

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

TREE FARM LICENCE

TFL 43

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

effective July 1, 1995

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Chief Forester**

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Objective of this document

This document is intended to provide an accounting of the factors I have considered, and the rationale I have employed, as Chief Forester of British Columbia in making a determination, under section 7 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence 43. The document will also identify where new or better information is required for incorporation into future determinations. I formulated my rationale for the AAC determination documented above in April 1995, and released the determination itself in June, 1995. This rationale report is a confirmation of my determination and an explanation of my rationale.

Description of the tree farm licence (TFL) area

Tree Farm Licence 43, presently held by Scott Paper Limited, is comprised of three separate blocks located on the southern coast of British Columbia. The Lower Fraser Block is situated along the Fraser River in the Chilliwack Forest District, and is surrounded by the Fraser Timber Supply Area (TSA). The Homathko Block is beside the Homathko River at the head of Bute Inlet in the Sunshine Coast Forest District, and is surrounded by the Sunshine Coast TSA. The third block of the TFL is the Kingcome Block, situated along the Kingcome River at the head of Kingcome Inlet in the Port McNeill Forest District. This block is surrounded by the Kingcome TSA. The entire TFL area is within the Vancouver Forest Region.

The Lower Fraser Block is the only block close to sizable communities, in this case Chilliwack, Agassiz, and Rosedale. There are small native communities near the Homathko and Kingcome blocks, and a logging camp near the Kingcome block.

The total land area of the TFL is 10 130 hectares, however, currently over 60% of the TFL area is either non-productive land (4385.6 hectares; 43.3%) or not economical or feasible to harvest due to environmental sensitivity, streamside management zones, grizzly bear habitat, inoperability or roads (1884 hectares; 18.6%). The following table shows the proportions of total area and timber harvesting land base in each of the three blocks of the TFL.

BLOCK	TOTAL AREA (hectares)	% OF TOTAL AREA	TIMBER HARVESTING LAND BASE (hectares)	% OF TIMBER HARVESTING LAND BASE
Lower Fraser	3549	35.0	1285	33.0
Homathko	5619	55.5	2090	53.7
Kingcome	962	9.5	520	13.3
TOTAL	10 130	100	3895	100

All three blocks of TFL 43 are on alluvial flood plains of the lower reaches of the rivers for which they are named. These blocks also all lie within the Coastal Western Hemlock biogeoclimatic zone. The forests within the timber harvesting land base of the TFL are largely

comprised of cottonwood and red alder, with minor components of other deciduous and coniferous species.

One management objective for TFL 43 is to convert the existing stands to intensively-managed cottonwood forests following harvesting. The stands within the timber harvesting land base of the Lower Fraser block have already been entirely converted to cottonwood. Almost 40 per cent of stands on the TFL 43 timber harvesting land base are currently older than the minimum harvestable age.

TFL 43 is unique in that it is managed exclusively for the production of deciduous fibre, specifically cottonwood. The volume harvested annually from the TFL supplies the equivalent of 25 to 35 per cent of the wood processed in the Scott Paper Limited mill in New Westminster. The remainder of the mill's fibre requirements are purchased on the open market. Of the total TFL 43 harvest, only the cottonwood (about half of the volume harvested) is used in the Scott Paper mill; all other species are traded for cottonwood or sold. The Scott Paper Limited mill produces tissue paper products exclusively.

History of the AAC

On January 1, 1985, the Minister of Forests awarded TFL 43 to Scott Paper Limited for the harvest of broadleaf (deciduous) species to supply their mill in New Westminster. On November 22, 1984, Management Plan No. 1 was approved for the period January 1, 1985 to December 31, 1989. The approval included the first AAC determination of 27 000 cubic metres. On December 29, 1988, the management plan was amended to apportion the AAC to both Scott Paper (26 490 cubic metres) and the Small Business Forest Enterprise Program (510 cubic metres). On August 1, 1989 the management plan was again amended, with 25 980 cubic metres and 1020 cubic metres apportioned to Scott Paper and the Small Business Forest Enterprise Program (SBFEP) respectively. These amendments did not change the total AAC of 27 000 cubic metres.

Management Plan No. 2 was approved on January 30, 1990 with the present AAC determination of 49 600 cubic metres made retroactive to January 1, 1990. This significant AAC increase was due to an increase in the size of the TFL. In addition, updated inventory information showed that the actual volumes per hectare harvested over the term of Management Plan No. 1 were higher than those projected in that plan. Therefore, the projected volumes used for Management Plan No. 2 were increased accordingly. Finally, the projected volumes were also increased to account for a higher percentage of conifer species to be harvested during access road construction in the Homathko block over the term of Management Plan No. 2.

The apportionment of the present AAC is 48 580 cubic metres to Scott Paper and 1020 cubic metres to the SBFEP. By agreement, the total SBFEP harvest allocation is to be harvested from the Fraser block, though no SBFEP volume has yet been harvested due to low demand for hardwood timber sales. On December 9, 1994, I extended Management Plan No. 2 to June 30, 1995. A replacement TFL agreement, for a term of 25 years, was issued by the

Minister of Forests on March 1, 1995, pursuant to section 29 of the *Forest Act*. On June 30, 1995, I approved Management Plan No. 3 for the period July 1, 1995 to December 31, 1999.

New AAC determination

The new AAC for TFL 43 will be 44 460 cubic metres. This AAC is a reduction of 5140 cubic metres (10.4%) from the previous AAC of 49 600 cubic metres. The new AAC is the same as that proposed by the licensee in Management Plan No. 3. The AAC reflects a reduction in the size of the timber harvesting land base from the last management plan. This reduction is due to a redefinition of environmentally sensitive areas and the establishment of streamside management zones.

This AAC determination also recognizes that the current AAC, and therefore the current harvest level, is above the sustainable long term harvest level, and that an AAC reduction is required at this time in order to provide for a gradual transition to the long-term harvest level on TFL 43. The downward trend in timber supplies results from the transition from harvesting older natural stands (having higher volumes per hectare) to harvesting younger managed stands with less volume per hectare at time of harvest.

This new AAC is effective July 1, 1995, and will remain in place until a new AAC is determined, which must take place within five years of this determination.

Information sources used in this AAC determination

Information considered in determining the AAC for TFL 43 includes the following:

- TFL 43 Management Plan No. 2;
- Statement of Management Objectives, Options, and Procedures (SMOOP), for TFL 43, Management Plan No. 3, September 2, 1993;
- Letter of December 1, 1993 from the Vancouver Forest Region Manager to the licensee approving the SMOOP for TFL 43;
- Letter of September 22, 1993 from the Chilliwack Forest District Resource Officer Timber to the licensee regarding operable land base mapping for the Lower Fraser Block of TFL 43;
- Letter of November 15, 1993 from the Port McNeill Forest District Resource Officer Timber to the licensee regarding operability mapping for the Kingcome Block of TFL 43;
- Letter of October 4, 1993 from the Sunshine Coast Forest District Resource Officer Timber to the licensee regarding operability mapping for the Homathko Block of TFL 43;
- Letter of November 29, 1993 from the Vancouver Forest Region Manager to the licensee regarding environmentally sensitive area mapping for TFL 43;
- Letter of November 8, 1993 from the Resources Inventory Branch, Manager Growth and Yield to the licensee regarding cottonwood loss factors for TFL 43;
- TFL 43 Draft Management Plan No. 3, March 29, 1995;

- Letter of April 18, 1995 from the licensee summarizing the public involvement process and response for Draft Management Plan No. 3;
- Timber supply analysis dated June, 1994, completed by the licensee;
- Supplemental timber supply analysis, B.C. Forest Service, March 14, 1995;
- Acceptance by the B.C. Forest Service of licensee's timber supply analysis, March 16, 1995;
- 20 Year Plan for TFL 43, dated July, 1994;
- Five Year Development Plan, 1994-98, for TFL 43, dated October, 1993;
- Letter from the Minister of Forests, dated July 28, 1994, to the Chief Forester stating the Crown's economic and social objectives;
- Memo from the Minister of Forests, dated February 26, 1996 to the Chief Forester stating the Crown's economic and social objectives regarding visual resources;
- Letter of May 11, 1995 from Economics and Trade Branch, Manager Resource Economics to the Chief Forester regarding economic impacts of the timber supply analysis for TFL 43;
- Technical review and evaluation of current operating conditions through comprehensive discussions with Forest Service staff, particularly at a meeting held in Victoria on April 28, 1995.

