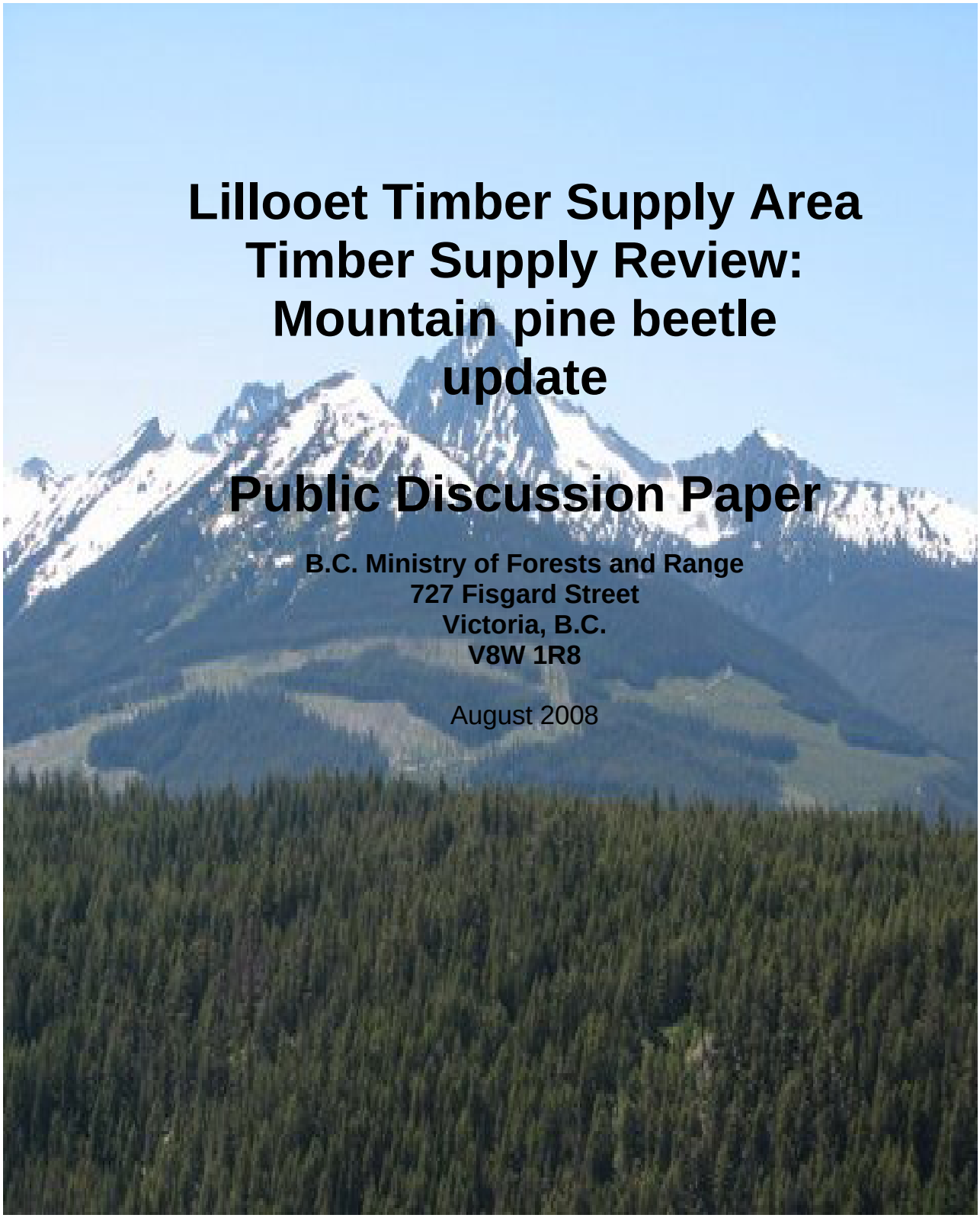
FOREST ANALYSIS AND INVENTORY BRANCH



Lillooet Timber Supply Area Timber Supply Review: Mountain pine beetle update

Public Discussion Paper

B.C. Ministry of Forests and Range
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Victoria, B.C.
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Public Discussion Paper

Introduction

The British Columbia Ministry of Forests and Range regularly reviews the timber supply* for all timber supply areas* (TSAs) and tree farm licences* (TFLs) in the province. This review, the third of its kind for the Lillooet TSA, examines the impacts of current forest management practices on the timber supply, economy, environment and social conditions of the local area and the province. Based on this review the chief forester will determine a new allowable annual cut (AAC) for the Lillooet TSA.

By law, the chief forester must review and set new AACs for all 37 TSAs and 34 TFLs every five years. The chief forester can postpone a timber supply review for up to five more years if the annual cut level is not expected to change significantly.

The chief forester may also set a new harvest level earlier than five years to deal with situations such as damage from severe wildfires or catastrophic insect infestations.

For the Lillooet TSA, the chief forester initiated the current timber supply review in 2004 but the review period has been extended to provide for additional consultation with First Nations. Subsequently, increased concern associated with the mountain pine beetle infestation has highlighted the need for re-examining the current AAC.

The objectives of the timber supply review are to:

- **Examine** relevant forest management practices, First Nations and public input, and economic, environmental and social factors;
- **Set a new AAC** for the next five years; and
- **Identify** information to be improved for future timber supply reviews.

