

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Golden Timber Supply Area

**Rationale
for
AAC determination**

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Chief Forester**

**effective January 1, 1995
until next determination within five years**

August 31, 1994

Introduction

Description of the timber supply area (TSA):

The Golden TSA is situated in the northern part of the Nelson Forest Region and is administered from the Golden Forest District Office. The TSA covers 921 231 hectares (ha) and its boundaries coincide with those of the Golden Forest District. The TSA has mountainous terrain and contains only 302 056 ha of productive Crown forest land. For various reasons—including operability, environmental sensitivity and lower timber quality—timber harvesting is currently confined to 174 599 ha, approximately 58 percent of the productive forest land and 19 percent of the total land base.

The largest forested biogeoclimatic zones in the TSA are the Interior Cedar-Hemlock and Engelmann Spruce-Subalpine Fir, with relatively minor areas of Montane Spruce and Interior Douglas-fir. In the forested area in the TSA the dominant tree species groups (mature and immature) are spruce, Douglas-fir and lodgepole pine, with smaller but still commercially significant quantities of subalpine fir (balsam), hemlock and western redcedar.

Within the current timber harvesting land base of 174 599 ha, referred to above, almost 30 percent of the forest is over 140 years old; approximately 33 percent is between 41 and 140 years; and just over 27 percent is 40 years old or less. Spruce represents the largest component of mature forest (over 120 years) while Douglas-fir is the dominant immature species.

Golden is the only community of any size within the TSA and is highly dependent economically upon forestry. A 1990 study by the Ministry of Finance and Corporate Relations estimated that 56 percent of the basic sector income in Golden was derived from forestry activity. Evans Forest Products Ltd. (herein referred to as "Evans") is the dominant forestry employer and operates a plywood mill in Golden and a sawmill in the nearby community of Donald. The company also holds one of the two Forest Licences in the TSA, the other, much smaller licence being held by Wood River Forest Inc. Including the two mills, harvesting operations on their Forest Licence and Timber Licences, and contract employment, Evans' operations alone directly employed some 762 person-years in 1992, or about 20 percent of the Golden labour force.

Tourism and recreation represent the second major industry in the TSA, due in no small part to the presence of five national parks and one provincial park on its boundaries, and to two smaller provincial parks and an ecological reserve which are located within the boundaries of the TSA but which are not part of the TSA itself.

History of present AAC

The present allowable annual cut (AAC) for the TSA, set in January 1981, is 650 000 m³ and has been apportioned by the Minister of Forests as follows:

	Cubic Metres	% of AAC
Forest Licences (2)	535,156	82.3
Small Business Forest Enterprise Program	98,206	15.1
Woodlot Licences	6500	1.0
Subtotal (allocated)	639,862	98.4
Unallocated	10,138	1.6
Total = current AAC	650,000	100

Evans, the holder of the largest Forest Licence (473 623 m³ or 72.9 percent of the AAC in 1992) directs the non-pulpwood portion of its harvest within the TSA to its two mills in Golden and Donald. It has historically also purchased the majority—up to 54 000 m³ annually of the Small Business Forest Enterprise Program (SBFEP) harvest for those mills. Timber Licences held by Evans contribute an additional 50 000 m³ annually to the mills. The only significant volumes of timber leaving the TSA are the 61 533 m³ apportioned to the other Forest Licence holder, Wood River Forest Inc., which are processed in Revelstoke, and a portion of the SBFEP harvest.

Between 1989 and 1992 the Forest Licence, Timber Licences, SBFEP and private lands in the Golden TSA provided between 75 and 84 percent of the timber for the two Evans mills. The balance was purchased outside.

New AAC Determination

Effective January 1, 1995, the new AAC for the Golden TSA will be 540 000 m³. This will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Because there are some uncertainties present in the data used for this determination, in the Implementation section of this rationale document I have directed that certain information must be gathered by certain dates so that it may be made available at the earliest opportunity if the chief forester wishes to redetermine the AAC.

Information sources used in the AAC determination

- 1988 Forest Inventory File manually updated to 1991. Includes spatial information for Visual Quality Objectives (VQOs), winter habitat, riparian habitat;
- *Golden TSA Forest Harvesting Guidelines*, BCFS, August 1993;
- Operational adjustment factors for interior cedar-hemlock stands in the Okanagan TSA, letter from I. Cameron and H. Merler (BCFS research pathologist) to Dan Peterson, Kamloops Region, August 12, 1993;

- *BFCS Golden Timber Supply Analysis*, July 1993;
- *Socio-economic Assessment of Timber Supply Scenarios for the Golden TSA*, Economics and Trade Branch, BCFS, March, 1994;
- *Golden Timber Supply Review Discussion Paper*, BCFS, April 1994;
- *Golden TSA 1994 Timber Supply Review Summary of Public Input (Draft)*; BCFS, 1994;
- Critique of the Golden TSA Socio-economic impact study, by Interior Lumber Manufacturer's Association, July 1994;
- *Golden TSA Timber Supply Review Audit*, a timber supply analysis prepared by Timberline Forest Inventory Consultants for Evans, May 1994, (herein referred to as the "Evans analysis") and letter to the Manager of Timber Supply, BCFS, dated August 17, 1994 from Timberline, clarifying points in the *Review Audit*;
- Annual reports of Forest Licensees and BCFS Small Business Forest Enterprise Program, 1981-1992;
- Development Plans of Forest Licensees and the BCFS SBFEP;
- History of crop establishment records, BCFS;
- BCFS Valuation Branch Timber Harvesting database—billed volumes 1981-1992;

Technical limitations of the information used

The *Forest Act* instructs me as 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 formed the major body of technical information used in my AAC determination for the Golden TSA. The timber supply analysis and associated inventory are concerned primarily with biophysical factors such as rate of timber growth, and definition of the land base considered available for timber harvesting. They also indirectly incorporate some economic information such as an operability classification that defines the types of terrain and timber that can be physically and economically accessed given current technology and markets.

However, the analytical techniques used to assess timber supply are simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis, due both to random variation and to limitations to the current state of understanding of ecological dynamics.

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

In making the AAC determination for the Golden TSA, I have considered the limitations of the technical information provided. I am satisfied that this information provides a sound basis for my determination.

In particular, I have taken the following into account.

- The inventory information for the TSA is based upon a 1968 forest cover inventory updated to 1991. Over three years of harvesting activity have occurred since 1991, but this data is the best available.
- In the BCFS timber supply analysis, variable density yield predictions (VDYP), which are intended for use with existing stands, were used to predict growth and yield in second-growth forests; managed stand yield curves were not used.
- Harvest profiles were not determined as part of the BCFS timber supply analysis.
- Some current practices—the maintenance of wildlife habitat beside avalanche paths and the impact of biodiversity requirements at the stand level—were not modelled due to lack of information at the time of analysis.
- Site index estimates for older stands may underestimate the productivity of the second growth stands which replace the old stands after harvest.