Role and limitations of the technical information used

The *Forest Act* requires me to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis and the inventory and growth and yield data used as inputs to the analysis formed the major body of technical information used in my AAC determination for TFL 43. The timber supply analysis is concerned primarily with biophysical factors-such as rate of timber growth and definition of the land base considered available for timber harvesting-and with management practices. The analysis also indirectly incorporates some economic information such as an operability classification that defines the types of terrain and timber that can be physically and economically accessed given current technology and markets.

However, the analytical techniques used to assess timber supply, particularly the area-based approach used for TFL 43, are simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due to unexplained random variations and limitations in the understanding of ecological dynamics. Scientific research is, in many cases, currently investigating these dynamics.

Furthermore, technical analytical methods 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 decisions 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 TFL 43, I have considered known limitations in the technical information provided, and I am satisfied that this information provides a sound basis for my determination.

In particular, I have taken into account that the area-based analysis approach used in the licensee's analysis does not provide as detailed and as thorough an examination of the harvest flow options afforded by their forest management program and available forest inventory data as a computer model-based approach could.

The role of the timber supply analysis

In considering the factors required under section 7 to be addressed in AAC determinations, I am assisted by a timber supply analysis provided to me through the TFL Management Plan process. For each TFL a timber supply analysis is carried out, using data that reflects the licensee's forest management commitments, as stated in the management plan document. This data is comprised of three categories: land base inventory, timber growth and yield, and management practises. This set of data is usually used with a computer model to produce a series of timber supply forecasts for the TFL.

In British Columbia, there is presently a limited amount of timber growth and yield data available for cottonwood. The data that is available is aggregated from cottonwood growth measurements taken over the species' entire geographic range and from all classes of site productivity, and is therefore not necessarily representative of the better-than-average growing conditions found on the alluvial flood plains of TFL 43.

Cottonwood is both the most abundant species on TFL 43, and is the focus of the silviculture program on the TFL. The lack of growth data for cottonwood stands on TFL 43 precludes the use of the more common volume-based approaches for the timber supply analysis. For the purposes of Management Plan No. 3, as with previous management plans for this TFL, the licensee has used an area-based approach to timber supply analysis. The legal agreement between the government and the licensee, as stated in the tree farm license document, also supports the use of the area-based approach.

The timber supply analysis is not an AAC recommendation, as it represents only one of a number of theoretical forecasts, and because it incorporates information about which there is some uncertainty. Rather, it is one possible forecast of timber supply, whose validity depends on the validity of the assumptions incorporated into the timber supply analysis 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 timber supply analysis are realistic and current, and the degree to which its theoretical estimates of timber supply must be adjusted, if necessary, to more properly reflect the true current situation.

Any adjustments are made on the basis of informed judgement, using the most current information available on forest management, which-particularly during the period leading up to,

and now during the implementation of the Forest Practices Code-may well have changed since the original information was collected.

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

The area-based approach to timber supply analysis and timber harvest regulation involves determining the extent of the timber harvesting land base and assuming that an equal portion of that land base is harvested during each year of the rotation period, while maintaining the other integrated resource management objectives for the area. In the case of TFL 43, the agreed-to forest management objectives include prompt conversion of all operable and available stands (including mixed coniferous/deciduous and alder stands) to pure cottonwood stands, followed by intensive management of these cottonwood stands on short rotations to produce pulpwood timber. In keeping with these objectives, and because a large proportion of the stands on the TFL are older than the minimum harvestable age, it is appropriate that the analysis use the rotation period (equal to the minimum harvestable age plus regeneration delay) expected for regenerated cottonwood stands on the timber harvesting land base of TFL 43. The proposed annual rate of harvest, in hectares per year, is then calculated by dividing the number of hectares in the timber harvesting land base by the number of years in the rotation period. These calculations have been performed for each of the three blocks of TFL 43, as they each have different rotation periods.

The timber supply analysis done by the licensee as part of Management Plan No. 3, and in support of this AAC determination for TFL 43, indicated that under current management, the AAC of 49 600 cubic metres (the expected volume from the allowable harvest area of 138.3 hectares per year) in place prior to this determination could not be maintained. The analysis has indicated that a harvest rate of 128.4 hectares per year, or approximately 44 460 cubic metres per year, can be maintained over the next rotation period; this is the licensee's proposed allowable annual cut, as stated in Management Plan No. 3.

Under this regime, the long term sustainable harvest level will be reached after 30 years, at which time all stands in the timber harvesting land base will have been converted to cottonwood. Using the Variable Density Yield Prediction stand volume growth model, the maximum long-term sustainable harvest level is approximately 30 500 cubic metres per year. This estimate assumes all stands are harvested at the age of maximum average annual growth. Using the minimum harvest ages assumed by the licensee, the long-term sustainable harvest level is approximately 28 300 cubic metres per year. However, the licensee contends that with more accurate growth data that they are collecting and analyzing for the TFL, the long-term sustainable harvest level could be between 35 000 and 45 000 cubic metres per year. While one would expect somewhat higher

yields from managed stands than from existing older stands, I believe it to be unwise to speculate on the magnitude of any such difference in the absence of quantitative evidence.

In future, a volume-based timber supply analysis for TFL 43 should provide more information about the long-term harvest level. This analysis will be especially useful in understanding the transition from a harvest level based on currently-available mature timber to a future sustainable harvest level based on the actual volume increment from managed cottonwood stands. In the meantime, the licensee has indicated that any fluctuations in harvest level, as may be expected from area-based harvest regulation, will be offset by purchases of volume on the open market.

Statutory framework

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

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. Two important ways of dealing with uncertainty are (i) minimizing risk, and (ii) redetermining AACs frequently to ensure they incorporate up-to-date information and knowledge. In respect of these: (i) in making AAC determinations I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with AACs from a range of possible harvest levels; and (ii) the benefits of frequent decision making have been recognized in the legislated requirement to redetermine AACs every five years. This principle is central to many of the guiding principles that follow.

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

The impact of the Forest Practices Code on timber supply is a matter of considerable public concern. In determinations made before the Code was brought into force, such as this determination for TFL 43, no final standards or regulations were available at the time of the licensee's analysis or of the Forest Service's verification of that analysis. Accordingly, these analyses were unable to fully assess the impact of any new constraints on timber production

which might be imposed under the Code. In this determination I have not considered any more stringent restrictions or additional impacts upon timber supply beyond those anticipated to occur due to the application of guidelines current at the time of the determination. However, I assumed that the Code would at least entrench the standards exemplified by those guidelines as statutory requirements.

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995. Studies in selected TSAs (*Forest Practices Code Timber Supply Analysis*, BCFS, February, 1996) indicate that under the Code there will be some impacts on timber supply additional to those expected under previous guidelines. In AAC determinations made since the coming into force of the Code, I have viewed with some caution the timber supply projections in the analyses for units such as TFL 43, which pre-date the Code. At the same time, I am mindful that the full force of the Code may not be felt during the transition phase of its implementation, and the impacts of specific factors on timber supply may not yet have been assessed on a local basis.

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

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

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

Some have suggested that, given the large uncertainties present with respect to some of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving, and management issues changing. Moreover, in the past, waiting for improved data has created the extensive delays that have resulted in the current urgency to

redetermine many outdated AACs. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

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

With respect to First Nations issues, I am aware of the Crown's legal obligations resulting from the June 1993 Delgamuukw decision of the B.C. Court of Appeal regarding aboriginal rights. The AAC I determine for a TFL should not in any way be construed as limiting the Crown's obligation under the Delgamuukw decision, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the TFL and that it is independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply. Aboriginal rights will be taken into account as far as possible under section 7(3)(a)(v) of the *Forest Act*, and will be respected in the administration of the AAC determined.

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

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

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

This section of the Act is appended as Appendix 1.

