

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

Merritt Timber Supply Area

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

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effective January 1, 1999

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Objective of this Document

This document is intended to provide the rationale employed in making my determination, under Section 8 of the *Forest Act*, for a temporary increase in the allowable annual cut (AAC) for the Merritt TSA. Merritt Forest District staff requested a review of the AAC to account for an emergency situation arising from an outbreak in Mountain Pine Beetle and the salvage of timber damaged by fire.

The Merritt TSA and present AAC

The Merritt TSA lies in the southern interior of the province, within the Kamloops Forest Region, and is administered from the Merritt Forest District Office. The TSA covers approximately 1.116 million hectares.

The present AAC for the TSA is 1 454 250 cubic metres, of which 250 000 cubic metres are attributable to stands of small-diameter pine.

New AAC Determination

Effective January 1, 1999, in response to the need for an emergency forest management strategy for salvage and forest health, the new AAC for the Merritt TSA will be 2 004 250 cubic metres. This is an increase of 550 000 cubic metres, which additional volume is partitioned and attributable to stands requiring harvesting for the objectives of fire salvage and forest health. A partition of 250 000 cubic metres will continue to be attributable to stands of small-diameter pine.

This determination will remain in effect until a new AAC is determined, which is expected to be complete by January 1, 2001.

Information Sources Used in the AAC Determination

Information considered in determining the AAC uplift for the Merritt TSA includes the following:

- *Merritt TSA Timber Supply Analysis*, British Columbia Forest Service (BCFS), September 1994;
- *Information Package, Request for Temporary Allowable Annual (AAC) Increase*, Merritt Forest District, November 25, 1998;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives regarding visual resources;
- *Site Index Adjustments for Old-growth Stands Based on Paired Plots*, BCFS, 1998;
- *Site Index Adjustments for Old-growth Stands Based on Veteran Trees*, BCFS, 1998;

- Technical review and evaluation of an uplift analysis and current operating conditions through comprehensive discussions with BCFS staff, notably at an information meeting Kamloops, November 17, 1998 and a conference call December 15, 1998;
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Act Regulations*, April 1995;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and Ministry of Environment, Lands and Parks (MELP);
- *Forest Practices Code Timber Supply Analysis*, February, 1996, BCFS and MELP.

Role and Limitations of the Technical Information Used

The *Forest Act* requires me to consider biophysical as well as social and economic information in AAC determinations. Because of the emergency situation and the urgency of the request for a temporary AAC increase, the timber supply analysis and the inventory and growth and yield data used as inputs to the 1994 analysis formed a large part of the technical information used in my AAC determination for the Merritt TSA. Additional information which I considered included new information since the 1994 analysis which may affect that analysis, a new uplift analysis, information concerning the area and timber volumes affected by the 1998 Tulameen Fire, and information concerning the Mountain Pine Beetle outbreak in the TSA.

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

Guiding Principles

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. Two important ways of dealing with uncertainty are (i) avoiding unnecessary risk, and (ii) redetermining AACs frequently to ensure they incorporate up-to-date information and knowledge. The latter represents a principle that has been recognized in the legislated requirement to redetermine AACs every five years.

However, I am also prepared to re-visit an AAC determination if new information with significant implications for timber supply becomes available. In my 1996 Merritt Timber Supply Area Rationale for AAC Determination, I made reference to this possibility:

Earlier, under Age class structure, I noted that the older stands in the TSA are at risk to fire and renewed insect infestations. At present the salvage program goals are being met within the current AAC; however, District staff, the forest industry and members of the public have expressed concerns that this AAC may be inadequate to meet future salvage needs. I am aware of these concerns, and while I am unwilling to raise the AAC solely on the basis of unsubstantiated expectations, I have sought in my determination to provide sufficient management flexibility to address salvage needs, should they come to pass. If a catastrophic event occurs which cannot be managed under the AAC in place at that time, then the AAC should be reviewed in light of that

new information.

Merritt Timber Supply Area Rationale for AAC Determination, effective January 1, 1996, p.31.

Staff from the Merritt Forest District brought new information to my attention concerning the emergency situation regarding the salvage of fire-killed timber and an outbreak of Mountain Pine Beetle, and the administration of the current AAC. As a result, I have reviewed my previous AAC determination and this new information, and have determined a new AAC.

The Forest Act requires that a new determination be made at least once every five years, and the normal Timber Supply Review process takes 22 months. This process began in November 1998 for the Merritt TSA, in preparation for the new AAC determination scheduled to be complete by January 1, 2001.

