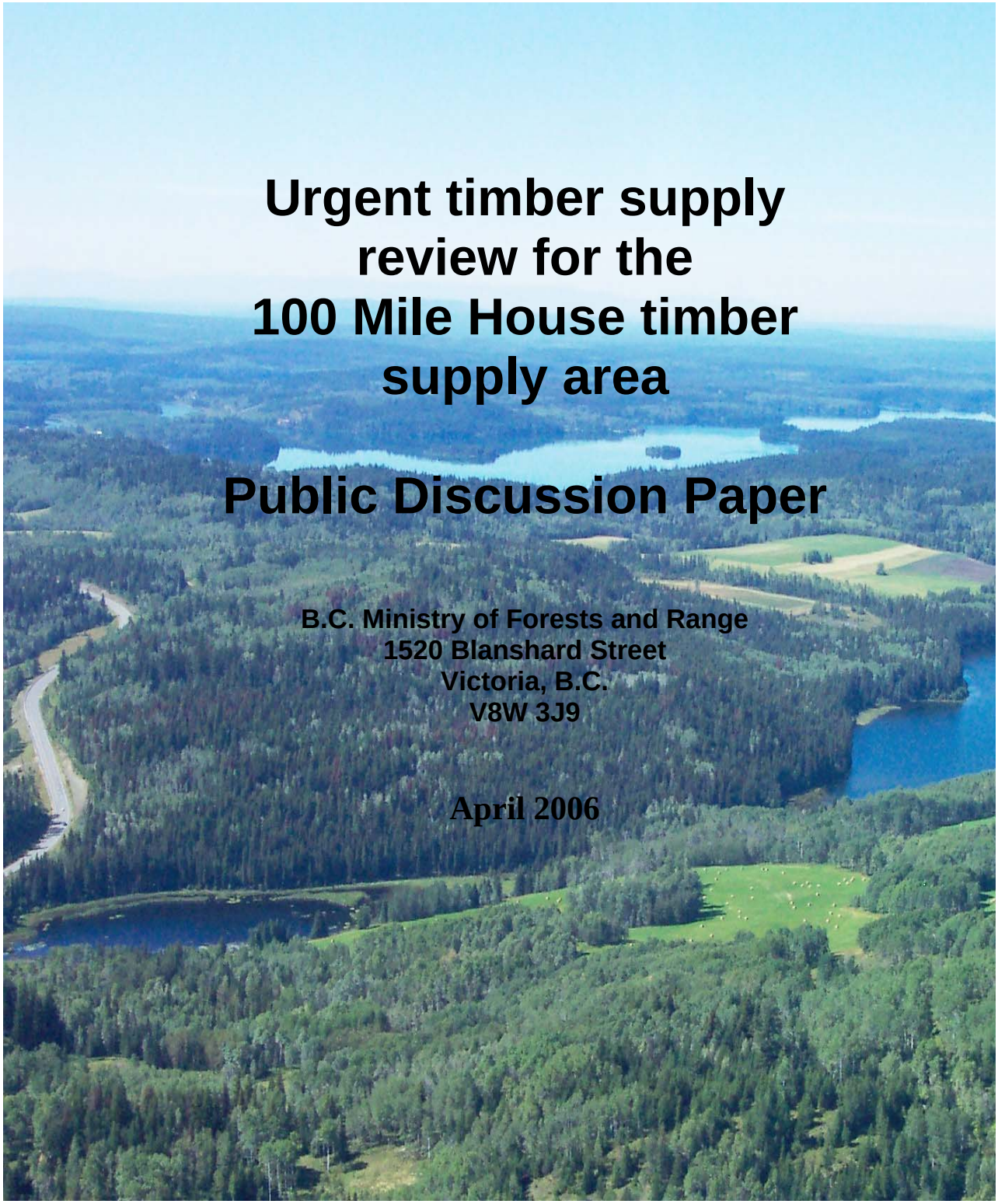
FOREST ANALYSIS AND INVENTORY BRANCH



Urgent timber supply review for the 100 Mile House timber supply area

Public Discussion Paper

B.C. Ministry of Forests and Range
1520 Blanshard Street
Victoria, B.C.
V8W 3J9

April 2006

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 for the 100 Mile House timber supply area, examines the impacts of current forest management practices on the timber supply, the current mountain pine beetle epidemic, economy, environment and social conditions of the local area and the province. Based on this review, if necessary, the chief forester will determine a new allowable annual cut (AAC) for the 100 Mile House timber supply area.

By law, the chief forester must review and set new allowable annual cuts for all 37 timber supply areas and 34 tree farm licences 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 abnormal situations such as damage from severe wildfires or catastrophic insect infestations.

The objectives of the timber supply review are to:

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

Urgent timber supply review in the 100 Mile House timber supply area

Mountain pine beetles (MPBs) are the most damaging insect that attack lodgepole pine in Western Canada. Beetles attack pine trees by laying eggs under the bark. When the eggs hatch, the larvae mine the phloem area 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 fungi 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 an unprecedented level in British Columbia's recorded history. Provincial aerial survey data shows the beetle had affected about 8.7 million hectares of British Columbia's Interior in 2005. This includes areas with light or trace mortality, with moderate mortality and with severe mortality.

The Ministry of Forests and Range estimates that the peak in the number of trees killed occurred during the summer of 2005 when about 139 million cubic metres of timber were affected. Mortality projections suggest that the epidemic could last at least 10 more years and under current conditions has the potential to kill more than 80% of the merchantable pine in the province's Interior.

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 Area (TSA)
An integrated resource management unit established in accordance with Section 7 of the Forest Act.

Tree Farm Licence (TFL)
Provides rights to harvest timber and outlines responsibilities for forest management in a particular area.

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

The forests of the 100 Mile House timber supply area are very diverse, however, lodgepole pine and Douglas-fir are the dominant species. Lodgepole pine represents approximately 55% of the total volume within the timber harvesting land base. In 2001, 1,178 hectares of timber had been mapped as experiencing either light, moderate or severe red attack as a result of the mountain pine beetle infestation. By 2002, this had expanded to 15,544 hectares and by 2004 and 2005, more than 600,000 hectares of red attack was being mapped each year. To date, the epidemic in the 100 Mile House timber supply area has killed the equivalent of 10 years of harvest.

While the mountain pine beetle has impacted a significant portion of the timber supply area, and the area impacted continues to expand rapidly, intervention may help to mitigate the economic and environmental impacts. For this reason, the chief forester is considering an urgent review of the timber supply and allowable annual cut in the 100 Mile House timber supply area.

The objectives of this document are to provide British Columbians with an overview of the timber supply review process and harvest level forecasts for the 100 Mile House timber supply area and to encourage them to provide comments.

Public comments will be accepted for 60 days, until June 7, 2006.

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

Description of the 100 Mile House timber supply area

The 100 Mile House timber supply area is located in south-central British Columbia and covers approximately 1.23 million hectares of the Southern Interior Forest Region. It is administered by the 100 Mile House Forest District.

The timber supply area is bounded on the west by the Fraser River, on the east by the Cariboo Mountains and Wells Grey Provincial Park, on the north by the Williams Lake timber supply area and on the south by the Kamloops timber supply area.

A 2004 community profile showed that the population of the South Cariboo region has dropped slightly from about 16,000 in 1991 to about 14,700 in 2001. The main communities are 100 Mile House (including 108 Mile Ranch) and Clinton, and smaller communities include Lac la Hache, Forest Grove, 70 Mile House, Lone Butte and Bridge Lake. The population is very dispersed throughout the timber supply area with many small rural settlements.

Land-use planning

The Cariboo-Chilcotin Land Use Plan (CCLUP) was approved by government in October 1994 and included five new parks in the 100 Mile House timber supply area. In March 1995, the 90-day implementation process report was released and, effective January 31, 1996, the targets and strategies relating to operational planning were declared as higher level plan direction under the Forest Practices Code.

An on-going sub-regional planning process covering the entire 100 Mile House TSA will further refine the implementation of the CCLUP targets and provide additional direction to operational planning.

The natural resources

The forests of the 100 Mile House timber supply area provide a wide range of natural resources, including forest products (timber and non-timber such as botanical products), water, fish and wildlife habitat, recreation and tourism. The grasslands and open forests provide forage for the beef cattle ranching industry, as well as critical wildlife habitat.