The *Forest Act*, Section 7 (3)

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

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

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

Land base contributing to timber harvest

The total area of TFL 43 is 10 130 hectares, less than one percent smaller than the area used in the previous timber supply analysis. The land base that is considered available for timber

harvesting (the "timber harvesting land base") is limited by inoperability, environmental sensitivity, requirements for grizzly bear habitat, streamside management zones, and the use of the area for purposes other than timber production, specifically roads. Reasonable assumptions, and if necessary, projections, must be made about these factors and appropriate areas must be deducted from the productive forest area to determine the timber harvesting land base. The timber harvesting land base determined for the purposes of the licensee's current analysis is 3896 hectares, a seven percent reduction from the previous analysis resulting from identification of new environmentally sensitive areas, inoperable areas and streamside management zones. The determination of the timber harvesting land base was done using 1993 aerial photographs, maps and field verification.

There may be more than one reason to deduct an area from the timber harvesting land base. Areas are not deducted to meet one particular requirement when an area already deducted for another requirement will satisfy both. BCFS staff have ensured that no such "double counting" has occurred with respect to the deductions in the licensee's analysis.

-Economic and physical operability

In defining the timber harvesting land base, inoperable areas -either difficult to access or not economically viable-were deducted. A total of 285.5 hectares (3% of the TFL area) are currently classified as inoperable on TFL 43. Due to the physical limitations to access, and given the current and projected economics of harvesting on TFL 43, it does not appear likely that currently-inoperable areas will provide opportunities for inclusion before the next AAC determination. Any such inclusions that are warranted will be made at that time.

For the present determination, I am satisfied that the operable land base has been adequately delineated and accounted for in the licensee's analysis.

-Environmental sensitivity

Identification of environmental sensitivity is based on 1994 ecosystem mapping and the ongoing management plan, total resource plan and timber development plan processes. The single largest reason for unavailability of productive land for timber harvesting is the 1271 hectare deduction for environmentally sensitive areas (ESAs).

ESAs accounting for sensitive wildlife habitat areas (typically coniferous old growth, grizzly bear habitat and bald eagle nesting and roosting areas) do not contribute to the timber harvesting land base, and are deducted in the analysis. Areas with lesser habitat values are also partially deducted from the operable land base in the analysis. In addition, 10% of the operable land base of the Kingcome block (59.1 hectares) was also deducted from the operable land base in the analysis to account for grizzly bear habitat as specific ESAs have not yet been identified on this block. This figure was determined after consultation with Ministry of Environment, Lands and Parks (MoELP) staff, and is based on the best available estimate of habitat requirements in this area.

Fisheries values have been identified and delineated as either streamside management zones or fisheries ESAs. Fisheries ESA areas have been totally deducted from the operable land base in the analysis. Streamside management zones are 20 metre wide strips along all Class A stream reaches on the TFL. Class A stream reaches are those portions of streams that support salmonid fish populations. Almost all TFL 43 water courses are Class A streams. After an examination of detailed maps for the TFL, 90% of the streamside management zone areas were also deducted from the operable land base, a total of 176.4 hectares.

Recreation ESAs were also identified however, as these areas were already deducted from the operable land base as they overlap with either wildlife or fisheries ESAs, there were no further deductions solely for recreation values.

I expect that all environmentally sensitive areas will be mapped for Management Plan No. 4, especially given the significance of the extent of the timber harvesting land base in determining timber supply. However, for the purposes of this determination, given the relatively recent inventory work and discussions with MoELP staff, I am satisfied that environmentally sensitive areas have been dealt with in an appropriate manner in the analysis.

-Estimates for roads, trails and landings

Road access to and within the TFL is not a concern at present as all blocks of the TFL are completely roaded. In some inventories, roads are classified as such on forest cover inventory maps, and shown as features with definite surface area that are therefore identifiable as part of the unproductive land base of the management unit. However, on TFL 43, all roads are mapped as linear features that show only the one-dimensional location of the road; thus the area occupied by the road surface is not recorded in the inventory. The actual unproductive area occupied by roads, as well as unmapped trails and landings, was calculated, and this area withdrawn from the timber harvesting land base in the analysis. A total of 54.4 hectares have been withdrawn from the timber harvesting land base of TFL 43 to account for the roads, trails and landings. I am satisfied that the licensee's analysis has accounted for these features in an appropriate manner.

Existing forest inventory

-Forest cover updates

The timber inventory for the TFL is updated every five years. The last inventory was completed in 1993, except for the Kingcome Block which was last inventoried in 1988. The Kingcome block was updated to account for the harvesting from 1988 to 1993 for use in the licensee's analysis. The 1993 inventory, based on 1993 aerial photos, also includes mapping of changes to the total land base as a result of accretion and erosion. The Forest Service has not completed the review and approval of the latest inventory, however this inventory information appears valid based on all reviews done by Forest Service staff to date.

AAC Rationale for TFL 43

Overall, I am satisfied that the inventory information used in the licensee's analysis, which reflects both the five year cycle of inventory updates and periodic re-inventories, provide me with reasonable forest cover information upon which to base my AAC determination for TFL 43. I expect the licensee to provide updated TFL 43 inventory information for formal review and approval by B.C. Forest Service staff prior to use in Management Plan No. 4.

I also expect that an inventory audit will be conducted on TFL 43 as part of the provincial inventory audit program. This audit procedure is a method of validating the accuracy of the existing inventory, in particular the volume of mature stands, the site class and species composition of immature stands and the reliability of the non-forest classification. The results help to identify the strengths and weaknesses in the inventory and to set priorities for future re-inventory activities. Although the inventory audit is not yet scheduled for TFL 43, I will use the results, when available, to assess the risk and uncertainty associated with the inventory in future AAC determinations.

-Age class structure

Overall there is a fairly even distribution of age classes on TFL 43, however there is significant variability between blocks. The Lower Fraser Block is comprised almost entirely of cottonwood stands below the minimum harvestable age. The Homathko Block is comprised of mainly cottonwood and red alder stands with an even mix of stands younger and older than minimum harvestable age. The Kingcome Block is comprised of mainly cottonwood and red alder stands above minimum harvestable age. Of the productive forested areas in TFL 43, 62 percent (3553 hectares) are older than the minimum harvestable age and 38 percent (2154 hectares) are younger than the minimum harvestable age. However, the pattern is quite different when only the timber harvesting land base (THLB) is examined, as 52 percent (2036 hectares) of the THLB are older than minimum harvestable age, and 48 percent (1860 hectares) is younger than the minimum harvestable age. The implications of the pattern of age class distribution in the three blocks of the TFL have been properly accounted for in the licensee's analysis, and the pattern of harvest flows that results is in keeping with the management objectives for the TFL.

-Species profile

The greater portion of the TFL inventory is dominated by cottonwood (76 percent by area) and red alder (18 percent by area), with minor components of coniferous species (slightly over 5 percent by area) and other deciduous species (less than one percent by area). The licensee's stated timber management objective is to convert the operable land base to cottonwood stands following the harvest of existing stands over the first rotation. The timber harvesting land base of the Lower Fraser Block has already been completely converted to cottonwood stands. Given the nature of the growing sites on TFL 43, I am satisfied that this is an appropriate management regime, and further, that the regime has been properly incorporated into the licensee's analysis.

-Harvest profile

In the licensee's area-based analysis, it is assumed that harvesting will be distributed throughout the timber harvesting land base, and over the range (or profile) of sites and forest conditions that exist. Comparison of the land base profile to the proposed five-year harvesting plan indicates that the harvest closely reflects the existing mix of species and ages.

The licensee's harvesting plan reflects the management objective of conversion of all non-cottonwood stands to cottonwood, while harvesting enough cottonwood to supply mill requirements. Harvest priority indicates dead or damaged stands will be harvested first, followed by older stands.

I note that volumes available for harvest over the medium term could fluctuate if current harvests were to concentrate on the better sites or if insufficient area is converted to cottonwood to provide for future fibre needs.

I am satisfied that the existing inventory provides the best information available at this time for use in determining harvest levels in TFL 43. I am also satisfied that the planned operations and harvesting requirements generally correspond with the existing age class structure and species distribution, and are therefore not limiting factors in the determination of the AAC for this TFL.

Growth and yield predictions

-Site productivity estimates

Site productivity is the ability of a particular site to grow trees and is usually expressed in terms of site class (good, medium, poor, low) or site index. Site index is a measure of site quality, or productivity, based on the height of the dominant trees in the stand at a reference age, usually 50 years. The productivity of a site largely determines how quickly trees will grow, and therefore affects expectations of the time it will take seedlings to reach green-up conditions. Site productivity also affects the age at which stands will reach merchantable size or minimum harvestable age and the volumes of timber that will grow in harvested stands.