Statutory framework

Section 7 of the *Forest Act* (revised 1992) requires the Chief Forester to consider various factors in determining AACs for TSAs. Section 7 is appended as Appendix 1.

Guiding principles

In considering the various factors required by section 7 of the *Forest Act* to be taken into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to *increase* the AAC—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 AAC—such as IRM objectives beyond those articulated in current planning guidelines.

The impact of the Forest Practices Code is a matter which was raised in public input. Even without the Code, I consider it reasonable to expect that, based upon recent trends, the constraints upon timber supply from the application of current guidelines would become increasingly significant over the next five years. In this determination, made prior to implementation of the Code, I have not had the benefit of any regulations or standards which might assist me in assessing the impact of any new constraints on timber production which might be imposed under the Code. However, while I have not considered any more stringent restrictions or additional impacts upon timber supply beyond those anticipated to occur due to the application of current guidelines, I have assumed that the Code will at the very least entrench the standards exemplified by current guidelines as statutory requirements.

The impact on the timber supply of land-use decisions resulting from the Commission on Resources and Environment (C.O.R.E.) process is a matter often raised in discussions of allowable annual cut determinations. In this respect, in determining allowable annual cuts it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from land-use decisions which have not yet been taken by government. Thus I do not consider the possible impacts of existing or anticipated recommendations made by the C.O.R.E. process, nor do I attempt to anticipate any action the government could take in response to such recommendations. I consider only those effects on timber supply which result from land-use decisions that have already been taken by government.

The Forest Renewal Plan will fund a number of intensive silviculture activities that have the potential to affect the long-term timber supply. It is too early, however, for me to assess their efficacy and so I have not taken them into consideration in this determination. The next timber supply review will be better positioned to determine how the Plan has affected the short and long-term timber supply.

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

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

Overall, in making this determination, I am mindful of my obligation as steward of the forest land of British Columbia and of the mandate of the Ministry of Forests as set out in section 4 of the *Ministry of Forests Act*.

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

Section 7 (3)

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

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

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

Inventory information

-general comments

The inventory information used in the BCFS timber supply analysis is old, dating from a 1968 forest cover inventory updated by computer-assisted mapping to 1991.

Significant to the present AAC determination is the fact that existing mature wood volumes may be overestimated in the inventory (see below, *mature volumes in existing stands*). Potential inaccuracies in the data cannot be systematically assessed until completion in 1995 of a statistical survey project.

However, the current inventory is the best information available, and in determining the AAC for this TSA I have been mindful of the uncertainties in the data.

- age class structure

As a whole, there is a fairly even distribution of young, middle- and older aged stands within the TSA. As such, the age class structure of the timber is not a limiting factor in the determination of the AAC for this TSA.

- mature volumes in existing stands

Calculations by BCFS District staff using billed volumes, the logged estimates from licensees' annual reports, the forest inventory file, and records of the history of crop establishment indicate that the volumes of wood per hectare that have actually been harvested in the TSA in the past 12 years may be lower, by as much as 10 to 15 percent, than the 425 cubic meters per hectare (m³/ha) projected for the first two decades in the BCFS timber supply analysis. (This could be partially due to underestimations of decay, waste and breakage factors, see section (iv) below.)

This indicates a risk that the available short-term timber supply may be lower than estimated. Nothing in the Evans analysis or in response to the raising of the issue

in the public discussion paper suggested this risk was unfounded; in particular, no information was presented to show that the BCFS analysis may have *underestimated* the mature volumes in existing stands.

This risk of overestimation is compounded by the fact that, in the experience of BCFS District staff, the logging which has occurred over the past 12 years in "first-pass" harvesting (which is now nearly complete) has generally been on sites which on average have had higher volumes per hectare than can be expected in the remaining existing mature timber. In fact the volume per hectare scheduled to be harvested in 5-year development plans is 21 to 28 percent less than that forecasted to be harvested in the BCFS base case, which supports the possibility that the harvested volumes per hectare projected for the next 20 years in the BCFS timber supply analysis may be overestimated.

In the BCFS timber supply analysis the projected initial harvest level is highly sensitive to variations in the wood volumes assumed to be present in existing stands. A 10 percent volume overestimation required a 26 percent reduction in the projected initial harvest level. This constitutes a very serious risk to the short-term timber supply, a risk which increases rapidly with any further overestimation of existing mature volumes beyond 10 percent.

The reliability of the forest cover inventory will be examined in 1994 through two studies—a volume ratio sampling project, and a decay and waste field study—but results are not expected to be available until late 1994 or spring 1995. The reliability of the volume estimates will be ascertained following analysis of the results of these field studies, but until that time the size of the risk is difficult to quantify. However, the high sensitivity of the projected initial harvest level to changes in estimates of the mature volumes in existing stands shows that the risk that the "base-case" initial harvest level may not be supported by the true short-term timber supply is potentially very serious. In my determination I have given this risk due consideration, and I have directed that the field studies and analysis necessary to resolve this question be completed by January 1, 1997.

Growth and yield predictions

- regenerated stand volumes

In predicting the volumes of wood anticipated to be present in regenerated forest stands, the BCFS timber supply analysis relied on the VDYP model, which is designed primarily for use in predicting volumes in *existing*, rather than in *regenerated* stands. BCFS staff acknowledge that other analyses completed for the Timber Supply Review show that if the Table Interpolation Program for Stand Yields (TIPSY)—which was designed for use with managed stands—had been used, the long-term timber supply level could have been 20 to 30 percent higher than projected in the analysis.

The licensee's timber supply analysis for this TSA used managed stand yield tables (including TIPSYS and Stand Projection System—SPS) and projected significantly higher long-term timber supplies than the BCFS analysis using VDYP. However a major component of the increase in long-term supply projected by the licensee is attributable to increases in site index (see below under *site indexes*). As noted above, BCFS analyses using TIPSYS in other TSAs also support somewhat higher long-term supply levels. However, these analyses also show that increases in the long-term supply level do not necessarily increase projected initial supply levels, except under the specific minimum harvest age and harvest flow conditions discussed in the next paragraph. For this reason I am satisfied that further analysis using TIPSYS would not have provided any information more useful to me in this determination than the sensitivity analyses carried out using VDYP.

