber supply by close to 20 percent. The results of the analysis indicate that the base case initial harvest level of 506 000 cubic metres per year could be maintained for 20 to 40 years before starting a series of declines to a long-term harvest level of 444 000 cubic metres per year.

I believe that this sensitivity analysis provides a realistic and useful assessment of the impact on timber supply from the constraints discussed and expected to act on the timber harvesting land base over the next few years. The results also illustrate that the short-term timber supply in the Soo TSA remains stable despite the additional constraints on the timber harvesting land base.

I am mindful of the additional factors constraining timber supply in the Soo TSA, and that the harvest levels projected in the base case depend on contributions from stands in helicopter-operable areas over time. Although the analysis showed timber supply in the short-term to be stable without an immediate contribution from the helicopter-operable land base, I believe that the dependence on timber supply from these areas has been compounded by the additional constraints on the conventional land base. I note that the sensitivity analysis illustrating the potential of a 18 percent reduction in harvest levels in the future if there is no performance in the helicopter-operable areas lends further support to a partition in the TSA. In consideration of these points, I believe that it is appropriate to implement a partition to the helicopter-operable portions of the land base in order to ensure the timber supply forecast and findings of this timber supply review are properly reflected in ongoing operations in the Soo TSA.

I am aware that a partition to these areas effectively reduces the harvest levels from the conventionally operable land base. However, I note that the timber harvesting land base in the 1999 analysis, as compared to the 1995 analysis, was reduced by 11 221 hectares on account of newly protected areas, and I am mindful that the impact of this has largely been mitigated by the delineation of a much larger helicopter-operable land base. This information provides me with greater certainty that a partition to helicopter-operable areas which approximates the level assumed in the analysis is required. In consideration of this information, I set this partition to be at least 90 000 cubic metres per year, a level which I determine to represent the contribution required from these areas to support the base case projection.

Also in this determination, I remove the 2500 cubic metres per year partition to cottonwood in the existing AAC. However, for reasons discussed elsewhere in this rationale, I am confident that this volume need not be explicitly removed from the newly determined AAC. I will also reduce the AAC by 3000 cubic metres per year to account for additional volume issued to the woodlot program since my previous determination, as required by the *Forest Act*.

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 Soo TSA by establishing an AAC of 503 000 cubic metres. This AAC excludes the volume issued to woodlot licences.

This AAC is partitioned as follows:

- 413 000 cubic metres maximum to the conventional land base, and
- 90 000 cubic metres minimum to the helicopter-operable land base (i.e. that land base totalling approximately 26 000 hectares and assumed in this analysis to be operable for helicopter harvesting).

In this determination, I also remove the 2500 cubic metres per year partition to cottonwood-leading stands. This determination is effective October 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.

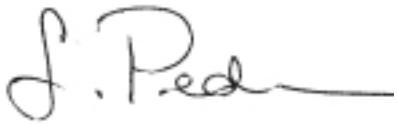
If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

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 to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Soo TSA. I recommend that district staff:

- monitor operations in and continue to refine areas delineated as operable for helicopter harvesting;
- monitor harvesting performance in lower productivity sites;
- complete terrain stability mapping;
- refine information on likely productivity loss from future roads;
- work with timber supply branch staff to determine harvest rules which closely approximate current practice;
- obtain localized data to provide better estimates of site productivity;
- monitor free growing performance, work to develop appropriate stand management regimes and work with Research Branch staff to better quantify local concerns about impacts of brush hazard to managed stand yields;
- work with Resources Inventory Branch staff to refine decay, waste and breakage estimates for stands in Pemberton Supply Block with high levels of decay;

- review visual quality objectives for visually sensitive areas, and where appropriate establish VQOs and clarify management for these areas;
- refine information regarding expected timber supply impacts of the recreation resource;
- obtain local stream and fish habitat inventory data;
- clarify management objectives for active floodplain areas;
- review wildlife habitat requirements for bald eagle, mountain goat, and moose, and clarify management objectives for these species; and
- finalize a deer habitat management plan.



Larry Pedersen
Chief Forester

June 29, 2000

Appendix 1: Section 8 of the *Forest Act*

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

Allowable annual cut

8. (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 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 the 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, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, 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) silvicultural treatments to be applied to the area,

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

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

(vi) any other information that, in 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.