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

Section 8 of the *Forest Act* requires the Chief Forester to consider a number of specific factors in determining AACs for TSAs. In this determination, while I have considered *all* the factors required under Section 8, as noted in “Reasons for decision”, I have placed most weight on my considerations under section 8(8)(e), owing to the urgency of dealing with a catastrophic situation. Also, to assist me in considering the required factors, in AAC determinations, a lengthy and detailed timber supply analysis and public review process is usually completed. However, for this emergency AAC uplift determination, the time constraints of the emergency have prevented the undertaking of the normal timber supply analysis. Nonetheless, there has been an abbreviated public review process and some specific new analysis has been undertaken. To ensure that all available information was considered, I have reviewed the September 1994 timber supply analysis, my 1996 AAC rationale, new information with respect to changes in the forest land base and forest management practices since the time of the last analysis and AAC determination, and a timber supply forecast prepared by Forest Service staff at my request, referred to in the following as the “uplift analysis”.

The Forest Practices Code Regulations were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* (the “Code”) was brought into force on June 15, 1995. In AAC determinations made since the coming into force of the *Code*, I have viewed with some caution the timber supply projections in BCFS timber supply analyses that pre-date the *Code*. This was the case for the Merritt AAC determination effective January 1, 1996, and I have been mindful of this caution in considering the September 1994 timber supply analysis as a source of information in making this AAC uplift determination.

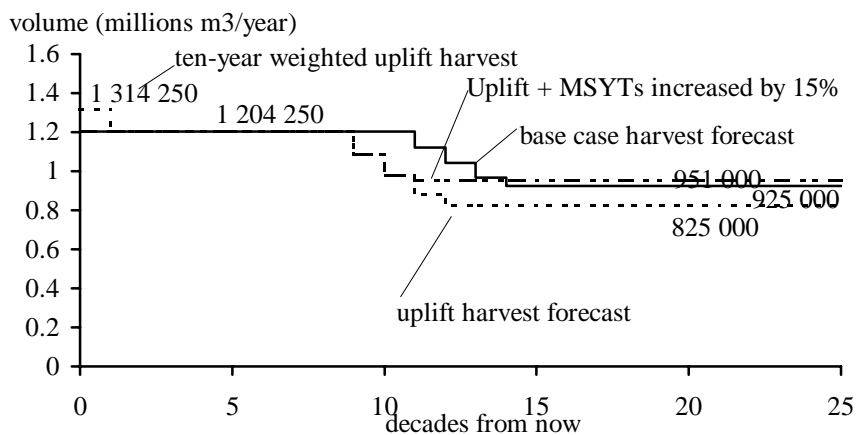
For the Merritt TSA, the base case projection in the September 1994 timber supply analysis indicated that the current AAC of 1 204 250 cubic metres could be maintained under existing management practices for 110 years. Following that, the harvest level

would decline by seven percent per decade for 30 years before reaching the long-term harvest level of 925 000 cubic metres at the beginning of the 15th decade.

Forest Service staff undertook a new timber supply analysis at my request to examine the implications of an uplift of 550 000 cubic metres for two years and the implications of any quantifiable changes in information since the last analysis.

In order to undertake the analysis quickly, the Merritt TSA data set from the 1994 analysis was used, since this is the most current data available for the TSA. The uplift volume was assumed to be evenly distributed between the first two years, at 550 000 cubic metres per year, but for the purposes of modelling a weighted average of 1 314 250 cubic metres per year was used for the first decade.

The figure below shows the original base case harvest forecast from the 1994 timber supply analysis. The uplift harvest forecast is also shown and includes consideration of stand- and landscape-level biodiversity. Beginning in year ten, the harvest level is the same as the 1994 base case analysis. This harvest level can then be maintained until decade 9 when it declines by 10% per decade, reaching a long term harvest level of 825 000 cubic metres per year in decade 12. When an approximation of old-growth site index adjustments is applied to the uplift forecast, the long-term harvest level rises to 951 000 cubic metres per year.



The Forest Act, Section 8 (8)

In my consideration of the factors required by Section 8 to be addressed in AAC determinations, I have concluded that much of the information I considered in my 1996 determination is essentially unchanged. Where changes have occurred, my consideration of the new information is discussed below.

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 harvest.

Since the 1994 analysis, terrain stability mapping has been completed for several drainages within the TSA. In 1998 the District completed operability mapping. District staff estimate that the operable land base will be reduced by approximately 40 000 hectares.

In addition, new research conducted on Douglas-fir leading types has resulted in the addition of approximately 40 000 hectares of these stands to the productive forest land base in the TSA.

The operability assessment has resulted in a decrease of 40 000 hectares, but this has been offset to some degree by the inclusion of about 40 000 hectares of Douglas-fir leading forest types. The uplift analysis did not examine the implications of these changes, but I consider that the effects will largely offset one another. This issue will be examined more fully in the next Timber Supply Review analysis.