The ability of increased regenerated volumes and associated higher long-term supply levels to affect short-term harvest levels is dependent upon considerations of harvest flow, minimum harvest age, and green-up periods (through possible easing of adjacency requirements). Increased regenerated stand volumes do not allow an increase in the projected initial harvest level if the harvest forecast is never to fall below the long-term level. However, in some circumstances the combination of increased regenerated yields and associated reductions in minimum harvest age *may* permit an increase in the projected initial harvest level *provided a decline in harvest level is permitted below the increased long-term level*. This was verified for this TSA in Evans' analysis.

From the foregoing, I am satisfied that regenerated stand volumes might be underestimated, in which case the long-term timber supply level may be higher than that shown by the analysis, which is cause for optimism in the long term. However, as explained in the following two sections, considerations with respect to operational adjustment factors and site indexes create uncertainty as to whether increased regenerated volumes will materialize. This is of particular concern in high elevation forests characterized by slow growth. Nevertheless, there is a possibility of an increase in short-term supplies, and I have taken this into account in my determination.

- *site indexes*

Inventory data includes site indexes used to classify the productivity (growth potential) of growing sites. The licensee's analysis assumed site indexes (estimates of growth potential) for older and very young stands that were higher than those used in the BCFS timber supply analysis. That is, the licensee's analysis assumed that on sites currently containing very young stands, or on sites from which presently existing older stands will have been harvested, the new trees in the regenerated stands will grow more quickly than assumed in the BCFS timber supply analysis.

The Evans analysis assumed that the site indexes for very young and for older stands would be better represented by site indexes for thrifty stands which the licensee defined as stands aged between 35 and 150 years. Based on this assumption, and using managed stand yield tables instead of VDYP, the Evans analysis projected lower culmination ages and a long-term harvest level more than 70 percent higher than in the BCFS base case. The Evans analysis also achieved an initial timber supply equal to the current AAC, seven percent above the BCFS base case, for the first decade.

BCFS staff acknowledge that site indexes for age classes eight and nine (i.e. for all timber older than 140 years) could be underestimated to some degree. This, in combination with other factors (reduced minimum harvest ages, and reduced green-up periods, both discussed below, and higher regenerated volumes, discussed above) could permit an increase in short-term timber supply. However, without further evidence I cannot consider the attribution of site indexes for younger stands to all older stands to be a reasonable extrapolation.

While the evidence is inconclusive for site indexes increased to the degree proposed in the licensee's analysis, some increase is possible, and there are some implications for the expected volumes in regenerated stands, which I have considered in the section above on *regenerated stand volumes*.

Higher site indexes also permit decreased green-up periods (see *Green-up requirements* below) and, because the trees will grow more quickly, can also result in the ability to decrease minimum harvest ages (i.e. trees will be large enough to harvest earlier)—which the BCFS analysis shows could increase short-term timber availability to some degree (see below, *minimum harvest ages*). Taken alone, this latter factor would indicate a possibility for some increase in the initial harvest level projected in the base-case of the BCFS timber supply analysis.

Even if site indexes were substantially increased there would be no effect on the volume estimates for *existing* stands, and only a small effect on projected initial harvest levels. Nevertheless, there is a possibility that the site indexes used in the BCFS analysis are underestimated to some degree, and there may therefore be an opportunity for a small increase in the initial timber supply from that indicated in the BCFS base case, and I have considered this in my determination.

- operational adjustment factors: root rot in regenerated stands

Armillaria (root rot) is assumed to be present in most stands in the TSA. Armillaria surveys in 1993 found 64 percent of a 355 ha study area in proposed stand tending areas in this TSA to contain greater than eight percent infection.

A BCFS research pathologist estimates that root rot disease can reduce the yield in regenerated interior cedar-hemlock (ICH) stands by 35 percent, and extend rotation length.

BCFS staff estimate that because ICH stands form 65 percent of the operable area in this TSA and not all of this is treatable, root rot may reduce yields in regenerated stands in the TSA by 20 percent. Parks Canada also identified a concern that fungal diseases will reduce second-growth yields. This factor was not addressed in the Evans analysis.

The presence of root rot affects short-term wood supply by prolonging green-up, thus reducing the availability of wood for second-pass harvesting. Stands may not be declared free-growing and greened up—which requires that they be healthy—until approximately 20 years after establishment. Moreover, root rots create gaps in forest stands, so that stands which are declared free-growing could, over time, become understocked. Thus root rot could well moderate any increases projected by the use of managed stand yield tables for regenerated stand volumes.

- aggregation procedures

Inventory information consists of a very large number of records from relatively small areas or units known as polygons. Each record includes information on tree species composition, heights and ages of trees, and the sites on which they grow. For convenience this data can be aggregated by combining the information so as to describe a smaller number of larger units.

The Evans analysis claimed the level of aggregation in the BCFS analysis was excessive and that less aggregation would increase the range of minimum harvest ages and permit an increase in initial timber supply. However, this assertion was not tested except in conjunction with the lower minimum harvest ages associated with higher site indexes. In this case the Evans analysis showed that in combination with reduced minimum harvest ages (discussed below under *minimum harvest ages*) the initial timber supply could be increased by 7 percent over the BCFS base case level. The BCFS analysis indicates that most of this increase is likely attributable to the reduction in minimum harvest age, so that differences in aggregation have only a minor effect on the initial supply level.

Minimum harvest ages

Minimum harvest age is the time it takes for stands to grow to a harvestable condition. In the BCFS timber supply analysis, the harvest age is assumed in most cases to be the culmination age—i.e. the age at which the average rate of growth of the volume of wood in a forest stand is at a maximum. The BCFS analysis assumed this to range between 100 to 130 years in the Golden TSA. BCFS staff indicate that harvest ages of regenerated stands may reach as high as 200 years in some high elevation areas (see below under *high elevation reforestation*).

The BCFS analysis indicated that reducing the minimum harvest age by ten years would make more timber available in the mid term. This would mean that less of

the currently existing timber would need to be reserved for the mid term, and this would permit a five percent increase in the initial short-term timber supply above the base-case forecast.

The Evans analysis, using managed stand yield tables and assumed higher site indexes, projected reduced culmination ages—and thus reduced minimum harvest ages. The Evans analysis, using these assumptions, projected an initial timber supply level equal to the current AAC, 7 percent above the BCFS base case.

From this I am mindful that it may be possible to decrease the minimum harvest ages to some degree. This would increase short-term supply, and I have considered this in my determination. However, for two reasons I must be cautious in giving too much weight to this factor. First, there is uncertainty about the assumed higher site indexes, and second, appropriate minimum harvest ages depend on management choices, including those based on particular product requirements.

Land base contributing to timber harvest.