The objectives of this document are to provide an overview of the timber supply review process and harvest level forecasts for the Lillooet TSA, and to encourage public comment. This document supplements the timber supply analysis report made available for public review in June 2005 and focuses on a new analysis of the mountain pine beetle infestation. Comments will be accepted for 60 days, until November 3, 2008.

Before setting a new AAC, the chief forester will review all relevant reports and public and First Nations input. The chief forester will outline his determination in a rationale statement that will be publicly available upon release. Following the release of the AAC determination, the Minister of Forests and Range will apportion the AAC to the various licences and programs within the TSA.

Description of the Lillooet timber supply area

The Lillooet TSA is situated in southwestern British Columbia between the Coast Mountains and the Thompson-Okanagan Plateau and covers approximately 1.125 million hectares. About 528 000 hectares within the Lillooet TSA are considered productive forest land and 47 percent of this is considered available and suitable for timber harvesting. The timber harvesting land base therefore represents approximately 250 000 hectares or 22 percent of the total area within the TSA.

The TSA is administered by the Cascades Forest District in Merritt.

Throughout this document, an asterisk after a word or phrase indicates that it is defined in a box at the foot of the page.

Timber supply
The amount of timber that is forecast to be available for harvesting over a specified time period, under a particular management regime.

Timber supply areas (TSAs)
An integrated resource management unit established in accordance with Section 7 of the Forest Act.

Tree farm licences (TFLs)
Provides rights to harvest timber and outlines responsibilities for forest management in a particular area.

The Lillooet TSA is characterized by rugged topography and dramatic climatic variations associated with the mountainous terrain found in this region. In the western portion of the TSA, temperate rain forest conditions predominate, while the eastern portion is dominated by the dry grasslands and semi-arid landscapes that comprise the interior dry belt.

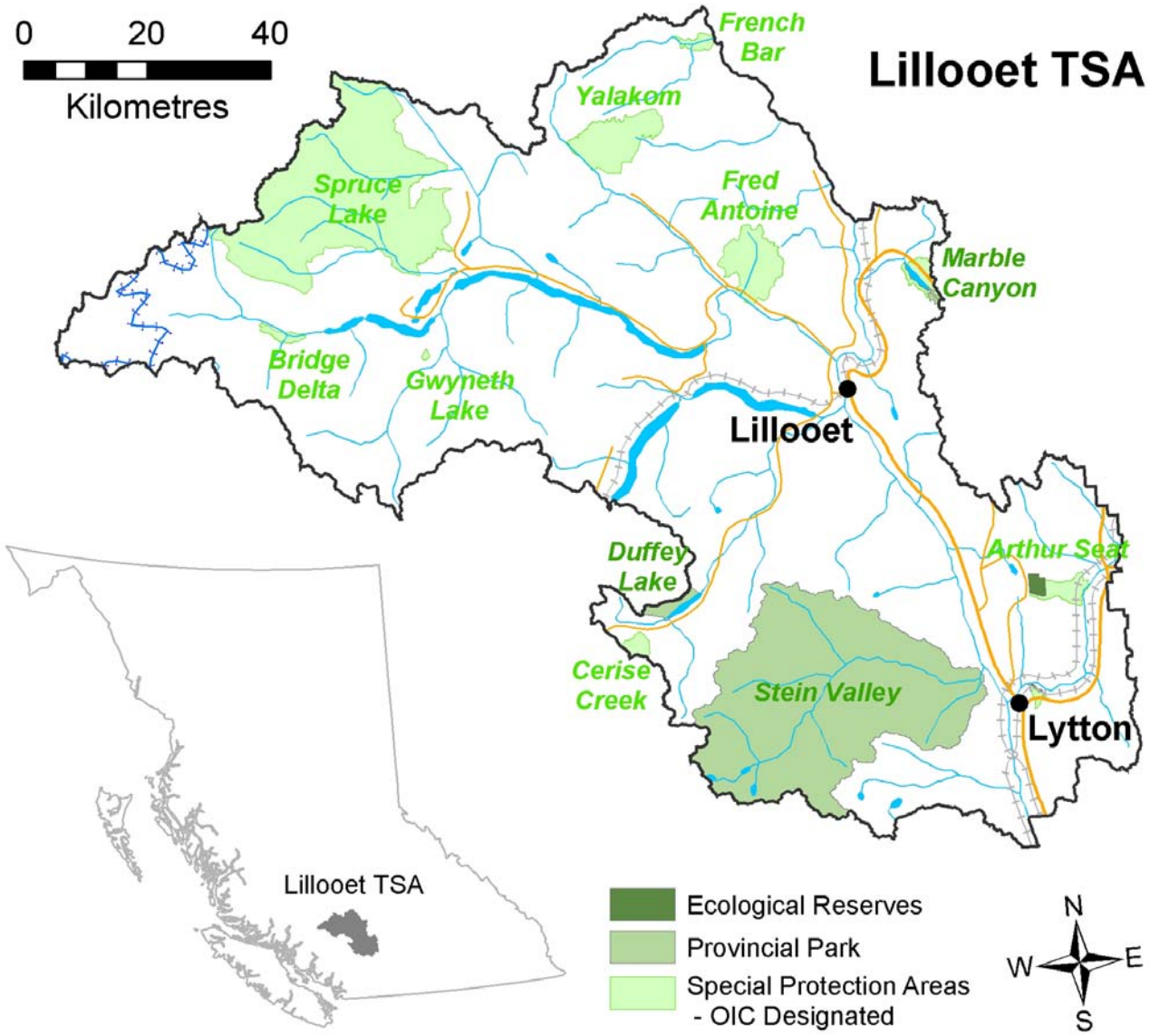


Figure 1. Map of the Lillooet Timber Supply Area.