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

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

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, 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 government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

(e) assert the financial interest of the government 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 Input

File: 10100-01

JUL 28 1994

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

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

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

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

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

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

.../2

Province of British Columbia
Minister of Forests
Parliament Buildings
Victoria, British Columbia
V8V 1X4

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

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

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

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

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

Soo Timber Supply Area
Timber Supply Review

Summary of Public Input

BC Ministry of Forests
Squamish Forest District
42000 Loggers Lane
Squamish, BC
V0N 3G0

June 29, 2000

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

Background

As part of the review of timber supply in the Soo Timber Supply Area, two opportunities were provided for public input. The first followed release of the Soo Timber Supply Area *Data Package* and *Information Report* in August 1997. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Soo Timber Supply Area (TSA). A 30-day review period, ending September 8, 1997, was provided for the public to comment on these documents.

On August 31, 1999, the British Columbia Forest Service released the 1999 Soo Timber Supply Area Analysis Report and Public Discussion Paper. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 60-day review period that ended October 29, 1999.

This report summarizes the input received during both public review periods. This information was provided to the chief forester for his consideration when he reviewed the allowable annual cut (AAC) for the Soo TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Squamish Forest District office.

Public Review Process and Response

Squamish Forest District staff actively solicited public input on the Timber Supply Review in the Soo TSA through the following actions:

- direct mail-out of the *Information Report, Data Package, 1999 Analysis Report* and *Public Discussion Paper* to key organizations in the Soo TSA or adjacent TSAs.
- the *Data Package* and the *Soo Timber Supply Area Analysis Report* were available at the district office.
- a meeting regarding the Analysis Report was held with eight representatives from local government in October 1999.

The Squamish Forest District also received 11 written submissions on the *Data Package* and four submissions on the *Analysis Report* (see Appendix 1).

Public Input

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

- Data Package (and Information Report)
- Timber Supply Area Analysis Report (and Public Discussion Paper)
- Other comments

Data Package

Land Base Factors

The Soo Coalition for Sustainable Forests says the five areas announced as new parks should not be considered as contributing to the timber harvesting land base. The Coalition says that, regardless of whether legislation creating the

parks has been passed or not, it is highly unlikely these areas will ever contribute to timber supply again. The Western Canada Wilderness Committee (WCWC) recommends additional areas for protection, saying more protected areas are needed to accommodate the recreation and tourism needs of humans, and the habitat needs of declining fish and wildlife populations.

International Forest Products Ltd. (Interfor) maintains that the reduction to the harvesting land base to account for areas with moderately sensitive soils is too high, citing the results of new mapping and a recent study. WCWC says further mapping and designation of environmentally sensitive areas is needed, particularly for unstable slopes.

Interfor requests that a sensitivity analysis be carried out for deciduous-leading stands (except cottonwood) to indicate the potential gains to the harvesting land base from converting deciduous to coniferous stands.

The Soo Coalition poses a variety of questions regarding the definition of the operable land base, maintaining that site index, volume per hectare and species are all critical in determining what should be included or excluded. The Coalition notes that doing a Timber Supply Review every five years permits inclusion of questionable stands in a future analysis, based on actual not predicted performance.

Interfor says the criteria used to define heli-logging operability are too narrow and should reflect past experience. The company also requests a sensitivity analysis to determine the increase in the operable land base if the threshold for defining sites of low timber growing potential is reduced from 350 m^3/ha to 300 m^3/ha. The Soo Coalition states agreement with the exclusion of problem forest types from the harvesting land base and says the emphasis should be on finding markets for this wood.

Expected Rate of Growth and Productivity
Interfor questions whether the results of the Old Growth Site Index study will be incorporated into the base case. If not, the company asks how site index for older forests was determined and requests a sensitivity analysis showing the effect of using the study results.

Minimum Harvestable Age
WCWC says the minimum harvestable age must be raised to 300 years to ensure management of the forest for wood quality, a continued supply of old-growth wood products, soil and water conservation, and fish and wildlife habitat. An individual submission questions how the minimum harvestable age (the age at which a stand's annual growth is 90 per cent of maximum annual growth) was determined. This submission asks if it is based on an analysis of short-term vs. long-term costs and benefits, and can be defended either economically or ecologically.