The gross area of the TSA is 921 000 ha. The portions of this which contribute to the timber management land base are limited by inaccessibility, by steep and unstable terrain, by environmental sensitivity, by frequent avalanches, by non-merchantable forest types, and by demands on operable (as well as inoperable) areas for other forest uses. Reasonable assumptions, and if necessary, projections, must be made about these factors and appropriate areas must be deducted ("netted-down") from the productive forest area to determine the harvestable land base. The area currently available for timber harvesting, as assumed in the BCFS analysis, is 174 599 ha. Questions have been raised as to whether this area could be increased.

- conventionally inoperable areas

In this TSA, the conventional harvesting systems are ground-based systems or high-lead cable systems. There may be a possibility of increasing the operable land base by harvesting in areas currently considered unharvestable by using non-conventional technology. However, in accordance with the guiding principles expressed earlier in this rationale, I cannot consider an upward adjustment to the AAC based on this "unconventional" land base until performance has been demonstrated. In this respect, in the Golden TSA, the BCFS Forest Inventory File indicates that since 1981, less than 500 ha have been harvested from inoperable areas—i.e. areas defined as currently unavailable for harvest for terrain-related or economic reasons—and no significant harvesting has occurred using non-conventional technology. While some areas above this current "operability line" may be harvested with today's technology, there are some areas below the operability line which are not likely to be harvested.

Further, from my previous knowledge of the area as Regional Manager of the Nelson Forest Region, as confirmed by a recent aerial reconnaissance, I conclude that there are no large areas of low-volume timber to exploit. Moreover, I have observed that some areas of good timber which are already in the conventionally harvestable land base in this TSA are located in the headwaters of long valleys and are potentially accessible only by the construction of roads over considerable distances through difficult terrain and/or extensive riparian zones. The economic accessibility of such stands appears questionable.

For these reasons I cannot support the licensee's contention that the BCFS analysis underestimated the harvestable land base by excluding areas that could be reclassified as operational. In fact the conventionally harvestable land base may be somewhat overestimated.

- reductions for future roads, trails and landings

Another specific concern raised by the licensee was that the figures assumed in the timber supply analysis for future losses in productivity due to roads, trails and landings were too high. This is possibly true, in which case the long-term timber supply level could be slightly higher; but this would not result in an increase in the projected initial harvest level.

- low productivity sites

About 7 000 ha of low-productivity growing sites in the TSA currently support mature wood. These areas have been excluded from the timber harvesting land base due to concerns regarding their capability to grow harvestable timber in a reasonable time period. The licensee maintains that some of these areas could be logged and reforested. If half of these sites could be logged and reforested, they would increase the timber harvesting land base by about three percent, and would contribute to harvest volumes in both the short and long terms.

Given that many of these areas may be very difficult to regenerate, or have marginal timber values, I cannot reasonably include a large proportion of them in the timber harvesting land base for this AAC determination. This is particularly true in view of concerns about regeneration and slow growth rates in areas of high elevation forest in this TSA which are already included in the timber harvesting land base (see below under *high elevation reforestation*). This indicates to me that with respect to inclusion of low-productivity sites, the current timber harvesting land base may already be overly optimistic.

- problem forest types

A number of forest stands in the TSA have been classified as problem forest types due to their low volume or poor quality, and many have been excluded from the timber harvesting land base. Nevertheless, certain portions of these forest types

are included where licencees have demonstrated harvesting performance. The licensee maintains that more of these problem forest types should be included in the timber harvesting land base. The harvestable portion of problem forest types contributes about four percent of the mature short-term timber supply. BCFS District staff estimate that between 1988 and 1991 between four and six percent of all timber harvested in the TSA came from problem forest types. It is difficult to ascertain whether these numbers indicate a trend in performance, but it is possible there may be an opportunity to increase timber supply by including more problem forest types in the timber harvesting land base, and I have recognized this in my determination.

From this I conclude that the land base assumptions used in the BCFS timber supply analysis are appropriate for use in determining this AAC, although they may be slightly optimistic, and that there is no opportunity at this time to consider establishing a partitioned AAC for the purpose of harvesting in traditionally inoperable areas.

Timber supply profile

The BCFS timber supply assumes that harvesting will be distributed throughout the timber harvesting land base, and over the range (or profile) of sites and forest conditions that exist. The extent to which actual harvesting does not reflect these profiles could affect timber supplies.

Minor concerns exist with respect to harvesting the steep-slope profile, the species profile, and the harvest-location profile (i.e. an appropriate distribution of harvesting between north and south integrated resource management (IRM) zones). I am satisfied that the information used in the BCFS analysis with respect to the timber supply profile represents these concerns adequately and is suitable for use in determining this AAC. In the event of the worst possible outcome with respect to each of these profiles, particularly with respect to the steep-slope profile, there could be some downward risk to the short-term timber supply, which should be reviewed in the next timber supply analysis.

Timber Licence reversion

Harvested volumes from Timber Licences, which are old tenure arrangements, do not contribute to the AAC for a TSA. However, once they are harvested, these areas revert to the Crown and will come under BCFS management. Future harvests from them will then contribute to the AAC for the TSA. A number of Timber Licences have already reverted in this TSA, and another 5 000 ha are scheduled for reversion in the future. This is accounted for in the BCFS timber supply analysis.

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

Regeneration delay

No unusual regeneration problems were identified by Ministry staff except with respect to high elevation sites (see below, high elevation reforestation).

Not-satisfactorily-restocked (NSR) areas

There is a backlog of 8 400 ha of NSR land, of which 5 200 ha are operable. The District plans to restock this area within five years. This was taken into account in the BCFS timber supply analysis.

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

High elevation reforestation

About 11.5 percent of the operable area in the TSA lies above 1650 m in elevation. At these elevations forest stands are difficult to establish and growth rates are slow due to the short growing season and harsh climate. District staff advise that minimum rotation lengths for many of these sites should likely be increased from the BCFS timber supply analysis assumption of 130 years to between 170 and 200 years. However, any resulting reduction in the long-term wood supply may be balanced somewhat by shorter rotations in the Interior Cedar-Hemlock stands.

There is also a risk to the short-term timber supply, since green-up at high elevations will take longer than forecasted in the BCFS analysis, constraining adjacency requirements (see below under *Green-up requirements*).

Incremental silviculture

Opportunities for incremental silviculture in the Golden TSA are largely restricted to stands in the Interior Cedar-Hemlock (ICH) and Montane Spruce (MS) in supply blocks E, F, and G. Supply blocks beyond this range are generally too far from the community of Golden to be treated economically.

Possible incremental silviculture activities include pre-commercial spacing and commercial thinning. Pre-commercial spacing could theoretically be applied to a maximum of 14 000 ha of ICH in age class 1, but armillaria will restrict this activity to only a portion of this total and only marginal volume gains are estimated for the short term.

The products of commercial thinning in this TSA are pulpwood or fence posts of 10 cm average diameter at breast height. These are not currently used by the local

processing plants, which are dependent upon sawlogs and peelers. No stands are currently proposed for commercial thinning.