Since the 1994 timber supply analysis, studies performed within the Merritt TSA have indicated that losses due to roads, trails and landings are expected to be less than previously estimated. This means the timber supply in the 1994 analysis, and now in the uplift analysis, was slightly underestimated in this regard, and I have taken this into account in my "Reasons for Decision". This issue will be examined more fully in the next Timber Supply Review analysis.

- age-class structure

I note from the 1996 rationale that

...the inventory is heavily weighted to mature stands, thereby raising questions about its stability. Mature pine, Douglas-fir and spruce stands are more prone to beetle infestations and fires than younger stands and, if left unharvested for long, may be lost to these natural forces. It appears that for at least the next several decades catastrophic infestations or fires in these older stands will remain very real possibilities. The Merritt Forest Licensees and the Interior Lumber Manufacturers' Association raised concerns that the current AAC may be inadequate for anticipated future salvage operations. During the public review period considerable public support was expressed for the timely harvest of these at-risk stands... This issue remains an important one and will be reviewed in future to help confirm whether existing management strategies are capturing enough of these mature volumes (in the Merritt TSA and elsewhere) before they are lost to natural forces.

AAC Rationale for Merritt TSA, p14.

The age-class structure of the Merritt TSA places the TSA at high risk for fire and beetle infestations. The Tulameen fire and the current Mountain Pine Beetle outbreak clearly demonstrate this situation, and I accept that a different approach to forest management is required in this situation.

Expected rate of growth

- *site productivity estimates*

Research into the productivity of old-growth stands, such as *Site Index Adjustments for Old-growth Stands Based on Paired Plots*, BCFS, 1998, provides evidence that the site index information used in the 1994 timber supply analysis underestimates growth rates for managed lodgepole pine and spruce stands. The uplift analysis examined the implications of increasing the yield of managed stands by fifteen percent. The analysis showed an increase of 126 000 cubic metres per year in the long term compared to the uplift harvest forecast for the long term. I accept that there is an upward pressure on timber supply from underestimates of site productivity, and expect that this will be examined more fully in the analysis for the next Timber Supply Review.

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

Based on my consultations with District staff, I have concluded that the information I considered in my 1996 determination is largely unchanged for this factor.

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

Based on my consultations with District staff, I have concluded that the information I considered in my 1996 determination is largely unchanged for this factor.

(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;

Based on my consultations with District staff, I have concluded that the information I considered in my 1996 determination is largely unchanged for this factor.

(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

- *visually sensitive areas*

In order to help meet the social and economic objectives of the Crown as expressed by the Minister, the BCFS has released guidelines for achieving visual quality objectives (VQOs) in a manner that is less constraining to the province's timber supply. These

range from using better landscape design techniques, to considering the potential benefits of fertilization in reducing green-up ages.

VQOs in the Merritt TSA are not yet formally approved under a planning process or by authority of the district manager, but are managed as recommendations as part of the known visual inventory, and I have accepted them in my 1994 determination as representing current management. District staff recognize that, due to ongoing natural forces (windthrow) affecting stands within visual areas, VQOs in some areas will not always be achievable. District staff estimate that approximately 10 000 cubic metres per year in visual zones may become damaged and thus disturbances may exceed VQOs in specific areas on a temporary basis.

Since the 1994 analysis, the overall area of the visually sensitive zone (about 10 percent of the 1994 timber harvesting land base) has increased by approximately 20 percent. This increase—which is primarily due to consideration of the small-diameter pine land base, improvements in inventory, and completion of the lakes classification process—could indicate a small *overestimation* in the timber supply projected in the 1994 base case analysis. However, also since the 1994 timber supply analysis, studies within the Merritt TSA suggest that the recovery occurs at a lower height than the 5.5 metres used in the 1994 base case. This earlier achievement of green-up would indicate a small *underestimation* in the 1994 projection. The influences of these two factors on timber supply are mutually opposing. The extent to which they may not be completely offsetting is uncertain without analysis, but will be quite small relative to the overall timber supply, which is in any event very stable in the short term. Therefore, and since I expect any associated uncertainty to be resolved in the forthcoming analysis for the next determination, I have not attempted to make any adjustment to the projected timber supply on this account at this time.

I am aware that the district has a management strategy in place for known scenic areas and is working towards meeting the Crown's social and economic objectives regarding VQOs. At the present time it is not possible to predict whether changes will result from meeting the VQOs in the TSA with less, rather than more, restriction on the timber supply than was modelled in the 1994 base case analysis.

Finally, I have noted that the VQOs may become compromised from time to time by natural events such as beetle outbreaks or fires. For this decision, the uncertainties associated with the VQOs in some areas of the TSA are of less immediate concern than the need to consider beetle-control strategies and objectives for salvaging damaged timber.

Further analysis of this issue will be undertaken for the next Timber Supply Review, and in the interim, having considered the district's VQO strategy, I have accepted the information on visually sensitive areas used in the 1994 base case analysis and the uplift analysis as suitable for use in this uplift determination.