The topography of the timber supply area is characterized by gently rolling hills throughout most of the area, with higher mountains in the Marble Range to the southwest and the Quesnel Highlands to the northeast. The western part along the Fraser River has a hot, dry climate, while the Cariboo Mountains in the east have a wetter climate and steep slopes. The central portion is a relatively high-elevation Interior plateau that is dry and flat.

Within the land base considered available for timber harvesting, lodgepole pine is the dominant species, while Douglas-fir, spruce, subalpine fir, Ponderosa pine, western red cedar, western hemlock and hardwoods also occur. About 75 per cent of stands in the timber harvesting land base are at or above the minimum harvestable age*, with an abundance of stands 100 to 120 years old and very few stands older than 250 years. Currently, about 83 per cent of productive forest, or 60 per cent of the total timber supply area land base, is considered available for harvesting under current management practices.

The forests and landscapes of the 100 Mile House timber supply area are home to a wide variety of wildlife, including mule deer, moose, eastern caribou, bear, lynx, marten and owls, as well as many fish species. The *Forest and Range Practices Act* outlines a process for identifying species at risk and designating wildlife habitat areas with specific management practices. Currently, 14 species identified as at risk may be found in the 100 Mile House Forest TSA, including grizzly bear, prairie falcon and bighorn sheep.

There is currently one community watershed within the 100 Mile House timber supply area; the Clinton Creek Community watershed is located northwest of Clinton.

Residents and visitors make extensive recreational use of the forests, parks and the many lakes located within the timber supply area; activities include hiking, fishing, hunting, mountain biking, backcountry recreation, wildlife viewing, snowmobiling and cross-country skiing. The area has a high road density, which provides easy access to many of the recreational opportunities identified above. Highway 97, a major route to north-central British Columbia, runs through the middle of the timber supply area.

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. In the 100 Mile House timber supply area, about 18 per cent of the productive forest land is not considered available for timber harvesting and will provide for additional environmental values.

Forested areas both inside and outside the timber harvesting land base will help to maintain critical forest habitats for many species. Forest cover requirements for biodiversity, visual quality, community watersheds, recreation features, riparian management, and protection of unstable terrain were included in the analysis.

Minimum harvestable age
The age at which a stand of trees is expected to achieve a merchantable condition. The minimum harvestable age could be defined based on maximize average productivity (culmination of mean annual increment), minimum stand volume, or product objectives (usually related to average tree diameter).

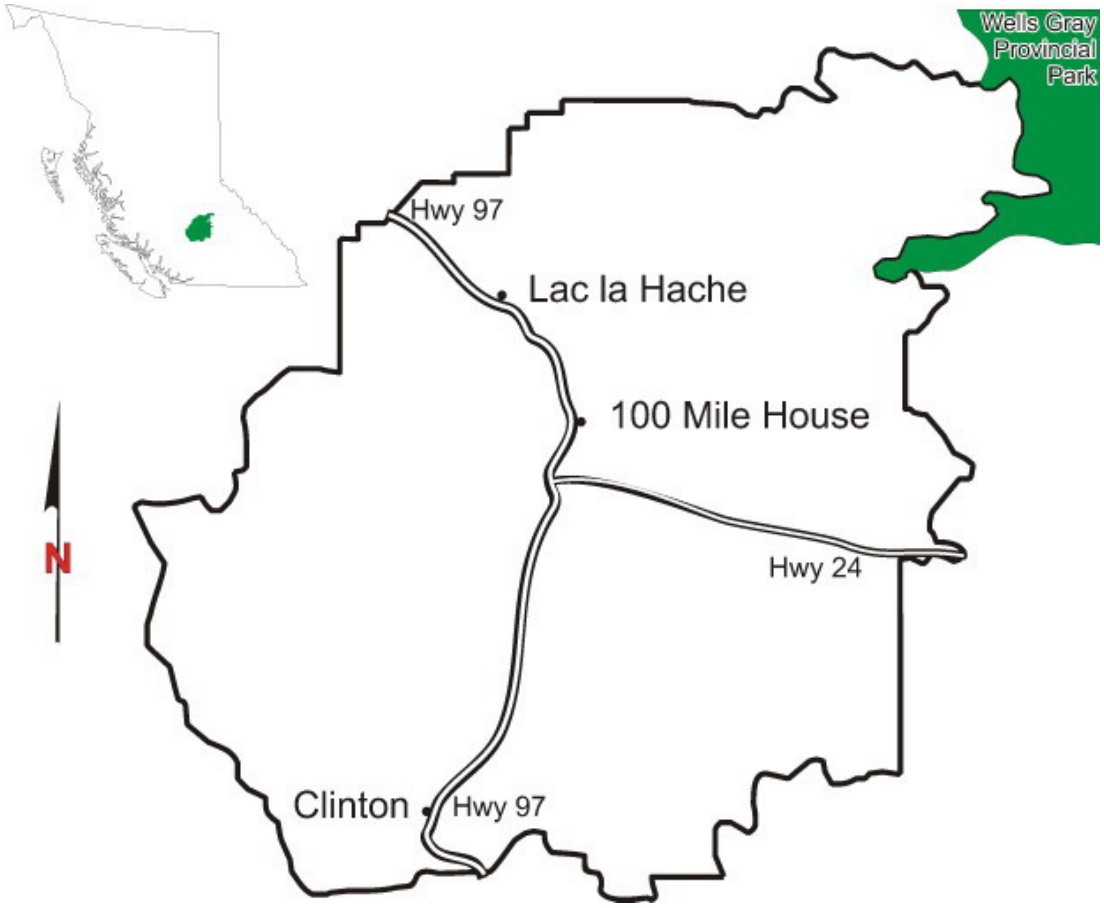


Figure 1. Map of the 100 Mile House timber supply area.

Regional economy

The 100 Mile House timber supply area is in the South Cariboo region where the economy depends primarily on forestry, tourism, agriculture, and small business employers. A 2004 community profile indicates the forest sector supports approximately 30 per cent of the total employment in the region. In addition to harvesting and mills, there are value-added industries including production of log houses (with a shift from spruce to pine), doors and windows, modular homes, cottage kits and timber frames construction. Tourism is a well-established and fast-growing four-season economic activity.

The forest sector supports numerous other jobs in the area through companies and employees purchasing goods and services from local businesses. Each 100 full-time direct forestry job in the timber supply area is estimated to support another 44 jobs, depending on the forestry activity (harvesting or timber processing).

Current annual cut

In January 2002, the chief forester established an allowable annual cut in the 100 Mile House timber supply area of 1.334 million cubic metres. This included 112,000 cubic metres from lower-quality timber under a 25-year, non-replaceable forest tenure called Pulpwood Agreement 16, which expires in 2015, and excludes the harvest associated with woodlot licences.

Innovative Forestry Practices Agreement

In 1997, Lignum Limited (subsequently acquired by Tolko Industries Ltd.) entered into an Innovative Forestry Practices Agreement (IFPA) with government, and a forestry plan associated with the agreement was approved in 2000. The forestry plan outlines the innovative forestry practices to be undertaken in the area covered by the agreement. Once a forestry plan is approved, the holder of the agreement may make a request to the Forest Service regional executive director that the allowable annual cut associated with their licences be increased based on the innovative forestry practices. The process for reviewing harvest levels for licences linked to an IFPA is not part of the timber supply review process.

Timber supply analysis and forecasts

Taking a different approach

Traditionally, several timber supply forecasts would be provided for the 100 Mile House timber supply area spanning the next 250 years. This approach assumes a good understanding of the forest and how it will respond to harvesting. It would offer reasonable estimates of future timber supply based on careful observation of the past. This understanding of the forest has been severely challenged by the current mountain pine beetle epidemic that is historically unprecedented in scope and severity.

There are many uncertainties regarding the mountain pine beetle epidemic. It is unknown whether the epidemic will consume all the mature lodgepole pine in the TSA and how far down the age profile it will reach. Originally it was thought that the beetles attacked only mature lodgepole pine stands, however, they have been observed in stands as young as 35 years. It is also hard to predict how fast surviving trees will grow, how susceptible they will be to windthrow, how long it will take regeneration to become established under an over storey of dead trees, and how long dead trees will retain commercial value.