Given the climatic diversity, the forests of the Lillooet TSA are fairly diverse. Lodgepole pine, Douglas-fir and spruce-leading stands dominate, but other tree species are also present including ponderosa pine, whitebark pine, subalpine fir (balsam), western redcedar and hemlock.

About 80 percent of the forests in the TSA are currently over the age of 60 years. Over time, as harvesting and mortality due to mountain pine beetle occurs, younger forests will become more predominant.

Lillooet is the largest community in the TSA. As of the 2006 census, the District of Lillooet had an estimated population estimate of 2,324 people. Including the surrounding communities that use Lillooet as their trading centre, the total is estimated at 5,000.

Several smaller communities occur within the TSA including Seton Portage/Shalalth, Xaxli'p, Lytton, Pavilion, Spences Bridge, Bralorne, and Gold Bridge.

Land-use planning

The Lillooet land and resource management planning (LRMP) process began in 1995. In 2003, the former Ministry of Sustainable Resource Management completed a draft plan that proposed a variety of strategies and management options. To date, except for a number of proposed parks, the draft plan has not been accepted as a higher level plan.

The natural resources

The Lillooet TSA includes a wide range of forest land resources, including forest products (timber and non-timber), forage, minerals, recreation and tourism amenities, and fish and wildlife habitats. Access to a diversity of landscapes, including lakes and rivers, provides exceptional recreation opportunities for both residents and tourists. Summer activities include camping, hiking, fishing, wildlife viewing and back-country recreation.

The diverse forests and landscapes of the Lillooet TSA are home to a wide range of wildlife species.

A number of endangered species potentially exist within the TSA some of which have identified wildlife habitat areas (WHAs). Red-listed species include Northern Spotted Owl, badger, the Lower Fraser population of White Sturgeon, Pallid Bat, Swainson's Hawk, Prairie Falcon, Fisher, and subspecies of the Western Screech-owl and Brewer's Sparrow. A variety of ungulates are found within the TSA including elk, mule deer, moose, bighorn sheep, and mountain goat. Other large mammals include grizzly and black bear. Also found are various furbearers such as beaver, mink, muskrat, otter, marten, weasel, wolverine, bobcat and lynx.

The rivers and lakes of the TSA support many fish species, including; steelhead trout, rainbow trout, bull trout, whitefish, white sturgeon, cutthroat trout, whitefish and all five species of pacific salmon.

Environmental values

Current forest management follows the standards set out in the *Forest and Range Practices Act*, which are designed to maintain a range of biodiversity and wildlife values. Forested areas both inside and outside the timber harvesting land base help to provide critical forest habitats for many species. In the Lillooet TSA about 53 percent of the productive forest land is not considered available for timber harvesting.

Forest cover requirements for biodiversity, visual quality, community watersheds, recreation features, riparian management, and protection of environmentally sensitive areas were included in the analysis.

Mountain Pine Beetle Infestation

The Mountain Pine Beetle (MPB) is the most damaging insect that attacks lodgepole pine in Western Canada. Beetles attack pine trees by laying eggs under the bark. When the eggs hatch, the larvae mine the phloem beneath the bark and eventually cut off the tree's supply of nutrients.

The beetles also carry a fungus that causes dehydration and inhibits a tree's natural defenses against beetle attacks. The fungus stains the wood blue or grey. Despite the discoloration, the wood remains structurally sound and can still be used for high-quality products such as sawlogs for a number of years after the tree has been killed.

Forests of mature lodgepole pine* are prime habitat for the mountain pine beetle, and the beetle thrives under warm weather conditions. The Interior of British Columbia has an abundance of mature lodgepole pine, and has experienced several consecutive mild winters and drought-like summers. As a result, mountain pine beetle populations have reached a level unprecedented in British Columbia's recorded history.

Mature lodgepole pine
In this report, mature has been defined as 80 or more years old.

Based on the provincial aerial overview data and projections from the latest version of the Provincial-level Mountain Pine Beetle Model (BCMPB v5), as of 2007 about 620 million cubic metres of mature pine have been killed province-wide in the current infestation. This represents approximately 46 percent of the total merchantable pine volume (1.35 billion cubic metres) on the provincial timber harvesting land base. Ministry of Forests and Range specialists now project that the infestation will be essentially over by 2018 and at that time the cumulative pine volume killed will be approximately 78 percent.

The forests of the Lillooet TSA contain approximately 17.6 million cubic metres of merchantable lodgepole pine. About 84 percent of this volume is found within pine-leading stands and 8 percent within Douglas-fir–leading stands.

The Mountain Pine Beetle model projections suggest that about 80 percent of the mature pine will be killed in the Lillooet TSA. This mortality is expected to occur over the next 12 years but the majority will likely occur within 5 years. Figure 2 illustrates that the majority of the expected pine mortality will occur by 2012.