- wildlife trees, riparian areas, biodiversity and old growth

Since the 1994 timber supply analysis, a policy for wildlife tree patch retention has been implemented in the Merritt TSA. District staff estimate that approximately 8 percent of the total Crown land base is being retained for wildlife tree purposes and that one-half of this area is being retained in currently constrained areas such as riparian management areas. For the uplift analysis, one-half of the remaining four percent was assumed to be wildlife trees which are accounted for in areas contributing to landscape level biodiversity. The yield curves used in the uplift analysis were reduced by two percent to account for the remaining wildlife trees assumed to be left within cutblocks.

Based on classification data gathered for several drainages, district staff have estimated that the total area required for maintenance of riparian areas and management zones on streams, wetlands and lakes, is expected to be greater than that used in the 1994 analysis.

Since the 1994 timber supply analysis, objectives for old growth and interim biodiversity emphasis options for landscape units have not been implemented. The uplift analysis examined the impact of managing for ten percent of the land base to be in high emphasis biodiversity management, with forty-five percent of the land base in each of medium and lower biodiversity emphases.

While using approximations for stand-level and forest-level biodiversity management, the uplift analysis showed that the harvest levels for the first decades, after accounting for the uplift in the first decade, are the same as the 1994 base case analysis. The harvest level can be maintained until decade 9 before declining to a long term level of 825 000 cubic metres per year, as compared to the 1994 base case analysis which showed that the harvest level could be maintained for 11 decades before declining to a level of 925 000 cubic metres per year.

Further analysis of this issue will be undertaken for the next Timber Supply Review. In the interim, I accept the information used in the uplift analysis as suitable for use in this uplift determination.

- community watersheds

In the 1994 timber supply analysis, no specific zones were identified, and no forest cover constraints were applied, in respect of designated community watersheds. Since the 1994 analysis, watershed assessments have been initiated on all of the community watersheds where timber harvesting has been proposed. Additionally, one watershed has been deleted (William) and one watershed has been added (Trout Creek). Trout Creek has a gross area of 2028 hectares within the Merritt TSA. The net result of these assessment processes and changes is uncertain, but could result in harvest restrictions in some areas, and I have taken this into account in my “Reasons for decision”.

- lakeshore management

Since the 1994 analysis the district has completed a lakes classification process resulting in the classification of 282 lakes greater than 3 hectares in size. District staff estimate that the outcome of this classification process should result in the exclusion from the timber harvesting land base of a slightly greater area of productive forest land than in the 1994 analysis. Since this larger reduction in the land base was not incorporated in the uplift analysis, I conclude that this analysis overestimates the timber supply to a small but unquantified extent throughout the forecast period, and I have discussed this below in “Reasons for decision”.

- management zones and forest cover requirements

The *Kamloops Regional Integrated Resource Management Timber Harvesting Guidelines* were used to divide the TSA into four management zones: selection harvesting management, landscape management, ungulate winter range and standard IRM. These zones are generally acceptable for use in this determination, noting the considerations with respect to the landscape management zone which I have discussed earlier, under *visually sensitive areas*. Further analysis of this issue will be undertaken for the next Timber Supply Review. In the interim, I accept the information used in the uplift analysis as suitable for use in this uplift determination.

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

Based on my consultations with forest district staff, I have concluded that the information I considered in my 1996 determination is largely unchanged for this factor.

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

Failure to respond at this time to the urgent need in this TSA for a higher level of harvesting operations directed to fire salvage and forest health could soon result in decayed timber and a lost opportunity to realise the fullest possible social and economic benefit from the emergency situation, and the early establishment of a healthy forest for future generations. Apart from these important considerations, based on my consultations with BCFS staff I am satisfied that, taking into account fluctuations in stumpage rates, employment levels and income, the information I considered in my 1996 determination may have varied slightly, but remains overall appropriate for use in this determination.

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

Based on their evaluation of forest development plans, district staff advise me that, except for the small pine partition, almost all operations in the TSA are projected to take place in response to fire salvage or forest health management. The infestation problem is

acknowledged as too large for any one operator to manage, and will therefore likely involve many operators and mills both inside and outside the TSA. Bringing collective power to deal with the problem will provide sufficient mill capacity, and the involvement of more than one mill will ensure sufficient distribution for marketability.

I expect any implications for the capability of existing facilities to process harvested volumes resulting from the proposed AAC uplift will be considered during arrangements for apportionment and tenure. While I am aware that there has been an announcement regarding an imminent mill closure in the TSA, I am nonetheless advised by the district that in consultation with numerous mill operators and licence holders, both inside and outside the TSA, a strategy for harvesting and utilising this additional volume is feasible.