If in the future the mills in the TSA diversify their range of products, there may be a benefit to short-term supplies from capturing some volume earlier in the rotation than would be the case without commercial thinning. However, for the present, due to associated marginal gains, the potential for spreading armillaria, the fact that commercial thinning reduces the density of forest stands, while wildlife thermal cover requires dense canopy stands, and since there is very little demonstrated performance in the TSA with these activities, I have assumed no contribution to this AAC from incremental silviculture activities.

However, intensive silviculture could be used in future to provide a medium-term gain by helping to partially fill any supply shortages that may be projected to occur in the mid term.

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

Utilization standards and compliance

The utilization standards assumed in the timber supply analysis are consistent with BCFS standards for the Interior, and are generally accepted by industry. Compliance with utilization standards is normal and is not an issue in determining this AAC. I have no reason to project that either the standards or the level of compliance will change in the near future.

Decay, waste and breakage

BCFS staff consider that underestimation of decay, waste and breakage could be a significant factor in the possible overestimation of existing stand volumes through the use of VDYP. If these volumes are overestimated, there would be a significant reduction in short-term timber supply (see above under *mature volumes in existing stands*).

There is a risk that some forest stands could be subject to higher losses from decay, waste and breakage if harvesting is delayed for 100 years or more for visual quality or riparian zone objectives. This problem is exacerbated if root rot is present in the stands. This is a particular concern in lodgepole pine and Douglas-fir stands over 70 years old. Due to uncertainties in the dynamics of future forest stands, this was not reflected in the BCFS analysis. This could indicate a minor downward risk to timber supply, but since this will only affect a small portion of the timber in the TSA, I do not consider this risk to be a significant factor in this determination.

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

Integrated Resource Management (IRM) objectives

Timber harvesting is just one in a range of uses of forest lands. Integrated resource management of forest lands to accommodate all resource values affects (among other things) the scheduling of the harvest of individual cut blocks. In recent years there have been significant increases in public demand for the use of forest resources other than timber, and in public and professional concern for other forest values. IRM considerations affecting timber supply in this TSA include requirements for landscape management as well as protection for threatened species and for riparian zones.

The primary basis for defining current forest management in the TSA, upon which the new AAC is based, is the *Golden TSA Forest Harvesting Guidelines*, August 1993. From this, in determining the AAC, as Chief Forester I apply the guiding principles set out on page 3 above, and consider only those factors which are a reasonable extrapolation from current practices.

For a number of reasons including improved information that has been collected since the BCFS analysis, and recent changes in forest management practices, the following IRM factors were not adequately represented in the BCFS analysis.

Avalanche paths

Timber adjacent to many avalanche paths forms important wildlife habitat and contains attributes critical to the provision of forage. It is BCFS District practice to maintain trees at least 20 meters tall on at least one side of many avalanche paths. Maintaining an adequate cover of mature timber that is also wide enough to permit a future cut block will prolong the rotation over an estimated five percent of the mature timber in the IRM zone. Avalanche path considerations were not included in the BCFS timber supply analysis because accurate information was not available on the affected area of mature forest adjacent to avalanche paths. It is estimated that the inclusion of avalanche path considerations could reduce the initial timber supply level by three to four percent below the BCFS base case.

Stand-level biodiversity

Maintaining stand-level biodiversity—through the retention of coarse woody debris, leaving 10 to 15 stems per hectare of live trees after harvest for cavity nesters, and leaving reserve zones around wildlife trees—will affect approximately 25 percent of the net operable land base. This will affect the harvestable volumes per hectare and will prolong green-up. While BCFS staff could not provide a quantitative estimate of the impact, I am satisfied that

management for stand-level biodiversity does exert downward pressure on the short-term timber supply.

Winter habitat and riparian habitats

The Golden TSA has been managed for these values for many years. However, the most recent inventories taken were in 1991, and following aerial reconnaissance in 1993, it is expected by staff of the B.C. Ministry of Environment, Lands and Parks, and agreed by BCFS District staff, that both the winter habitat—mainly for elk but also for deer and moose—and riparian habitat will need to be two percent greater than modelled in the BCFS timber supply analysis. This would produce a small reduction in the short-term timber supply.

Green-up requirements

The "green-up" period is the time required for an area to reach a desired condition, usually with respect to height, after harvest. Adjacent stands cannot be harvested until this condition has been satisfied. When green-up requirements are applied to larger areas, they can also restrict the harvesting of non-adjacent stands. In the Golden TSA, the major factor identified in the Evans analysis as potentially reducing green-up, which would *increase* the initial timber supply, is the possible underestimation of site indexes. Conversely, major factors which would increase green-up periods and *decrease* the initial supply are slower growth rates on high elevation sites and possible impacts of root rot.

I am satisfied that, until the uncertainties with respect to site indexes are resolved, the green-up assumptions used in the BCFS timber supply analysis are appropriate, with the following exception.

Since the BCFS analysis was completed, in the northern IRM zone—which comprises 43 percent of the net operable area—minimum green-up has been increased from free-growing (estimated to take 15 years) to three metres (20 - 25 years). This change was necessary to make minimum green up in this TSA consistent with other TSAs in the Nelson Forest Region, and with many other TSAs in the province. This increased requirement is now current practice in the District and will produce a large impact on the initial timber supply if a four-pass harvesting system is required in the IRM zones (see below *difficulty of achieving a three-pass harvest*).

50 percent reduction in maximum cut block size

Since the BCFS analysis was completed, maximum cut block size has been decreased from 80 ha to 40 ha. This will affect the spatial distribution of blocks, and there are indications that this could increase the number of harvest

passes required in some areas and so restrict timber supply in the short term (see below *difficulty of achieving a three-pass harvest*).

Recreation - visual quality objectives

Since completion of the BCFS analysis, visual quality objectives within the Trans-Canada Highway corridor have changed from modification and partial retention to partial retention only. These changes mean that forest cover requirements on six percent of the net operable land base are now more restrictive to timber harvesting. BCFS staff estimate that, considered alone, this will reduce the initial timber supply by an estimated approximately two percent below the BCFS analysis base case.

Difficulty of achieving three-pass harvest

At the time the timber supply analysis was initiated, District guidelines assumed that timber would be removed, from both the north and south IRM zones, in *three* harvest passes. Since that time it has become apparent that past harvest patterns and cut block locations and sizes may have left the landscape in a condition where a *four*-pass system may be required to complete harvesting while meeting adjacency requirements. District staff now advise me that there is a high probability that a four-pass system will be required in at least part of the IRM zones.

