BRITISH COLUMBIA
MINISTRY OF FORESTS

Dawson Creek Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective May 1, 2003

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Chief Forester

Table of Contents

Objective of this document

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

Description of the TSA

The Dawson Creek TSA covers about 2.3 million hectares in north-eastern British Columbia and is one of thirteen TSAs within the new Northern Interior Forest Region. The TSA is bounded by the Peace River to the north and the Alberta border to the east. To the west are the Hart Ranges and to the far south lie the Front Ranges, both of which are characterized by the mountainous terrain and steep valleys of the Rocky Mountains.

In 2001, the population of the Dawson Creek TSA was estimated at 26 500 people. The city of Dawson Creek is the largest community in the TSA, where about 40 percent of the population of the TSA live. Other communities include Tumbler Ridge, Chetwynd, Hudson's Hope and Pouce Coupe. Two First Nations communities in the TSA are the West Moberly and Saulteau. In addition, there is a Métis community at Kelly Lake.

About 60 percent of the Dawson Creek TSA (about 1.4 million hectares) is considered productive forest land managed by the Crown. Currently about 52 percent of this area is considered available for timber harvesting under current forest management practices. The current timber harvesting land base is estimated at 730 220 hectares, of which 429 440 hectares (59 percent) are stands of predominately coniferous species and 260 342 hectares (41 percent) are stands of predominately deciduous species.

The TSA lies primarily within two ecoregions: the Boreal Plains in the east, and the Central Canadian Rocky Mountains in the west. Climate is characterized by cold prolonged winters and warm short summers.

Of the 14 biogeoclimatic zones in the province, four are represented in the TSA: Boreal White and Black Spruce (BWBS); Engelmann Spruce-Subalpine Fir (ESSF); Sub-Boreal Spruce (SBS); and, Alpine Tundra (AT). White spruce, lodgepole pine, trembling aspen, balsam poplar, black spruce and sub-alpine fir are the main tree species occurring in the TSA and frequently grow together as mixed-wood stands.

History of the AAC

In 1987, the former Peace TSA was divided into the Dawson Creek TSA, the Fort St. John TSA and Tree Farm Licence (TFL) 48. The Dawson Creek TSA was initially assigned an AAC of 1 250 000 cubic metres—570 000 for deciduous stands and 680 000 for coniferous stands.

A new AAC determination in 1989 led to an overall increase to 1 710 173 cubic metres—710 173 for coniferous and 1 000 000 for deciduous. This increment was based primarily on improved deciduous utilization and recognition of the contribution of deciduous volume within coniferous-leading stands. In 1990, the coniferous component of the AAC was

increased to 860 173 cubic metres through the addition of 150 000 cubic metres for small-diameter pine stands.

In 1996, the deciduous component of the AAC was reduced significantly to 886 500 cubic metres based on a new timber supply analysis. The corresponding coniferous component of the AAC was reduced slightly to 846 533 cubic metres with the requirement that at least 100 000 cubic metres annually be taken from stands classified as small-diameter pine.

The total AAC of 1 733 033 cubic metres is currently apportioned by the Minister of Forests as follows:

Licence Category	Apportioned volume (cubic metres /year)			Percent of total
	Coniferous	Deciduous	Total	
Forest licence – replaceable	496 613		496 613	28.7
Forest licence – non-replaceable	100 000	600 000	700 000	40.4
Timber sale licence (<=10 000 m^3/yr)	72		72	0.0
Pulpwood agreement	0	195 169	195 169	11.3
Small Business Forest Enterprise Program (BC Timber Sales)	220 140	81 000	301 140	17.4
Woodlot licence	14 210	10 331	24 541	1.4
Forest Service Reserve	15 498	0	15 498	0.9
Total	**846 533**	**886 500**	**1 733 033**	**100.0**

New AAC determination

Effective May 2003 the new AAC for the Dawson Creek TSA will be 1 860 000 cubic metres. This AAC excludes volume issued to woodlot licences since the 1996 determination and is partitioned as follows:

- 978 000 cubic metres attributable to coniferous-leading stands of which at least 100 000 cubic metres annually must be taken from stands classified as small pine;
- 882 000 cubic metres attributable to deciduous-leading stands.

This AAC will remain in effect until a new AAC is determined, which may take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for the Dawson Creek TSA include the following:

- Dawson Creek TSA Timber Supply Analysis. Timber Supply Branch. 1994;

- Dawson Creek TSA Timber Supply Analysis Addendum. Timber Supply Branch. 1996;
- Dawson Creek Timber Supply Area Rationale for Allowable Annual Cut (AAC) determination. Timber Supply Branch. 1996;
- Dawson Creek Timber Supply Area Timber Supply Review Data Package. Timber Supply Branch. 2000;
- Dawson Creek Timber Supply Area Information Report. Timber Supply Branch. 2000;
- Dawson Creek Timber Supply Area Analysis Report. Timber Supply Branch. October 2002;
- *Dawson Creek TSA: Timber Supply Review Public Discussion Paper*, BCFS, October, 2002;
- Dawson Creek TSA Timber Supply Review: Summary of Public Input, BCFS, 2003 (Appendix 5);
- Dawson Creek TSA Inventory Audit. Resources Inventory Branch. 1995;
- Dawson Creek TSA — Documentation of Vegetation Resources Inventory Interim Analysis. Terrestrial Information Branch. 2000.
- Dawson Creek TSA — Documentation of VRI Final Analysis: May 14, 2002. Terrestrial Information Branch. 2002;
- Vegetation Resources Inventory – Attribute Adjustment procedures (draft). Version 4.4. , Terrestrial Information Branch, 2002;
- Procedures for factoring visual resources into timber supply analyses, 1998;
- Forest Practices Code of B.C. Guidebooks, as amended;
- *Forest Practices Code of British Columbia Act*, consolidated to March 2002;
- *Forest Practices Code of British Columbia Act* Regulations and Amendments, current as of March 2002;
- Variable density yield projection (VDYP) batch application user's guide, version 6.6d. Terrestrial Information Branch. 2000;
- BatchTIPSY growth and yield model version 3.0a. Research Branch. 2000;
- BatchTools version 3.2. Research Branch. 2000;
- Site index adjustments for old-growth stands based on veteran trees. Working Paper 36. Research Branch. 1998;
- Site index adjustments for old-growth stands based on paired plots. Working Paper 37. Research Branch. 1998;
- Dawson Creek Land and Resource Management Plan. LUCO. 1999;
- Dawson Creek Draft Landscape Unit Planning Strategy (June 1999). Victoria, B.C;
- Aspen Managers' Handbook for British Columbia. (FRDA) Report No. 230. 1995;
- Forest Practices Code Timber Supply Analysis, 1996;

- *Identified Wildlife Management Strategy*, February 1999;
- Letter from the Minister of Forests, dated July 28, 1994, to the chief forester, stating the Crown's economic and social objectives for the province (Appendix 3);
- Memo from the Minister of Forests, dated February 26, 1996, to the chief forester, stating the Crown's economic and social objectives for the province regarding visual resources (Appendix 4);
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BC Forest Service (BCFS) and Ministry of Sustainable Resources Management (MSRM), including the AAC determination meeting held in Dawson Creek, January 20-21, 2003.

Role and limitations of the technical information used

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

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

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

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

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires

consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, in cases where projections of short-term timber supply are not stable, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine these AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

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

The *Forest Practices Code of British Columbia Regulations* were originally 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. The timber supply implications of some of the Act and its regulation, in some cases still remain uncertain, particularly when considered in combination with other factors (for example landscape biodiversity provisions). In each AAC determination, I take these uncertainties into account to the extent possible in context of the best available information.

More recently, on November 21, 2002, government passed the new *Forest and Range Practices Act*, which will ultimately replace the *Forest Practices Code of British Columbia Act.* As the timber supply implications of this new Act and any pursuant regulations become clear and measurable, they will be accounted for in AAC determinations. Uncertainties will continue to be handled as they were under the previous legislative regime.

The eventual timber supply impacts associated with strategic land-use decisions resulting from the various planning processes—including the Dawson Creek Land and Resource Management Plan (LRMP), Protected Areas Strategy, or other area-based planning processes—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal

approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for regular AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

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

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

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

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the British Columbia Court of Appeal and the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions. In this respect it should be noted that my

determination does not prescribe a particular plan of harvesting activity within the TSA or TFL. My determination is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

The British Columbia Court of Appeal decided in March 2002 that pending the final determination of the existence of aboriginal rights and title, the Crown has an obligation to consult with First Nations with respect to asserted rights and title in a manner proportional to the strength of the interests. I consider any information brought forward respecting First Nations' interests. In particular I consider information related to actions taken to protect interests, including operational plans that describe forest practices designed to seek to address such First Nations' interests. In this context, I re-iterate that my AAC determination does not prescribe a particular plan of harvesting activity, nor does it involve allocation of the wood supply to any particular party.

If, subsequent to this determination, I become aware of information respecting First Nations interests that would substantially alter the estimate of timber supply underlying my determination, I am prepared to revisit my determination.

Overall, in making AAC determinations, I am mindful 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* and the *Forest Act*.

The role of the timber supply analysis

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the timber supply review process.

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

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

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

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

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

Base case forecast for the Dawson Creek TSA

The base case harvest forecast presented in the *October 2002 Dawson Creek Timber Supply Area Analysis Report* incorporated the most current available information on forest management, land base and timber yields for the TSA. The forecast included specific assumptions about the TSA that are discussed in detail in the analysis report.

Given the specific assumptions applied, the timber supply analysis separately assessed areas with coniferous-leading (excluding small pine stands), deciduous-leading and small-pine stands. The results suggested that a total harvest level of 2 078 000 cubic metres per year can be maintained for up to five decades before declining by about four percent per decade to 1 786 000 cubic metres per year by decade 8. The total harvest forecast declines a further 28 000 cubic metres beginning in decade 19 and achieves a long-term harvest level of 1 759 000 cubic metres per year by decade 21.

In the base case, a constant harvest level of 1 098 000 cubic metres per year of coniferous-leading stands can be achieved over the entire simulation period. For deciduous-leading stands, an initial harvest level of 880 000 cubic metres per year (the current AAC adjusted for woodlots) can be maintained for 5 decades before declining by 10 percent per decade to a long-term harvest level of 588 000 cubic metres per year. The current small pine partition (100 000 cubic metres per year) can be maintained for up to 19 decades before declining by 10 percent per decade to a long-term harvest level of 72 000 cubic metres per year.

In the analysis, coniferous volume within deciduous-leading stands is assumed to contribute to the overall deciduous harvest forecast. Likewise, the deciduous volume within coniferous- or small pine-leading stands contributes to the overall coniferous- or small pine-leading harvest forecasts respectively. Like the previous (1996) timber supply analysis, the 2002 timber supply analysis indicates that the potential harvest level from coniferous-leading stands is significantly higher than the current coniferous partition of 846 533 cubic metres per year.

I accept that the base case forecast provides me with a suitable basis from which to assess the assumptions regarding land base, management practices and timber yields for this TSA. In the following sections, I will discuss many of the analysis assumptions in the context of my considerations for this AAC determination.

In the timber supply analysis, various sensitivity analyses were conducted to assess the potential implications for timber supply arising from uncertainty in data assumptions and estimates. These sensitivity analyses have also assisted me in considering the factors leading to my determination.

I have also considered all public input received on the data package and analysis report, and where appropriate I discuss this input in my considerations under the various factors presented in this rationale.

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

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

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

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

Land base contributing to timber harvesting

- general comments

As part of the process used to define the timber harvesting land base in the timber supply analysis, a series of deductions was applied to the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest, for ecological, economic or social reasons. The deductions in the Dawson Creek TSA timber supply analysis resulted in a timber harvesting land base of 730 220 hectares, or about 52 percent of the productive Crown forest area in the TSA.

Where my consideration of the information has identified a factor which in my estimation requires discussion in this document, it is described below.

- physical and economic operability

In the analysis, two deductions were applied to account for physical and economic operability. In the first deduction, 34 hectares were excluded from the timber harvesting land base as inoperable due to physical criteria such as steep slopes and unstable soils. A GIS-based exercise was used to identify these areas. This approach was thought to be an improvement over older environmentally sensitive area (ESA) inventories.

The second deduction (26 279 hectares) was intended to account for geographically isolated areas such as hanging valleys that are expected to be inaccessible due to high development costs. In total, 26 313 hectares were excluded from contributing to timber supply because of economic or physical operability constraints.

District staff reviewed harvesting records and identified no examples of areas being specifically excluded from harvest due to terrain stability concerns. They advise that areas

having a moderate to high likelihood of landslides are typically associated with riparian areas for which deductions to the timber harvesting land base had already been applied.

I have reviewed the information and assumptions applied in the base case and accept the deductions that account for geographically isolated areas as the best information available. However, I find that the deduction for sensitive terrain (34 hectares) appears low given that a significant proportion of the TSA involves steep, mountainous terrain. Moreover a review of older ESA inventories indicates that the timber harvesting land base assumed in the base case include over 16 000 hectares identified as highly sensitive to soils (Es1) and approximately 4 000 hectares classified as moderately sensitive (Es2).