Regeneration and Silviculture
An individual submission notes areas where regeneration is ongoing, costly and not very successful and asks why the Squamish Forest District continues to approve harvesting in these areas. Interfor says their experience on hemlock/balsam good sites is 80 per cent planting rather than 100 per cent natural regeneration as stated in the *Data Package*, and recommends changes to reflect this.

The Soo Coalition questions whether silvicultural goals are currently being achieved, and says in the future silviculture funds may not be available as required to meet the criteria used in the analysis.

Wildlife
Interfor says the draft plan for deer winter range management is in error and requires further on-the-ground confirmation prior to being incorporated in the Timber Supply Review. The company recommends that deer winter range be modelled using the approaches in *Deer and Elk Habitats in Coast Forests of B.C.* (such as designation of retention or rotational winter range based on snow zones, and harvesting managed for spring forage needs).

Interfor says reductions applied to account for moderate goat habitat are excessive, noting that the application of forest cover constraints would be more appropriate than land base exclusions.

WCWC says further mapping and designation of wildlife management areas is needed. They say although deer management areas are identified, important valley bottom winter habitat for grizzlies, mountain goats and other species must be identified and withdrawn from the timber harvesting land base. In addition, WCWC says Spotted Owl Recovery Areas must be removed from the harvesting land base and may need to be expanded as new nesting sites are discovered.

Interfor says that based on data from the 1994 Soo TSA analysis report, two-and-a-half times the land needed to satisfy wildlife tree patches (WTPs) has already been removed from the timber harvesting land base (in riparian buffers, environmentally sensitive areas, low sites, etc.). The company says it is likely that 100 per cent of WTP requirements can be satisfied outside the harvesting land base and therefore the further three per cent reduction from the harvesting land base is unnecessary.

WCWC says the assumption that 75 per cent of WTPs can be met outside the timber harvesting land base is wishful thinking and questions whether a professional biologist has confirmed this. The committee notes that harvesting is targetted in the best valley-bottom forest which is also important winter habitat.

Biodiversity
WCWC says the application of low biodiversity emphasis due to the lack of detailed objectives is not acceptable. Until more detailed work is complete, WCWC and an individual submission say a precautionary approach should be taken and high biodiversity emphasis at the landscape level assumed for the entire TSA.

Interfor says the analysis should assume low emphasis for biodiversity with only old seral-stage retention. The company says this is consistent with the direction given for tree farm license timber supply analyses and with the Timber Supply Review in the Fraser TSA. Interfor says the premise that not all elements of biodiversity can, need to be, or will be maintained on every hectare of the timber harvesting land base should be put forth.

WCWC says old growth reserves must not be harvested. They say the justification that they will be replaced in three rotations is ridiculous, noting that old-growth dependent species cannot wait three centuries. An individual submission says all low-elevation old growth forests should be exempt from logging, especially in the Elaho River and Sims Creek watersheds.

Watersheds
WCWC says the 23 community watersheds in the Soo TSA must be withdrawn from the timber harvesting land base. The Department of Fisheries and Oceans (DFO) says the rate of harvesting must not compromise the hydraulic stability in a given watershed and that generally a maximum harvested area (ECA or equivalent clearcut area) of 20 per cent is required for fish-bearing streams in order to protect fish habitat. DFO recommends that the current ECA

requirement (a maximum 33 per cent of the watershed being less than three metres tall at any one time) be reassessed to adequately protect the hydrological regime and fisheries resources of the TSA.

Riparian Areas
WCWC says protection of riparian areas must be increased and extended to headwater streams, citing the results of reports by DFO (1986) and the Sierra Legal Defence Fund (1996). DFO notes the role of the *Fisheries Act* which may require measures beyond the Forest Practices Code if required to protect fisheries values.

Visual Quality Objectives
Interfor asks the Forest Service to consider two VQO zones, one with gentler slopes (<40 per cent) with a lower green-up height requirement and one with steeper slopes (>40 per cent) with higher height requirements. The company says the increased availability of gently sloped, generally better sites for more intensive management will enhance timber availability. Further, they question how the approved mitigation measures around visual quality and adjacency which resulted from the Protected Area Strategy will be incorporated into the analysis.