Given these and other large uncertainties, a different approach to assessing timber supply has been designed as an interim measure to provide timely, yet considered, allowable annual cut decisions in timber supply areas impacted by the mountain pine beetle. The first 20 years have been modelled in greater detail than in previous Ministry of Forests and Range analyses. The projected spread of the mountain pine beetle, shelf life and harvesting were tracked at the stand level on an annual basis. Exploration of the mid-term was more general and analysis was limited to those stands already planted or naturally regenerated today.

The long term (80 years and more into the future) was not specifically considered as it would unlikely impact decisions about the amount of pine to salvage over the next 5 years. This removed the need to speculate on the establishment and growth of regeneration under varying amounts of residual overstorey.

Further, unlike traditional analyses, no base case is presented. Instead a number of possible scenarios are presented that the chief forester will consider along with many other sources of information when setting the allowable annual cut. These scenarios demonstrate:

1. over the next twenty years, mountain pine beetle is projected to have a bigger impact on the landscape than harvesting;
2. significant consideration needs to be given to how the existing AAC is deployed;
3. mid-term harvest levels are highly uncertain but will likely be significantly below the current AAC;
4. protecting mid-term timber supply requires that some dead pine in mixed species stands not to be harvested;
5. increased harvest levels can salvage significantly more timber without compromising the mid-term, provided that the entire cut is directed at pine-dominated stands; and
6. within twenty years, harvest opportunities within the TSA will decrease significantly.

Major assumptions

Assumptions common to most of the scenarios presented in this public discussion paper are discussed in the sections that follow.

Projection of the beetle epidemic

All the scenarios presented in this public discussion paper assume the mountain pine beetle epidemic will continue unabated for the foreseeable future. Eighty-three per cent of the pine thought old enough to overwinter a mountain pine beetle brood is projected to die before 2026. Like all provincial modelling to date, that age was assumed to be greater than 60 years old.

The epidemic was projected using a computer model (BCMPBv2) developed by scientists in the British Columbia Forest Service, the Canadian Forest Service and consultants. The computer model was calibrated using provincial infestation maps from 1999 to 2004. Subsequent to the 100 Mile House timber supply analysis, the mountain beetle projections have been refined using 2005 pest aerial overview data. These subsequent projections show a much faster progression of the epidemic, however the total amount of pine killed remained essentially unchanged.

Shelf life

A major assumption impacting the efficacy of any salvage program is the shelf life of the dead lodgepole pine, or the length of time it will remain commercially viable. After that period the dead pine is considered a non-recovered loss (NRL). Although research studies are underway, no definitive studies about shelf life specific to mountain pine beetle in British Columbia are complete. In light of this, two estimates of shelf life were assumed in the forecasts presented in this public discussion paper — both are based on the wet, moist and dry ecosystems across the 100 Mile House timber harvesting land base as portrayed in Figure 2. The first assumed shelf lives for sawlogs to be three, five and 10 years; the second assumed six, eight and 13 years — with the longest shelf life in the driest ecosystems.

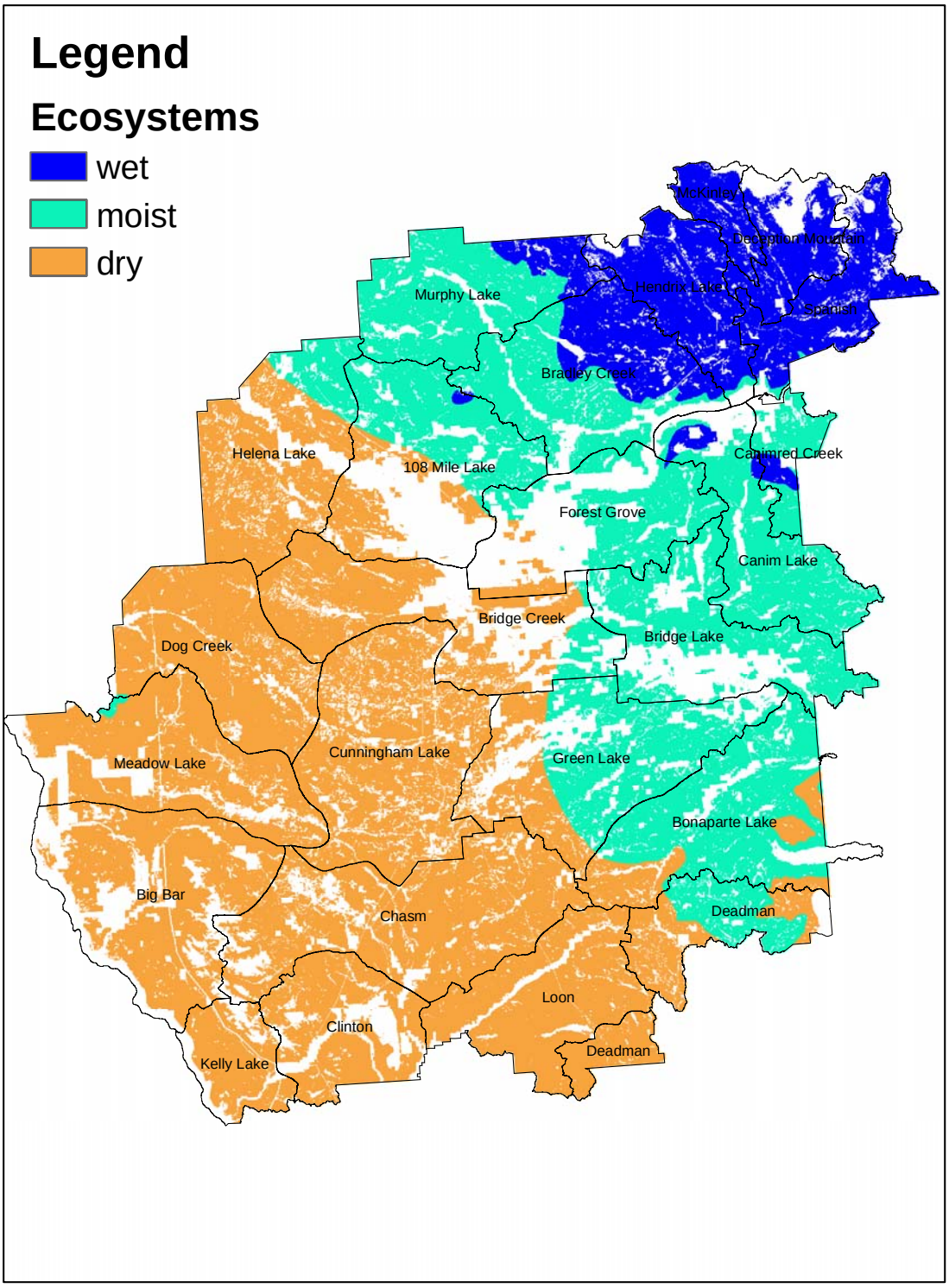


Figure 2. Landscape unit boundaries and the distribution of wet, moist and dry ecosystems across the 100 Mile House TSA.

Timber harvesting land base and inventory

The TSR 2 timber harvesting land base, with an updated inventory depleted for recent harvesting, formed the basis of the detailed 20-year timber supply forecasts.

Management for non-timber objectives

Since TSR 2, the location of old-growth management areas (OGMAs) within the 100 Mile House timber supply area have been delineated. The forecasts presented reflect the removal of OGMAs from the timber harvesting land base. Consistent with the 100 Mile House Sustainable Resource Management Plan, in addition to the spatially defined non-timber management emphasis areas portrayed in Figure 3, green-up and the mature biodiversity emphasis objectives were modelled.

Minimum harvest volumes

Consistent with TSR 2, all scenarios assumed a stand required at least 65 cubic metres per hectare of merchantable volume to be considered a candidate for harvest. However, none of scenarios presented resulted in stands with just 65 cubic metres per hectare being harvested.