I acknowledge that the reliability of the ESA soils inventories is uncertain, but nonetheless consider that the area deducted in the base case does not adequately account for sensitive soils. Based on the older ESA inventories, additional analysis suggested that the timber harvesting land base may be overestimated by up to 16 800 hectares. I note that approximately 13 600 hectares involves coniferous-leading stands with the balance involving deciduous-leading (2 800 hectares) and small pine stands (400 hectares). I therefore conclude that although uncertain, the coniferous, deciduous and small pine harvest forecasts may be over-estimated by up to three, one and one percent respectively. I have discussed this further in my 'Reasons for Decision'.

I also request that regional and district staff re-examine the methodology used to identify physically inoperable areas including unstable terrain over the term of this determination. Any new information will be incorporated into the next timber supply analysis.

- problem forest types

Problem forest types are stands that are physically operable and exceed minimum productivity criteria yet are not currently utilized or have marginal merchantability. In the analysis, those polygons with a leading species of larch, black spruce, lodgepole pine (stocking class 4), alder, maple or birch were excluded from the timber harvesting land base to account for leading species groups that are typically not harvested in the TSA. In total, 166 735 hectares were deducted from the timber harvesting land base to account for problem forest types.

District staff advise that pure balsam stands comprising 11 673 hectares of the timber harvesting land base and 32 980 hectares of pure and leading balsam poplar stands, although deemed merchantable in the base case, are currently not targeted for harvesting based on current practice.

I have reviewed the analysis assumptions regarding problem forest types and have discussed them with district staff. I note that because of limited performance in pure balsam and pure and leading balsam poplar stands, their contribution to timber supply on the Dawson Creek TSA is presently uncertain.

While I expect that some proportion of these stands will likely be harvested in the future, I currently view their contribution to the timber harvesting land base with caution. I have therefore considered that coniferous and deciduous timber supply may be overestimated by up to 3 and 13 percent respectively compared to the base case projection on account of this factor. I have discussed this further in my 'Reasons for decision'. I also encourage district staff and licensees to review and monitor harvesting performance in these areas over the

term of this determination. Any new information will be incorporated into the next analysis.

- non-merchantable stands

Non-merchantable stands were defined as mature stands that do not meet the minimum volume criteria. In the base case these criteria excluded mature stands not meeting a minimum of 120 cubic metres (conventional ground-based systems) or a minimum of 200 cubic metres (cable and aerial systems). In addition, mature small pine stands less than 17.5 metres were considered non-merchantable. In the timber supply analysis, 163 607 hectares were deducted to account for non-merchantable mature stands. The criteria used in the model were based on operational practice and the advice of local BCFS district staff.

I have reviewed the criteria used in the analysis and find them reasonable for use in this determination. I note that because provincial loss factor-compiled volume adjustments were used in the base case rather than the more current adjustment factors derived from recent inventory work, volume estimates for existing stands may be underestimated as discussed later under *vegetation resources inventory* and *volume estimates of existing stands* . As a result, a proportion of the stands that were excluded in the base case may in fact meet the minimum volume criteria for merchantable stands. I have considered the effect of this impact along with others associated with the compilation of the vegetation resources inventory adjustments on timber supply in my 'Reasons for decision'.

- low productivity stands

In the timber supply analysis, low productivity stands were considered to be immature stands that are not projected to achieve a volume greater than or equal to 120 cubic metres per hectare at maturity. VDYP Batch version 6.6d was used to project the volume per hectare of all immature stand polygons. Where the projected volume did not achieve the minimum volume per hectare at maturity, the polygon was excluded from the timber harvesting land base. In total, 89 789 hectares of productive forest were excluded from the timber harvesting land base to account for low productivity stands.

In the timber supply analysis, age and height attributes were adjusted using inventory adjustment ratios (described under *vegetation resources inventory*) before the low productivity exclusion criteria were applied.

Having reviewed the criteria and methodology used in the base case, I consider it the best available and therefore suitable for this determination.

- mixedwood forest types

Mixedwood stands comprise a large proportion of the productive forest within the Dawson Creek TSA. In the analysis, coniferous mixedwood stands are defined as stands comprised of at least 20 percent deciduous species; deciduous mixedwood stands are comprised of at least 20 percent coniferous species. In the timber supply analysis, approximately 13 percent (92 246 hectares) of the timber harvesting land base consists of mixedwood stands. In the analysis, 48 689 hectares are assumed to contribute to the deciduous harvest forecast and 43 556 hectares contribute to the coniferous harvest forecast.

Limited information on the dynamics and growth and yield of mixedwood stands in the Dawson Creek TSA is currently available. As a result, the analysis made no attempt to model mixedwood species interactions and the complex successional processes typical of mixedwood boreal ecosystems.

BCFS district staff advise that to date, there has been limited harvesting performance in mixedwood stands in the Dawson Creek TSA. Hence it is uncertain whether their full contribution to the timber harvesting land base was appropriate.

Sensitivity analyses were conducted to demonstrate the impacts of excluding the contribution of mixedwood stands to timber supply. Removing all mixedwood stands from the timber harvesting land base reduces the coniferous timber supply projected in the base case by up to 12 percent. The long-term deciduous harvest level is reduced by a maximum of 20 percent compared to the base case, however the initial deciduous harvest level of 880 000 cubic metres per year can still be maintained for two decades before declining.

I have reviewed and discussed the information with BCFS staff and am mindful that sensitivity analyses indicated that mixedwood stands contribute substantially to timber supply in the base case. Given that licensees currently avoid harvesting of mixedwood stands, I acknowledge the district staff's concern regarding the full contribution of these stands to the timber supply. I have considered this uncertainty and I accept that there is some degree of risk to the timber supply if these stands are not consistently harvested in the future. However, I find it is not unreasonable to expect that markets will change and that in the future many of these stands will be merchantable.

In summary, based upon my review of the information presented to me, I am not certain that 100 percent of the mixedwood stands should be included in the timber harvesting land base at this time. Given the level of uncertainty about these stands, I find it reasonable to take a cautious approach in my consideration of the higher projected harvest levels for the Dawson Creek TSA.

I note that district and regional staff are currently developing a boreal mixedwood strategy and local policies for mixedwood management in cooperation with local licensees. Any new information can be included in the next timber supply analysis. For this determination, I have considered that timber supply may be overestimated due to the uncertainty about future harvesting of these mixedwood stands and have further discussed this below in my 'Reasons for decision'.

- small pine stands

In the base case, small pine stands were defined as leading lodgepole pine stands, of any site class, with a height between 17.5 metres and 19.4 metres, not in stocking class 4, and that yield at least 120 cubic metres at maturity. Within the Dawson Creek TSA, these stand types are estimated to cover 40 437 hectares of the timber harvesting land base.

In the 1996 AAC determination I noted that there was uncertainty regarding the contribution of small pine stands to timber supply. I included a 100 000 cubic metre per year partition for small pine stands and requested that staff monitor harvesting performance. To date, I note that there has been no harvesting under this partition and only limited harvesting of this profile in the past five years.

Although district staff have better defined the small pine profile since my previous determination, they are still uncertain about this profile due to inventory labelling deficiencies, variability in the stand attributes (age, height, volume and stocking) and the lack of harvesting performance. In addition, further examination of the small pine yield tables and stand dynamics assumed in the timber supply model suggest that the small pine volumes projected in the analysis may be somewhat optimistic. However, I note that at this time, no specific data have been gathered that confirms any potential overestimation of the small pine growth and yields. Moreover, sensitivity analyses demonstrated that even if the small pine yields assumed in the base case were reduced by 45 percent, a harvest level of 100 000 cubic metres per year could still be maintained for at least 5 decades.

I have reviewed the uncertainty and implications of the base case assumptions, and examined the results of the sensitivity analysis and the alternative harvest flows for small pine (discussed later under *alternative harvest flows*). I note that the small pine harvest forecast displays a high degree of stability and have concluded that there is little risk to timber supply in the short term on this account.

I understand that BCFS staff plan to issue a licence specific to small pine stands in the near future. I encourage staff and licensees to continue to review the small pine profile, including its growth and yield characteristics, and request that they continue to monitor harvesting performance. Any new information will be considered in future timber supply analyses.

- transportation and utility corridors

In the analysis, a percentage of the productive forested area was excluded to account for the permanent loss of productive land due to roads, trails, and landings, as well as oil and gas well sites, seismic lines, pipelines and power lines. Separate estimates were made for existing and future structures, to reflect both potential changes in the existing access network and future requirements over time. These estimates account for the area that is permanently removed from the timber harvesting land base.

For *existing* transportation and utility corridors, estimates were based on a comprehensive review by BCFS staff and included forest cover and TRIM II mapping, ground-based surveys, silviculture records, and information from licensees. In the analysis, transportation and utility features were grouped by feature class. An estimated average disturbance width for each feature class was applied in a GIS-based exercise to derive the area in each feature class. After previous deductions, 11 260 hectares (approximately 0.8 percent of the productive forest) were excluded from the timber harvesting land base to account for existing transportation and utility corridors.

To account for *future* transportation and utility development, 5 percent of the current timber harvesting land base covered by stands older than age 12 was deducted. In total, a further 34 005 hectares (2.4 percent of the total productive forest) were excluded from the current timber harvesting land base.

All highways and larger municipal roads of a sufficient size to be mapped as polygons were removed from the timber harvesting land base as non-forest areas.

BCFS District staff concur with the magnitude of the reductions made for existing and future transportation and utility corridors, noting the future access requirements associated with oil and gas development are difficult to predict.

Having reviewed the estimates, I am satisfied that the reductions used are acceptable and in the absence of better information find them suitable for this determination.

- agricultural land reserve

Agriculture in the Dawson Creek TSA dates back to the 1800s and continues to play an important role in the region. The South Peace area is similar to prairie agricultural regions to the east and activity includes cereal crops, beef cattle and ranching, as well as specialty crops such as oilseeds, turf-seeds and honey.

In the mid 1970s, the importance of preserving lands for agricultural purposes was recognized through B.C.'s *Land Commission Act* of 1973 and the establishment of the Agricultural Land Reserve (ALR). Although the Act provides for permitted uses other than agriculture, its primary purpose is to preserve agricultural land to encourage and maintain farming, not for continuing permitted uses. Consequently, that portion of the Provincial Forest that coincides with the ALR may be withdrawn from timber production over time, as the demand for agricultural land arises.

In the Dawson Creek TSA, approximately 113 446 hectares (16 percent) of the timber harvesting land base coincides with area that is identified as ALR. In the base case, all areas within the timber harvesting land base identified as ALR are assumed to contribute to timber production over the entire planning horizon. Forest district staff advise that regeneration to managed forest is current practice and no large scale withdrawals are anticipated for the foreseeable future.

I have reviewed the information including sensitivity analysis that examined the potential impacts of removing a proportion of the ALR area from the timber harvesting land base. Although I acknowledge that future withdrawals of agricultural land are possible, the precise amount, rate and location of these withdrawals is unknown. Moreover, these are decisions that are ultimately approved by government and it would be inappropriate for me to speculate on what those decisions might be or try to account for potential impacts they might have on timber supply. I therefore accept the assumptions used in the analysis and have made no adjustments to the base case forecast on this account.

- woodlot licences

The *Forest Act* requires that AACs for TSAs be exclusive of the timber supply contribution from woodlot licence areas. When a woodlot licence is proposed, the associated harvest level is considered part of the AAC for the TSA. Once the licence is issued through a new or expanded woodlot, the associated area and timber supply is excluded from the AAC for the TSA in the next subsequent AAC determination. The area and annual volume associated with the new or expanded woodlot is then administered under the authority of the district manager.

In the Dawson Creek TSA, eleven new woodlots occupying 6 600 hectares have been issued since the previous AAC determination. During the same period, five expansions to the area of existing woodlots were issued. In total, new and expanded woodlots since the

previous AAC determination comprise 12 452 cubic metres per year from coniferous stands and 4 451 cubic metres per year from deciduous stands.

In the analysis, the timber harvesting land base was correctly adjusted to account for the area of new or expanded woodlots. However in establishing the initial deciduous harvest forecast in the base case, 6 578 cubic metres per year were deducted from the current AAC rather than the 4 451 cubic metres derived above. As a result, the short-term deciduous timber supply projected in the base case may be underestimated by 2 127 cubic metres per year. In my determination, as noted in 'Reasons for decision', I have therefore accounted for the inclusion of this improperly excluded volume in the projected timber supply.

Existing forest cover inventory

- general comments

The original forest cover inventory for the Dawson Creek TSA was collected between 1970 and 1988. Subsequent re-inventories and updates have been conducted since 1983 to improve the overall reliability of the inventory. For the timber supply analysis, the inventory was updated to account for harvesting and regeneration activities to December 31, 1999 and growth was projected to December 31, 2000.