Non-Recoverable Losses
The Soo Coalition says the timber supply analysis should consider actual performance in recovery of dead and damaged timber. The coalition says stands not contributing to timber supply should be available at salvage rates and off quota.

Socio-Economic Factors
An individual submission says there is inadequate recognition of the importance of tourism for the future local economy, and that the maintenance of viewscapes and old growth is important. WCWC says the emphasis on maintaining fibre flow for community economic stability is misguided. They state that most of the wood harvested is not processed in local communities, and that tourism contributes more to overall employment and economic stability than the forest industry does. WCWC says more information is needed on the growth/decline of employment in various sectors, the cyclical nature of timber harvesting, and the amount of employment insurance paid to loggers.

Timber Supply Area Analysis Report

Land Base Factors
The Resort Municipality of Whistler expresses concern that mountain hemlock/yellow cedar high elevation forests are lumped in with western hemlock/balsam stands. The municipality says harvest projections in these stands should be very conservative until further study is done. Whistler's submission notes they have seen exceptional damage in immature stands at higher elevations this year due to the very heavy snow pack.

Intensive Forest Management Ltd. notes that new parks are not shown on the maps in the report. The company also expresses concern that the threshold volume for heli-logging is 400 m^3/ha and that stands of nearly all the leading species are considered. This submission questions the economics of logging high elevation, poor quality hemlock/balsam in the back end of nowhere, suggesting that a considerable fir and/or cedar component is needed to cover costs.

Intensive Forest Management also questions the inclusion of age class 8 & 9 and height class 3 hemlock or balsam stands in the timber harvesting land base.

Wallace Forestry expresses agreement with the limits applied in the analysis on the contribution from helicopter areas, pending a more complete review of the criteria used to

define stands suitable for this method of harvesting. Limiting the annual heli-harvest to 135 ha should be tied to a five-year maximum (675 ha), according to this submission.

The Association of Whistler Area Residents for the Environment (AWARE) notes that no consideration was given to the protection of any second-growth areas, many of which will have high values for uses other than timber extraction. As well, AWARE says no areas were considered for longer rotations, noting that other values could be enjoyed in a longer rotation harvest.

Growth and Yield
Wallace Forestry says the growth of stands following partial cutting may not achieve levels anticipated from clearcut harvesting. This submission says data on future yields in partial cut areas is not reliable at this time.

Intensive Forest Management notes that the projected volumes for existing hemlock and balsam stands seem high.

Wildlife
Intensive Forest Management Ltd. notes that goshawks are an issue not addressed by the *Analysis Report*. AWARE says protective measures for wildlife must be spread out. The association questions what species that don't live in protected areas do if wildlife trees are mainly being maintained in protected areas.

Forest Cover and Green-up Requirements
Two submissions question the universal application of cover and green-up requirements. AWARE says each block requires its own length of time and height to green up, and the depth of snow must be considered. The association notes that many areas around Whistler have not greened up in 15 to 20 years.

The Municipality of Whistler expresses that recognition of the potential impacts of the 2010 Winter Olympics should be considered in the analysis, even though the final decision will not be made until 2003.

Riparian and Visually Sensitive Areas
The Municipality of Whistler questions the use of the Mid Coast TSA as an example of designated scenic areas. The municipality states that no scenic areas are currently designated in the Sea-to-Sky corridor, with two million visitors annually, and that the analysis of scenic areas is a priority. They recommend a flexible "visually acceptable green-up" so trees show above the snowpack before adjacent logging occurs. Five metres is insufficient where snow packs can easily exceed seven metres, according to this submission.

Wallace Forestry says the reductions used in the analysis for visual values and for riparian management may not be sufficient to meet requirements.

Non-Recoverable Losses
Intensive Forest Management expresses concern that unforeseen losses are not adequately accounted for in the analysis.

Socio-Economic Impacts
The Resort Municipality of Whistler says the socio-economic analysis would be of more value if it also identified the economic impact of tourism. In recommending a study to evaluate the impact of tourism revenue, the municipality says this would provide an increased awareness of the socio-economic relationship between forestry and tourism, and the benefits of integrated management. They recognize the importance of forestry to adjacent communities.