Due to the lack of site productivity information, it is not known at this time if the harvest may be required to decline, in the short to medium term, to a level below the long term level before later rising to the long term harvest level. However, the licensee has planned for this, and is prepared to purchase additional volume to maintain the operation of its mill if the harvest level must decline below the long-term harvest level.

Estimating future site productivity is particularly difficult in deciduous stands, due to the lack of management history in these stand types. This situation is further complicated by the licensee's planned program of converting all suitable sites to cottonwood stands after harvesting, which may shift the site index of some stands (that is, the site index that applies to the existing species may not apply to cottonwood). However, site indexes have been derived from sample tree heights and measurements taken on permanent sample plots in the TFL, and have been assigned according to the most prevalent species in each stand. In spite of the difficulties in assigning site

indexes to cottonwood stands on TFL 43, I am satisfied, at this time, that the best available approach was used in the analysis. I expect further improvements to the estimation of site indexes as the licensee continues to gather data on the growth responses in managed cottonwood stands. Finally, site productivity will tend to affect long term, rather than short term, timber supply in this TFL, and is therefore not of greater concern in this determination.

-Volume estimates for existing stands

There is a lack of growth and yield information for existing stands of deciduous species, (cottonwood in particular) in British Columbia, as compared to coniferous species. This limitation is particularly evident on TFL 43, where growing conditions are significantly better than the provincial average. The licensee has begun to develop yield tables for the prediction of existing stand volumes, using the Variable Density Yield Projection (VDYP) growth and yield model. However the results are not yet adequate for input to a volume-based timber supply analysis for TFL 43 due to the high proportion of cottonwood stands.

The VDYP results used in the timber supply analysis incorporate the B.C. Forest Service factors for decay (volume lost due to rot), waste (volume unavoidably left on site during harvesting) and breakage (harvesting-induced losses) for all species except cottonwood. Cottonwood volumes have been reduced for decay only, at the recommendation of Resources Inventory Branch of the B.C. Forest Service, as the waste and breakage factors produced by VDYP are not representative of the TFL 43 area. Preliminary indications are that the stands on TFL 43 tend to have less waste and breakage than VDYP predicts. I am satisfied that this lack of deductions for waste and breakage should not negatively impact forest management on TFL 43 because of the area-based system of harvest regulation used for the TFL.

The lack of growth and yield data limits the ability to predict existing and future stand yields over a range of site productivity parameters, which are required to support a typical volume-based timber supply analysis for TFL 43. Until such information is available, I am satisfied that the area-based approach, as presented by the licensee in Management Plan No. 3, provides a suitable method of examining timber supplies. I expect the licensee to continue to work with the B.C. Forest Service, Resources Inventory Branch, to develop stand yield data for existing stands, and the appropriate waste and breakage factors, that will support the use of a volume-based timber supply analysis for the Lower Fraser block in Management Plan No. 4, and for the Kingcome and Homathko blocks in subsequent management plans.

-Volume estimates for regenerated stands

A total of 14 permanent sample plots have been installed in TFL 43, however to date only three of these plots have been measured a second time. As a result of this lack of long-term growth data, regenerated or managed stand yield tables have not yet been developed for cottonwood stands. I expect that the licensee's data collection efforts will focus on developing these yield tables, in cooperation with the B.C. Forest Service, Research Branch, for Management Plan No. 4.

Overall, I recognize that there is insufficient data and knowledge about expected deciduous growth specific to TFL 43 to develop reliable stand yield estimates, and therefore limited information with which to perform a volume-based timber supply analysis at this time. However, until a volume-based analysis is available, the area-based approach does provide a usable method of estimating a suitable harvest rate, and I am satisfied that it presents me with sufficient information to support this AAC determination.

-Minimum harvestable ages and rotation periods

Minimum harvestable age is the time it takes for stands to grow to a harvestable condition. Minimum harvestable ages for TFL 43 are derived from two product objectives. The first is to harvest stems that have a minimum average diameter of 35 centimetres or greater. The second product objective is related to fibre quality, specifically the fibre brightness of the pulpwood timber. The fibre brightness usually begins to decline when cottonwood stands are 50 to 60 years old, indicating that harvest should occur before this age is reached.

Harvestable ages in both the B.C. Forest Service and the licensee's analyses are set at 25 years for cottonwood, red alder and other hardwoods in the Lower Fraser Block and 30 years for cottonwood, red alder and other hardwoods in the Homathko and Kingcome Blocks. A minimum harvestable age of 121 years was assigned to all predominantly-conifer stands.

To determine the rotation period for the purposes of the area-based analysis, the minimum harvestable age is added to the average regeneration delay period. The regeneration delay is one year in the Lower Fraser Block and three years in the rest of the TFL. A more detailed discussion on this topic follows below in "[Regeneration delay](#)". Rotation periods are 26 years for the Lower Fraser Block and 33 years for the rest of the TFL.

There is currently very little harvesting history, or yield data, with which to confirm or reject the minimum harvestable ages used in the licensee's analysis. Professional opinion from staff in the B.C. Forest Service, Research Branch, and from an independent ecological consultant familiar with TFL 43, indicates that the 25 and 30 year minimum harvestable ages are reasonable given current knowledge about growth rates in cottonwood stands. This same body of opinion also indicates that the growth rate of managed cottonwood stands could be greater than currently expected. No evidence was presented to suggest that these growth rates could be lower than expected. If this is the case, minimum harvestable ages may be lower than those presently used on the TFL.

Examination of the cottonwood stand growth data available from VDYP shows that the minimum harvestable ages used in the analysis are typically two to six years less than the age at which the mean annual increment (MAI, or the average annual volume growth of a stand) is at a maximum. The age at which maximum MAI is reached, called culmination age, is an important reference point, since successive harvests at this age will maximize volume harvested over the long term. Given the uncertainty in the stand growth estimates for cottonwood on TFL 43, the minor differences between MAI values at culmination age and at minimum harvestable ages, and the management objective of prompt conversion of all stands to cottonwood (which favours the

choice of a younger minimum harvestable age), I believe that the minimum harvestable ages used in the analyses are appropriate for this unit at this time.

Supplementary analysis was done by the staff of the B.C. Forest Service, Timber Supply Branch, to examine the effect of uncertainty about minimum harvestable ages. The results indicate an 8% increase in annual area harvested could occur while still maintaining all other management objectives, if the minimum harvestable age for all species were 2 years shorter. A 6% decrease in annual harvested area would be required to maintain other management objectives if minimum harvestable ages were 2 years longer. The results also indicate that if hardwood minimum harvestable ages were 5 years longer, significant harvest shortfalls would result at 40, 80, and 120 years from now.

Given the current knowledge base, I am satisfied that the rotation periods used are appropriate for the range of species and sites on this TFL, and believe they have been used appropriately in the licensee's analysis. However, I recognize that significant uncertainty exists about minimum harvestable ages, and I expect the licensee to refine, for Management Plan No. 4, their data regarding minimum harvestable ages in conjunction with their work on estimating stand yields, as discussed above in "*Volume estimates for regenerated stands*".

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

Regeneration delay

Regeneration delay is the period of time between harvesting and the date by which an area is occupied by a specified minimum number of acceptable well-spaced trees. The licensee has aggressively reforested all harvested areas to minimize regeneration delays. The licensee's analysis assumes regeneration delays of one year in the Fraser block, and three years in the Homathko and Kingcome blocks.

BCFS staff have indicated that the actual regeneration delay in the Homathko and Kingcome blocks is actually less than the three years used in the analysis, however without adequate documentation of the actual regeneration delays experienced in these blocks, I am not prepared to assume that the regeneration delays will actually and consistently be shorter than those stated.

Since the forests of TFL 43 are managed on a comparatively short rotation, the accurate determination of regeneration delay can have a significant impact on timber supply. I expect that continued monitoring of regeneration performance will improve the assessment of regeneration delays for Management Plan No. 4. In the meantime, I accept the regeneration delays as used in the licensee's analysis.