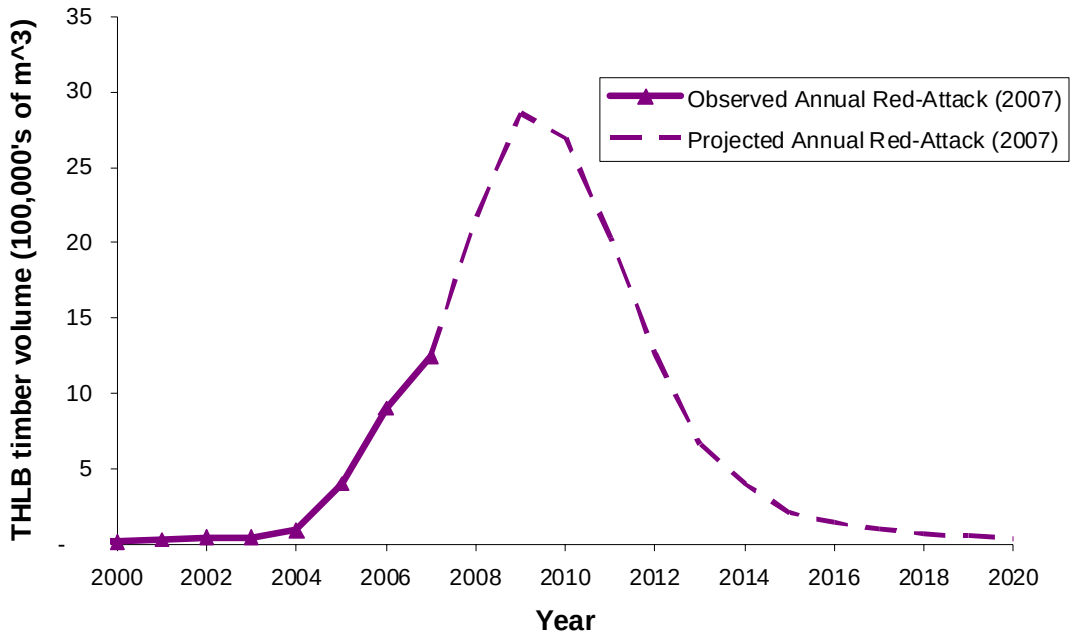


Figure 2. Annual volume of lodgepole pine killed by the MPB in the Lillooet TSA (BCMPB v5, 2007).

Current annual cut

In January 2002, the chief forester established an AAC in the Lillooet TSA of 635 900 cubic metres. Data from the Ministry's harvest billing system indicates that during 2003-2007, about 49 percent of the total AAC was harvested with the majority of harvest focused in Douglas-fir stands.

Timber supply forecasts

Forsite Consultants prepared a timber supply analysis in 2005 for the Ministry of Forests and Range to support the chief forester's timber supply review. A timber supply computer model was used to project a number of possible timber supply forecasts for the Lillooet TSA.

The base case forecast incorporated new data and considered current forest management practices. A major component of that analysis investigated the proposed management recommendations of the Lillooet LRMP planning table. Details of the base case and the data used are described in the 2005 analysis report. For more information, the 2005 analysis report is available on the Ministry of Forests and Range website at: www.for.gov.bc.ca/hts.

A major shortcoming of the 2005 analysis was the lack of consideration of the current MPB epidemic. As a result, the harvest forecast, as seen in Figure 3, was able to maintain the current AAC of 635 900 cubic metres for 60 years before declining to a long-term harvest level (LTHL) of 379 920 cubic metres per year. Figure 4 shows that pine is a significant component of the 2005 base case harvest forecast.

To reflect more recent data on MPB, an addendum to the analysis report was completed by Forsite Consultants in March 2008. The focus of this public discussion paper is to present the findings of the MPB analysis and the implications for forest management in the Lillooet TSA.

Three scenarios were modelled in the MPB addendum: MPB base – where harvesting assumptions were the same as in the 2005 base case; Pl salvage – where harvesting was focused on pine-leading stands; and No harvest in Pl leading stands — where pine-leading stands were avoided. The following assumptions were common to all three scenarios:

(1) Mortality of pine in mature stands will likely result in the loss of 14.1 million (80% of the pine volume) cubic metres of pine in the next 10 years. To simplify the analysis, no explicit shelf-life was modelled. It was assumed that if the dead pine was not harvested within 10 years for sawlogs or other products those pine-leading stands would be unavailable for harvesting. This assumption is approximately equivalent to a about a 5-year shelf-life for sawlogs or other products as the infestation is projected to peak in 2012. Dead unsalvaged stands were assigned a regeneration delay of 10 years and were considered to grow as natural stands. Harvested pine stands were planted and assigned managed stand yield curves.

(2) Mortality in young pine-leading stands (i.e., stands less than 60 years old) was assumed to occur at a rate varying from 0 percent for stands less than 20 years to 47 percent for stands 50-60 years old. In the model, these young stands that were assumed to be killed had their stand ages set to zero and assigned a regeneration delay of 20 years. This mortality in total accounted for about 969 hectares of young pine stands being killed by the end of the first decade.

(3) To enable increased flexibility for salvaging dead pine stands, the forest cover constraints for visual management were removed for a period of 30 years for pine-leading stands. All other forest cover objectives (e.g., wildlife, community watersheds) were modelled in the analysis.