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

Minister's letter

The Minister has expressed the economic and social objectives of the Crown in two documents to the chief forester—a letter dated July 28, 1994, and a memorandum dated February 26, 1996, and I understand these to apply to the Merritt TSA. These documents are appended to this rationale as Appendices 3 and 4 respectively. Of significance in this determination are the effects of visual resource management on timber supply. The Minister's memorandum asked that pre-Code constraints applied to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. I have discussed the district's VQO strategy above under "*visually sensitive areas*".

Local objectives

The Minister's letter suggested that the Chief Forester consider important local social and economic objectives that may be derived from the public input to the Timber Supply Review. In preparation for this AAC determination, district staff consulted with community leaders, licensees and First Nations representatives. I have reviewed a summary of those consultations, which indicates good general support among those groups for the proposed AAC increase. Following aggressive information campaigns on the Mountain Pine Beetle by the Forest Service, Forest Renewal B.C. and one licensee, a two-week public input period generated just three letters of response, all expressing support for the uplift strategy. No expressions of concern have been received from the public.

In the process of developing a strategy to address the Mountain Pine Beetle problem, it was agreed that a "home grown" solution would be the most effective and efficient. To that end, all licensees within the TSA were asked to provide feedback as to what extent they could realistically participate in an accelerated harvest strategy. The discussion with licensees substantially contributed to the District's draft management plan to implement any AAC uplift.

I have considered the input received and am mindful of the views that were brought forward. The consideration of those views has been an important component of this determination.

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

Unsalvaged losses

Unsalvaged losses are those volumes expected to be lost on a regular basis to catastrophic natural forces; they do not include losses due to endemic infestations, which are normally accounted for in the growth and yield tables. The 1994 BCFS timber supply analysis assumed annual losses of approximately 117 000 cubic metres, attributed to: insects (53 000 cubic metres); fire (39 000 cubic metres); wind damage (18 000 cubic metres); and miscellaneous (7000 cubic metres). New estimates place unsalvaged losses at approximately 123 000 cubic metres. I am mindful of the extreme difficulty associated with estimating this factor in a management unit such as this at this time. However, it is important to note that this subsection of the *Forest Act* refers to *unsalvaged* loss—even after all salvage efforts have been made. Provided there are ongoing salvage initiatives and occasional increases in salvage and control strategies, I accept the loss projections as adequate for use in this determination.

Major salvage programs

Beetle salvage operations in lodgepole pine and spruce stands have accounted for the harvest of a significant portion of the AAC. District staff have informed me that in view of the current situation with the fire-killed timber and mountain-pine-beetle outbreak, most of the AAC in 1999 will be directed to salvage and beetle-control programs. The proportion attributable to small diameter pine stands cannot be redirected without adversely affecting licensees' harvesting and processing of timber from these stands due to their specialized nature. Further, District staff have presented me with information which leads them to conclude that without an AAC uplift the Mountain Pine Beetle outbreak could result in a major devastation of pine stands in the TSA.

Tulameen Fire

The Tulameen Fire started on August 31, 1998 as the result of a hangover lightning strike. Extended drought, large expanses of heavy forest fuels, steep slopes and extreme fire weather caused the fire to spread rapidly. Rates of spread were documented at 75 meters per minute, up to 96 metres per minute during peak runs. Spotting was occurring 1.6 kilometres ahead of the main fire.

Before the fire was brought under control it had spread over an area in excess of 9000 hectares. The fire affected mature timber, harvested material and reforested sites. Fire control actions utilized heavy machinery and an estimated 110 kilometres of control line

were established. Management of the burned area is being undertaken in a way that involves stakeholders. Harvesting and rehabilitation are currently taking place and work will be underway on the burn for several years.

The total volume of timber killed by the fire, or that has been under-burned by the fire and may die, is estimated to be 734 000 cubic metres. Staff estimate that 477 500 cubic metres are suitable for salvage logging and can be harvested without disturbing sensitive sites. I accept that these are the volumes available for harvest and that these volumes need to be harvested quickly before the trees begin to check and degrade to the point where they are uneconomic to harvest. I am aware of the difficulties and increased costs of harvesting and processing fire-damaged timber, and note that at least one licensee has made a commitment to re-tool its processing facility to deal with the carbon problems created by processing fire-killed timber.

Status of the Mountain Pine Beetle in the Merritt TSA

The Mountain Pine Beetle, *Dendroctonus ponderosae*, is the most damaging insect pest of lodgepole pine in western Canada. On average, 16 000 hectares of mature timber are killed each year by this insect in the Kamloops Region, with large tracts of susceptible timber remaining. These stands are largely composed of even-aged lodgepole pines that are past their natural rotation age, and mixtures of large, mature pine mixed with other species such as Douglas-fir.