- vegetation resources inventory

In 1995 an inventory audit of the Dawson Creek TSA was completed by BCFS Resources Inventory Branch. The audit indicated that, among other things, the volumes of the mature component of the inventory were likely underestimated by 19 percent on average. It was also recognized that some of the original inventories were out of date. In the rationale for my 1996 determination, I acknowledged the deficiencies in the inventory and recommended that a re-inventory of this unit be conducted as soon as possible. In response, BCFS staff initiated a phase II Vegetation Resources Inventory (VRI) of the TSA in 1997. No VRI phase I was undertaken because given available resources, a higher priority was placed on improving volume estimates.

VRI Phase II ground sampling was conducted from 1998 to 2001 and included a total of 128 ground sample plots. Inventory specialists from the Ministry of Sustainable Resource Management (MSRM) Terrestrial Inventory Branch (formerly BCFS Resources Inventory Branch) completed final analysis of the results in March 2002. By comparing ground sample data to inventory information, inventory specialists developed statistically-based height, age, and volume adjustment ratios for deciduous stands as well as balsam-, spruce- and pine-leading stands. Separate volume adjustment ratios for small pine were also developed from the VRI information to account for the closer utilization expected in these stand types.

Volume adjustment ratios were compiled using both traditional loss factors as well as 'net factor/net volume adjustment factors' (NF/NVAFs). Loss factor-compiled volume adjustment ratios were employed in the base case. The NF/NVAFs were not used due to concerns about the methodology when the timber supply analysis was initiated. These concerns have since been resolved by MSRM and BCFS specialists.

Application of the VRI phase II adjustments (loss factor based) increased volume estimates of existing stands within the productive forest of the TSA by approximately 15 percent on

average. The adjustments also increased the average site index of the unit by approximately 0.7 metres.

Sensitivity analyses were conducted to test the impact of using NF/NVAF-compiled adjustments instead of the loss factor-based ratios that were assumed in the base case. The results suggest that the long-term deciduous harvest level depicted in the base case may be underestimated by up to 12 percent. Moreover, the initial harvest level of 880 000 can be maintained for an additional 4 decades if the NF/NVAF-compiled volume adjustments are employed. In addition, the sensitivity analysis suggests that the coniferous harvest forecast may be underestimated by about two percent compared to the base case.

I have reviewed the results of the VRI and discussed the implications of the adjustment process on stand volumes, site index, and the timber harvesting land base with BCFS staff. I note that the results of the VRI are broadly consistent with both the previous audit and local field experience on the TSA. I acknowledge that although loss factor-compiled volume adjustment ratios were applied in the base case, I consider that it would have been more appropriate to use the localized NF/NVAF-compiled ratios, consistent with current MSRM standards. I have therefore concluded that both the coniferous and deciduous timber supply depicted in the base case may be underestimated and I have discussed this further in my 'Reasons for Decision'.

District staff advise that the VRI phase II inventory has strengthened the accuracy of the inventory estimates. I acknowledge that the reliability associated with Phase I (photo interpretation) attributes is still a concern and note that licensees have initiated studies to reduce this uncertainty. I will consider any new information in subsequent determinations.

- volume estimates for existing stands

The Variable Density Yield Prediction (VDYP) model 6.6d was used to estimates timber volumes for all existing natural stands (defined as stands older than age 12 years). VDYP is based on information gathered from a large number of sample plots throughout the province, and is generally accepted in British Columbia as an adequate model for projecting volumes in existing stands. As a general rule in making AAC determinations, and in the absence of statistically valid contradictory evidence for a particular area, I rely on VDYP estimates for existing natural stands.

As discussed above under *vegetation resources inventory,* I note that the VRI phase II volume adjustment ratios employed in the base case were compiled using provincial loss factor estimates. Using the NF/NVAF-compiled ratios would have provided a better accounting of existing stands volumes and I have further this discussed this in my 'Reasons for Decision'.

Expected rate of growth

- site productivity estimates

Inventory data include estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow, which in turn affects the time regeneration will take to reach green-up conditions, the volume of timber that can

be produced, and the ages at which a stands will satisfy mature forest cover requirements and reach a merchantable size.

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

In the Dawson Creek TSA timber supply analysis, VDYP BatchTools version 3.2 was used to generate site index of forest stands greater than 30 years old using VRI-adjusted age and height attributes. For younger stands, the growth history is too short to give accurate measurements of site productivity using conventional site index tools and the adjusted attributes of height and age. Therefore for stands 30 years and younger, the existing site productivity estimates reported on the TSA file were used to represent site index in the base case.

A sensitivity analysis was performed to show the impact on timber supply of applying general provincial OGSI adjustment equations to a total of 104 532 hectares (14 percent of the timber harvesting land base) of lodgepole pine, subalpine fir, and spruce stands older than age 140. The corresponding regenerating stand yields, green-up ages and minimum harvestable ages were recalculated based on the adjusted site indices. Because of the small area involved (480 hectares) and data limitations of the OGSI studies, no OGSI adjustments were applied to deciduous-leading stands older than 140 years. The sensitivity analysis indicated that if site productivity is underestimated to the extent suggested by the OGSI studies, the short- to long-term coniferous harvest level could be up to 10 percent higher compared to the base case.

Having reviewed the information, I find that the site index assignments used in the base case reflect currently acceptable procedures. However, based on the findings of provincial OGSI studies, sensitivity analyses on this unit and elsewhere, I accept that there is a high likelihood that future stand yields may be significantly underestimated. While the precise magnitude of the productivity increase is not certain, I conclude that the coniferous harvest forecast depicted in the base case may be underestimated by up to 10 percent. I have further discussed this below in my ‘Reasons for decision’.

- aggregation procedures

For the timber supply analysis, the inventory for the Dawson Creek TSA was aggregated into 98 analysis units based on species composition, site index, age and silvicultural regime. Analysis units for existing coniferous stands were further divided into two age classes (stands older than 140 years and stands aged 13 years to 140 years) to better

account for differences in site productivity estimates which are more difficult to estimate in older stands. Species mixtures used to represent future regenerating stands were based on the silviculture objectives for the TSA, as described by BCFS district silviculture specialists.

I have reviewed the aggregation procedures and find that an appropriate methodology was used to capture the productivity of the unit. I therefore consider them suitable for use in this determination.

- volume estimates for regenerating stands

Volume estimates for regenerating stands were generated using two models. The Table Interpolation Program for Stand Yields (TIPSY) batch version 3.1a was used to estimate growth and yield for all regenerated coniferous stands. Existing regenerated stands were assumed to be all stands with an age of 12 years or less. Because no aspen and balsam poplar yield curves are available in TIPSY, The Variable Density Yield Prediction (VDYP) model 6.6d was used to estimate the growth and yield of all existing stands as well as all future regenerated deciduous stands.

To develop curves for mixedwood analysis units, or where more than one regeneration method (e.g., planting, natural) was planned for a given analysis unit, yield tables were constructed by combining the appropriate TIPSY- and VDYP-generated yield tables.

To account for the loss of timber volume due to operational conditions, Operational Adjustment Factors (OAFs) were applied to the TIPSY-generated yield projections. Standard provincial OAF values of 15 percent to account for unmapped stand openings (OAF 1), and 5 percent to account for decay and age-related losses such as waste and breakage during harvest (OAF 2) were employed. The VDYP model used to project existing and regenerating deciduous volumes also incorporates estimates of volume of wood lost to decay, waste and breakage, and is discussed later in this rationale under *decay, waste and breakage*.

Standard sensitivity analyses whereby regenerating stand yields were increased and decreased by 10 percent, showed no impact on short-term deciduous and small pine harvest levels. For the even flow coniferous forecast, the sensitivity analyses showed that timber supply is proportionately sensitive to changes in regenerating stand yield estimates.

Except for the potential underestimation associated with deciduous yields discussed under *vegetation resources inventory*, I have no evidence that suggests that volume estimates for regenerated stands are either over- or under- estimated and therefore accept them as modelled in the base case for use in this determination.

- minimum harvestable ages

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

In the analysis for the Dawson Creek TSA, minimum harvestable ages were assumed to occur when stands attained an average volume of 120 cubic metres per hectare. The corresponding minimum harvestable ages range from 34 years for thrifty lodgepole pine stands regenerating on good sites, to 141 years for existing balsam stands growing on poor sites. For deciduous stands the minimum harvestable ages in the analysis range from 45 to 81 years. Approximately 77 percent of the existing natural stands on the timber harvesting land base are currently at or above minimum harvestable age.

In the analysis, the minimum harvestable ages are typically well below culmination age (the age at which the average volume production is maximized) for both the coniferous and deciduous forest types. Moreover, sensitivity analyses showed no impact on the base case harvest forecast when minimum harvestable ages were increased or decreased by 10 years.

As I have stated in rationales for AAC determinations for other TSAs in the province, minimum harvestable ages are subject to considerable uncertainty given the highly qualitative nature of the criteria and the difficulty associated with predicting future harvest and merchantability objectives. Having considered the criteria that were applied in the timber supply analysis, and noting the relative insensitivity of the harvest forecast to changes in minimum harvestable ages, I accept the assumptions as the best available and suitable for use in this determination.

- harvest scheduling priorities

Harvest rules are used in the timber supply analysis to define parameters that direct the timber supply model—when presented with a number of stands meeting the criteria for harvest—to the stands that should be selected first for harvest.

In the base case, stands identified in the current five-year development plan were targeted first for harvesting. Thereafter, stand selection was determined using a relative-oldest first harvest rule, whereby priority for harvest was highest for stands that are oldest relative to the applicable minimum harvestable age. To simulate annual salvage operations in the TSA, a minimum periodic harvest target of 5 000 cubic metres per year was also assigned to pine- and spruce-leading stands. District staff advise that a relative-oldest harvest rule is broadly consistent with current operational practice.

I have reviewed the assumptions applied in the base case and discussed them with BCFS district staff. I consider the approach used to appropriately reflect current practice and I accept it for use in this determination. However, I acknowledge that in the future, achieving landscape unit and market objectives may require a more random pattern of harvest ages and this may negatively impact timber supply as projected in the base case. Any new information can be considered in future determinations.

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

Regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In the timber supply analysis for the Dawson Creek TSA, regeneration delay was modelled at four years for coniferous and two years for deciduous analysis units.

Current practice is to plant conifer seedlings on all conifer openings; spruce and lodgepole pine are the principal conifer species planted. Subalpine fir (balsam) and lodgepole pine natural ingress also contribute to overall conifer stocking. Trembling aspen and balsam poplar are relied upon entirely for natural deciduous regeneration.

District staff have reviewed silvicultural records from the past five years and advise that the analysis assumptions reasonably reflect current practice on the TSA. Having reviewed the methodology and assumptions, I accept the estimates of regeneration delay as suitable for this determination.

Not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas consist of productive forest land that has been denuded and has failed, partially or completely, to regenerate either naturally or by planting or seeding to the specified or desired "free growing" standards for the site. These areas consist of 'backlog' NSR—areas in which harvesting or other disturbance such as wildfire occurred before 1987—and 'current' NSR.

Within the TSA, 42 848 hectares were identified as NSR (type identity class 4 or 9) on the forest inventory file. Because of delays in updates to the inventory, many of these stands are identified in the inventory as having a projected age of zero. Since it is known that this age often does not reflect actual conditions, harvesting history information was used to develop a 'logging based age'—the years since stand disturbance less an estimated average regeneration delay—to provide a more realistic distribution of the age of stands identified as NSR.

Based on the projected age (or logging based age where the projected age was zero), stands were classified as either current NSR (26 538 hectares) or pre-1987 backlog NSR (16 310 hectares). Current NSR was assigned to regenerating analysis units according to the initial proportion of existing (sufficiently stocked) regenerating stands in the timber harvesting land base.

In the analysis, only a small proportion of areas identified as backlog NSR were assumed to contribute to timber harvesting. To simulate rehabilitation activities within the TSA, approximately 1500 hectares of backlog NSR were assigned to regenerating analysis units in the model during the first 2 decades of the forecast period. The balance of the backlog NSR was excluded from the timber harvest land base as non-commercial brush.

District staff have reviewed the estimates used in the base case and advise that they are reasonably consistent with information from recent silviculture records. They also advise that during the past three years, forest licensees and BCFS district staff have surveyed over 75 000 hectares of pre-1987 conifer openings within the TSA to assess their status and their potential need for follow-up treatments such as brushing and/or fill planting. The surveys suggest that in addition to the existing backlog NSR area, approximately 15 000 to 17 000 hectares of conifer stands may potentially become NSR if they are not treated for brush competition. District staff indicate that it is unlikely that current resources will allow more than a minor amount of this area to be rehabilitated.

I have discussed the methodology and assumptions used to account for current and backlog NSR with BCFS district staff. I accept that the current NSR areas were adequately accounted for in the base case and have made no adjustments. However, I am concerned

by the significant area of reforested backlog NSR that is not contributing to the productivity of the unit, and acknowledge the need for a strategic approach that identifies measurable targets and outcomes to address this issue. I am further concerned by the results of recent surveys that indicate that additional backlog areas may also soon revert to NSR status, resulting in further productivity losses. To this end, I encourage BCFS district staff to investigate funding opportunities from the Province's Forest Investment Account (FIA) and develop a strategy for identifying and treating backlog NSR areas during the term of this determination. Any new information will be incorporated into the next analysis.