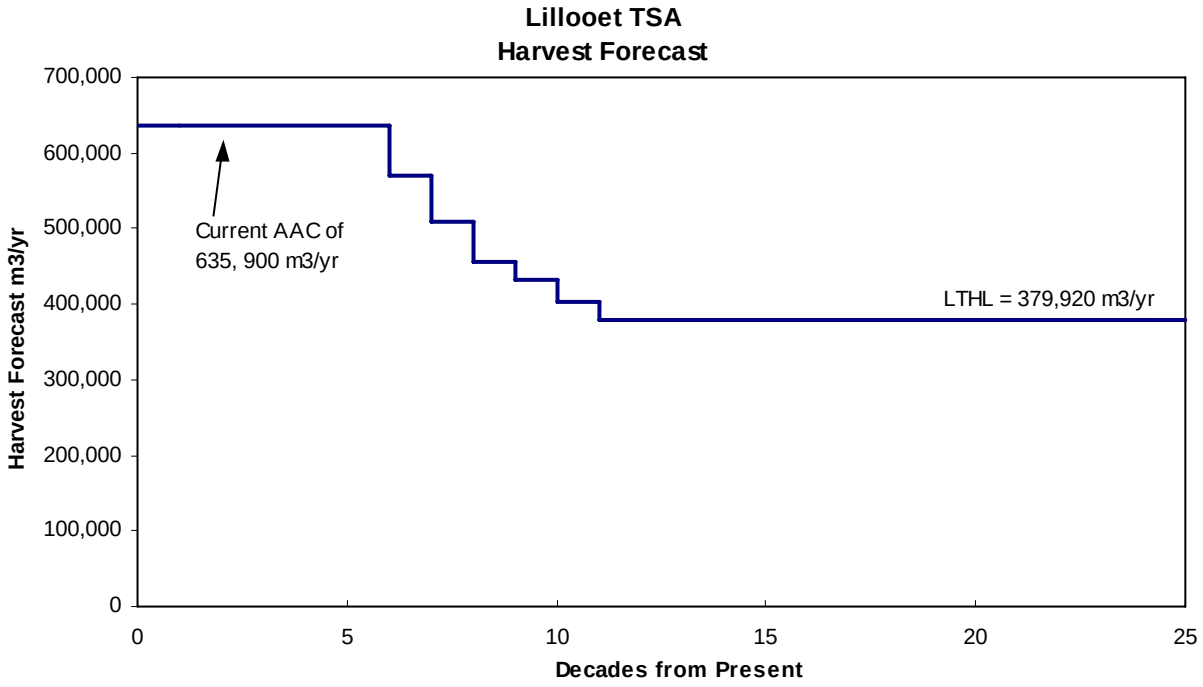
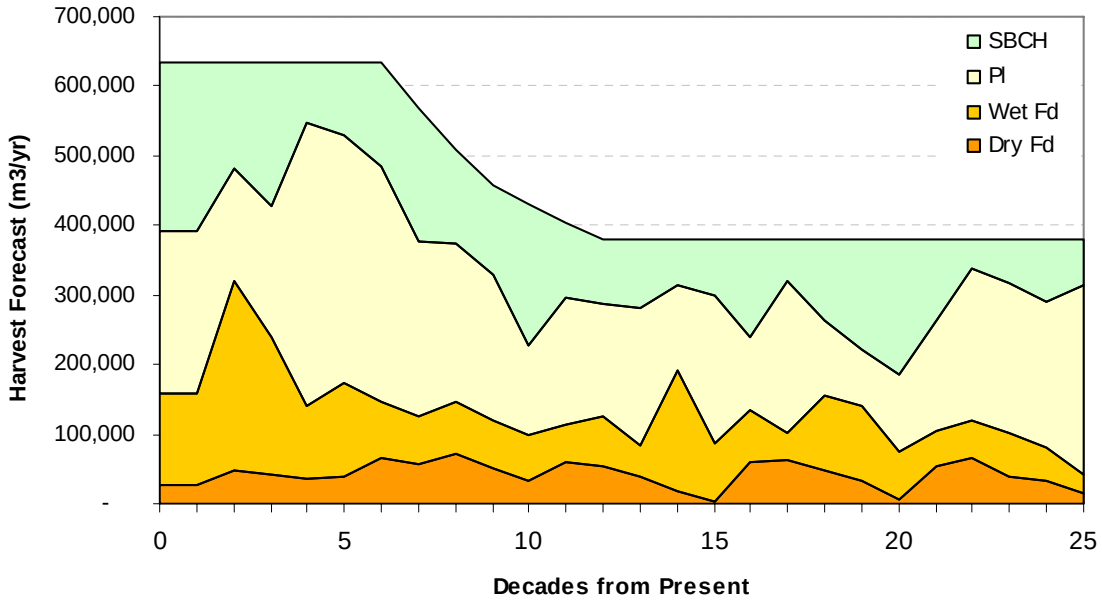


Figure 3. Base case harvest forecast of the Lillooet TSA 2005 timber supply analysis.



SBCH – Spruce Balsam Cedar Hemlock;
Pl – Lodgepole pine;
Wet Fd – Wet Zone Douglas-fir;
Dry Fd – Dry Zone Douglas-fir.

Figure 4. Projected species composition of Lillooet TSA 2005 base case harvest forecast.

Analysis results

Figure 5 shows three potential harvest scenarios based on different assumptions around the harvest of dead pine.