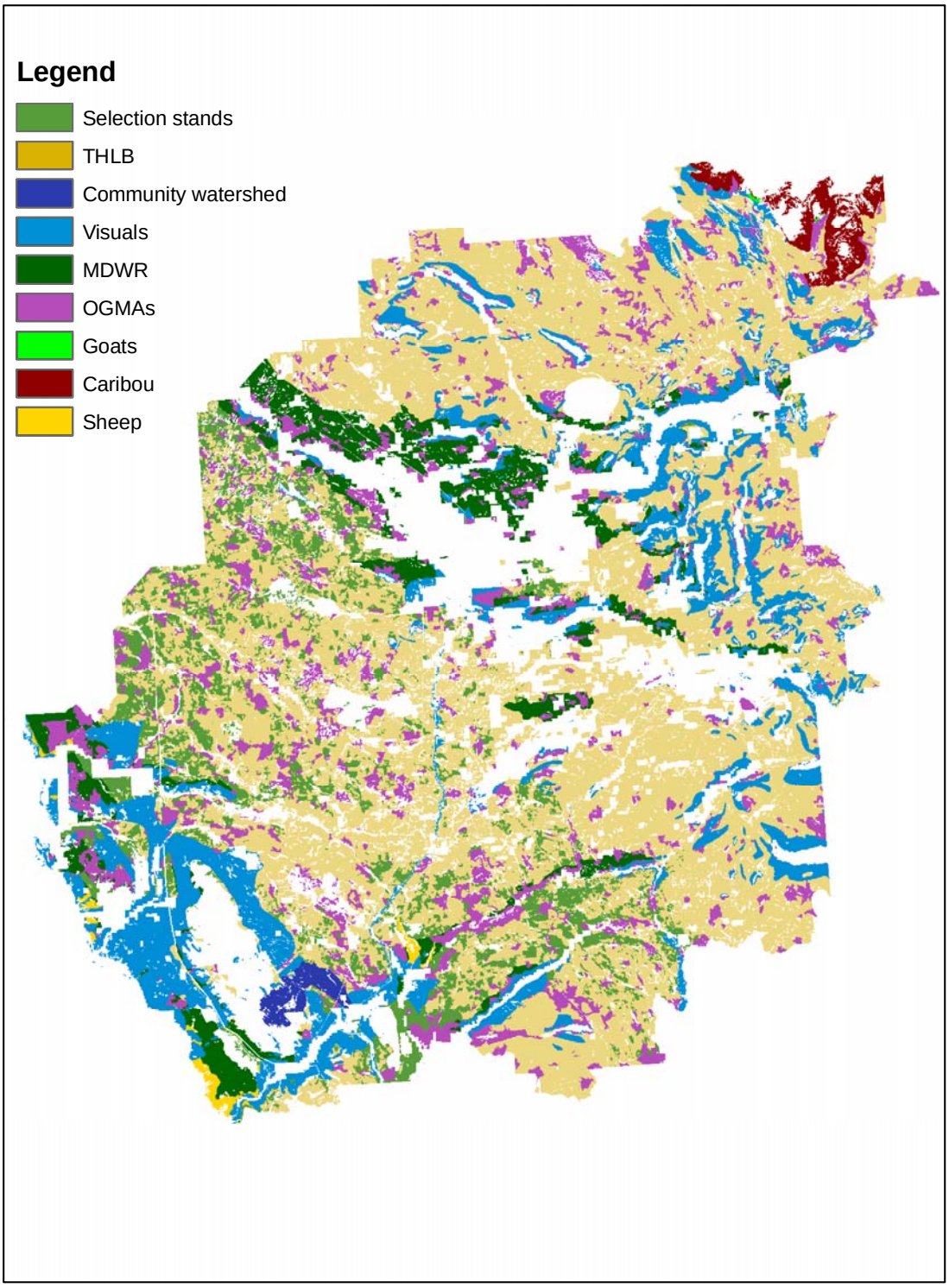


Figure 3. The location of the timber harvesting land base, selection harvesting and areas managed with a non-timber emphasis (e.g., mule deer winter range and visuals) across the 100 Mile House TSA.

Analysis results

Scale of the infestation and deployment of the current AAC

To date, the epidemic in the 100 Mile House TSA has killed the equivalent of 10 years of harvest. Over the next 20 years, the mountain pine beetle will have a bigger impact on the landscape than harvesting. Three scenarios were modelled to demonstrate this.

- Scenario A: assume no losses to mountain pine beetle and no harvesting for the next 20 years.
- Scenario B: assume no losses to mountain pine beetle and continue harvesting the current AAC for the next 20 years.
- Scenario C: assume the mountain pine beetle epidemic continues unabated, but no harvesting for the next 20 years.

The projected mature growing stock* for each scenario in 2026 is presented in Figure 4. Mature growing stock is defined as the merchantable volume of stands at least 80 years old.

Assuming a continuation of the current AAC, harvesting is expected to reduce mature growing stock by 27.5 million cubic metres or 30% by 2026. Mountain pine beetle alone is expected to reduce the live standing inventory by 40 million cubic metres or 44% by 2026. The total reduction in mature growing stock will depend on to what extent harvesting and beetle activity overlap. The greater the overlap — the greater the mature growing stock in 2026 — the greater the mid-term. The results of three scenarios presented in Figure 5 demonstrate this clearly.

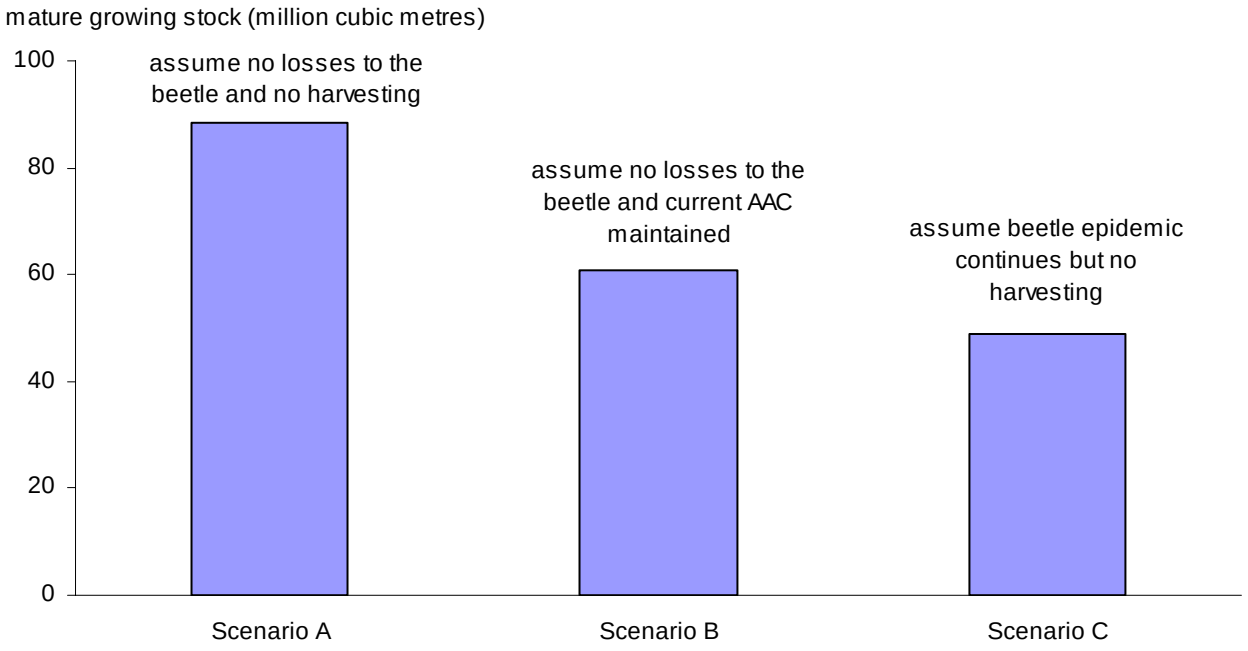


Figure 4. The projected impacts of mountain pine beetle versus harvesting on mature growing stock in 2026.

Growing stock
The volume estimate for all standing timber at a particular time.