A January 1994 study by the Forest Operations Group in the Faculty of Forestry at the University of British Columbia found that for the adjacent Revelstoke TSA, a minimum of a four-pass harvesting system would be required in virtually every drainage in order to meet adjacency requirements. Based on this information, and from my experience in other TSAs in the province, I believe it is reasonable to assume that a four pass system could also be required in many drainages in the IRM zones in the Golden TSA.

In response to my concern over the implications of this requirement with respect to the initial timber supply, and because the BCFS timber supply analysis did not provide me with information sufficient to evaluate the impacts of a four-pass system, I directed my staff to analyse what these impacts could be. My staff have advised me that if a four-pass system were required throughout the IRM zones, such that no more than 25 percent of the forest cover in each zone is allowed to be of less than green-up age at any time, the initial timber supply would be significantly reduced; the maximum harvest possible in the first decade would be about 545 000 m³, which is 16 percent below the current AAC. If a four-pass system is not required in some areas of the IRM zones, the impact on the initial supply could be reduced.

However, if a four-pass system is required throughout the IRM zones, the combination of this factor with other IRM objectives would increase the constraint on timber supply. In particular, my staff advise me that in combination with the increased green-up requirement for the northern portion of the TSA, which is current practice (as discussed above), if green-up takes 20 years, the use of a four-pass system throughout the IRM zones would reduce the maximum harvest possible in the first decade to about 409 000 m³, which is 37 percent below the current AAC. If green-up takes 25 years, the maximum harvest would be further reduced.

These large impacts occur because a significant percentage of the timber harvesting land base is already below green-up age due to past harvesting, and only limited further harvesting is possible in the first decade without exceeding forest cover constraints. Extending the number of harvest passes, particularly to higher than a three-pass system, often creates short-term (and to a lesser degree long-term) supply problems. When this occurs, longer green-up periods rapidly exacerbate this problem.

I consider it likely that a minimum of a four-pass system may be needed in some areas to achieve the combined IRM objectives in the TSA. This will substantially increase constraints on supply beyond those modelled in the BCFS timber supply analysis base case, which indicates that the base-case projected initial harvest level is too high. This constitutes a serious risk to the initial timber supply in this TSA, a risk which I have given due consideration in this determination.

Concerns about current IRM guidelines

The Ministry of Environment, Lands and Parks advises that current IRM guidelines for biodiversity in the Golden TSA are inadequate to maintain the mandate of that ministry with respect to the following values, and I have considered these concerns.

Old growth: The Ministry of Environment, Lands and Parks maintains that ten percent of the old growth in each biogeoclimatic sub-zone will be required for wildlife purposes. The Ministry of Environment, Lands and Parks estimates this could reduce initial timber supplies by approximately five percent. However, there is uncertainty about this estimate for a number of reasons including possible contributions by inoperable areas, particularly in high elevations, and the extent to which any particular area of the TSA can satisfy several IRM objectives simultaneously.

Mountain caribou: The mountain caribou is a blue listed species—i.e. it is at risk because of low numbers and restricted habitat. Core habitat and migratory habitat for mountain caribou require the maintenance of

respectively 40 percent and 20 percent of the forest cover in age class seven or more.

Caribou habitat requirements are lower in the Golden TSA than in the adjacent Revelstoke TSA. Nevertheless the Ministry of Environment, Lands and Parks maintains that because 12 000 ha of the net operable land base of the Golden TSA, including 7 000 ha or 10 percent of the mature timber supply, are in the core habitat for caribou, second-pass harvesting will need to be reduced 5 to 25 years from now. This will reduce the timber supply in the second decade, and BCFS District staff estimate that ensuring a steady decline would require a reduction of approximately two to four percent in the initial timber supply, although the BCFS timber supply analysis indicates the impact could be somewhat greater.

Forest ecosystem networks: Staff of the Ministry of Environment, Lands and Parks maintain that forest ecosystem networks (FENs) consisting of important habitats connected by linking corridors will require a combination of extended rotations with more harvest passes and additional reserves over 10 percent of the net operable area. Some of this requirement may overlap with old-growth requirements and caribou habitat, and some habitat is already provided in the riparian zones. Nevertheless it is reasonable to assume that there will be some additional habitat requirements imposed due to FENs, which are currently incorporated into some total resource plan submissions in the Golden District.

BCFS staff advise me that guidelines for old growth, mountain caribou and FENs have not yet been implemented in current practice due to the need to resolve overlap issues and associated impacts on timber supply through the Land and Resource Management Planning process. I agree that many habitat issues are interlinked and complex, but I am satisfied that the appropriate maintenance of wildlife habitat in this TSA will require increasingly strict application of these guidelines which are already of concern to the Ministry of Environment, Lands and Parks, and that this will have some impact on the short-term timber supply.

From the above, it is evident that for the purpose of determining this AAC it is necessary to consider that constraints on short-term supply from forest cover requirements are likely to be considerably greater than those modelled in the BCFS timber supply analysis base case and that the initial harvest level should therefore be significantly lower. The BCFS timber supply analysis indicates a 14 percent reduction in initial timber supply if forest cover requirements are increased by 10 percent. I have taken this particular analysis into account in the overall context of the integrated management objectives considered in this AAC determination.

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

Inability to find wood to meet development plans

Both the Small Business Forest Enterprise Program (SBFEP) and the major licensee in the TSA are having trouble finding suitable and available wood to meet planning requirements.

The current 5-year development plan (1994 -1999) for the SBFEP identifies in assured areas (i.e. areas which the BCFS is confident will be approved for harvesting) only 66 percent of the volume required to meet commitments. About 20 percent of the remaining required volume is in areas considered marginally economic to develop. District staff have been unable to identify over ten percent of the remaining required volume within the SBFEP planning area. BCFS staff advise that they will be unable to meet commitments without compromising younger age classes and other resource values.

At the time of making this determination, while planning is continuing, half of the cut blocks in the initial five year plan submitted by the major licensee in the TSA have been rejected by District staff for failing to meet IRM objectives, although the smaller licensee has located five years' supply.

However, opportunities for non-clearcutting prescriptions, which are not generally being pursued by major licensees, could offset this problem to some extent by providing a small addition to timber supplies.

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

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

The BCFS timber supply analysis shows that, due to the availability of high-volume older stands, harvest levels in the short and mid terms in the TSA can remain above, but must decline toward, a long-term level to be reached seventy years from now. This level will remain relatively steady thereafter.

The base case in the BCFS timber supply analysis shows a projected initial harvest level of 605 000 m³/yr., declining by 10 percent per decade to a long-term level of 309 000 m³/yr.