The Mountain Pine Beetle is a very aggressive insect, placing entire pine stands at risk. Mountain pine beetle infestations often result in extensive tree mortality. Factors contributing to susceptibility include high stand density; species composition (high component of lodgepole pine); age (over 80 years); elevation and aspect; and tree vigour. Weather is one of the most important factors influencing the population dynamics of the beetle. The weather conditions in the Merritt TSA are very favourable for Mountain Pine Beetle development and dispersal since summer temperatures are consistently high with low precipitation, and the winters are moderate.

The forests within the Merritt TSA contain some of the highest hazard stands in the province. Hazard is a combination of factors including: stand age, host basal area, stand density, elevation, and climatic conditions. In the TSA, pure lodgepole pine stands occupy 38 percent of the timber harvesting land base, with Douglas-fir/yellow pine (19 percent), lodgepole pine/Douglas-fir (16 percent) lodgepole pine/spruce (13 percent) and spruce/white pine/cedar (9 percent) also present. Large-scale commercial harvesting only began around 1970; as a result, 77 percent of the timber harvesting land base still holds mature stands, over half of which are stands dominated by lodgepole pine. The Mountain Pine Beetle and fire are the most dominant force of forest succession within these stand types.

Since 1992-93, the Mountain Pine Beetle infestation has been increasing in the Merritt TSA. Over the past 2 summers, the population has increased exponentially. Factors leading to this outbreak in the beetle population include:

- 1) The mature lodgepole pine profile for the Merritt TSA;
- 2) the natural cycling of the insect population;
- 3) the availability of suitable host material;
- 4) the favourable climatic conditions conducive to Mountain Pine Beetle survival and development, plus two mild winters followed by a very hot, dry summer in 1998.

For the past two to three years, weather patterns have significantly influenced the expansion of the beetle population. The extremely mild winter of 1997/98 allowed good brood survival. An increase in over-winter survival rate coupled with the hot, dry summer of 1998 created optimum conditions for the expansion and colonization of the Mountain Pine Beetle. Lodgepole pine trees were stressed due to the hot, drought-like conditions, and translocation was reduced due to moisture stress. Warm, daily mean temperatures in the summer allowed beetles to emerge over a very short, concentrated period of time. The very large flight of beetles in a short time frame, plus the relative lack of resistance on the part of the host, allowed many successful mass attacks and a significant expansion of the population.

The marked increase in the number and area of red attacks (dead lodgepole pine due to Mountain Pine Beetle) following a 1998 detailed aerial survey, raised concern that current management strategies for the beetle were not adequately addressing the problem. Field assessments on the ground were conducted to evaluate the 1998 green attack levels in a number of drainages in the Merritt District. The level of green attack varied among areas, but on average, the expansion rate was 20 percent or greater. The ground surveys revealed that in general, low elevation, mixed species stands had low green attack and high incidence of red and grey attack (i.e. trees dead for more than one year). Mountain pine beetle population levels had built up in these stands and the insects had then dispersed to other susceptible areas. Many of the visited stands had very high levels of green attack and very few red-attack trees. Other areas showed the Mountain Pine Beetle moving into stands dominated by small diameter stems (low hazard), thus indicating intense beetle pressure.

Data derived from detailed, 1998, helicopter overview surveys indicate that the Mountain Pine Beetle currently affects an area in excess of 4400 hectares within the Merritt TSA. An estimated 3500 hectares of this area lie within the timber harvesting land base. This overview survey captured information about 1997 beetle attack and these populations have since spread to new hosts as a result of the 1998 beetle flight. Initial ground reconnaissance work indicates that substantial spread has resulted from the 1998 flight and that some populations have dispersed to new (susceptible) host stands.

For the period 1993 to 1998, the average annual expansion of the area in the TSA affected by Mountain Pine Beetle is approximately 19.4 percent. At the previous level of attack,

staff projected an additional 854 hectares of damage each year. The most recent beetle flight resulted in an increase in affected area from 1997 to 1998, of over 1200 hectares. This represents an annual rate of expansion of 29 percent.

Forest Service staff have informed me there are differing professional opinions on how to best manage the current Mountain Pine Beetle outbreak. The strategies and tactics employed to date have not achieved the desired goals of reducing unsalvaged losses and minimizing the spread of the beetle population. Much of the effort over the past few years has been targeted at reducing the inventory of the susceptible pine type, through development and harvesting of mature, high-hazard pine. When Mountain Pine Beetle populations are low, this is a practical management strategy. However, when Mountain Pine Beetle outbreaks are in progress, other strategies and tactics are more effective. To reduce proliferating Mountain Pine Beetle populations, and subsequent beetle pressure and spread to susceptible stands, brood removal (by harvesting infested trees) is the most effective tactic. The outbreak in the Merritt TSA, as is typical of most Mountain Pine Beetle outbreaks, began in low-hazard, highly susceptible stands (low elevation, mixed species) and has spread into high-hazard stands. When beetle pressure reaches the magnitude that is currently observed, low (i.e. small-diameter stems), moderate and high hazard stands are almost equally at risk.