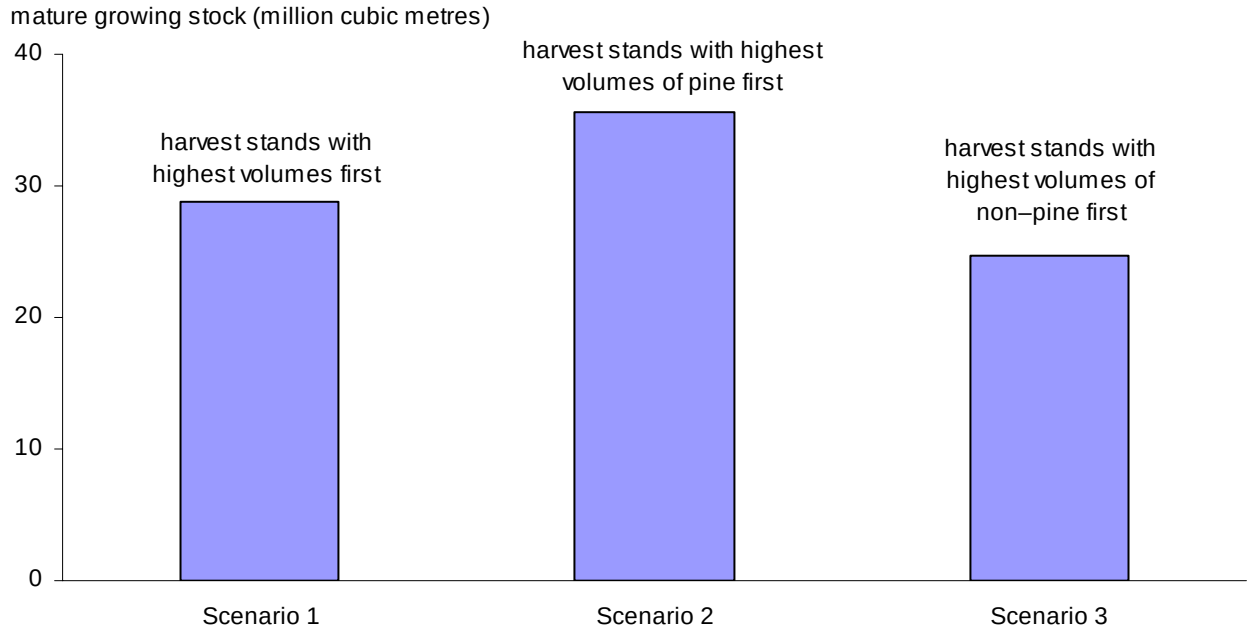


Figure 5. Estimated growing stock in 2026 assuming three different harvest priorities and continued harvesting at the current AAC for the next 20 years.

In these scenarios a continuation of the current AAC for the next 20 years was assumed. Three, five and 10-year sawlog shelf life numbers were assumed for wet, moist and dry ecosystems respectively. The first scenario, which assumed stands with the highest volume regardless of species composition would be harvested first, was meant to approximate traditional harvest strategies. The second scenario assumed stands with the highest pine volumes would be harvested first thereby hopefully maximizing the overlap between harvesting and beetle activity. The third scenario, which assumed stands with the highest volumes of non-pine would be harvested first, is meant to demonstrate the impact of avoiding beetle killed stands.

The most mature growing stock, 35.6 million cubic metres, was retained by first harvesting those stands with the highest volumes of pine — scenario 2 (see Figure 5). Scenario 1, which prioritized stands for harvest on the basis of highest volume regardless of species composition, resulted in a 19% reduction in mature growing stock by 2026 relative to scenario 2. Scenario 3, where harvest was directed to stands dominated by species other than pine, resulted in a 31% reduction in growing stock by 2026 relative to scenario 2.

While scenario 2 — chasing pine — appears to protect the mid-term the best, it may prove difficult to implement. Correct implementation requires the characteristics a stand being considered for harvest to be compared to all other stands of merchantable age across the 100 Mile House timber harvesting land base. A simpler strategy that captures the intent of scenario 2 is presented in subsequent sections.

In summary — how stands are prioritized for harvest has a significant impact on mid-term timber supply regardless of whether the AAC is increased.

Mid-term timber supply

Under any of the above scenarios, if the current allowable annual cut was maintained beyond 2025, the projected growing stock that could be economically harvested would likely be exhausted before the middle of the century. The harvest beyond 2045 would depend on a combination of stands less than 60 years old today and the continued partial cutting of Douglas-fir stands.

It is estimated that between 2046 and 2055, stands that are less than 60 years old today would contribute a maximum of 500,000 cubic metres per year. Their contribution is estimated to steadily increase in the decades that follow. By 2066, these stands may contribute an estimated 820,000 cubic metres per year. However, these estimates are maximums as approximately half of the volume in these stands is lodgepole pine. Both industry and ministry staff have reported significant mountain pine beetle attack in 50-year–old stands within the timber supply area.

In summary — assuming the mountain pine beetle epidemic continues, to avoid a more than 60% potential reduction in harvest level by 2046, within 20 years harvest levels will have to fall below the existing AAC.

Some dead pine will not be salvaged

By 2026, 40 million cubic metres or 83% of the pine assumed susceptible to mountain pine beetle is projected to be killed across the timber harvesting land base. Thirty-six million cubic metres are projected to be killed by 2015. Sixty per cent of the projected kill is expected to occur in moist to wet ecosystems where a relatively short shelf life for sawlogs from dead trees is assumed.

Assuming 100% salvage via selection harvesting, the projected death by 2015 implies a harvest level of more than 3 million cubic metres per year maintained for at least a decade. However, this would require a radical change in harvest practices by licensees. Most of the pine in 100 Mile House timber supply area occurs in mixed species stands. Traditionally, selection harvesting has been limited to stands on drier sites dominated by Douglas-fir and clearcutting has been practiced on other sites. TSR 2 assumed selection harvesting contributed approximately 10% of the total harvest.

Where stands have enough non-pine volume to provide an economic mid-term harvest opportunity, it would be desirable to forego salvage of dead pine, if clearcutting is the likely harvest method. On average, a stand with 40% or less susceptible pine would currently have 161 cubic metres per hectare of volume from other species (see Table 1). By 2026, this may equate to 190 cubic metres per hectare. In light of the projected losses to mountain pine beetle across the timber supply area, such stands should be retained for the mid-term and the pine content in these stands should be written off.

Conversely, stands with more than 70% susceptible pine currently average less than 13 cubic metres per hectare of volume from other species (see Table 1). The anomalous volume of 13 cubic metres per hectare of non-pine comes from the fact that most of the stands in this class were at least 90% pine. It would make sense to harvest these stands over the next decade because the non-pine component would not provide a mid-term harvest opportunity.

Those stands in the middle class — “40-69% pine” — should exceed 100 cubic metres per hectare by 2026 and may or may not provide a future economic harvest opportunity.

Table 1. The composition of stands within the 100 Mile TSA timber harvesting land base that have some component of susceptible pine. (Note: Totals may not agree due to rounding).

Pine content (%)	Average non-pine volume (cubic metres/ha)	Timber harvesting land base area (x1000 ha)	Standing volume — all species (x 1,000,000 cubic metres)
1-39	161	82.3	16.7
40-69	87	83.6	16.0
70-100	13	193.3	38.0
Total		359.1	70.8

In summary — limiting harvest over the next decade to stands with at 1east 70% pine content would accommodate a substantial uplift with no change in harvest practices and without unduly compromising the mid-term.

Potential harvest levels for practical salvage strategy

Based on Table 1, a practical strategy for the 100 Mile House timber supply area that captures the intent of scenario 2 would be to limit harvesting over the next decade to stands with at least 70% pine. As previously mentioned, by the end of 2015, 36 million cubic metres of pine is projected to be killed across the timber harvesting land base. This strategy would allow up to 26 million cubic metres of the dead pine to be potentially harvested by the end of 2015. The other 10 million of dead pine would be sacrificed to protect the mid-term.

The strategy would seek to harvest as much timber as possible during the next decade from stands with at least 70% pine while respecting the 100 Mile House Sustainable Resource Management Plan. It was assumed harvest levels would have to drop below the existing AAC during the second decade to ration out the remaining economically viable stands until managed stands achieve a merchantable age. With that in mind, a harvest rate of one million cubic metres per year was chosen for the second decade (2016-2025). A higher harvest rate during the second decade was physically possible but at the expense of the mid-term. It was assumed there would be no need to restrict harvesting during the second decade to stands with at least 70% pine. During both the first and second decades it was assumed traditional economic behaviour would continue and licensees would favour those stands with the highest merchantable volumes regardless of species composition.