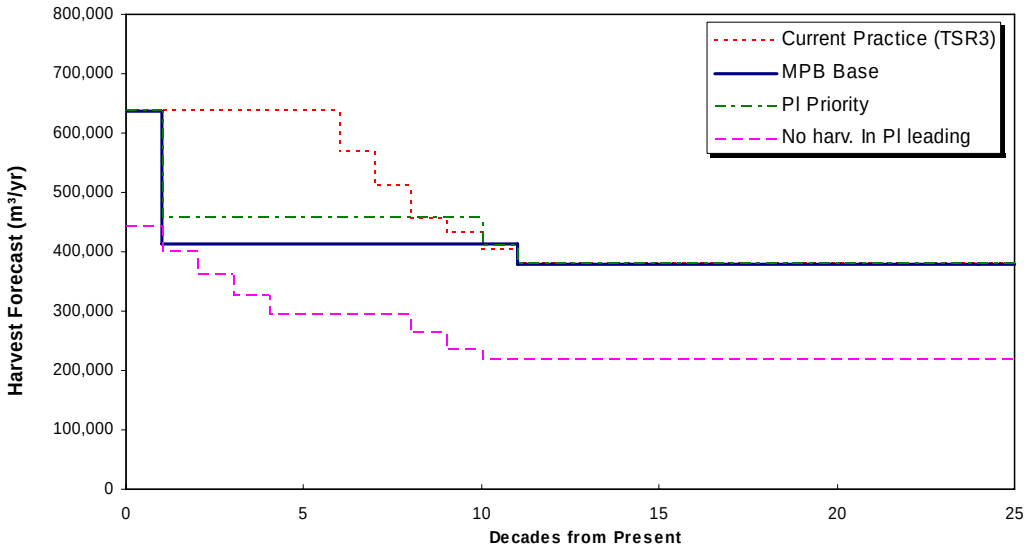
The harvest forecast labeled "MPB Base" reflects the original harvesting assumptions used in the 2005 analysis. In this scenario, stands that are oldest relative to an assigned 'minimum harvestable age' are harvested first. In existing stands the minimum harvestable age was set to 80 years for Douglas-fir and pine-leading stands and 100 years for all other coniferous species.

This scenario projects a harvest level of 635 900 cubic metres per year for one decade followed by a decline of 35 percent to 413 900 cubic metres per year beginning in decade 2. The harvest level further declines to a long-term level of 379 920 cubic metres per year in decade 10.

The MPB base scenario, while enabling significant pine harvest, did not specifically prioritize harvesting in pine-leading stands.

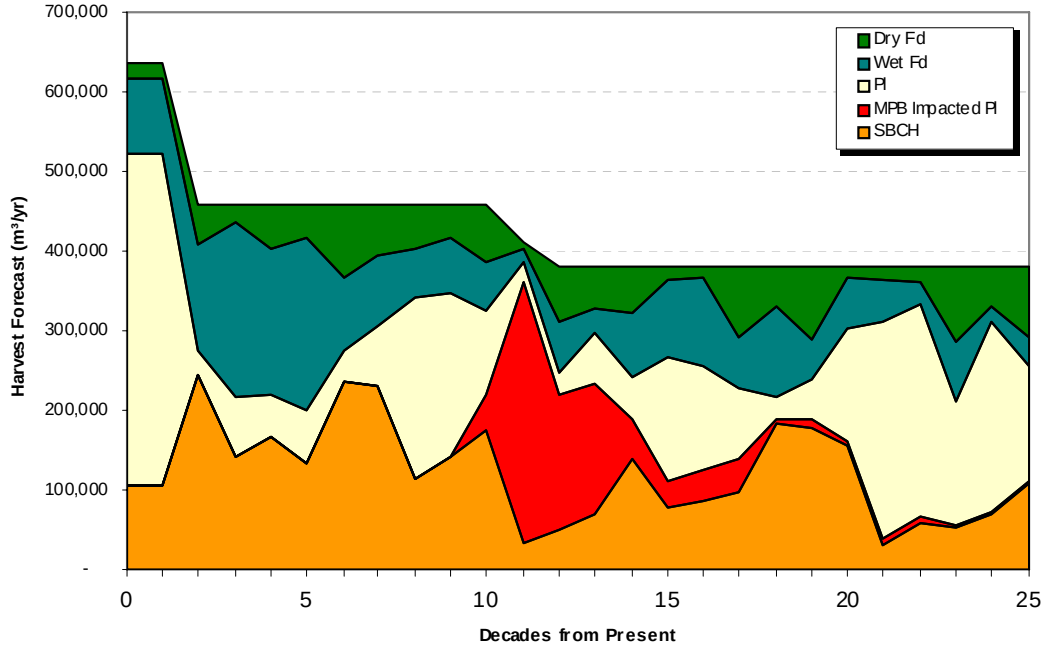
A second scenario (labeled "Pl Priority" in Figure 5) shows that if a harvest priority is assigned to pine-leading stands during the first decade, about 4.3 million cubic metres of pine could be salvaged in the first decade. The focus on harvesting pine in the first decade helps ensure that other species are available for harvest in the mid-term. This scenario resulted in an increase of the mid-term harvest by 11 percent or 45 000 cubic metres per year compared to the MPB base scenario.

To date, there has been relatively limited harvesting of pine-leading stands in the Lillooet TSA. Therefore, in a third scenario, the implications to timber supply of avoiding pine-leading stands was explored. The "No harv. in Pl leading" harvest forecast shown in Figures 5 and 7 projects an initial harvest level of 442 400 cubic metres per year, 30 percent lower than the current AAC. This harvest level declines by 10 percent per decade for the next four decades to a mid-term level of 294 000 cubic metres. The harvest level declines further to a long-term level of 218 900 cubic metres in decade 10. In this scenario, spruce, balsam, cedar and hemlock stands are forecast to contribute over 50 percent to the harvest during the forecast horizon.