Impediments to prompt regeneration

BCFS district staff indicate that vegetation competition from grass (*Calamogrostis sp*.), aspen suckering, alder and willow brush remain a concern in some parts of the TSA. They indicate that successful regeneration in these situations, particularly in the ESSF biogeoclimatic zone, depends on the ability to apply herbicide to a portion of these stands.

In addition, domestic livestock grazing is a significant activity within the TSA and may impact the stocking, vigour, and distribution of regenerating stands. Currently there are 133 grazing licences and permits covering 137 034 hectares and 18 grazing leases covering 4 788 hectares of Crown land within the TSA. Approximately 38 percent of the timber harvesting land base associated with deciduous stands occur within grazing areas while 10 percent of the timber harvesting land base associated with coniferous stands occurs within grazing areas.

Grazing is typically deferred from conifer plantations for an interim period until seedlings reach one metre in height to reduce the likelihood of trampling damage and seedling mortality. However, in regenerating deciduous stands, localized damage can occur and is typically worse in summer-logged blocks due to surface disturbance and the shallow rooting of aspen suckers.

In the analysis, the potential impacts of grazing on growth and yield were not considered in the base case. However a sensitivity analysis was conducted to simulate the potential impact of reduced stocking on regenerating stands in 30 percent of grazing areas. Using the TIPSY growth and yield model, the impact of reduced and 'clumpy' stocking was estimated and a number of yield curves were reduced accordingly. The sensitivity analysis suggested that the even-flow coniferous forecast and long-term deciduous harvest level may be overestimated by up to two and five percent respectively.

During my discussions with BCFS district staff, information was also presented that indicates that 695 hectares of 'tame pasture' (i.e., cultivated grazing areas that have been seeded with agronomic species) were included in the timber harvesting land base but is not expected to contribute to timber supply in the future.

I have reviewed and discussed the information with BCFS staff and have concluded as follows. I recognize that successful establishment of regeneration in many parts of the TSA may require the use of herbicide treatment. In addition, grazing occurs on a significant proportion of the timber harvesting land base and may influence the development of regenerating stands. I have therefore accounted for a potential overestimation in the base case projection and have discussed it below in my 'Reasons for

decision'. While, no specific information is available that indicates with certainty the potential implications of grazing, I note that it primarily impacts long-term timber supply.

I am aware that a *District Manager Operating Procedure* is in place to reduce conflicts between range use and silviculture activities. As well, I acknowledge that the BCFS has initiated a 5-year research project that will attempt to quantify the impact of livestock grazing on regenerating aspen stands. The results of this research along with any other new information will be considered in the next determination.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

- silvicultural systems

The predominant silvicultural systems currently in use on the TSA are clearcutting with reserves and coppice with reserves. Irregular shelterwood is also employed in pure spruce and spruce-, pine- and balsam-leading stands. According to district staff, where irregular shelterwood is employed, approximately 10 percent of stand volume is retained following harvesting.

In the base case all silvicultural systems were assumed to be even-aged. To test the impact of irregular shelterwood on the coniferous harvest forecast, a sensitivity analysis was performed by applying a volume reduction to one third of pure spruce and spruce-pine and balsam-leading analysis units. A 10 percent volume reduction was assumed to approximate the impact of the 10 percent retention left following harvest. The results indicated that the coniferous harvest projection in the base case may be overestimated by approximately 2.5 percent compared to the sensitivity analysis.

Further investigation revealed that over the first five periods of the sensitivity analysis, approximately 12 percent of the total area harvested in the model was harvested using an irregular shelterwood silvicultural system, compared to 4 percent estimated from recent silviculture records (representing current practice over a 5-year period).

I have reviewed and discussed the base case assumptions and associated sensitivity analyses with BCFS staff. I note that uneven-aged silvicultural systems were not modelled in the base case and that because of retention associated with shelterwood systems, coniferous timber supply is likely overestimated. However, the precise degree of this over-estimation is difficult to determine. In the sensitivity analysis, approximately three times as much area was harvested in the short-term using the shelterwood system than is reflected by current practice. Therefore in the absence of better information, I consider that the impact on timber supply is likely less than one percent—approximately one-third the impact depicted in the sensitivity analysis. I have further discussed this below in my 'Reasons for decision'.

I note that there is considerable uncertainty in the growth and yield of uneven-aged silvicultural systems and methods to more accurately predict the dynamics of uneven-aged silvicultural systems are currently being developed. Any new information can be incorporated into the next analysis.

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

Utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. These standards were incorporated into the timber supply analysis for the Dawson Creek TSA to estimate minimum merchantable stand volume.

To derive stand volumes, a 30-centimetre stump height was assumed in the analysis for all species. A 10-centimetre top diameter was assumed for all species groups except for small pine where 7.5 centimetres was assumed. For spruce and subalpine fir, a 17.5 diameter-at-breast-height (dbh) was assumed. For aspen, balsam poplar and lodgepole pine a 12.5 dbh was assumed except for stands defined as small pine where a 9.5 centimetre dbh was assumed. The assumptions are consistent with provincial standards and operational practice on the TSA and I therefore find them reasonable for use in this determination.

Decay, waste and breakage

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

In the 1996 AAC rationale, I noted that decay estimates using VDYP, overestimated decay losses by 24 percent for deciduous stands. As discussed under Existing forest cover inventory, a VRI phase II was completed for the TSA in 2001. The VRI included destructive sampling of deciduous samples to provide more local estimates (i.e., NVAF) of decay.

I note that NVAF was not incorporated in the yield assumptions used to generate the base case harvest forecast because of uncertainties with the methodology at the time of the analysis. These have since been resolved. As a result, a sensitivity analysis was performed which used the net factoring/NVAF-compiled volume adjustment ratios.

I have considered the information on the decay, waste and breakage factors used in the analysis. As noted previously in *vegetation resources inventory,* yield curves were not compiled using the NVAF information. Therefore the base case assumptions likely overestimate losses from decay waste and breakage and I have discussed this further in my 'Reason for decision'.

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

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing

of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

- adjacency and green-up

To manage for resources such as water quality, wildlife and aesthetics, and to avoid concentrating harvest-related disturbance in particular areas, operational practices limit the size and shape of cutblocks and amount of disturbance (areas covered by stands of less than a specified height), and prescribe minimum green-up heights for regenerated stands on harvested areas before adjacent areas may be harvested. Green-up requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

In the timber supply analysis adjacency in non-visually sensitive areas was modelled by applying a forest cover requirement to the IRM zone and the component of the timber harvesting land base located within the caribou habitat, and grizzly bear management zones. In the model it was assumed that within these areas, at any given time, no more than 33 percent of the timber harvesting land base can consist of stands less than three years old.

Additional sensitivity analyses showed that increasing and decreasing the age at which green-up is achieved by one metre had no impact on timber supply. During all periods of the harvest forecast a high proportion of stands within the timber harvesting land base are available for harvest.

District staff confirm that at present, adjacency and green-up constraints in no way limit the ability to access merchantable stands within the TSA. Given the stability of timber supply forecasts when higher forest cover constraints are applied, and the uncertainty regarding additional future constraints, I will not make any adjustments at this time. Any additional information that becomes available over the term of this determination can be incorporated into the next timber supply analysis.

- recreation features

The Dawson Creek TSA supports a wide range of public and commercial recreation and tourism opportunities. Popular recreation activities within the TSA include hunting, hiking, camping, scenic and wildlife viewing fishing, boating, cross country skiing and snowmobiling.

Recreation interests are addressed through a recreation features inventory, completed in 1992/93 and updated to current MSRM standards. A combination of local knowledge, public input, field reconnaissance, air photos, topographic maps and other agency information was researched to complete the inventory.

In the analysis, all areas classified as very sensitive—i.e., those areas with outstanding recreational, educational, scientific or heritage values—were excluded from the timber harvesting land base. Twenty percent of areas identified as having a sensitive recreation management class and a high or very high feature significance were also excluded. In total, 21 905 hectares were removed to account for priority recreation areas. District staff advise

that the approach used is broadly consistent with current management and the direction of recreation trends within the TSA.

Having reviewed the assumptions and methodology used in the timber analysis, I note that the recreation inventory is the best available information, consistent with objectives of the LRMP, and therefore suitable for use in this determination.

- cultural heritage resources

A cultural heritage resource is defined by the *Forest Act* as "an object, a site or the location of a traditional societal practice that is of historical, cultural or archaeological significance to British Columbia, a community or an aboriginal people". Archaeological and historical sites typically contain physical evidence of past human activity, and traditional use sites do not necessarily contain historical physical evidence but may indicate current use by a First Nation.

An archaeological overview assessment (AOA), which identifies sites of potential cultural and heritage significance, has been completed for the Dawson Creek TSA. The majority of archaeological sites identified in the TSA consist of artifacts of stone tools and/or flakes that indicate the crafting or repair of tools. More complex sites include other features such as the remains of cooking hearths. Historical sites date from the early fur trade and homestead period in the 1800s and include Hudson's Bay Company forts and early police outposts. Traditional use areas within the TSA include sacred areas and sites of spiritual significance, ceremonial sites, gathering sites for resources such as berries and medicinal grounds and traditional hunting grounds.

In the timber supply analysis, 88 hectares were excluded from the timber harvesting land base to account for known archaeological sites based on inventories supplied by the Ministry of Sustainable Resources Management.

West Moberly First Nations, Saulteau First Nations, Lheidli T'enneh and the Treaty 8 Tribal Association have completed traditional use studies. While confidentiality agreements prohibit public access to the information, I note that they are reviewed by BCFS staff as part of operational planning in the district.

The Twin Sisters resource management zone is an area of spiritual significance and has traditional use value to local First Nations. Traditional use has included hunting, gathering of medicinal plants, food and wildlife resources, burial sites, and heritage campsites. I note that the Dawson Creek Land and Resource Management Plan (LRMP) contains objectives and strategies for managing the Twin Sisters resource management zone and that local First Nations are involved in ongoing discussions with industry to develop management guidelines specific to the area. In the interim, licensees have deferred harvesting in the Twin Sisters RMZ. I have discussed this further under First Nations considerations.

I have reviewed the information regarding cultural heritage resources in the Dawson Creek TSA. From my discussions with district staff, I consider that the management practices for these areas are being conducted appropriately at the operational level given the obligations under the Forest Practices Code to manage for these resources. I note that a specific deduction was made to account for known archaeological sites and that deductions applied in the analysis for wildlife tree patches, riparian and other values also overlap with the

practices for managing cultural values in the TSA. As a result, for this determination I am satisfied that culture heritage resources were appropriately accounted for in the analysis.

- visually sensitive areas

Careful management of scenic areas visible from communities, public use areas and travel corridors is an important forest management objective. The Forest Practices Code enables the management of visual resources by providing for scenic areas to be identified and 'made known', and by providing for the establishment of visual quality objectives (VQOs). To achieve this, visual landscape inventories are carried out to identify, classify and record visually sensitive areas. On completion of such an inventory, a specialist may derive recommended visual quality classes (i.e., 'preservation', 'retention', 'partial retention', 'modification' or 'maximum modification') to identify levels of alteration that would be appropriate for particular areas.

The Code requires these objectives to be identified by the district manager or designated in a higher level plan and be 'made known' to licensees. When this has been done and a recommended visual quality class has become current practice, it may be incorporated into a timber supply analysis, preferably as a VQO established by the district manager or contained in a higher level plan. Established VQOs are intended to reflect the desired level of visual quality based on the physical characteristics and social concern for an area and seek to balance the perceptions and needs of people with the social and economic needs of the province. To achieve VQOs, constraints are placed on timber harvesting, road building and other forest practices.

A visual landscape inventory for the Dawson Creek TSA was completed in 1991 and was updated in 1996 using accepted BCFS procedures. Based on this inventory as well as direction provided through the LRMP process and by BCFS visual resource specialists, scenic areas within the TSA have been identified. In 1997, scenic areas were 'made known' and where detailed landscape inventory and analysis were complete, VQOs were established by the district manager. Based on the landscape inventory, there are currently 54 385 hectares of *recommended* VQOs and 59 242 hectares of *established* VQOs within the Dawson Creek TSA timber harvesting land base.

In the base case, standard BCFS procedures were used to determine the proportion of allowable disturbance for each of the five visual quality classes described above. A height of five metres was assumed to be the height at which visually-effective green-up was attained. The corresponding average ages to green-up were derived for each landscape unit using BatchTools version 3.2.

According to standard *Procedures for Factoring Visual Resources into Timber Supply Analyses* both established and recommended VQOs should have been modelled concurrently in the base case to represent current practice. However, only recommended VQOs were modelled in the base case; areas with established VQOs were inadvertently modelled as part of the IRM zone. A sensitivity analysis was therefore conducted to examine the combined impact on timber supply of both established and recommended VQOs. The results suggest that the long-term deciduous harvest level and the even-flow coniferous harvest level represented in the base case are overestimated by approximately two and three percent respectively.