Impediments to prompt regeneration

No impediments to prompt regeneration have been identified. Normally I would expect that a management unit with productive growing sites, such as TFL 43, would have some concerns with brush competition, however this does not appear to be a problem in this unit due to the use of fast-growing cottonwood regeneration.

Not-satisfactorily-restocked areas

At the time of the analysis, there was a total of 37.4 hectares of current not-satisfactorily-restocked (NSR) areas in TFL 43. There was no backlog NSR on the TFL. The licensee's analysis and Management Plan No. 3 assumed the restocking of all current NSR within one year (Fraser block) or three years (Homathko and Kingcome blocks). These 37.4 hectares of NSR have since been planted.

I note from the licensee's records that the amount of land restocked annually, either naturally or by replanting, does not equal the area shown as harvested annually. The difference is accounted for in the area removed from production due to roads, lost to erosion, or left as unharvested buffer zones within the harvest areas that do not require restocking. Given the licensee's performance to date and the management plan commitments, I am satisfied that the restocking objectives will be met, and that these assumptions are therefore appropriate. I am also satisfied that the impact on the timber supply has been properly reflected for the purposes of my AAC determination.

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

Silvicultural systems

The clearcut silvicultural system is predominantly used in TFL 43, in conjunction with the conversion of all operable area to cottonwood stands. I am satisfied that this system will facilitate the licensee's objective of short rotation stand management, as modeled in the analysis. Management Plan No. 3 commits the licensee to using a selection harvesting system, or to the establishment of no-harvesting reserves, where site stability or other resource values are significant.

I note that selection harvesting, or the establishment of such reserves, could have some downward pressure on timber supplies, especially if used extensively. Since a specific selection harvesting program has not yet been defined, I expect that the extent of no-harvesting reserves or the use of a selection silviculture system, and any resultant impact on timber supplies will be documented in Management Plan No. 4. I will consider such impacts in my AAC determination at that time and have therefore not considered these potential impacts further in this determination.

Incremental silviculture

The current incremental silvicultural program on TFL 43 consists of fertilization of newly-planted areas using sewage sludge. As there are no managed stand yield tables for cottonwood stands, the potential timber supply implications of this treatment have not been incorporated in the analysis. However, there could be a small upward influence on long-term timber supply as a result of this program, and I encourage the licensee to continue to quantify the yield effects of

these, and any other silvicultural treatments, used or proposed on TFL 43 for future management plans.

Given the licensee's management objective of converting all stands on TFL 43 to cottonwood, the short rotations used in TFL 43 for cottonwood management, and the relative lack of old conifer stands, there are no opportunities to use commercial thinning on the TFL.

Previous incremental silvicultural programs, such as pruning and juvenile spacing, have been discontinued, as these treatments were found to increase damage to the residual trees due to breakage from wind or snow and ice accumulations, or due to stem girdling caused by increased vole populations.

Stand conversion programs

All stands of alder, other hardwoods, and conifers are planned for conversion to cottonwood stands over the first rotation. The pattern of harvest in the licensee's development plans for the Homathko and Kingcome blocks reflects this stand conversion program. The Fraser block has already been entirely converted to cottonwood. Although volume from rehabilitation harvest in other management units is often not charged against quota allocations or tallied for cut control purposes, all such volumes harvested on TFL 43 are part of the regular harvest program, and are part of the licensee's cut control volume. The forest products market cycle may affect the rate and timing of the conversion program on the Homathko and Kingcome blocks, however, I am satisfied that the area-based management regime, as reflected in the licensee's analysis, provides sufficient flexibility to adjust the areas planned for harvest to account for market cycle fluctuations without negatively impacting timber supplies.

(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 for mature conifer and older mature (greater than 40 years) deciduous stands on TFL 43 require harvest and removal of trees with a diameter at breast height (dbh) of 17.5 cm or greater, to a maximum stump height of 30 cm and a minimum top diameter of 15 cm. Immature conifer stands and younger mature (between 24 and 40 years) deciduous stands are utilized to a 12 cm dbh, a 30 cm stump height, and a 10 cm top diameter. I am pleased to note that the licensee's minimum dbh standard of 12 cm is below the provincial standard of 12.5 cm, and that these factors appropriately reflect current management for this unit.

Decay, waste and breakage

Although there are average figures, by forest inventory zone, for decay, waste and breakage for most species in British Columbia, there are presently no waste and breakage factors specifically applicable to the cottonwood stands in TFL 43. The licensee has appropriately used the B.C. Forest Service decay, waste and breakage factors for all species except cottonwood, but has only applied the B.C. Forest Service factors for decay for cottonwood. The zonal average waste and breakage figures available from VDYP are not representative of the TFL 43 area. As a result, they have not been used, at the recommendation of the B.C. Forest Service, Resources Inventory Branch.

In light of the area-based approach used, I am satisfied that the lack of the waste and breakage factors does not present a limitation at this time. I am, however, aware that the licensee has experienced significant amounts of waste and breakage in older mature (over 40 years) deciduous stands. I expect these factors to be quantified and applied to future volume-based analyses for this unit.

(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

As provided in section 4 of the *Ministry of Forests Act*, (Appendix 2) the purpose and function of the Ministry of Forests is to manage, protect, and conserve the forest and range resources of the Crown and to plan the use of these resources to ensure production and harvesting of timber and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives constrain the timber supply must be considered in AAC determinations.

-Visually sensitive areas

Recreation resources are one of the forest resources to be managed in TFL 43. "Recreation resource" is defined in the *Forest Practices Code of British Columbia Act* to include a "scenic or wilderness feature or setting that has recreational significance or value". In order to manage such scenic values, visual landscape foresters in B.C., in collaboration with specialists in other parts of the world, have developed procedures for identifying and managing "visually sensitive areas". These procedures incorporate both biophysical and social factors-including visual sensitivity ratings based on topography, slope and other biophysical factors, and social factors such as numbers of viewers and their perceptions-and provide recommended visual quality objectives (VQOs) for these visually sensitive areas. These objectives limit the amount of visible disturbance that is acceptable in these areas.

To meet these objectives, constraints are placed on timber harvesting, road building, and other forest practices in the sensitive areas. The constraints are expressed in terms of "forest cover

requirements" which specify the maximum allowable percentage of a landscape unit that can be younger than the "visually effective green-up" age. This is the point at which regeneration is perceived by the public to be a visually satisfactory forest. The heights that stands are considered to have met visually effective green-up requirements are based on the results of focus tests performed with a cross section of the public from 12 communities throughout B.C.

The identification of visually sensitive areas is typically done through a landscape inventory. Due to the remoteness and lack of accessibility of the Homathko and Kingcome blocks, landscape inventories are not yet considered necessary for these blocks. District and regional B.C. Forest Service staff noted that considerations in the Coastal Fisheries/Forestry Guidelines and the Coastal Harvesting Guidelines overlap with, and adequately address, landscape sensitivities on these blocks.

A landscape inventory has been completed for the Fraser block; 1520 hectares (43 percent of the total block area) currently have VQOs identified. The maximum allowable percentage of disturbance in the VQO areas significantly exceeds the proposed total annual area harvest from the entire Fraser block. Therefore, when examined in total, VQO requirements do not present a restriction to timber supply from this block. However, each island within the Fraser block is treated as its own viewshed, and the VQO objectives are tracked for each island individually. As a result, it is conceivable that the VQO objectives could restrict harvesting on some individual islands at some point.

The Minister of Forests has expressed the provincial socio-economic objective of ensuring an appropriate balance between protecting visual resources and minimizing the impact of such protection measures on timber supplies, recognizing that these may overlap with other objectives now required under the Forest Practices Code (see below, Appendix 1 and Appendix 4). Since visual quality objectives do not directly constrain the timber supply in TFL 43 at this time, no further consideration of these objectives is required to ensure consistency between this AAC determination and other Code requirements. However, as the implications of this new policy direction become reflected in operating procedures, there may be a reconsideration of certain practices at the field level.

In general, I am satisfied that the VQO objectives can be met while harvesting the annual area planned, and that they present no restriction to the planned harvest in this portion of TFL 43 at this time. I expect the licensee to complete the landscape inventory on the Homathko and Kingcome blocks, and to identify visual quality objectives for consideration in preparing Management Plan No. 4. Depending on the management regime that is deemed appropriate at that time, it may be advisable to incorporate visual quality management into the timber supply analysis for Management Plan No. 4.