Intensive Forest Management notes that the economic stability of communities is important, and that actual wages generated is more valuable information than person-years. The company says silviculture employment figures

seem to be extrapolated from the last ten years of high activity, but that there's no longer an endless supply of blocks to be treated. As well, the company says any use of helicopters, by shortening the working season and using imported crews, will eliminate many person-years of labour from the local workforce and put local companies at risk.

AWARE expresses the opinion that economic growth in this area is not in forestry, but in other areas such as tourism. The association says the amount of land required to keep such a few people working in forestry is not in the best interests of all other user groups, and often creates conflict. They state that there is a place for timber harvesting in the area but not at the expense of other users.

Other Comments

Many submissions commented on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Timber Supply Review Process
Powder Mountain Resorts Ltd. disputes the right of the Ministry of Forests to pursue any land use options in the Soo TSA that might conflict with their pre-existing rights to develop the Callaghan Valley. This claim is the subject of ongoing legal action.

The Soo Coalition says the analysis should include a section indicating what the impacts of the Forest Practices Code are and will be on both short- and long-term timber supply. The coalition says finalization of landscape units and resource emphasis designations is paramount to have a meaningful timber supply analysis. They also say the public review period for the data package should be longer than 30 days due to the importance of the document.

Interfor expresses concern with double-counting due to so many overlapping constraints and requests a detailed explanation of how these will be modelled.

Forest Management Practices
WCWC says Soo TSA forests must be managed in the same manner as Clayoquot Sound (i.e., First Nations decision-making power; no clearcutting; full protection for environmental and cultural resources; expanded protected areas; and full ecological and cultural inventories of intact areas before road building or logging approvals).

One individual calls for the banning of herbicides due to harm to wildlife. Two submissions say that clearcutting, while still currently the method of choice, places too much burden on remaining forests to support all displaced users and can cause damage to soil, wildlife habitat, streams, etc. AWARE states that selective logging practices could help significantly in maintaining stand value during and after logging.

The Municipality of Whistler says greater emphasis on forest recreation, planning and staffing are warranted, noting that the Sea-to-Sky Corridor has seen unprecedented levels of growth in the tourism and recreation market since the last Timber Supply Review. They recommend a modified Community Forest approach to showcase a unique example of integrated resource management. The municipality also requests information on the effects of heli-logging on the land base, stand regrowth and residual stand health.

Harvest Levels
Many submissions comment on the appropriate level of harvesting in the Soo TSA:

- Four individual submissions express the opinion that the TSA has been overcut and harvesting must be curtailed immediately.
- An anonymous submission questions the objective of maintaining the current harvest rate in the short term and asks if this will not compromise future economic opportunities or the ability to achieve biodiversity objectives in the longer term.
- Wallace Forestry states that if the analysis indeed shows that sustained yield has been achieved for the TSA, this is significant and should be noted.
- The Soo Coalition says defining the analysis units should receive the next highest priority for future analysis, and that a conservative approach should be taken in the interim to avoid a future falldown in harvest levels.
- The Municipality of Whistler says it is pleased the AAC appears to be approaching a sustainable level but recommends a conservative AAC until landscape unit designation is completed. As well, the municipality says the projection of 22 per cent of the area for heli-logging is overly optimistic and the AAC should be reduced accordingly until this level of heli-logging is achievable.
- WCWC says the AAC must be reduced by 70 per cent to allow for adequate protection of all ecosystems and recreation and tourism potential.
- AWARE expresses support for a further reduction in order to protect other values and users of the forest.
- Wallace Forestry notes that the impacts of Northern Spotted Owl management on harvest levels have not adequately been determined. They further note that impacts of First Nations land settlements will seriously affect the TSA, and request an analysis of the impacts.

Appendix 1

Submissions received by the Squamish Forest District

Submissions received on the Data Package
Government agencies
Department of Fisheries & Oceans

Industry
International Forest Products Ltd.

Interest groups
Soo Coalition for Sustainable Forests
Western Canada Wilderness Committee
Shapiro Hankinson & Knutson (solicitors for Powder Mountain Resorts Ltd.)

General Public
Six individual submissions

Submissions received on the Timber Supply Analysis Report
Local Government
Resort Municipality of Whistler

Interest groups
Association of Whistler Area Residents for the Environment

Consultants
Intensive Forest Management Ltd.
Wallace Forestry