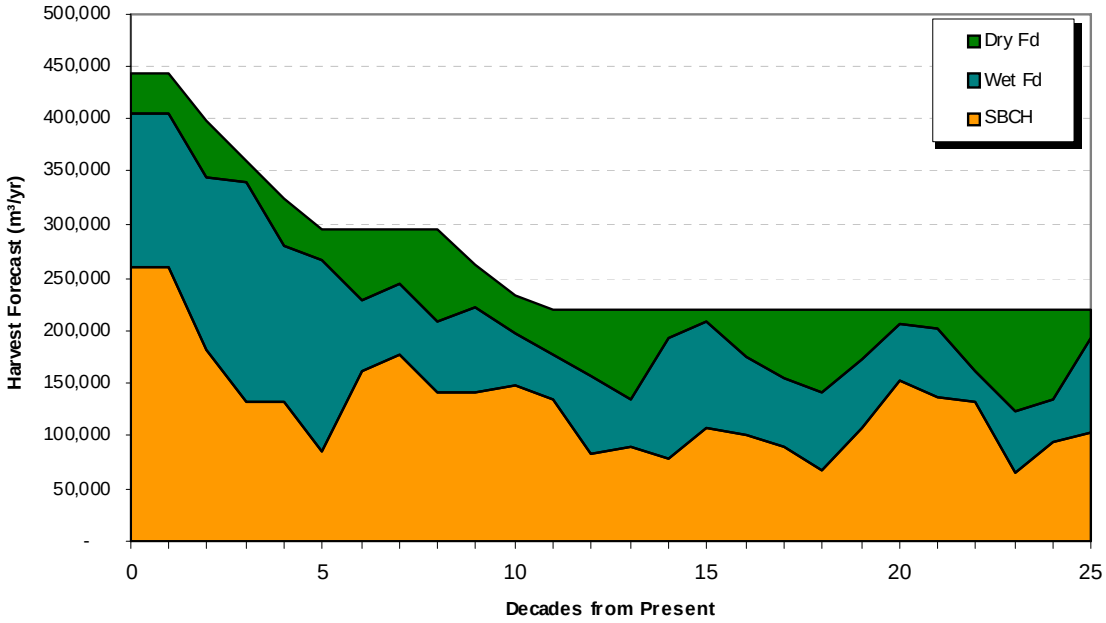
Current Practice (TSR 3) – base analysis;
MPB Base – see text;
Pl Priority;
No harv. In Pl leading – see text.

Figure 5. Harvest flow considering mortality due to mountain pine beetle infestation.



SBCH – Spruce Balsam Cedar Hemlock;
Pl – Lodgepole pine;
Wet Fd – Wet Zone Douglas-fir
Dry Fd – Dry Zone Douglas-fir;
MPB Impacted Pl – Mountain Pine Beetle-impacted lodgepole pine.

Figure 6. Contribution of species groups to the pine-lead priority scenario.



SBCH – Spruce Balsam Cedar Hemlock;
Wet Fd – Wet Zone Douglas-fir;
Dry Fd – Dry Zone Douglas-fir.

Figure 7. Contribution of species groups to the no harvest in Pl-leading scenario.

Objectives and strategies to address the beetle infestation

The Cascades Forest District's strategy to respond to the impacts of the mountain pine beetle epidemic is, with full consideration for non-timber values, to maximize value recovery of dying and dead pine trees across the TSA.

Specific objectives include the following:

- Recovering the highest value from beetle-infested timber before it deteriorates burns, or decays, while respecting other forest values (e.g., timely new tenures offered and new uses for dead pine considered such as for bioenergy).
- Developing new short-term tenure opportunities to help expedite the harvest of mountain pine beetle-infested stands.
- Providing and enhancing First Nations opportunities in conjunction with accommodation agreements.
- Minimizing impacts to the non-pine component of the TSA, while supporting existing facilities such as Ainsworth's veneer plant in Lillooet.
- Proactively addressing other forest health factors in a manner consistent with the District Forest Health Strategy.
- Encourage activities under government's *Forests for Tomorrow* program to help ensure the fastest possible conversion of affected areas to productive forests.

The Cascades Forest District recognizes that implementing the above objectives and strategies is challenging given the operational realities associated with the Lillooet TSA.

Specific challenges include:

- A lack of large local processing facilities (sawmills) for pine.

- The existing Ainsworth veneer plant specifically requires Douglas-fir logs to operate.
- Cost-prohibitive log hauling given that all sawmills are located outside of the Lillooet TSA
- Geographic variables such as steep and difficult terrain which contribute to higher cost to harvesting timber in the Lillooet TSA.
- Poor market conditions; salvage of dead pine is a particularly marginal activity in almost any market condition.

These operational realities affect the ability of the Cascades Forest District to implement mountain pine beetle management objectives and strategies. For example, while one million cubic metres of pine was issued under tenure by the Cascades Forest District in 2007, none of this volume has yet been harvested.

Stewardship issues to be considered due to MPB

It is projected that there will be about 14 million cubic metres of pine mortality in the Lillooet TSA by 2012. Given the harvesting history and the high cost of harvesting operations, it is unlikely that much of the pine volume will be salvaged within the next 10 years. If the AAC remains at the current level, or is increased to allow additional salvage the pine, it is possible that the harvest of the non-pine could also be increased if the AAC is not directed to pine. The harvest history in this TSA, as reported by the harvest billing system, shows that in recent years only about 50 percent of the AAC was being harvested and that pine comprised about 28 percent of the harvest. If future harvesting is similar to the recent past, it is not likely that non-pine species will be over-harvested in the mid term. However, to ensure protection of the non-pine resource, the chief forester has partitioned the AAC in other MPB management units specifying that no more than a certain volume of the harvest can be non-pine. This action ensures that the mid-term timber supply is not compromised by over-harvesting non-pine in the short term, ensuring good stewardship of the forest resource. It also allows the opportunity to maintain, or increase, the harvest of pine to the level of the AAC should this activity be economically feasible in the future for sawlogs or emerging fiber opportunities such as bioenergy. Partitioning also ensures that the chief forester does not need to re-determine the AAC to reflect the entrance of investors pursuing the pine fiber opportunity.