-Recreation inventory and analysis

A recreation inventory and analysis was completed by the licensee in 1994, and has since been accepted by the B.C. Forest Service. Each area exhibiting high environmental sensitivity due to its recreational values (for example fishing, wildlife viewing, beaches, boating and general nature study) has been designated as a recreation ESA. These areas have overlapping environmental values as they occupy the same riparian portions of the TFL as designated fisheries or wildlife habitat ESAs. Due to this overlap, all recreation ESA areas were excluded from the timber harvesting base in the analysis for their fisheries or habitat values. B.C. Forest Service staff from the district and regional offices indicate that the Coastal Fisheries/Forestry Guidelines and the Coastal Planning Guidelines, and now management under the Forest Practices Code, will protect the recreation values which have currently been identified on the TFL. It should be noted that the physical features associated with these recreation values are neither developed (for example, with picnic tables, trails or viewing blinds) nor intensively managed as they tend to suffer significant periodic losses to river erosion. For the purposes of this determination, I am satisfied that the recreation values on TFL 43 have been appropriately accounted for in the analysis.

-Biodiversity and forest ecosystem networks (FENs)

There are currently no prescriptions for maintenance of biological diversity on TFL 43, however ecosystem mapping for the TFL was completed in 1993, and has been subsequently accepted by the B.C. Forest Service. This mapping has been used in various planning processes to account for the biological diversity on the TFL. Given the small, interspersed nature of the operable land base within the total river drainage areas, the management strategy for the TFL provides for maintenance of habitat values on the inoperable land base. As discussed in *Environmental sensitivity* above, protection of habitat values has been accomplished largely through the designation of environmentally sensitive areas (ESAs). These ESAs are linked through forest ecosystem networks, or FENs.

To date, forest-level biodiversity planning has largely used FENs to account for and protect existing fish, wildlife and bird habitat through ESAs and by avoidance of these areas during cutblock layout. In the Fraser block, protection of bald eagle nesting and roosting areas, and protection of fish spawning areas, are the primary concerns. In the Homathko block, the most significant FEN areas include the Homathko River estuary and the Cumsack Slough wetlands, as well as identified old growth forest habitat for grizzly bears. These areas have been withdrawn from the timber harvesting land base in the licensee's analysis. The smaller Kingcome block does not have designated FENs at this time, however the existing fish and wildlife habitats have been protected through ESAs, and an additional 10% of the operable land base has been withdrawn in the analysis to account for as-yet unidentified but anticipated grizzly bear habitat areas in this block, as discussed earlier under *Environmental sensitivity*. The presence of Ecological Reserves 40A and 40B immediately adjacent to the Kingcome block also provide a local network of protected ecosystems.

The areas removed from the operable land base of the TFL contribute to the maintenance of genetic-level biodiversity. In addition, 400 different cottonwood clones are currently grown by

the licensee; these clones are mixed during planting to ensure localized diversity in the gene pool.

With the implementation of the Forest Practices Code, there will be increasing emphasis on identifying and protecting biodiversity in all management units. I expect that, for the next AAC determination, implications of biodiversity maintenance at the forest-level, landscape-level, stand-level and genetic-level, will be accounted for in the licensee's analysis in Management Plan No. 4. In the meantime, for this determination, I accept that the licensee's allowances for biodiversity are appropriate, and have been factored adequately in their analysis.

-Riparian habitat

To protect riparian habitat, streamside management and other buffer zones are located along watercourses in the TFL; these zones limit or modify timber harvesting practices adjacent to the watercourses.

As discussed in *Environmental sensitivity* and *Biodiversity and forest ecosystem networks* above, protection of sensitive riparian habitats has been accomplished in the analysis through removal of fisheries or wildlife habitat ESAs from the timber harvesting land base, and through further reductions to account for streamside management zones along all Class A streams in the TFL.

As stated in my guiding principles, the implementation of the Forest Practices Code will have additional impacts on timber supply in many areas. Of particular significance for TFL 43 are the Code requirements for the management of riparian or alluvial areas. These requirements have not been incorporated in the analysis as there was not sufficient direction on this matter when the data package was assembled.

Riparian habitats overlap with environmentally sensitive areas and FENs on TFL 43, and have therefore been accounted for in the licensee's analysis in conjunction with these factors. I am mindful that the timber supply impacts of these factors will not necessarily be cumulative, however for the purposes of this determination, I am satisfied that riparian areas have been appropriately accounted for in the analysis. The implementation of the Forest Practices Code will provide further direction on riparian management, however, I believe that, to a large extent, the pattern of land base deductions from the timber harvesting land base in the licensee's analysis of TFL 43 will deal with most Code requirements, and that additional impacts are likely to be small in comparison. Further assessment of riparian zones, in light of the Forest Practices Code, should be carried out as part of Management Plan No. 4.

-Wildlife habitat

Significant wildlife habitat values exist on TFL 43, and are accounted for, and protected where required, through withdrawal of the areas from the timber harvesting land base in the analysis and by avoidance of the areas during harvest planning. As discussed above in *Environmental sensitivity* and *biodiversity*, wildlife habitat areas are identified as ESAs or streamside management zones in TFL 43, and are reserved from harvesting. An additional reduction of 10%

of the otherwise-operable timber harvesting land base has been made on the Kingcome block to account for expected, but as yet unidentified, grizzly bear habitat. These measures provide adequate protection of the habitat values, and I am satisfied that they have been adequately accounted for in the analysis.

-Areas of cultural or archeological significance

Archeological sites have not been found to date on TFL 43; due to the nature of the frequent flooding of much of the area, it is unlikely that any significant archeological sites are present. However, the licensee will continue to refer harvesting plans to the First Nations that reside near the various blocks of the TFL for their review and comment.

-Green-up period

Areas adjacent to harvested cutblocks are not available for future harvest until the cutblocks have regenerated, and the young stands attained an acceptable green-up height. In the licensee's analysis, it was assumed that a green-up height of three metres would be achieved in three years. Including the regeneration delay of one to three years, the total green-up period ranges from four to six years on TFL 43.

I am satisfied that the green-up periods are reflective of the fertile soil, favourable growing conditions, and rapid growth of cottonwood on TFL 43. I also acknowledge that regeneration, and consequently green-up, may be achieved in shorter time frames than assumed in the licensee's analysis. However, the Forest Service analysis indicated that meeting green-up conditions earlier does not affect the harvest forecast. I have therefore not considered this factor further in the reasons for my AAC determination.

-Erosion and accretion

Due to the proximity of all three blocks of TFL 43 to major river systems, the entire TFL is comprised of alluvial flood plains. Therefore, accounting for loss of land base through erosion, or the addition of land through accretion is an important consideration for this unit. The licensee currently obtains new aerial photographs every five years to update all land base and forest cover changes, including those due to river erosion and accretion.

All eroded land is deemed to be harvested for the purposes of area-based harvest administration. Newly accreted lands are restocked within the specified regeneration delay for the block (one to three years), and are only included in the timber harvesting land base when the forest cover has reached at least three metres in height, has at least 50% crown closure, and has been determined to be environmentally and economically operable. At present, there is no separate accounting for land base changes due to erosion or accretion, however, as shown below in **Implementation of Decision**, I will require a separate accounting of such changes for future management plans. For the purposes of this determination, I am satisfied that the licensee has properly accounted for land base changes due to erosion and accretion in their inventory and analysis, and I have therefore implicitly accounted for this in my determination.

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

First Nations concerns

The Homathko block of TFL 43 is currently under land claim by the Homalco Indian Band. The Kingcome block is under land claim by the Kwakiutl/Musgamagw Tribal Council. In addition, the Kingcome block is accessed through Indian Reserve lands that border the block. This access does not present any problems at this time. The Sto:Lo Nation has a land claim over the Fraser block, claiming it as traditional territory.

I realize the uncertainty that land claims may pose to forest management in general, and specifically to the management of portions of TFL 43. However, in accordance with my guiding principles, it would be premature to factor into my AAC determination for the unit any speculative changes to the land base of the TFL that may result from resolution of the land claims.