Sensitivity analysis also examined the impact of changing the allowable percent denudation to the maximum and minimum values recommended in the *Procedures for Factoring Visual Resources into Timber Supply Analyses*. The results indicate that short-term timber supply is insensitive to changes in the allowable percent denudation. Impacts on long-term timber supply were less than one percent compared to the base case forecast.

I have reviewed the assumptions and methodology used in the timber supply analysis and discussed them with BCFS staff. I note that the visually sensitive scenic areas that have been 'made known' in the Dawson Creek TSA represent approximately 15 percent of the timber harvesting land base. However, approximately half of these areas were incorrectly modelled in the base case. As a result, the base case did not appropriately reflect current practice on areas with established VQOS. Drawing on the results of the sensitivity analysis I have therefore concluded that timber supply may be overestimated by two to three percent on account of this factor. I have discussed this further in my 'Reasons for decision'.

- ungulate winter range

Ungulate habitat within the Dawson Creek TSA is represented through draft ungulate winter ranges and wildlife burn areas. Both have been mapped from inventory information provided by former Ministry of Environment staff (now the Ministry of Water, Land and Air Protection).

In the base case, a 90 percent reduction was applied to these areas. After previous deductions, 24 750 hectares—approximately 1.8 percent of the productive forest—was excluded from the timber harvesting land base to account for ungulate habitat.

Subsequent to the analysis, regional Ministry of Water Land and Air Protection (MWLAP) staff suggested that in addition to the 90 percent deduction described above, areas identified as highly sensitive to wildlife (Ew1) in older environmentally sensitive areas (ESA) inventory should be excluded from the timber harvesting land base. Additional analysis showed that after accounting for other land base deductions, excluding 90 percent of Ew1 areas would only require an additional deduction of 77 hectares from the timber harvesting land base.

I have discussed the deductions made for ungulate habitat with BCFS and MSRM staff and have reasoned as follows. I acknowledge the concerns of MWLAP staff regarding the Ew1 inventory. However, based on additional analysis, I note that most of the Ew1 areas have been already excluded as a result of other deductions from the timber harvesting land base assumed in the base case. In addition, I note that management for sensitive wildlife habitat—including ungulate species—is also accommodated through deductions for riparian areas, wildlife tree patches as well as through forest cover requirements for landscape-level biodiversity, grizzly bear management and caribou habitat.

In summary, I accept the ungulate winter range and wildlife burn areas as an approximation of ungulate habitat requirements and have made no adjustments to the base projection on account of this factor. I note that the Dawson Creek LRMP includes objectives and strategies aimed at identifying and managing critical ungulate wintering habitat. However, I am mindful that to date, no ungulate winter range areas have been formally established nor have specific objectives and strategies been confirmed. I therefore request that BCFS district staff in cooperation with staff from MWLAP and MSRM, and local licensees

evaluate and clarify the specific areas—including those identified in the older ESA inventories—and the associated objectives and strategies for these areas during the term of the AAC. Any new information will be incorporated into the next analysis.

- caribou habitat

Northern caribou (i.e., southern ecotype) are known to spend the winter in low elevation pine stands and black spruce bogs prevalent in the Kiskatinaw Plateau in the eastern portion of the TSA. The availability of terrestrial lichen in these stands is the principal food source for caribou during the winter months.

The Dawson Creek LRMP includes management objectives and strategies aimed at sustaining viable and healthy caribou populations primarily through management of low elevation habitat. In addition, a caribou management zone, including 132 942 hectares (18 percent) of the timber harvesting land base, was also delineated during the Dawson Creek LRMP process.

In the analysis, the maintenance of forest cover for low elevation caribou habitat was modelled by applying minimum mature-plus-old and old forest cover requirements by landscape unit to the caribou management zone (in addition to the green-up requirement). The forest cover requirements and methodology are described in detail in the timber supply analysis report and were based on the recommendations of regional wildlife specialists.

Regional specialists also advise that low productivity pine stands provide the best terrestrial lichen production areas and are therefore valuable as winter ranges. Although no specific deduction was made in the base case to account for these stands, additional analysis indicates that over 80 percent of these stands are located outside the timber harvesting land base.

I have reviewed the information and discussed it with BCFS and MSRM staff. I note that although the caribou management zone has not been established under any authority, the assumptions used in the analysis are broadly consistent with the LRMP recommendations and provide a reasonable approximation of a likely management regime for caribou habitat. Moreover, I note that most of the high value caribou habitat areas are outside the timber harvesting land base.

I also draw on the results of sensitivity analyses that indicate that removing the forest cover requirement assumed in the base case has no significant implications to timber supply over the planning horizon. In summary, I accept that the best available information through an interpretation of the LRMP caribou management strategy was used, and that caribou habitat was adequately modelled in the base case.

- grizzly bear habitat

The conservation of grizzly bears and their habitat was also recognized as an important objective in the Dawson Creek LRMP. Strategies identified in the LRMP include identifying and mapping grizzly bear habitat and managing forest cover through landscape-level planning.

In the analysis the maintenance of forest cover was simulated by applying an early seral forest cover constraint to areas identified as grizzly bear habitat within the productive forest (in addition to the green-up requirement). In the model this area included 108 467 hectares

of NDT1 and NDT2 areas within the timber harvesting land base. The forest cover requirements were based on the recommendations of regional BCFS and former Ministry of Environment wildlife habitat specialists.

BCFS and MSRM district staff advise that although the grizzly bear management zone was developed during the LRMP process, it has not been officially established under any authority. However, district staff indicate that the analysis assumptions provide a reasonable proxy for the current grizzly bear management regime within the Dawson Creek TSA.

Having discussed this information with BCFS and MSRM staff, I have concluded that the assumptions applied in the analysis are a reasonable expression of the intent of the LRMP. I consider the methodology and assumptions to represent the best available information and find them broadly consistent with current management. I therefore accept the base as modelled and have made no further adjustments. Finally, I note that it would be useful and appropriate to formalize and give authority to this strategy in the future.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting, in order to protect riparian and aquatic habitats. Stream riparian classes (S1 to S6) are described in the *Riparian Management Area Guidebook* and are determined based on presence of fish, occurrence in a community watershed and average channel width criteria. The stream class is used to determine the acceptable management regimes and requirements within RRZs and RMZs. Similar criteria and methodology are used to classify the RRZ and RMZ associated with lakes and wetlands.

In the analysis a combination of TRIM II and forest inventory data were used to approximate the location and area of riparian habitat since riparian inventories are incomplete for many areas of the TSA. Streams were broadly classed, based primarily on stream size and slope gradient. Wetlands and lakes were classified by size according to what is depicted in the forest inventory. Wetland classes included those areas depicted as wetlands on the inventory file as well as non-productive black spruce stand types.

RRZ and RMZ widths for each riparian feature class were then applied in a GIS-based exercise to produce riparian buffers. Since it was not possible for the GIS to distinguish between some riparian feature classes, the entire buffer width was considered to represent the reserve and was fully excluded from the timber harvesting land base. The overall deduction for riparian areas was 65 318 hectares or 4.6 percent of the timber harvesting land base.

District staff reviewed silviculture prescriptions representing a cross–section of major licensees' activities in 2001/2002. Their review and analysis revealed that although retention within the riparian management zone varies from no retention (generally smaller riparian features) to 100 percent retention (generally larger riparian areas), overall, the riparian buffering methodology applied in the analysis adequately represents the average constraints on riparian features and is reasonably consistent with current practice.

Having discussed the information and assumptions with BCFS staff, I have considered that although there were some inconsistencies between the buffering methodology and current practice, these differences are likely to be mutually offsetting and unlikely to significantly impact the base case projection. I have therefore concluded that the accounting of riparian management areas is adequate for the purposes of this determination and have made no further adjustments. However, I request that district staff continue to refine the riparian classification and review management practices over the term of this determination, so that the next timber supply review for the Dawson Creek TSA can incorporate estimates based on the best information available at that time.

- identified wildlife

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

Volume I of the IWMS was released in February 1999 and details several species which may occur in the TSA and that may require future consideration, including the bull trout, Trumpeter Swan, Northern Goshawk, fisher, grizzly bear and mountain goat. Volume II, which has yet to be released, may identify additional species. The species identified in Volume I will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in higher level plans.

At the time the data package was assembled, there were no established or proposed WHAs within the TSA. As a result, no specific accounting for WHAs was included in the timber supply analysis. However, in 2002, five WHAs were established including one for bull trout and four for mountain goat. A review of these established WHAs shows that two are located entirely within provincial parks and the other three comprise approximately 178 hectares of productive forest in the TSA. Further analysis indicates that less than 10 hectares of these WHAs involve area within the current timber harvesting land base.

While the current impact on timber supply of established WHAs is negligible, I recognize that the Province has committed to the ongoing implementation of the IWMS with expected short-term timber supply impacts of a full one percent across the province.

Given the species known to be present in this TSA, I expect that the future establishment of WHAs could reduce the timber harvesting land base by up to one percent as described by provincial policy. As there was no accounting for the impact of IWMS in the base case forecast, I will thus take into account in this determination a one-percent impact on timber supply, which I believe accommodates the established WHAs and those yet to be established in the future.

I have considered the risk posed to the timber supply as a result of this factor, and I will discuss this further under 'Reasons for decision'.

- biodiversity

Biological diversity, or biodiversity, is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the *Forest Practices Code*, biodiversity in a given management unit is assessed and managed at both the stand and landscape levels. In the timber supply analysis for the Dawson Creek TSA, areas both within and outside of the timber harvesting land base were assumed to contribute to meeting biodiversity requirements.

- stand-level biodiversity

In the Dawson Creek TSA, stand-level biodiversity is managed by retaining reserves of mature timber, or wildlife tree patches, within cut-blocks and in adjacent inoperable and other retained areas to provide structural diversity and wildlife habitat.

In the timber supply analysis, preliminary results from the *Dawson Creek Forest District Landscape Unit Planning Strategy*, and procedures described in the *Landscape Unit Planning Guide* were used to determine the required WTP retention level for each landscape unit. In the analysis the it was assumed that 50 percent of the requirement would be met through areas outside of the timber harvesting land base, consistent with the guide. As a result, an additional 22 288 hectares—approximately two percent of the productive land base—were excluded from the timber harvesting land base to account for wildlife tree patches not provided through other previous deductions such as riparian areas, physically inoperable and uneconomic stands.

District staff reviewed silviculture records between 1997 to 2002 and confirm that the methodology and assumptions used in the analysis are broadly consistent with current practice. The assumptions used were also consistent with a recent operational review of wildlife tree patches conducted by the BCFS Northern Interior regional research ecologist.

Having reviewed the assumptions and methodology used in the base case and discussed them with district staff, I accept them as appropriate for use in this determination and have made no adjustments.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that this—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives as discussed throughout this document—will provide for the habitat needs of most forest and range organisms.

A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests. Although some general forest management

practices can broadly accommodate the needs of most ecosystems, more often a variety of practices is needed to represent the different natural disturbance patterns under which ecosystems have evolved. Natural disturbance patterns vary from frequent wildfires in the dry interior regions to rare stand disturbance events in the wetter coastal regions.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A landscape unit is an area established by the district manager, generally up to 100 000 hectares in size, based on topographic or geographic features such as a watershed, or series of watersheds, to manage biodiversity and other forest resource values. The Dawson Creek TSA includes all or portions of 29 draft landscape units with over 90 percent of the timber harvesting land base involving just 15 landscape units.

The *Biodiversity Guidebook,* the *Landscape Unit Planning Guide* and *Higher Level Plans: Policy and Procedures* all provide policy and guidance on management for landscape-level biodiversity. The *Landscape Unit Planning Guide* provides guidance on which components of the full range of recommendations included in the *Biodiversity Guidebook* should be implemented to achieve a balance of forest management objectives. The *Landscape Unit Planning Guide* contains forest cover requirements for old seral forest that are to be applied at the biogeoclimatic variant level within each landscape unit. The requirements are stated as a minimum percentage of the productive forest to be retained in stands above a specified age that varies by ecosystem type. The guide also allows the old-seral requirement to be phased in over time in landscape units with a lower biodiversity emphasis.

The 1996 Higher Level Plans: Policy and Procedures guide provides further policy guidance. It outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—that may be employed when establishing biodiversity management objectives for a landscape unit.

In the timber supply analysis, the *Landscape Unit Planning Guide* was used to determine a minimum percentage of the productive forest to be retained in stands at least 80, 100, 140 or 250 years of age, depending on the seral stage, biogeoclimatic zone and stand type (i.e., coniferous or deciduous leading).

In the base case, the application of mature-plus-old and old seral forest cover requirements within intermediate and higher BEO areas were applied consistent with the guide, while in lower BEO areas, a weighted 45:45:10 (lower: intermediate: higher BEO) old seral requirement was inadvertently used instead of the correct value from the guide. However, a sensitivity analysis that applied the appropriate values to lower BEO landscape units showed no impact on timber supply compared to the base case forecast.