Three harvest forecasts — scenarios 4, 5 and 6 — are presented in Figure 6. Scenario 4 assumed it would be desirable to provide an uplift that could be sustained for 10 years and sawlog shelf lives of 3, 5 and 10 years were assumed for wet, moist and dry ecosystems respectively. Scenario 4 projected an elevated harvest level of 1.87 million cubic metres per year between 2006 and 2010. The 10 year harvest level for scenario 4 was limited by the amount that could be harvested between 2013 and 2015. Increasing the sawlog shelf life figures to 6, 8 and 13 years for wet, moist and dry ecosystems respectively — scenario 5 — increased the 10 year harvest projection to 2.1 million cubic metres per year (see Figure 6).

Scenarios 4 and 5 demonstrate that by setting a harvest level for 10 years, some attacked stands will become economically non-viable before they can be harvested. A solution to this problem is to harvest at a higher rate during the first five years than the second — scenario 6. Scenario 6 assumed sawlog shelf life figures of 3, 5 and 10 years for wet, moist and dry ecosystems respectively. Harvest levels of 2.6 million cubic metres per year are forecast between 2006 and 2010 followed by harvest levels of 1.6 million cubic metres per year between 2011 and 2016 (see Figure 6).

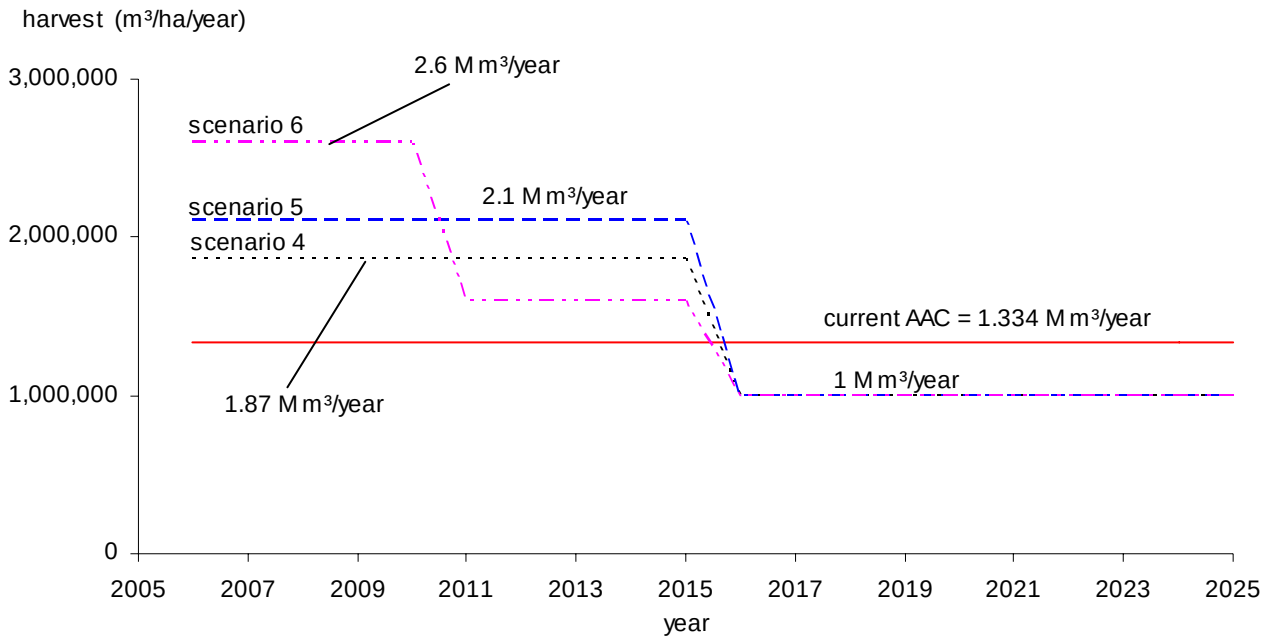


Figure 6. Possible harvest options during the next decade 2006-2015, assuming harvesting is limited to stands with at least 70% pine.

The total amount of pine salvaged during the next ten years for scenarios 1 through 6 are presented in Table 2.

Table 2: Volume of pine salvaged between 2006 and 2015, and the merchantable growing stock in 2026 for scenarios 1 through 6.

Scenario	Description / assumptions	Volume of pine salvaged (2006-2015) (million cubic metres)	Merchantable growing stock in 2026 (million cubic metres)
1	deploy current AAC harvesting stands with highest volumes first	7.4	18
2	deploy current AAC harvesting stands with highest volumes of pine first	12.5	25.9
3	deploy current AAC harvesting stands with highest volumes of non-pine first	5.2	14.6
4	cut 1.87 million annually for 10 years from stands with at least 70% pine	17.4	22.6
5	same as scenario 4 but assumed long sawlog shelf life figures	19.7	22.8
6	harvest 2.6 million annually for 5 years followed by 1.6 million annually for 5 years from stands with at least 70% pine	19.6	22.4

Those stands that contribute to merchantable growing stock are assumed to be at least 80 years old with merchantable volumes of 150 cubic metres per hectare or more in 2026.

Table 2 shows scenarios 4, 5, and 6 salvage at least 4.9 million cubic metres more pine over the next decade than deploying the existing AAC to the best advantage — scenario 2. Scenarios 5 and 6 salvage essentially the same amount of pine. Given 26 million cubic metres could be theoretically salvaged from this group, the salvage efficiency of scenarios 4, 5 and 6 ranged between 67 and 76%.

Table 2 also presents how much merchantable growing stock will remain in 2026 for scenarios 1 through 6. Given recent harvesting in the TSA has averaged 200 cubic metres per hectare, harvesting extensively in stands with only 65 cubic metres per hectare (the TSR 2 minimum) may not be practicable. For this reason, merchantable growing stock was only reported in Table 2 for stands at least 80 or more years old with at least 150 cubic metres per hectare of live volume in 2026.

Relative to scenario 4 (maintaining the one elevated harvest level for the entire decade) an additional 2.2 million cubic metres of pine can be salvaged by elevating the harvest for the first five years more than the second with negligible impact to the amount of merchantable growing stock that will be retained for harvest in the mid-term.

Interestingly, scenarios 4, 5 and 6 result in less growing stock in 2026 than scenario 2 (use the existing AAC to chase pine for the entire 20 years). The reason is illustrated in Figure 7, which depicts the total, pine and non-pine harvest for scenario 4 . The trends portrayed in Figure 7 for scenario 4 are quite similar to those for scenarios 5 and 6. Once the restriction of harvesting stands with at least 70% pine was removed in 2016, the modelled harvest switches from pine-dominated stands to stands dominated by other species. This abrupt change is portrayed in a map in Figure 8, from 2016 harvesting becomes concentrated in the north east. Under scenario 4, between 2016 and 2025 the amount of sawlog NRL is projected to increase by 8.8 million cubic metres. This increase in NRL and Figures 7 and 8 provide a strong argument for directing the harvest to pine-dominated stands beyond 2015, if economically feasible, to safeguard the mid-term.