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

Community dependence on the forest industry

The area-based analysis does not include any alternative harvest flows based on current forest management that would facilitate evaluation of the implications to the Province of different initial harvest rates. However, given the relatively small AAC for TFL 43 in comparison to the significance of the forest industry in the three timber supply areas surrounding the blocks of TFL 43, I do not expect that any potential changes in harvest flow from TFL 43 will have any noticeable implications to the Province or to the local communities.

Difference between AAC and actual harvest

For TFL 43, cut control is regulated on an area basis, but volumes for areas to be harvested are also specified in the management plan for proposed harvest blocks shown in the 5-year development plan. These volumes are also tracked as part of the cut control process. It is therefore possible for the actual volume harvested to vary, depending on the site productivity and stand volumes recovered from the harvested areas.

The cut control records show that the actual areas harvested during the two previous five-year cut control periods (1985 to 1989 and 1990 to 1994) were within 1.0% and 3.4% of the harvest targets respectively. I note also that the harvest and billing records for the same two cut control periods show that the volumes harvested are within 1.0% and 3.8% of the AAC respectively. The annual variation has ranged from a low of 66.0% of AAC in 1985 to a high of 137.2% of AAC in 1987. These periodic and annual figures are well within the standard cut control allowances for periodic (+/- 10%) and annual (+/- 50%) harvest level variation.

AAC Rationale for TFL 43

Since 1985, the licensee, in harvesting on an area-regulated basis, has harvested less than their approved portion of the AAC in every year but one. I also note that there has been no harvest to date on the portion of the TFL AAC allocated to the Small Business Forest Enterprise Program (SBFEP) due to low demand for hardwood timber sales. This accumulated volume from the period 1988 to 1994 totals 6630 cubic metres; all SBFEP volumes from TFL 43 are to come from the Fraser block.

Overall, I am not concerned about the potential harvest level fluctuations allowed under cut control regulations, as discussed above, because the licensee has suggested it can deal with fluctuations through buying and selling in the market. Further, the fact that harvests have approximated allowable levels would indicate that no unaccounted-for considerations are constraining timber supply. I am therefore satisfied that harvest level fluctuations do not indicate a cause for concern in this unit, and have therefore not further accounted for this in my AAC determination.

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

Timber processing facilities

Cottonwood pulpwood logs harvested from the TFL are processed at Scott Paper Limited's Western Manufacturing Division paper mill in New Westminster. Cottonwood pulp produced at the mill is combined with market pulp purchased on the open market to make tissue paper products. The mill employs about 700 people, and an additional 15 to 20 people are employed seasonally by the company's logging contractors.

An equivalent of about 30% of the total mill volume requirement is obtained as a result of harvesting rights under TFL 43. The TFL directly provides about half of the mill's total cottonwood fibre supply requirements, or about 15% of the total mill requirement. The remainder of the volume harvested from TFL 43 is sold or traded on the market for cottonwood from other sources. The remainder of the mill requirements are purchased on the open market. This fairly diversified approach to acquiring fibre supply suggests that minor year-to-year fluctuations in volume harvested from the TFL should not present problems to mill operations.

There are no new timber processing facilities proposed at this time to augment or replace the paper mill.

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

Minister's letter and memo

While the minister has not expressed any specific social or economic objectives of the Crown for TFL 43, he has expressed the social and economic objectives of the Crown for the province (letter to the Chief Forester dated July 28, 1994, attached as Appendix 3 and memo the Chief Forester dated February 26, 1996, regarding visual quality resources, attached as Appendix 4),

and I understand these to apply to TFL 43. 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 also stated in his letter that "...any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the Chief Forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. The latter would likely require the use of alternative harvesting systems, and to encourage this the minister suggested consideration of partitioned AACs.

The Minister's memo of February 26, 1996 asks that pre-Code constraints applied to timber supplies in order to meet visual quality objectives be re-examined when determining AACs, in order to ensure that they do not unreasonably restrict timber supplies. I have discussed this above, under "*Visually sensitive areas*", where I noted that no adjustment to visual quality objectives was required in this TFL at this time for consistency with other Code requirements.

The licensee's mill currently employs about 700 people; a further 15 to 20 people are employed by various logging contractors. I fully appreciate the impact that a reduced AAC could have on employment levels, but I am confident that the licensee will make up the difference in wood purchases on the open market. Overall, the licensee's recommended AAC reduction is expected to have minimal impact on the company, employment and government revenue due to their ability to purchase additional volume and because the TFL supplies only about 30% of the company's fibre requirements. I also recognize the possibility that the actual volume harvested may fluctuate, and the effects these fluctuations may have on employment, as discussed under section 7(3)(b) above. Opportunities for the use of commercial thinning, as discussed under section 7(3)(a)(iii) above, are limited in this TFL, and there is no proven performance or strategy in place for commercial thinning. Therefore, I am not considering the effects on timber supply from commercial thinning in this determination.

Operability was discussed under section 7(3)(a)(i) *land base contributing to timber harvest* above. There I concluded that there are unlikely to be opportunities in the future to harvest areas that are currently considered inoperable. My review of operability leads me to the conclusion that, at present, the land base defined for the analysis accurately reflects timber harvesting opportunities. I do not consider it appropriate to establish a partitioned AAC for the purpose of harvesting in currently inoperable areas. Any future consideration of the inclusion of currently inoperable areas in the timber harvesting land base will require careful consideration of environmental factors.

Local objectives

The Minister's letter suggests that I should consider important local social and economic objectives that may be derived from any public input in the TFL management planning process.

The licensee conducted a public viewing of their draft management plan during the entire month of August 1994, and held three, one-day open houses in the communities closest to the three blocks of the TFL; Chilliwack, Powell River, and Port McNeill. There were no attendees in Chilliwack; two B.C. Forest Service staff members attended the Powell River open house to examine the licensee's presentation, and two Mount Waddington Regional District staff members attended the Port McNeill session for information. No members of the general public attended any of the open houses or the plan viewing. As a result, no public comments were received.

While there was a lack of local public comment, I have considered the general employment, revenue, taxation and community stability implications of my AAC determination.

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

Unsalvaged losses

Although the presence of a number of insects, diseases and other pests has been noted on the TFL, none have been considered significant or abnormal. Therefore, no salvage programs are planned.

Normal rates of unsalvaged losses are very small. Less than seven hectares have burned since 1985, and losses due to blowdown are insignificant as the road network allows good access to all parts of the TFL. Another potential source of unsalvaged losses is erosion, as previously discussed. All unsalvaged losses are accounted for as part of the area deemed to be harvested, and all unsalvaged volumes are recorded as part of the licensee's annual harvest for cut control purposes. I am satisfied that this is an appropriate method of accounting for unsalvaged losses, and that it ensures any timber supply losses are accounted for in the licensee's area-based timber supply analysis.

Reasons for decision

In reaching my decision on the determination of an AAC for TFL 43, I have considered all of the factors presented above and have reasoned as follows.

Normally, the licensee would be required to submit a volume-based timber supply analysis, using a computer-based forest estate model, to provide me with information on the implications of harvest flow alternatives. However, I conclude that the area-based approach to timber supply analysis provides me with sufficient information upon which to base this AAC determination given the following factors:

- the time required to gather information which would accommodate the analysis of harvest flow alternatives;
- the licensee's support for a 10.4% AAC reduction;
- the agreed-to management objective of conversion of all stands in the timber harvesting land base to cottonwood;

- the projected achievement of a long-term sustainable harvest in 30 years; and
- the licensee's willingness to purchase volume on the open market, if necessary, to compensate for any shortfall in harvest due to the use of area-based harvest regulation.

In my evaluation of the evidence related to the AAC for TFL 43, I note that there are factors which exert downward influence on the timber supply projection indicated in the timber supply analysis, and others that exert upward influence. These are discussed below.

Factors exerting downward influence on the timber supply analysis

-Land base contributing to timber harvest

The total land base of TFL 43 has decreased slightly (by less than one percent) since the previous timber supply analysis. However, the timber harvesting land base is now seven percent smaller, due to the identification of new environmentally sensitive and inoperable areas, and the establishment of streamside management zones in the Homathko and Kingcome blocks. These changes have been accounted for in the current timber supply analysis.