A number of additional sensitivity analyses were also undertaken. During preparation of the data package, forest licensees suggested that some BEC variants within the ESSF biogeoclimatic zone may be incorrectly represented as NDT1. In addition, district and regional staff suggest that old seral attributes in some variants may be achieved earlier than was represented in the base case. Sensitivity analyses were conducted to examine the impact of uncertainty in these assumptions. The results showed that varying these assumptions in the base case had a negligible impact on the timber supply projected in the base case.

Having reviewed the information and discussed it with BCFS staff I have considered as follows. Within the Dawson Creek TSA, a significant proportion of the area contributing to forest cover requirements is located outside the timber harvesting land base. In addition, the forest outside the timber harvesting land base is broadly distributed among NDTs and landscape units and therefore contributes to the achievement of most of the old seral requirements within the TSA. Although the assumptions in the base case were not entirely consistent with the LUPG for lower BEOs, a sensitivity analysis confirmed no impact on the timber supply projected in the base case.

I recognize that the draft landscape units modelled in the analysis have not been formally designated. As such, I am aware that the assumptions applied in the timber supply analysis do not indicate any type of formal recognition or future expectation with respect to the final outcome of landscape unit planning. However, I note that implementation of the Dawson Creek TSA *Landscape Unit Planning Strategy* is underway and the draft landscape units best approximate current management.

Moreover, my review of the timber supply analysis, including the associated sensitivity analyses confirms that the timber supply projections are insensitive to variations in landscape-level biodiversity requirements, possible misrepresentation of NDT1 and old seral age. Therefore, until the landscape unit planning is completed and plans are approved, I conclude that there is little risk to the harvest level projections due to any uncertainty regarding this factor. I have therefore made no adjustments.

- disturbance in stands outside the timber harvesting land base

Natural disturbance events such as fire, windthrow and insect outbreaks, and their interactions, can change successional processes and alter stand structure and composition over time. Natural disturbances can occur both within and outside of the timber harvesting land base, and hence influence the achievement of landscape-level biodiversity objectives and available timber supply. The *Biodiversity Guidebook* provides a method for approximating the natural seral stage distribution based on the estimated average return interval of disturbance events by NDT.

In the timber supply analysis, disturbance within the inoperable forest—i.e., those forest stands located outside of the timber harvesting land base—was modelled by assigning a forest cover requirement and an annual disturbance target by NDT. The approach was intended to provide a rough approximation of possible natural disturbance cycles over the forecast period.

I have reviewed the methodology used to model disturbance in inoperable areas and discussed it with BCFS staff. Clearly, forests within inoperable areas do experience random stand-level disturbances, thereby influencing the achievement of landscape-level forest cover objectives over time. I note that stand dynamics and successional processes are difficult to predict with certainty. However, in the absence of better information, I find the assumptions used in the base case provide a reasonable approach for use in this determination. The results of ongoing scientific investigations will undoubtedly bring greater clarity to this issue and can be incorporated into future determinations.

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

Dawson Creek Land and Resource Management Plan

The Dawson Creek Land and Resource Management Plan (LRMP) was approved by Cabinet in March 1999 and is intended to guide land use and resource management activities including forest development planning. The plan was the result of a consensus-based planning process that directly involved industry representatives, First Nations, agricultural and environmental interests, local and provincial government agencies and the general public.

The LRMP planning area covers 2.9 million hectares and includes Crown lands within the Dawson Creek Forest District (now part of the larger Peace Forest District), excluding the Kakwa recreation area. The plan area has been divided into 12 resource management zones each with resource values, management objectives and associated strategies. To date, no part of the LRMP area has been established as a higher-level plan or objective.

To protect key natural, cultural, and recreational values, the plan also recommended the establishment of seven Goal 1 and nine Goal 2 protected areas totalling over 150 000 hectares. To date, all protected areas have been formally designated except for the proposed 19 730 hectare Peace River/Boudreau Lake protected area.

In the analysis, all designated parks were excluded from the timber harvesting land base. Because it has not yet been formally designated, no specific deductions were made to account for the proposed Peace River/Boudreau Lake protected area. In the base case, approximately 1805 hectares of the proposed Peace River/Boudreau Lake protected areas contribute to the timber harvesting land base.

I am aware that the proposed Peace River/Boudreau Lake protected area is still under consideration but no decision has yet been finalized by government. Consistent with my Guiding Principles, I therefore cannot speculate on the final outcome of government strategic land use decisions such as the designation of protected areas. However, I note that the proposed Peace River/Boudreau Lake proposed protected area currently contributes only about 1805 hectares of the timber harvesting land base. Therefore if the protected area is eventually designated the potential impact on timber supply would only be about 0.2 percent.

I note that in addition to protected areas, the general intent of LRMP recommendations are being reflected in forest development plans and a number were specifically modelled in the base case as described under *grizzly bear habitat* and *caribou habitat*. I note that many of the LRMP recommendations pertaining to forestry are dependent on landscape unit planning for which objectives are not yet finalized. I acknowledge that ongoing implementation of the LRMP will help to clarify the projected timber supply impacts arising from the LRMP as accounted for in this analysis of the Dawson Creek TSA. Any new information will be considered in future determinations.

First Nations considerations

With respect to First Nations in the Dawson Creek TSA, I am aware of the following:

- There are five First Nations groups that have asserted land base interests within the Dawson Creek TSA. Two of these groups (West Moberly First Nation, Saulteau First Nation) have reserves within the TSA. Three others (Halfway River First Nation, McLeod Lake Indian Band, Lheidli T'enneh Band) do not have reserves in the TSA.
- Four of these groups (West Moberly First Nation, Saulteau First Nation, McLeod Lake Indian Band, Halfway River First Nation) are signatories to Treaty 8, which identifies their treaty rights as hunting, trapping and fishing. The West Moberly, Saulteau and Halfway River First Nations have requested expansion of their existing Treaty 8 reserves through treaty land entitlement claims. These claims are currently before the Government of Canada for consideration. The Halfway and West Moberly claims are currently under negotiation for resolution.
- The Lheidli T'enneh Band has initiated treaty negotiations through the British Columbia Treaty Commission (BCTC) process. Negotiations are currently in Stage 4 of the 6-stage process, negotiating an agreement in principle.
- The community of Kelly Lake is substantially composed of individuals asserting Métis' or First Nation aboriginal rights.
- In addition, the Kelly Lake Métis Settlement Society is in the process of asserting its independence as an aboriginal group with rights and title and has asserted an interest within the TSA to establish a reserve and traditional use area.
- In the Dawson Creek TSA, First Nations and Métis have some limited direct involvement in the forest industry. The Saulteau First Nation retains a woodlot within the TSA and several First Nations' companies have been contracted to carry out silviculture-related activities in the TSA.
- The Twin Sisters Resource Management Zone (RMZ) was identified through the Dawson Creek LRMP as having special cultural significance to First Nations, and is currently being recognized in operational plans. The Twin Sisters Special Management Committee (TSSMC) has developed recommendations for management objectives and strategies for the Twin Sisters RMZ area.

All of the above-mentioned First Nations groups as well as the Kelly Lake Métis Settlement Society were sent the analysis report, the public discussion paper, and a letter inviting their comments. The district also completed follow-up phone calls to each group offering to meet with them to provide information, and discuss the timber supply review process.

The Saulteau and West Moberly First Nations responded by way of a joint letter to the Chief Forester dated November 4, 2002. They indicated that until capacity issues are addressed they would be unable to participate in the process. In addition, the McLeod Lake Indian Band submitted a letter dated October 14, 2002 advising of their desire for timber volume to be apportioned to them through a direct award process.

District staff also held a meeting with the Kelly Lake Métis Settlement Society. Society members expressed their interest in economic opportunities including those enabling recreational facilities throughout their declared traditional territories. No response was received from any of the other First Nations groups cited above.

I note that the Lheidli T'enneh Band are in the latter stages of negotiations towards an agreement in principle but a treaty has not yet been concluded. Regarding the treaty land entitlement claims of the Halfway River, West Moberly and Saulteau First Nations, I understand that no formal land-status changes have occurred, and that negotiations are ongoing with the Halfway River and West Moberly First Nations. The final outcomes of these negotiations with respect to treaty land entitlements are unknown and BCFS staff have indicated it is not certain what portion of that area will be provided in any potential settlements.

District staff have informed me that consultation on forestry matters related to forest development plans and range use plans is carried out on an on-going basis. A number of resources are utilized and various activities are carried out to ensure effective communications, as follows:

- use of traditional use studies and information on recorded archaeological sites by BCFS staff during review and authorization of forest activities;
- bands have provided copies of maps of traditional use studies to district staff;
- Prince George forest region (now part of the new Northern Interior forest region) has provided funding to encourage working relationships with First Nations including improving AOA maps and undertaking a traditional use study;
- awareness training for BCFS staff;
- trapping tenure holders (about 25 percent of whom are First Nations) are advised of proposed forestry operations through the district's planning referral process.

These activities have been useful for understanding the interaction between treaty rights, traditional use activities, and resource development including timber harvesting. To date, the communications and studies suggest that appropriately located, timed and designed harvesting can occur without negatively affecting treaty rights. In addition, current forest management in the TSA, which has been represented in the base case, includes the protection of critical wildlife habitat, biodiversity and riparian areas and will assist in maintaining the basis for wildlife- and fish-related uses.

I am aware that some of the First Nations mentioned in the first paragraph of this section have asserted title to areas within the Dawson Creek TSA. For those groups involved in the treaty process, these claims are summarized in the treaty process 'Statements of Intent'.

Regarding the Twin Sisters RMZ, I am aware that TSSMC included representatives from the West Moberly, Halfway River and Saulteau First Nations as well as government and industry. Within this management zone, enhanced consultation with First Nations regarding future resource development is expected. Klin-se-za Protected Area has also been established within the management zone; and was appropriately excluded in the timber supply analysis.

Based on all of these considerations related to land entitlements, treaty rights, and to other information on First Nations that has been made available to me, I conclude that no adjustments to the timber supply projected in the base case on account of First Nations issues are required in this determination.

I will consider any new information, including any decisions on treaties with the First Nations at the time of my next AAC determination. If new information contradicting any of my conclusions becomes available during the effective term of this determination, I may re-visit this determination prior to the required time.

In the meantime, as I have noted in my 'Guiding Principles,' the AAC that I determine should not in any way be construed as limiting the Crown's obligations resulting from recent court decisions including those of the Supreme Court of Canada. In this respect, the AAC that I determine does not prescribe any particular plan of harvesting activity within the Dawson Creek TSA by requiring any particular area to be harvested or to remain unharvested. My AAC determination is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

As I make my AAC determination, I am mindful of the responsibility of other statutory decision-makers to administer the determined AAC consistently with other legislation, and with relevant court decisions respecting the interests of First Nations.

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

Alternative rates of harvest

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

In addition to the base case forecast, the timber supply analysis examined several alternative forecasts. The assumptions for these options are discussed in detail in the *October 2002 Dawson Creek Timber Supply Area Analysis Report.*

One alternative forecast projected an initial coniferous harvest level of 1 208 000 cubic, 10 percent higher than the base case. This level was maintained for three decades followed by a reduction to the long-term level. In this alternative, existing timber supply is depleted more rapidly, which then requires second growth and longer-term managed stands to be available sooner than assumed in the base case forecast. As the coniferous harvest in the base case and this alternative projection both begin well above the current AAC, and as noted in the socio-economic analysis, indicates, the increase could generate additional

revenue and employment benefits. However, it is important to note that unlike the alternative projection, the harvest rate in the base case would not require a level of increased activity that would later have to be reduced.

In a second alternative harvest forecast, the small pine harvest level was increased by 35 percent to 135 000 cubic metres per year and maintained for 10 decades, followed by a 10 percent per decade decline to the long-term harvest level. This alternative forecast demonstrates that a significantly higher small pine harvest level can be maintained with no reduction in the long-term harvest forecast.

A third alternative projected an initial deciduous harvest level of 968 000 cubic metres per year, 10 percent higher than depicted in the base case. This level is maintained for a maximum of three decades before declining by 10 percent per decade, to achieve the long-term harvest level of 588 000 cubic metres per year in decade eight.

These harvest projections demonstrate that considerable flexibility in the magnitude and duration of the initial harvest level exists in the Dawson Creek TSA. This flexibility in the choice of an initial harvest level indicates that to the extent the assumptions in the base case may not have adequately accounted for specific factors, these may still be accommodated for within acceptable rates of decline. I have been mindful of this flexibility in making my determination.

Community implications

A socio-economic analysis was conducted as part of the timber supply analysis, in which the impact of timber supply adjustments on local communities and the provincial economy was assessed. The assumptions and findings of the socio-economic analysis are presented within the *October 2002 Dawson Creek Timber Supply Analysis Report*. I have reviewed the information in the socio-economic analysis and I am mindful of the implications to communities of variations in the harvest level for the Dawson Creek TSA.

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

Timber processing facilities

I have reviewed the information regarding the existing and proposed timber processing facilities, and am aware of the reliance of these facilities on the volume harvested in the TSA.

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

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). The letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs. As discussed under *small pine* and 'Reasons for decision', I have considered matters regarding partitioning small pine and deciduous-leading stands. With respect to commercial thinning, the economics of this activity are not currently advantageous and no operations are planned.