In stands where the green-attack levels are very high, baiting to contain beetle populations is not recommended. Baits may not be able to hold large beetle populations within a stand if the availability of suitable hosts has been greatly depleted. Numerous blocks infested with Mountain Pine Beetle have been held through one or more flights, but this is no longer possible in many areas due to intense beetle pressure and host depletion.

In spite of the Ministry of Forests implementing one of the most intensive single-tree-treatment programs for Mountain Pine Beetle in the province, and one licensee implementing an aggressive harvest strategy against the Mountain Pine Beetle, the problem and its impact on all resource values continues to increase. This places the future timber supply for the Merritt TSA in jeopardy as a large component of the TSA is comprised of susceptible host.

Based on a sampling of cutblocks in areas infested by Mountain Pine Beetle in the Willis, Whipsaw, Sunday and Steven's Creek drainages, the average harvest-area-to-affected-area ratio for Mountain Pine Beetle sanitation and salvage operations is 4:1. Based on this ratio, approximately 14 000 hectares of harvesting are needed in order to control the beetle on current beetle-attack areas. The total volume currently affected within the timber harvesting land base is estimated to be 3.8 million cubic metres. These harvesting operations need to begin as soon as possible, in an effort to control the beetle before the 1999 flight.

To bring the Mountain Pine Beetle under control, Merritt Forest District staff have developed a plan that includes redirecting the conventional harvest into salvage operations, beetle control, and other forest health activities in the TSA, such as control of

the spruce bark beetle. In addition to redirecting the harvest within the 1996 AAC, Forest Service staff have requested a two-year AAC uplift of 400 000 cubic metres in order to bring the Mountain Pine Beetle situation to a manageable level within a four-to five-year time frame.

In developing the plan, all licensees within the TSA were asked to provide feedback on the extent to which they could realistically participate in an accelerated harvest strategy. Clearly, dealing with an uplift of this magnitude will create many logistical challenges. There are also issues associated with softwood lumber quotas and market conditions. However, licensees are prepared to redirect their activities and Forest Service staff believe that the plan can be delivered.

I have considered the information Forest Service staff have put before me on the current state of the Mountain Pine Beetle infestation in the TSA, which I consider to be an emergency situation requiring urgent response. I accept that there is a high risk of catastrophic outbreak, and that the Forest District has prepared an action plan which can be successful in controlling the situation.

Reasons for decision

In reaching my decision on an AAC for the Merritt TSA, I have considered the factors set out in Section 8 of the *Forest Act* and have reasoned as follows.

While I have carefully examined and evaluated all the relevant considerations under Section 8, which are documented throughout this rationale, in view of the catastrophic situation which has necessitated this determination, as I noted earlier my decision turns largely on the considerations under section 8(8)(e). The evaluation of the other factors is necessary to ensure that important forest values are not unacceptably affected, and that all consequences of the uplift decision are sufficiently informed by the full range of considerations. For this reason, while I have given primary weight to considerations under section 8(8)(e), I have also carefully examined smaller implications for timber supply identified by my consideration of other factors, as follows.

The 1994 BCFS timber supply analysis base case and associated sensitivity analyses identified a high degree of stability in the existing timber supply. Under current management assumptions and practices the AAC of 1 204 250 cubic metres could be maintained for 11 decades before declining. Sensitivity analysis showed that even in the event of a 10-percent increase in the area required to be covered by mature stands—the factor tested that offered the largest individual impact on timber supply—the AAC of 1 204 250 cubic metres could still be maintained for eight decades.

The “uplift analysis” was prepared largely on the basis of the 1994 analysis, but was updated where possible to include subsequent changes in management, and incorporated an AAC uplift of 550 000 cubic metres per year for two years. Data on which the 1994 analysis was based which was not updated, was scrutinized for its ongoing reliability.

The uplift analysis indicated that with the inclusion of the uplift, and changes to incorporate stand-level and forest-level biodiversity, the 1994 base case harvest level of 1 204 250 cubic metres per year can be maintained for eighty years following one decade at the uplifted harvest level of 1 314 250 cubic metres per year—the proposed 2-year increase was averaged over a 10-year period for modelling purposes).

I have noted several factors that imply over-or underestimation in the 1994 and/or “uplift” analyses. Consideration of two factors indicates possible *overestimation*—the lake classification process and community watersheds—while consideration of roads, trails and landings indicates possible *underestimation*. The lake classification process should result in the exclusion from the timber harvesting land base of a slightly greater area of productive forest land than was estimated in the 1994 analysis, in view of which the uplift analysis has overestimated the timber supply to a small but unquantified extent throughout the forecast period. Watershed assessments in community watersheds have the possibility to result in harvest restrictions in some watersheds, the net result of which is uncertain, but could also constrain the supply to a small extent.