The BCFS timber supply analysis examined a number of alternative harvest schedules. It was found that *without considering the additional constraints on timber supply discussed above, (under IRM objectives)*, the current AAC of 650 000 m³/y could be maintained for ten years if the harvest level declined by 12 to 13 percent per decade thereafter. If the decline were kept to 10 percent per decade, a supply shortfall would occur through decades seven to nine. However, maintaining the AAC at the current level would compromise the IRM objectives addressed under section (v) above.

The analysis also found that the harvest could be maintained at the current AAC of 650 000 m³/yr. for forty years, but the analysis showed a very serious timber shortage after that time, and did not account for any of the additional IRM constraints discussed in this rationale document.

The analysis also showed that the maximum harvest level that could be sustained for forty years with a subsequent decline of no more than 10 percent per decade was 484 000 m³/yr. However, given the socio-economic implications, an AAC at this level is unacceptable for the Golden TSA unless it were required to maintain long-term forest productivity and satisfy IRM objectives.

With respect to socio-economic impacts, the Interior Lumber Manufacturers' Association (ILMA) submitted a critique of the socio-economic assessment (SEA) report prepared for the TSA by Crane Management consultants. The consultant has responded to the critique. BCFS staff have reviewed both documents and I am satisfied that, to the extent that I am able to consider these factors, the SEA was conducted appropriately and provides useful and accurate socio-economic analysis pertinent to the timber supply review.

The timber supply analysis indicates to me that an appropriate balance between minimizing both short-term economic disruption and future supply shortfalls would be achieved by some initial reduction in harvest rate followed by a steady rate of decline to a stable level. The timber supply analysis base case and similar forecasts provide useful information for achieving this purpose, and I have discussed this further below, under "Reasons".

The Evans analysis duplicated the BCFS base-case analysis with an initial harvest level of 605 000 m³ when the same assumptions were used. All of the licensee's other analyses were based on higher site indexes and regenerated yields which, as already discussed, I do not consider entirely supportable. Each of these began with an initial harvest of 650 000 m³, the only variations being harvest levels after the first decade—they did not show any alternative harvest forecasts beginning at levels other than the current AAC, which as discussed above, I believe would compromise IRM objectives. However, the long-term harvest levels shown by the Evans analysis do indicate the possibility of a more optimistic outlook for the long-term future of the Golden area.

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

The BCFS timber supply analysis included all those types of timber which regional processing facilities are currently processing or capable of processing.

The Golden timber industry is dominated by one major licensee with a plywood mill and a sawmill. The entire current AAC of 650 000 m³/yr. represents only 78 percent of the capacity of these major mills, and the current apportionment of this AAC to these mills is 57 percent of their capacity. BCFS staff have calculated that after accounting for the unsuitability to these mills of the pulpwood component of the AAC, the TSA apportionment to the mills accounts for approximately 57 percent of the mills' actual input. The remaining mill input has come from the SBFEP, Timber Licences and private land both within and outside of the TSA. In short, the mills are almost equally dependent upon wood supplies which are included in the AAC for the TSA and on wood supplies which are not.

The mills are currently operating at about 80 percent of capacity. The licensee has indicated that the non-AAC component of their inputs may not be maintainable at the present level, and that any reduction in AAC for the TSA could affect the viability of these mills.

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

The Minister has expressed the social and economic objectives of the Crown for the province (letter dated July 28, 1994 attached as appendix) and I understand them to apply to the Golden TSA. They are consistent with the objectives stated in the Forest Renewal Plan and include good forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest level changes in a managed transition from old growth to second-growth forests, so as to provide for continuity of employment. The Minister advised that any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability. He placed particular emphasis on the importance of long-term community stability and the continued availability of

forest jobs. To this end he asked that I consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. The latter would likely require the use of alternative harvesting systems, and to encourage this the Minister suggested I consider a partitioned cut.

The employment and community impact issues are discussed in detail in the *Socio-Economic Assessment of Timber Supply Scenarios for the Golden TSA*, and I am familiar with the impacts of different harvest levels (see discussion under (c) above). The use of commercial thinning has been discussed in *incremental silviculture* above, where I concluded that its potential impact on the AAC at this time is insignificant.

The operability issue was discussed in *Land base contributing to timber harvest* above. There I concluded that the land base assumptions used in the BCFS timber supply analysis could be slightly optimistic, and that there is no opportunity at this time to consider establishing a partitioned AAC for the purpose of harvesting in historically inoperable areas.

The Minister's letter suggests that I should consider important local social and economic objectives that may be derived from the public input in the timber supply review. In the present case the local objectives would appear to parallel the provincial objectives expressed by the Minister. 51 percent of respondents indicated a preference, if an AAC reduction were necessary, for equal reductions now and later, and 30 percent preferred a larger reduction now, with smaller reductions later.

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

In the BCFS analysis the annual unsalvaged losses were assumed to be a constant 19 000 m³/yr. BCFS staff advise me that this a reasonable estimate. However, Evans has suggested that these losses should decrease over time in proportion to the amount of growing stock. This may be possible, and could contribute to an increase in long-term timber supply. However, it would have no impact in the short term.

Reasons for decision

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

- The base case of the BCFS timber supply analysis provides a projected initial harvest level that avoids serious future shortfalls and declines smoothly to a steady long-term harvest level. However, some of the factors identified and considered above influence the validity of the projected initial harvest level in the base case and indicate that this

rate must be modified in order to determine an AAC that will meet the required range of forest management objectives.

- The BCFS analysis also indicated that it would be possible to maintain the current AAC for a decade, and still avoid future shortfalls, provided the harvest level were allowed to decline by 12 to 13 percent per decade. In the absence of other considerations I would view this to be a desirable option for the community of Golden, particularly in view of the Minister of Forests' advice to me concerning the economic and social objectives of the Crown.
- There is evidence that the management practices required to meet IRM objectives for mountain caribou, riparian and winter habitats, biodiversity, visual quality, maintenance of old-growth, forest ecosystem networks, and the desired spatial relationship between cutblocks (adjacency requirements) were not adequately accounted for in the BCFS timber supply analysis. The necessary changes to protect these values will exert downward pressure on short-term timber supplies.
- Many of the issues in the previous paragraph are inter-related and difficult to quantify. However, a sensitivity analysis completed by BCFS staff under my direction did provide me with quantitative estimates of the impacts on the short-term timber supply resulting from changes in forest cover requirements needed to meet IRM objectives, specifically adjacency requirements. Specific concerns identified were the need for a four-pass harvesting system in at least some parts of the IRM zones—rather than the three-pass system modelled in the base case—and the increased green-up requirements currently in place in the northern IRM zone. This analysis showed that the use of a four-pass system, in conjunction with this longer green-up period, required that the projected initial harvest level be reduced to about 409 000 m³/yr., or lower if green-up takes 25 years instead of the 20 years assumed for the northern zone. I consider this to represent the lower limit of a reasonable range of projected initial harvest levels.
- Another factor with a significant potential to reduce the initial timber supply level is the possible overestimation in the BCFS analysis of mature volumes in existing stands. The evidence presented for overestimation of these volumes cannot be viewed as conclusive in the absence of completed statistical surveys. However, given that the *potential* impact on the initial harvest level from any such overestimation is considerable, responsible stewardship requires that the initial harvest level be set in a range lower than in the base case, in order to provide some degree of assurance against future shortfalls in the event that the volumes are overestimated. I received no evidence of any *underestimation* of the existing inventory volumes that would suggest the projected initial harvest level should be set higher than in the base case.
- From the above paragraphs, it is evident that the current AAC cut must be reduced. However, there are some factors which may offset the necessary reduction. If higher site indexes are verified, these could permit higher regenerated volumes, lower minimum harvest ages, potentially reduced green-up periods, and the inclusion into the timber harvesting land base of some sites currently assessed as low-productivity. In