The Minister's memorandum addressed the effects of visual resource management on timber supply. In it, the Minister asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. As discussed under *visually sensitive areas,* I am satisfied that the implications of visual resource management in the TSA were adequately explored through sensitivity analyses, and are consistent with the direction in the Minister's letter. I also take the Dawson Creek LRMP as an important expression of local objectives for the Dawson Creek TSA regarding the management of visual resources.

I have considered the contents of the letter and memorandum in my determination of an AAC for the Dawson Creek TSA. I am satisfied that this determination is consistent with the Minister's direction as expressed in these documents.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. The BC Forest Service provided a number of opportunities for public input through the timber supply review process for the Dawson Creek TSA, including opportunities to review the data package and the timber supply analysis and to respond to the public discussion paper. A summary of this public input is reproduced in full as Appendix 5.

BCFS staff solicited public input by distributing copies of relevant documents including the data package, information report, analysis report and public discussion paper to First Nations, licensees, local government and environmental groups. Documents were also made available at district and regional offices and on the Ministry of Forests internet site.

In addition, notification of the Timber Supply Review advising of the availability of documents were placed in local newspapers in Dawson Creek, Chetwynd, Tumbler Ridge, and Fort St. John areas. A meeting was also held with the Kelly Lake Settlement Society/Kelly Lake Ma-M-Way Cooperative.

In response, BCFS district staff received one written submission relating to the data package and four submissions relating to the analysis report. Some of the opinions expressed in the input relate to items outside my mandate to take into account as chief forester under my legislated authority for an AAC determination. For example, suggestions about allocation of timber harvesting rights are within the mandate of the Minister of Forests and not the Chief Forester. Opinions were expressed from a number of

stakeholders recommending that the AAC be increased. While I acknowledge the opinions expressed, I note that any decision that I make on the harvest level for the TSA must be predicated on sound information, and I cannot speculate about land use or other decisions which have not been taken by government.

Although public input was limited, local objectives are an important consideration in my determinations and I have considered it along with the general employment and community stability implications in making my AAC determination for the Dawson Creek TSA.

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

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed by natural causes such as fire and disease, but not recovered through salvage operations. Estimates for unsalvaged losses account for epidemic infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are typically accounted for in inventory sampling for existing timber yield estimation or through other methods. Losses associated with second-growth stands are addressed by applying operational adjustment factors (OAFs) as noted previously in this rationale.

For the timber supply analysis, the regional pathologist and entomologist provided estimates of total annual average losses using forest health data specific to the Dawson Creek TSA. The information was supplemented with estimates from federal *Forest Insect and Disease Survey* data. The unsalvaged component of the losses was estimated using data from the district's salvage program.

In total, 58 892 cubic metres per year were deducted from the projected harvest volume to account for unsalvaged losses due to fire, wind, spruce beetle and *Innonotus tomentosus* root disease. District staff have examined the assumptions and approach used to derive unsalvaged losses and indicate that the estimates appear reasonable.

I have reviewed the methodology and assumptions regarding unsalvaged timber losses and discussed them with BCFS staff. I consider them the best available information and therefore suitable for this determination.

Reasons for decision

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

The base case harvest forecast suggested that a total annual harvest level of 2 078 000 cubic metres can be maintained for up to 5 decades before declining. Of this, for coniferous-leading stands (excluding small pine stands) a non-declining harvest of 1 098 000 cubic metres per year can be achieved over the entire simulation period. In addition, the base case also suggested that a small pine harvest level of 100 000 cubic metres per year—the same as the current partition—can be maintained for up to 19 decades before declining to a long-term harvest level of 72 000 cubic metres per year.

For deciduous-leading stands, the base case projected an initial harvest level of 880 000 cubic metres per year for 5 decades before declining by 10 percent per decade to a long-term harvest level of 588 000 cubic metres per year. As stated previously in Base forecast for the Dawson Creek TSA, I accept the base case forecast as a suitable basis from which to assess the assumptions regarding land base, management practices and timber yields for this TSA.

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

For the majority of factors applicable to the Dawson Creek TSA, I am satisfied that the assumptions applied in the base case harvest forecast were appropriate. Following is my consideration of those factors as they affect either the coniferous-leading or deciduous-leading stands and for which I consider it necessary in this determination to take into account implications to the timber supply projected in the base case.

In the Dawson Creek TSA the deciduous and coniferous components of the inventory present different challenges and opportunities, and consequently the two are considered separately here, as they were in the previous analyses and determinations.

Coniferous-leading stands

In the timber supply analysis, two distinct harvest components make up the total coniferous harvest: one forecast depicts the harvest level from small pine-leading stands, and the other forecast depicts the harvest level from all other coniferous-leading stands.

I reviewed the timber supply forecast for small pine stands and identified a number of uncertainties in the analysis assumptions, including those describing *volume estimates for existing stands, site productivity estimates, visually sensitive areas* and *identified wildlife*. However, I noted the high proportion of growing stock relative to the initial harvest level of 100 000 cubic metres per year. Alternative harvest forecasts and sensitivity analyses further confirmed a very stable harvest projection from small pine stands.

For all coniferous stands (other than small pine stands) the factors which indicate that the timber supply projected in the base case forecast may be overestimated and to a degree that can be quantified to some extent are as follows:

- *physical operability:* I concluded that the deductions applied in the base case to account for sensitive terrain are likely underestimated given that a significant proportion of the TSA involves steep, mountainous terrain. A review of coniferous-leading stands within the timber harvesting land base associated with older soil ESAs suggested that timber supply projected in the base case may be overestimated by up to 3 percent.
- *problem forest types:* In the base case, 11 673 hectares of pure balsam stands were assumed to contribute to the timber harvesting land base. I considered it likely that a

proportion of these stands will not contribute to timber supply because of the very limited harvesting performance observed to date. Based on the proportion of the timber harvesting land base covered by these stands, I concluded that timber supply may be overestimated by up to 3 percent.

- *mixedwood stands:* I noted that mixedwood stand types—including 43 556 hectares of coniferous-leading mixedwood stands—account for approximately 13 percent of the timber harvesting land base. Based on discussions with staff and the results of sensitivity analyses, I considered that timber supply may be overestimated by between zero and 12 percent.
- *impediments to prompt regeneration:* I acknowledged the potential impacts of livestock grazing on the growth and yield of regenerating stands. Although the scope and magnitude of grazing impacts is highly uncertain, sensitivity analyses suggest that the harvest forecast depicted in the base case may be overestimated by up to two percent.
- *silvicultural systems:* I noted that approximately 4 percent of coniferous leading stands are harvested using irregular shelterwood (uneven-aged) silvicultural systems. However, the base case assumed that 100 percent of areas were harvested using even-aged silvicultural systems. Although uncertain, based on sensitivity analysis I concluded that timber supply is likely overestimated by less than one percent.
- *visually sensitive areas:* I noted that 59 242 hectares of areas with established VQOs were incorrectly modelled in the base case. A sensitivity analysis indicated that the timber supply projected in the base case may be overestimated by approximately 3 percent.
- *identified wildlife:* I accepted that the implementation of the measures of the identified wildlife management strategy, including establishment of WHAs will likely result in a one percent reduction in the size of the timber harvesting land base which will have a corresponding impact on timber supply in the short to long term.

I am also aware that there are some factors that indicate that coniferous timber supply as projected in the base case may be underestimated to a degree that can be quantified. These factors are described as follows:

- *site productivity:* I considered it likely that the productivity of second-growth coniferous stands will be greater than indicated by data from existing old growth stands. Although the precise magnitude of this underestimation is highly uncertain, sensitivity analysis suggested that short- to long-term timber supply may be underestimated by between zero and 10 percent.
- *decay, waste and breakage:* Locally-based Net Volume Adjustment Factors (NVAF) were not incorporated into the estimates of existing stand yields. I concluded that short- to long-term coniferous timber supply is likely underestimated by approximately two percent.

In consideration of the cumulative effects of the factors acting to either increase or decrease timber supply, I have the following observations.

As the coniferous timber supply was projected as an even-flow forecast, I have considered the above-listed factors to act across the entire forecast horizon (i.e., with equal impact on both the short- and long-term timber supply projections). The factors acting to increase timber supply projected in the base case cumulatively range from about 2 percent to 12 percent. Those acting to decrease timber supply range from 5 percent to 25 percent.

For perspective, I have examined the net influence of the above ranges and note that the base case may be either overestimated by as much as 23 percent (25 minus 2) or it may be underestimated by up to 7 percent (12 minus 5). This provides me with a sense of the overall scope of the uncertainty on timber supply.

In further assessing the above factors, I note that the old-growth site index adjustments applied to coniferous stands greater than age 140 are based on broad provincial studies. While more localized study may in future confirm that *site productivity* estimates are indeed underestimated, when a potential increase (or decrease) in AAC is concerned, I apply particular caution in assessing potential site productivity gains. In making my determination, and until the potential increases are confirmed through local studies, I have applied no adjustments to the site productivity estimates assumed in the base case.

Regarding the uncertainty associated with *physical operability*, I have again taken a cautious approach given that a significant proportion of the TFL includes steep, mountainous terrain. Drawing on the information provided by the ESA inventory, I have assigned the full extent of the uncertainty (i.e., 3 percent overestimate of timber supply) in making my determination.

As discussed under *problem forest types*, I questioned the base case assumption whereby balsam-leading stands contributed in full to the coniferous timber supply depicted in the base case. I note that balsam is a viable commercial species, but because of the very limited performance in these stand types, I concluded that coniferous timber supply may be overestimated from zero to three percent. For the purposes of this determination, I will assume that up to half of these stands contribute to timber supply, and have thereby assigned a downward impact on the base case forecast of 1.5 percent. Once again, this factor is highly uncertain and will require further study as indicated below under 'Implementation'.

Regarding the potential timber supply impacts described under *impediments to prompt regeneration*, I am not convinced that livestock grazing will be a significant issue affecting coniferous timber supply over the forecast horizon. Although I acknowledge that empirical evidence of an impact may be established, I have not considered this to be significant for the purposes of this determination. I note that results from a BCFS research study will better quantify the scale of these impacts, if any, in the near future. These results will be incorporated into the next determination.

As noted previously, the impacts of uncertainties associated with *silvicultural systems*, *visually sensitive areas* ands *identified wildlife* were reasonably well quantified through sensitivity analysis, or in the case of *identified wildlife* through provincial policy decisions. These factors work to overestimate coniferous timber supply by one, three and one percent respectively.

Likewise, the uncertainty associated with *decay, waste and breakage* was well quantified through a sensitivity analysis. I noted that the application of NF/NVAF-compiled volume adjustment ratios are based on local information and their application is consistent with current provincial standards. In making my determination I have considered that coniferous timber supply is underestimated by two percent on account of this factor.

And finally, I reviewed the contribution from mixedwood stands and noted that a significant area—over 10 percent of the timber harvesting land base contributing to coniferous timber supply in the base case—is comprised of mixedwood stands. Important questions were raised about the current operational viability of these stands. I am not convinced that it is realistic to assume that all these mixedwood stands will prove economic to access and harvest in the near future. In addition, there is a high degree of uncertainty in our understanding of mixedwood stand dynamics and the complex successional processes associated with mixedwood boreal ecosystems. In making my determination I have therefore again chosen a cautious approach by not including the contribution of mixedwood stands in assessing the coniferous harvest forecast.

In summary, I have weighed the likely impact of the individual factors described above and considered their net effect on the base case coniferous forecast. I have concluded that at this time, the coniferous harvest level should not be increased to the level suggested by the base case. Having reviewed the factors above and accounted for their associated risk and uncertainty, it is my opinion that the base case harvest level likely overestimates available timber supply. I have accounted for this uncertainty and risk by considering a harvest level 20 percent lower than projected by the base case. As a result I have determined that an appropriate harvest level from coniferous-leading stands (excluding small pine stands) is 878 000 cubic metres per year. Noting the stability of the small pine forecast, it is also my expectation that an additional harvest of 100 000 cubic metres from small pine stands can also be readily supported, therefore providing for a total coniferous harvest level of 978 000 cubic metres per year.

Deciduous-leading stands

For deciduous-leading stands, factors which indicate that the timber supply projected in the base case forecast may be overestimated and to a degree that can be quantified to some extent are as follows:

- *mixedwood stands:* I noted that mixedwood stand types—including 48 689 hectares of deciduous-leading stands—account for approximately 13 percent of the timber harvesting land base. Based on discussions with staff and the results of sensitivity analyses, I considered that deciduous timber supply may be overestimated by up to 20 percent.
- *problem forest types:* In the base case, 32 980 hectares of pure or leading balsam poplar stands were assumed to contribute to the timber harvesting land base. I considered it likely that a proportion of these stands should not contribute to timber supply because of the very limited harvesting performance observed to date. Based on the proportion of the timber harvesting land base covered by these stands, I concluded that the deciduous timber harvesting land base may be overestimated by up to 13 percent.