Implications to the TSA

Environmental implications

The impacts of the current mountain pine beetle infestation in the Lillooet TSA will inevitably affect forest values such as wildlife habitat, stream hydrology and visual quality. While some animals will lose habitat, dead trees will provide habitat for other animals.

Trees affect stream flow mainly through evapo-transpiration, shading and interception. Beetle-killed trees cease transpiration and are less effective in providing shade and interception. As a result, the potential hydrological implications need to be considered when planning harvesting in watersheds impacted by the beetle epidemic.

Regardless of the AAC determined by the chief forester, the district will monitor the beetle epidemic, effectiveness of management strategies, and licensee responsiveness to the epidemic, and report the findings periodically to the chief forester.

First Nations implications

There are many First Nation groups asserting traditional territory within the Lillooet TSA. These include members of the St'at'imc, Tsilhqot'in, Nlaka'pamux, and Secwepemc Nations.

There are five First Nation bands residing within the Lillooet TSA that have signed Forest and Range agreements and/or offers with the Ministry of Forests and Range. These agreements and/or offers provide tenure and revenue sharing opportunities for the First Nations.

The Lillooet TSA includes a high number of known archaeological sites. The majority of these sites are situated along rivers although many sites have also been found away from riverine systems.

Archaeological sites are often found as a result of forest harvesting activities. British Columbia's *Heritage Conservation Act* provides for the protection of archaeological sites that predate 1846. The Ministry of Forests and Range and licensees must make appropriate adjustments to forest development plans in consideration of such sites. The timber supply modelling described earlier considered the impacts to timber supply of known archaeological sites.

Areas of current traditional use practices (referred to under the *Forest and Range Practice Act* as Cultural Heritage Resources) are also present within the Lillooet TSA. Like archaeological sites, traditional use sites are also considered during forest development planning. In the base timber supply analysis no specific modelling assumptions were made around traditional use areas and their management. However, for the AAC determination, the chief forester will be presented the information brought forward by First Nations and identified by ministry staff. To date several studies as well as the identification of sacred sites will be considered by the chief forester when he determines a new AAC.

The Ministry of Forests and Range has been consulting with First Nations with respect to this timber supply review and will continue to fulfill its legal obligations to consult in conjunction with the release of this public discussion paper.

Community implications

The implication of changes in the AAC for local communities is an important consideration in the timber supply review. The current AAC for the Lillooet TSA is 635 900 cubic metres. However, the harvest level is significantly less than the allowable cut. High costs associated with timber harvesting and road building, and poor markets limit the economic feasibility of harvesting to the higher-valued Douglas-fir stands.

Given current harvest patterns, it is unlikely that the pine component of the TSA that is expected to be killed by mountain pine beetle over the next decade will be fully harvested. Additionally, this pine component will not be available in the mid-term. Therefore, non-pine forests will provide most of the timber supply in the short- and medium-terms. As such, it will be particularly important to consider partitioning the AAC to limit the harvest of non-pine species during the next decade. The expected mortality of about 14 million cubic metres of pine should provide an opportunity for investment in a facility that uses non-sawlog material.

Your input is needed

Public and First Nations input is a vital part of establishing the allowable annual cut (AAC). Feedback is welcomed on any aspect of this discussion paper or any other issues related to the timber supply review for the Lillooet TSA. Ministry staff would be pleased to answer questions to help you prepare your response.

Please send your comments to the forest district manager at the address below.

Your comments will be accepted until November 3, 2008.

You may identify yourself on the response if you wish. If you do, you are reminded that responses will be subject to the *Freedom of Information and Protection of Privacy Act* and may be made public. If the responses are made public, personal identifiers will be removed before the responses are released.

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Background information regarding TSR

The chief forester's responsibility

Determining the AACs for public forest lands in British Columbia is the responsibility of the province's chief forester. In this lengthy and complex process, the chief forester considers technical reports, analyses and First Nations and public input, as well as government's social and economic objectives.

This responsibility is required by legislation in the *Forest Act*, Section 8. It states that the chief forester shall specifically consider the following factors:

1. The rate of timber production that may be sustained from the area, taking into account:
   - the composition of the forest and its expected rate of growth;
   - the time that it will take the forest to become re-established;
   - silviculture treatments, including reforestation;
   - standards of timber utilization;
   - constraints on the amount of timber that may be produced due to use of the forest for other purposes.
2. The short- and long-term implications to the province of alternative rates of timber harvesting from the area.
3. The economic and social objectives of the Crown for the area, region and province — as expressed by the minister of forests.
4. Abnormal insect or disease infestations, and major salvage programs planned for the timber on the area.

Some of these factors can be measured and analyzed—others cannot. Ultimately, the chief forester's determination is an independent professional judgment based on the best available information. By law, the chief forester is independent of the political process, and is not directed by the minister of forests and range when determining AACs. In these determinations, the chief forester considers relevant information from all sources.