combination, these factors, particularly the latter three, could permit an increase in the short-term supply which could offset to some degree the reductions indicated by the larger downward influences. All four of these factors could potentially contribute to a higher long-term timber supply than indicated in the BCFS analysis.

- Other factors which could also offset the necessary AAC reduction to some degree are possible expansion of the land base to include more low-productivity sites or problem forest types, and incremental silviculture activities such as commercial thinning. It is also possible that the use of less aggregation of data in the BCFS analysis could have produced a small increase in the short-term harvest. However, each of the potential contributions to the initial timber supply from these factors is only a possibility, and if realised, would be small.
- The upward or downward influence on initial timber supply from operability issues remains uncertain. It is not clear whether the timber harvesting land base has been over- or underestimated. However, any increase or decrease in timber supply from uncertainty about operability would have a small impact over the period of effectiveness of this determination.

Since some of the IRM objectives under current practices were not adequately considered in the BCFS analysis, and because of my concern with respect to the possible overestimation of existing stand volumes, the initial harvest level must be below the current AAC of 650 000 m³. The BCFS District staff are experiencing serious difficulty in locating wood to meet current planning requirements based on current IRM objectives. Based on my familiarity with the area, confirmed by recent aerial reconnaissance, in my view this is at least in part due to inclusion into the timber harvesting land base of areas that are inoperable due to inaccessibility. The degree of difficulty experienced by District staff in locating wood indicates to me that an appropriate harvest level must be substantially below the current AAC.

The lowest level I have considered is 409 000, which resulted from assuming a four-pass harvest system throughout the IRM zones, in combination with the increased green-up requirement now in place in the northern IRM zone. However, I have considered the possibility that site indexes may be too low, which would reduce green-up time and would raise the initial harvest level to some small extent above this lower limit. I have also considered advice by BCFS District staff that the four-pass system will not be required in all drainages, which would also increase the initial harvest level. However, while there is some uncertainty, it is my estimation that the majority of the area in the IRM zones will require a four-pass system.

In making this determination I must consider social and economic impacts. The rate set must not be so high as to cause later disruptive shortfalls in supply, nor so low as to cause undue immediate social and economic impacts. In my determination, in response to the socio-economic objectives of the Crown as expressed to me by the Minister of Forests, I

have therefore attempted to minimize any necessary reduction. Nevertheless, I must ensure that any AAC which I determine meets the needs of good forest stewardship.

Unfortunately, at this time, any harvest level for this area which meets the need of good forest stewardship will have some impact on established patterns of socio-economic activity in the Golden area. Nevertheless, the long-term productivity of the forests of the Golden area must be my paramount concern, and in my judgement, the harvest level I have determined represents the smallest possible reduction consistent with the accommodation of this overriding requirement.

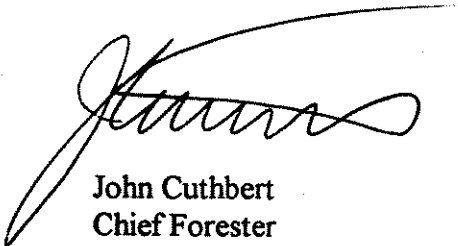
The allowable annual cut for the Golden TSA will be 540 000 m³.

Implementation of Decision

This determination will be effective January 1, 1995, until the next determination within five years.

In view of the uncertainties to be resolved with respect to the timber supply in the Golden area, I am directing BCFS staff to

- have completed by January 1, 1997, a 20-year plan to determine the timber availability in the TSA for the next 20 years;
- have completed by January 1, 1997, an inventory audit, followed by destructive testing and analysis to determine the accuracy of existing stand volume estimates;
- evaluate the ability to carry out successful reforestation in high elevation stands, before the next timber supply analysis;
- evaluate the current operability line before the next timber supply analysis.



John Cuthbert
Chief Forester

Appendix 1

The B.C *Forest Act* Section 7 (revised 1992) reads as follows:

Allowable annual cut

7. (1) The chief forester must determine an allowable annual cut before December 31, 1995, and after that determination at least once every 5 years after the date of the last determination, for
- (a) the Crown land in each timber supply area, excluding tree farm licence areas and woodlot licence areas, and
 - (b) each tree farm licence area.

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

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

then, with respect to that timber supply area or tree farm licence area, as the case may be, the chief forester is not required to make the determination under subsection (1) of this section before December 31, 1995, or within 5 years after the last determination, but is required to make the determination

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

(1.2) When the chief forester determines an allowable annual cut for a tree farm licence area, any management plan that specifies an allowable annual cut for that area is conclusively deemed to be amended so that the allowable annual cut specified in the management plan is the same as the most recent one determined by the chief forester.

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

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

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

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

- (a) the rate of timber production that may be sustained on the area, taking into account
 - (i) the composition of the forest and its expected rate of growth on the area;
 - (ii) the expected time that it will take the forest to become re-established on the area following denudation;
 - (iii) silvicultural treatments to be applied to the area;
- (iv) the standard of timber utilization and the allowance for decay, waste

- and breakage expected to be applied with respect to timber harvesting on the area;
- (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production; and
 - (vi) any other information that, in his opinion, relates to the capability of the area to produce timber;
- (b) the short and long term implications to the Province of alternative rates of timber harvesting from the area;
 - (c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities;
 - (d) the economic and social objectives of the Crown, as expressed by the minister, for the area, for the general region and for the Province; and
 - (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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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
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V8V 1X4

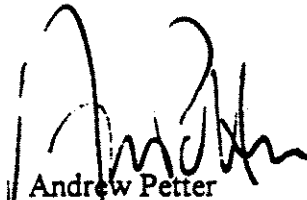
John Cuthbert

Page 2

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

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

Yours truly,



Andrew Petter
Minister