Based on the requirements of the Forest Practices Code for management of riparian areas and biodiversity, it is reasonable to expect that the future timber harvesting land base will be smaller than estimated in the licensee's analysis. While it is not possible at this time to determine the exact magnitude of the reduction, sufficient direction is provided in regulations under the Code to make me certain that requirements for these resource values will exceed levels of protection used for the licensee's analysis.

-Alternative silvicultural systems

Management Plan No. 3 indicates the licensee's commitment to the use of alternative (non-clearcut) silvicultural systems where soil stability or other resource values are important. Depending on the extent of the use of alternative systems, there may be a downward impact on timber supplies.

Without a schedule of planned use, or history of past use, of alternative systems, and quantification of the subsequent impact in timber supply, I cannot speculate at this time about the extent of the timber supply implications of such a program. I do, however, consider the likelihood of significant impact to be quite small. The effect of any use of non-clearcut systems will be accounted for in the next AAC determination.

I conclude that, due to the very high likelihood of increased area being reserved from harvests in riparian areas following implementation of the Forest Practices Code, the timber harvesting land base, and hence the timber supply, of TFL 43 will be smaller than defined in the licensee's timber supply analysis.

Factors exerting upward influence on the timber supply analysis

-Rotation period

A number of factors influence the choice of the rotation period, including the regeneration delay, the growth characteristics of the tree species being managed, the productivity of the site, the product objectives (in this case, log size and fibre brightness), the silvicultural treatments applied to the stands and their impacts on the stand characteristics such as piece size or volume production.

In the information I have examined for this AAC determination, there is some suggestion that the regeneration delay actually being achieved on many sites on TFL 43 is shorter than the regeneration delays factored into the timber supply analysis. If shorter regeneration delays are being achieved, more areas could be available to harvest each year under the management objective of rapid conversion. I feel there may be some degree of flexibility on this issue, but no direct evidence was presented to me that would support the use of shorter regeneration delay assumptions in this AAC determination. Therefore, I will not assume that shorter regeneration delays will occur; rather I choose to use the information as presented and will not further contemplate any AAC increase to account for potentially shorter rotation periods.

-Volume estimates for regenerated stands

At present, there is very little data available on the growth performance of pure or managed cottonwood stands. Growth and yield data for other species in British Columbia regularly show faster growth in managed stands than has occurred in the existing older stands. I infer that the same will likely hold true for the managed cottonwood stands on TFL 43. This may, in future, allow for shorter rotation ages as well as increased volume yield. Although the licensee has

established a series of permanent sample plots to measure the growth of these new stands, results are not available for use in timber supply analysis. Therefore, in the absence of more accurate data, I choose to rely on the rotation age assumptions used in the current timber supply analysis for TFL 43. Further, I believe that it is premature to speculate on volume effects that will, at any rate, apply only in the longer term.

I conclude that the downward pressures to timber supply on TFL 43 that may be expected due to further decreases to the timber harvesting land base are offset by the upward pressures that may be expected from better information about the actual growth of managed cottonwood stands on the TFL. In addition, small shifts in rotation ages may offer some flexibility to offset uncertainties that could reduce timber supply. I am not able to quantify either the upward or downward pressures at this time, but I do believe these pressures will offset each other in the short term, and have therefore not further adjusted the AAC to account for them.

Having weighed these considerations, it is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, ensures longer-term IRM objectives can be met, reflects current management practices, avoids severe curtailment of locally-established patterns of socio-economic activity based on timber harvesting, and minimizes risks of disruptive shortfalls in future wood supply, can best be achieved in this TFL at this time by the establishment of an AAC of 44 460 cubic metres (128.4 hectares). Further, although I am not establishing a definite partition, I expect that this AAC will be distributed across the three blocks of TFL 43, as specified in Management Plan No. 3, as follows:

- Lower Fraser block: 14 912 cubic metres (49.4 hectares)
- Homathko block: 20 351 cubic metres (63.3 hectares)
- Kingcome block: 9 197 cubic metres (15.7 hectares)

New AAC determination

The new AAC for TFL 43 will be 44 460 cubic metres. This AAC is a reduction of 5 140 cubic metres (10.4%) from the previous AAC of 49 600 cubic metres. The new AAC is the same as the level proposed by the licensee in Management Plan No. 3. The reduction reflects the reduction in the amount of the operable land base since the last management plan.

Implementation of Decision

This determination came into effect on July 1, 1995 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. In my letter to Scott Paper Limited of June 30, 1995, I approved Management Plan No. 3 for TFL 43, for the period July 1, 1995 to December 31, 1999, with a number of conditions of approval that are also relevant to implementing this AAC decision:

1. In order to initiate the transition to a volume-based timber supply analysis, in addition to preparing an area-based timber supply analysis for draft Management Plan No. 4, the licensee is to prepare a volume-based timber supply analysis for the Lower Fraser block. The volume-based analysis for the Lower Fraser block will initiate the transition to a volume-based timber supply analysis for the entire TFL, which will be a requirement of future management plans. A commitment to this effect is to be included in the Statement of Management Objectives, Options and Procedures for draft Management Plan No. 4, which is required February 28, 1998.
2. The licensee is required to submit, and include as an amendment to Management Plan No. 3, the estimated time frame for completing the conversion of stands in the Kingcome and Homathko blocks to second-growth cottonwood stands. In addition, the licensee is to include a schedule for the establishment of growth and yield plots in both blocks and an estimate of when volume-based timber supply analyses will be feasible for these blocks.
3. The licensee is to submit, and include as an amendment to Management Plan No. 3, a description of the changes that have taken place to the TFL 43 land base due to erosion and/or accretion from river activity since the formation of the TFL, if this information is available.
4. The licensee is to submit, and include as an amendment to Management Plan No. 3, a proposed up-to-date Schedule B prorate. The information used to determine the prorate, as well as the calculations, should be included. The prorate should be determined using the ratio of the area of productive Schedule B lands to total productive lands. Should a reallocation of the AAC be necessary based on the new prorate, I will forward a letter to all holders of Management Plan No. 3 with the necessary changes.

In addition, I also instruct the licensee as follows:

5. In conjunction with their implementation of the requirements of the Forest Practices Code, to review and update the delineation of environmentally sensitive areas (ESA), biodiversity requirements, riparian areas and wildlife habitats.
6. To complete a landscape inventory for TFL 43, including designation of visual quality objectives (VQO) for all blocks of the TFL, for consideration during the preparation of Management Plan No. 4.
7. To work cooperatively with the B.C. Forest Service staff in Resources Inventory Branch and Research Branch to prepare appropriate volume estimates for both existing and regenerated

stands on TFL 43. In conjunction with this work, I expect the licensee to refine their assumptions of decay, waste and breakage, minimum harvest ages and regeneration periods.

8. To arrange for an audit of the inventory of the TFL, to specifically examine the accuracy of the existing inventory, assess the strengths and weaknesses in the inventory, and to assist in setting priorities for future re-inventory activities.

I formulated my rationale for the AAC determination documented above in April 1995, and released the determination itself in June, 1995. This rationale report is a confirmation of my determination and an explanation of my rationale.



Larry Pedersen
Chief Forester

May 3, 1996

Appendix 1: Section 7 of the *Forest Act*

Section 7 of the *Forest Act* reads as follows:

Allowable annual cut

7. (1) The chief forester must determine an allowable annual cut before December 31, 1996, and after that determination at least once every 5 years after the date of the last determination, for
- (a) the Crown land in each timber supply area, excluding tree farm licence areas and woodlot licence areas, and
 - (b) each tree farm licence area.

- (1.1) If, after the coming into force of this subsection, the minister
 - (a) makes an order under section 6 (b) respecting a timber supply area, or
 - (b) amends or enters into a tree farm licence to accomplish the result set out under section 33.1 (1) (a) to (d),

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

- (c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
 - (d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.
- (1.11) If
 - (a) the allowable annual cut for the tree farm licence is reduced under section 7.1 (3), and
 - (b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

AAC Rationale for TFL 43

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

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

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

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

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

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

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

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

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

Section 4 of the *Ministry of Forests Act* (1978) reads as follows:

Purposes and functions of ministry

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

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

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994 to Chief Forester regarding social and economic objectives of the Crown

Appendix 4: Minister of Forests' memo of February 26, 1996 to Chief Forester regarding social and economic objectives of the Crown--visual resources.