Offsetting these restrictions on supply, I have noted that the timber supply in the 1994 analysis, and now the uplift analysis, was slightly underestimated with regard to new information on roads, trails and landings. The net implication for timber supply from these mutually opposing factors is uncertain. Given the two constraining, and one augmenting factor, it is possible a small net overestimation may have occurred. However, in view of the demonstrated high stability of the forecast over the next nine decades, no adjustment to the projected harvest level is required in respect of a small, potential overestimation at this time, and I am satisfied that any minor implications for the overall timber supply from these factors will be accounted for in a timely way in the forthcoming analysis for the next AAC determination without risk to the currently projected harvest level.

The high rate of expansion of the area that remains under beetle attack in spite of aggressive practices to contain the insect, and the large area of pine stands at risk in the TSA cause me great concern. I am advised that virtually all of the harvesting activity in the 1996 AAC over the next two years will be directed at fire salvage and forest health issues such as beetle control. The fact that this is not expected to contain the outbreak leads me to conclude that an uplift in AAC is needed. From my review of the 1994 and “uplift” analyses, and from my considerations and reasoning as outlined above, I am satisfied that the projected initial harvest level in the “uplift” analysis provides an appropriate response to this emergency situation.

As noted above in my considerations under section (c) with respect to alternative rates of harvest, failure to respond at this time to the urgent need in this TSA for a higher level of harvesting operations directed to fire salvage and forest health could soon result in decayed timber and lost opportunities both to realise the fullest possible social and economic benefit from the emergency situation, and to ensure the early establishment of a healthy forest for future generations.

In conclusion, my review of all the factors considered in this determination has not provided any reason why determining an uplift at this time would create an unacceptable risk, and significant benefits have been identified. Given that the majority of the harvest in this TSA is already directed to salvage operations and forest health management, I find that the TSA and the timber values in it cannot be properly managed at the current AAC level at this time. In some management units, from time to time there are compelling forest management reasons for cutting in the short term at any one of a range of possible harvest levels. In this TSA, the significant volumes of mature and overmature timber inventory, and the unrealistic nature of any expectations of carrying that inventory over indefinite time periods in the face of this catastrophic situation, warrant such specific management of the harvest level at this time.

This situation will need to be thoroughly reviewed in the next review of the timber supply for this TSA by the normal full-scale TSR process of data-compilation, analysis and public review, for which preparations have already begun, and which I expect to complete in accordance with the original schedule by January 1, 2001. At that time the success of this uplift strategy in controlling losses will be addressed, and the potential requirement for other management strategies to maintain control of the situation can be considered.

Determination

It is my determination that a timber harvest level that accommodates objectives for all forest resources and which allows for a major salvage program for fire-killed timber and control of the Mountain Pine Beetle can best be achieved in this TSA at this time by establishment of an AAC of 2 004 250 cubic metres. This represents an increase of 550 000 cubic metres from the current AAC, and this additional volume is partitioned and attributable to stands requiring harvesting for the objectives of fire salvage and forest health. A partition of 250 000 cubic metres will continue to be attributable to stands of small-diameter pine.

This determination comes into effect on January 1, 1999, and will remain in effect until a new AAC is determined, which I expect to be complete by January 1, 2001.



Larry Pedersen
Chief Forester

December 17, 1998

Appendix 1: Section 8 of the *Forest Act*

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

8. 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 agreement areas and woodlot licence areas, and
 - (b) each tree farm licence area.
- (2) If the minister
- (a) makes an order under section 7 (b) respecting a timber supply area, or
 - (b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (1) (a) to (d),

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

- (c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
 - (d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.
- (3) If
- (a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
 - (b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

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

- (4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).
- (5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to
- (a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area,
 - (b) different types of timber and terrain in different parts of private land within a tree farm licence area, and
 - (c) gains in timber production on Crown land that are attributable to silviculture treatments funded by the government of British Columbia, the federal government, or both.
- (6) The regional manager or district manager must determine a volume of timber to be harvested from each woodlot licence area during each year or other period of the term of the woodlot licence, according to the licence.
- (7) The regional manager or the regional manager's designate must determine a volume of timber to be harvested from each community forest agreement area during each year or other period, in accordance with

- (a) the community forest agreement, and
 - (b) any directions of the chief forester.
- (8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider
- (a) the rate of timber production that may be sustained on the area, taking into account
 - (i) the composition of the forest and its expected rate of growth on the area,
 - (ii) the expected time that it will take the forest to become re-established on the area following denudation,
 - (iii) silviculture treatments to be applied to the area,
 - (iv) the stand of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
 - (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
 - (vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,
 - (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,
 - (c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,
 - (d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and
 - (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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

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

Purposes and functions of ministry

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

Documents attached:

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

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