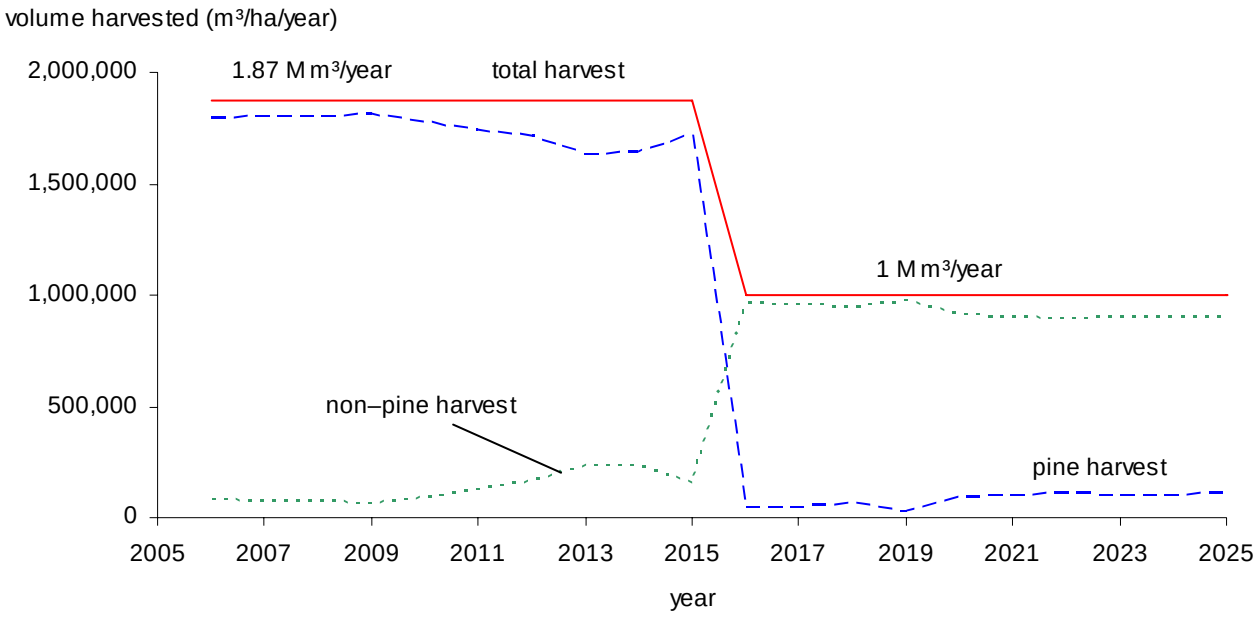


Figure 7. The total, pine and non-pine harvest for scenario 4.

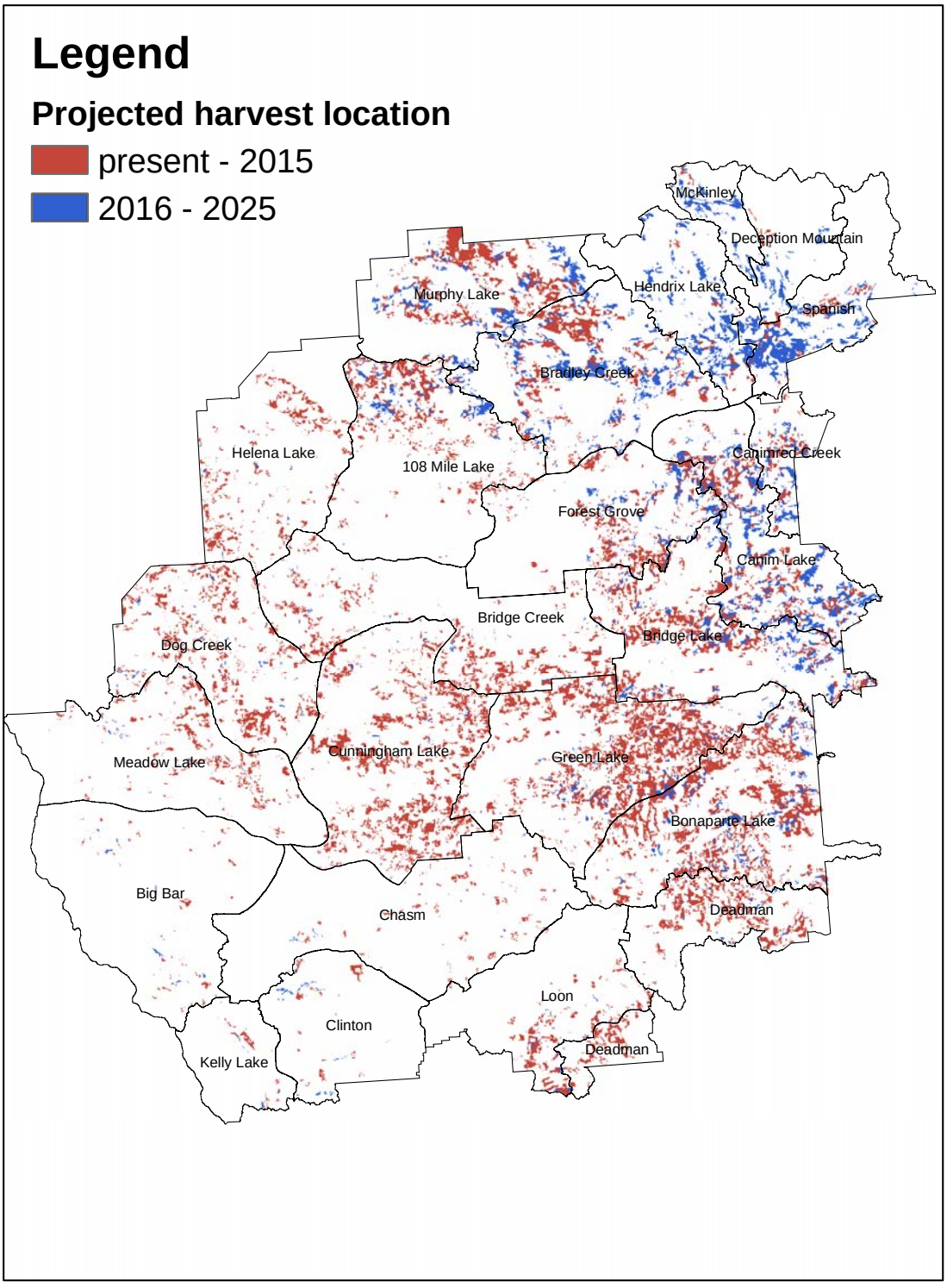


Figure 8. The location landscape unit boundaries and the projected harvest for scenario 4.

In summary — elevated harvest levels ranging from 1.87 to 2.6 million cubic metres per year will be considered by the chief forester during his determination. These harvest levels assume only stands with at least 70% pine will be harvested. There is sufficient evidence to suggest focusing harvest on these stand types beyond 10 years would benefit the mid-term.

The vast majority of the cut and not just an uplift should be targeted to pine

Scenarios 4, 5 and 6 all assumed the entire cut during the first decade was directed to stands with at least 70% pine. Two scenarios, 7 and 8 tested the impact of only directing the uplift proportion of scenarios 4 and 6 respectively to stands with at least 70% pine. Again, 3, 5 and 10 year sawlog shelf life figures were assumed for wet, moist and dry ecosystems respectively and stands were prioritized for harvest on the basis of highest volume. The projected volume of pine salvaged during the uplift and the projected merchantable growing stock in 2026 is presented in Table 3.

A comparison of Tables 2 and 3 reveals that despite the uplifts assumed under scenarios 7 and 8 the total amount of pine salvaged by the model is only roughly equivalent to using the current AAC to best advantage (scenario 2), yet the amount of growing stock available for harvest in the mid-term would be approximately 30% less.

The Ministry of Forests and Range harvest billing records, show the proportion of the total harvest that was pine has averaged 69% of the harvest over the past five years. This means some stands with considerably more pine than 70% and some stands with considerably less pine than 70% have been harvested. To safeguard the mid-term, licensees and government will need to increase their efforts to ensure the vast majority of stands harvested over the next decade have 70% pine content as a minimum. It is recognized there will be an ongoing requirement to salvage some other stand types in response to attack by other insect pests and fire.

In summary — no matter how well focused an uplift, not targeting the existing AAC toward to susceptible stands will clearly be to the detriment of mid-term harvest levels.

Table 3. Impact on 2026 merchantable growing stock of only focusing an uplift and not the existing AAC on pine stands.

Scenario	Description/assumptions	Volume of pine salvaged (2006-2015) (million cubic metres)	Merchantable growing stock in 2026 (million cubic metres)
7	partitioned harvest and harvest levels of 2.6 million and 1.6 million cubic metres annually for successive five-year periods	11.6	18.4
8	partitioned harvest and a harvest level of 1.87 million cubic metres per year for 10 years	13.4	17.8

Both scenarios assume a harvest of one million cubic metres per year in the second decade.