- *physical operability:* I concluded that the deduction applied in the base case to account for sensitive soils is likely underestimated given that a significant proportion of the TSA involves steep, mountainous terrain. A review of the deciduous-leading stands within the timber harvesting land base associated with older soil ESAs suggested that short- to long-term timber supply projected in the base case may be overestimated but by less than one percent.
- *impediments to prompt regeneration:* I acknowledged the potential impacts of livestock grazing on the growth and yield of regenerating stands. Although the scope and magnitude of grazing impacts is highly uncertain, sensitivity analyses suggest that the long-term deciduous harvest level depicted in the base case may be overestimated by up to five percent.
- *visually sensitive areas:* I noted that 59 242 hectares were incorrectly modelled in the base case. A sensitivity analysis indicated that the long-term deciduous timber supply projected in the base case may be overestimated by approximately two percent.
- *identified wildlife:* I accepted that the implementation of the measures of the identified wildlife management strategy, including establishment of WHAs will likely result in a one percent reduction in the size of the timber harvesting land base which will have a corresponding impact on timber supply in the short to long term.

Factors which indicate that the timber supply projected in the base case forecast may be underestimated and to a degree that can be quantified to some extent are as follows:

- *decay, waste and breakage:* Locally-based Net Volume Adjustment Factors were not incorporated into the estimates of existing and future stand yields. I concluded that long-term deciduous timber supply may be underestimated by up to 12 percent. Sensitivity analyses also demonstrated that the initial harvest level of 880 000 cubic metres per year could be maintained for an additional 4 decades compared to the base case.
- *woodlot licences:* I noted that the base case assumptions over-represented the area of new and expanded woodlots. As a result, deciduous timber supply projected in the base may be underestimated by 2 127 cubic metres per year.

In assessing the above factors, I note that three factors—*mixedwood stands, problem forest types* and *decay, waste and breakage*—have potentially significant impacts (over 10 percent) on timber supply. The first two factors act to reduce timber supply but the extent is not known with a degree of certainty. Based on discussions with BCFS staff and historic trends in other parts of the province, I find it likely that a proportion of deciduous mixedwood stands as well as pure-and leading-balsam poplar stands will eventually contribute to timber supply. However, based on current performance I am unwilling to assume their full contribution to timber supply at this time.

I note that the third factor (*decay, waste and breakage*) acts to increase the deciduous timber supply projected in the base case by up to 12 percent in the long-term. The associated sensitivity analysis and alternative harvest flows also suggest that additional flexibility is available during the short to medium term compared to the base case. This helps to counteract and reduce the risk of the negative impacts on timber supply of the previous two factors. I also draw on the results of sensitivity analyses whereby the area of

the timber harvesting land base was reduced by 10 percent. In the sensitivity analysis, I note that the initial deciduous harvest can still be maintained for up to 3 decades before declining by 10 percent per decade.

The remaining downward factors indicate that timber supply may be overestimated, but based on sensitivity analyses neither *impediments to prompt regeneration* nor *visually sensitive areas* impacts the short-term harvest level.

The analysis included several alternative harvest forecasts which demonstrated considerable flexibility in initial deciduous harvest level. These provides me with additional confidence that the current deciduous AAC (correctly adjusted for woodlots) of 882 000 cubic metres provides a stable level for at least several decades. During this period many of the uncertainties in the assumptions will be further clarified, particularly those associated with *mixedwood stands* and *problem forest types.*

Finally, regarding the *Dawson Creek LRMP*, ongoing confirmation and clarification of management guidelines will further reduce uncertainties in factors affecting timber supply in the Dawson Creek TSA. Any new information including revised strategies will be accommodated in future analyses.

Determination

Having considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided, it is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, and that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the Dawson Creek TSA at this time by establishing an AAC of 1 860 000 cubic metres.

This AAC excludes volume issued to woodlot licences since the 1996 determination and is partitioned as follows:

- 978 000 cubic metres attributable to coniferous-leading stands of which at least 100 000 cubic metres annually must be taken from stands classified as small pine;
- 882 000 cubic metres attributable to deciduous-leading stands.

This AAC is effective May 1, 2003 and will remain in effect until a new AAC is determined, which may take place within five years of this determination.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below in cooperation with licensees. I recognize that the ability to undertake these projects is dependent on available staff resources, time and funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Dawson Creek TSA. I recommend district and regional staff work with licensees to carry out the following:

- re-examine the methodology used to identify physically inoperable areas, particularly those areas with unstable terrain;

- review the assumptions regarding problem forest types including the contribution of pure balsam and pure and leading balsam poplar stands to the timber harvesting land base;
- examine the assumptions regarding the full contribution of mixedwood stands to the timber harvesting land base prior to the next timber supply analysis;
- continue to update forest inventories of the TSA, including the photo interpretation component (phase I) of the Vegetation Resources Inventory (VRI) project;
- review the small pine profile including its contribution to the timber harvesting land base, and its growth and yield characteristics, as well as harvesting performance within the profile;
- monitor the average ages of harvested stands to determine if the relative-oldest-first harvest rule remains an appropriate assumption in the next analysis;
- review management practices within riparian areas to ensure that the estimates applied in the next timber supply analysis reflect the best information available;
- develop a strategy for identifying and managing backlog NSR areas and investigate funding opportunities through the Province's Forest Investment Account;
- continue to review, quantify and manage the negative impacts of livestock grazing on regenerating stands within the TSA;
- work with Ministry of Water, Land and Air Protection staff and First Nations interests to resolve issues associated with chemical brushing treatments of conifer plantations within the TSA;
- work with the Ministry of Water, Land and Air Protection, and the Ministry of Sustainable Resource Management to clarify the extent of and management regimes associated with ungulate winter range areas within the TSA;

Larry Pedersen
Chief Forester

April 3, 2003

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 2002, reads as follows:

Allowable annual cut

8 (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(3.1) If, in respect of the allowable annual cut for a timber supply area or tree farm licence area, the chief forester considers that the allowable annual cut that was determined under subsection (1) is not likely to be changed significantly with a new determination, then, despite subsections (1) to (3), the chief forester

(a) by written order may postpone the next determination under subsection (1) to a date that is up to 10 years after the date of the relevant last determination, and

(b) must give written reasons for the postponement.

(3.2) If the chief forester, having made an order under subsection (3.1), considers that because of changed circumstances the allowable annual cut that was determined under subsection (1) for a timber supply area or tree farm licence area is likely to be changed significantly with a new determination, he or she

(a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and

(b) must give written reasons for setting the earlier date.

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

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

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

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

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

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

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

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

(iii) silviculture treatments to be applied to the area,

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

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

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

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

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

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

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

1998-29-2; 1999-10-1; 2000-6-2; 2002-25-21.

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

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

Purposes and functions of ministry

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

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

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

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

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

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

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

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

Appendix 5: Summary of Public Input

File: 10100-01

JUL 28 1994

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

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

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

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

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

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

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

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

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

Yours truly,

Andrew Petter
Minister

Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

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

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

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

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

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

.../2

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

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

Andrew Petter
Minister of Forests

Dawson Creek Timber Supply Area
Timber Supply Review

Summary of Public Input

BC Ministry of Forests

Peace Forest District
9000 17th Street
Dawson Creek, BC V1G 4A4

April 2003

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

Dawson Creek Timber Supply Area

Background

As part of the review of timber supply in the Dawson Creek Timber Supply Area (TSA), two opportunities were provided for public input. The first followed release of the Dawson Creek TSA *Data Package* and *Information Report* in September 2000. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Dawson Creek TSA. A 30-day review period, ending October 12, 2000, was provided for the public to comment on these documents.

On October 24, 2002, the British Columbia Forest Service released the *2002 Dawson Creek Timber Supply Area Analysis Report* and *Public Discussion Paper*. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 45-day review period that ended December 9, 2002.

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

Public Review Process and Response

Staff from the Peace Forest District, as well as Ministry of Forests regional staff, actively solicited public input on the Timber Supply Review in the Dawson Creek TSA through the following actions:

- 56 copies of the *Data Package* and *Information Report* and 87 copies of the *Analysis Report* and *Public Discussion Paper* were mailed to stakeholders in the TSA, including First Nations, licensees, local governments and environmental groups.
- All the documents were available at the district office as well as the regional office in Prince George. About 10 copies of the *Data Package,* six copies of the *Analysis Report* and seven copies of the *Public Discussion Paper* were picked up.
- Advertisements were placed in seven local newspapers in the Dawson Creek, Chetwynd, Tumbler Ridge and Fort St. John areas, advising of the availability of all documents for review by the public.
- Copies of all the documents were made available to the local media. One interview was conducted with the local newspaper, The Peace River Block News.
- Referrals were made to the Ministry of Forests website where documents were available to download.
- On November 15, 2002, a meeting was held in Dawson Creek with representatives of the Kelly Lake Settlement Society/Kelly Lake Ma-M-Way Cooperative. Three people attended.

The forest district and regional offices received one written submission relating to the *Data Package* and four submissions relating to the *Analysis Report* (see Appendix 1).

Public Input

In this section, public input on the information presented in the Timber Supply Review

documents for the Dawson Creek TSA is summarized under the following headings:

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

Data Package

Socio-economic Factors
An individual submission recommends more wood be made available to small-scale operations. The individual suggests that small-scale operators create five times the number of jobs as large operators to produce the same amount of product. Wood utilization by small operators is also more efficient, according to this submission.

Timber Supply Area Analysis Report

Size of the Land Base
The submission from the Ministry of Agriculture, Food & Fisheries (MAFF) expresses pleasure that the removal of some Agricultural Land Reserve lands from the timber harvesting land base has been considered. MAFF requests the opportunity to see the assumptions used and to discuss the results of the sensitivity analysis.

First Nations
In a joint submission, the Saulteau First Nations and West Moberly First Nations state they cannot meaningfully or effectively participate in consultations (such as the Timber Supply Review) unless they have the resources to undertake their own review and/or analysis. They express dismay that despite their repeated requests for capacity funding and despite many court decisions on the Crown's obligation to consult with First Nations, their rights, title and interests — and the legal obligations of the ministry — continue to be disregarded. The First Nations state they will insist on the Province's strict compliance with its legal obligations.

This joint submission also notes the importance of the Timber Supply Review and its impacts on their ability to exercise their Treaty and Aboriginal Rights guaranteed by Treaty 8, especially with regard to a sufficient land base to sustain their culture.

In its submission, the McLeod Lake Indian Band notes the recent announcement by the Treaty Negotiations Office that First Nations can access direct awards for timber sales. The Band says they have economic aspirations in the forest industry, and that as part of the Timber Supply Review, an allocation of 15 to 20 per cent of the AAC of the Dawson Creek TSA should be allocated to the First Nations program.

Socio-economic Factors
MAFF raises three issues of concern relating to socio-economic considerations, as follows:

- Is there a reason why the Timber Supply Review is not timed to utilize the most recent census results?
- There is an appearance of bias toward the timber industry with respect to the socio-eonomic profile. It ignores the fluctuations in the forest industry since the 1996 census but repeatedly points out the downturn in the mining industry since then.
- Figure 3 appears to aggregate direct and induced jobs differently than was done in the socio-economic analysis for the Dawson Creek Land and Resource Management Plan.

Other Comments

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

Timber Supply Review Process
MAFF asks if it's not possible to involve other

affected ministries in the earlier stages of the Timber Supply Review. With more time to respond, MAFF suggests that these ministries could provide information about their resources and objectives that may assist in the AAC determination.

Allocation and Stumpage

An individual says various practices of large operators should be considered when future timber supplies are allocated. The following examples are given:

- West Fraser is bringing in large volumes of out-of-province timber at bargain prices, at the expense of local contractors.
- Canfor shuts down when lumber prices drop, forgetting the record prices and profits of the previous years.

In addition, this submission says the low stumpage rate on aspen makes it difficult for small operators (e.g., woodlot holders) to market their wood to companies such as LP Chetwynd. The stumpage should be increased to reflect aspen's true value, according to this individual.

Chetwynd Forest Industries (CFI) says an increase in coniferous volume should not be allocated in a manner that increases manufacturing capacity in the region. The company recommends a combination of the following options:

- make volumes available on the market in the form of Section 20, Category 1, Small Business Sales.
- award several non-replaceable forest licences on a competitive basis. This may also create opportunities to resolve First Nations issues.

Harvest Levels

CFI says an increase in coniferous AAC would be good news for local mills if opportunities are created to meet more of their wood requirements locally (from within the TSA). This would create economic stability for their business, the local economy, and employees and contractors, according to the company.

However, CFI says it may be difficult to utilize the coniferous cut by the full 351,000 cubic metres in the short term due to operational, planning and timber supply constraints. The company recommends an incremental approach to utilizing the increase, such as an immediate increase of 200,000 cubic metres, followed by subsequent increases of 50,000 cubic metres.

Appendix 1

Submissions received by the Peace Forest District

Submissions received on the Data Package

General public
one individual submission

Submissions received on the Timber Supply Analysis Report

First Nations
Saulteau First Nations/West Moberly First Nations
McLeod Lake Indian Band

Government agencies
Ministry of Agriculture, Food & Fisheries

Forest industry
Chetwynd Forest Industries