Characteristics of a possible future land base in 2026

Using the results from scenario 6, where 2.6 million and 1.6 million cubic metres per year were harvested for successive five-year periods, the age class distribution across the landscape is portrayed in Figure 9. Again the large areas of predominantly dead stands in the central and southern landscape units support the idea of extending the period of targeted harvesting beyond 2015. In addition, under this scenario there will be large contiguous areas of early or mid-rotation stands throughout the timber supply area. This is also the case for the scenario where 1.87 million cubic metres per year was harvested for the first decade.

Excluding the most northerly landscape units, projected large contiguous areas of forest greater than 60 years old tend to be either, mule deer winter range, OGMAs, visually sensitive areas or areas traditionally managed through selection harvest (compare Figures 3 and 9). The large block of "green" in the north east is somewhat deceptive due to activity of spruce beetle.

In summary — harvest opportunities in 2026 and beyond will be limited.

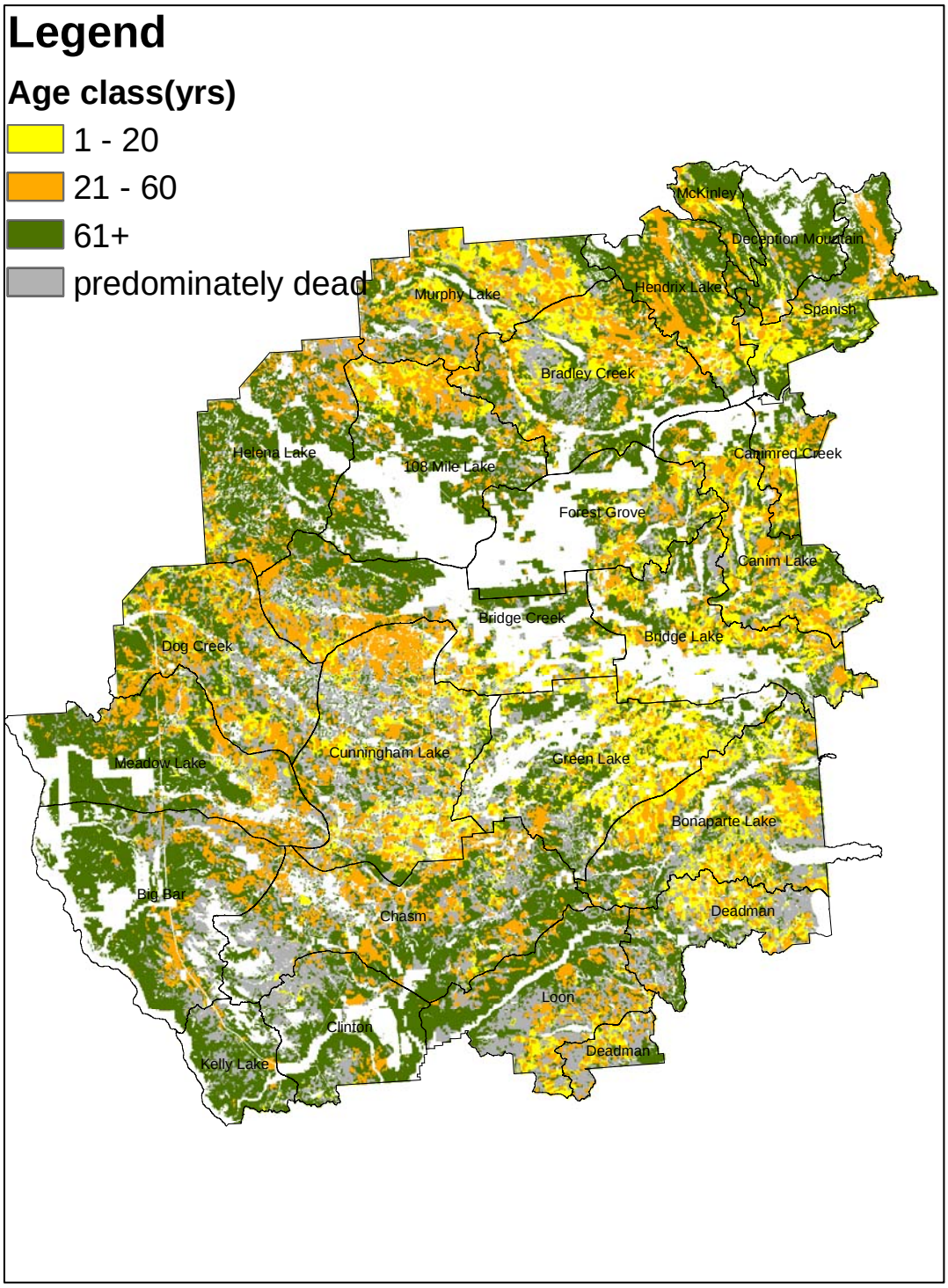


Figure 9. The age of stands in 2026 and the location of those stands that are projected to be predominately dead across all Crown forest lands. This assumes the mountain pine beetle continues unabated and a cut of 2.6, 1.6 and 1 million cubic metres per year for 5, 5 and 10 year periods respectively (Scenario 6). Landscape unit boundaries are provided for reference.

Analysis summary

The analysis explored a range of possible scenarios. The results are summarized as follows:

1. To date, the mountain pine beetle epidemic has killed the equivalent of ten years of harvest within the TSA. If the epidemic continues unabated, it will have a bigger impact on the landscape over the next twenty years than continued harvest with the current AAC.
2. Considerable thought should be given to the deployment of the existing AAC. Even without an uplift, the salvage of pine and the amount of growing stock to be harvested in the mid-term can vary by in excess of 40%.
3. Mid-term harvest levels are highly uncertain because it is unknown to what extent mountain pine beetle will attack young stands within the TSA. However, if the epidemic continues unabated, mid-term harvest levels will be significantly below the current AAC.
4. It is assumed current harvest practices will continue and clear cutting will be the dominant harvest method. Approximately a quarter of the pine occurs in stands that have sufficient volume in other species to definitely provide a mid-term harvest opportunity. Approximately another quarter of the pine occurs in stands that have sufficient volume in other species to possibly provide a mid-term harvest opportunity. Approximately, half the pine occurs in stands that would clearly not provide a mid-term harvest opportunity. These stands, composed of at least 70% pine would provide considerable economic opportunities over the next decade.
5. Depending on whether a stable harvest for ten years, or a higher harvest over the next 5 years is desired and what shelf life assumptions are used, elevated harvest levels over the next five years could range from 1.87 to 2.6 million cubic metres per year. These increases have a salvage efficiency of 67 to 76% with little detriment to the mid-term. However, this is predicated on the entire harvest over the next decade being focused on the harvesting of stands with at least 70% pine. Only dedicating the uplift portion of an elevated cut to pine dominated stands salvages no more pine than using the existing AAC to it best advantage while severely compromising mid-term timber supply (see Tables 2 and 3).
6. By 2026, the landscape will provide limited harvest opportunities and considerable thought should be given to continuing to carefully deploy the harvest to pine dominated stands beyond the first 10 years.

Proposed objectives and strategy to deal with the beetle infestation

The 100 Mile House Forest District's strategy to deal with the impacts of the mountain pine beetle epidemic is, with full consideration to protect and manage other non-timber resource values, to maximize value recovery of dying and dead pine trees across the timber supply area. Mountain pine beetle population levels are high across the majority of the timber supply area, and it is no longer possible to slow or delay the population. As such, the beetle harvest activities will be primarily focused on expedited large-scale harvest and salvage of in danger, dying or dead lodgepole pine stands. This will reduce the net economic loss of timber value and provide the opportunity to bring denuded forest land back into active production.

Lodgepole pine dominated forests are a significant component of the timber supply area, however there exists significant diversity in many portions of the timber supply area in terms of landscape features, elevation and species mix, which will provide opportunities for strategic retention planning to manage and protect other resource values.

The 100 Mile House Forest District's strategy and objectives in responding to the current infestation include:

- Directing harvest of the existing AAC and potential uplift volumes to high-priority (> 70% pine component) mountain pine beetle killed or infested stands.
- Recovering the highest value from beetle-infested timber before it deteriorates, burns, or decays, while respecting other forest values.
- 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.
- Conserving the long-term forest values identified in the Cariboo-Chilcotin Land Use Plan.
- Recognizing landscape and stand-level biodiversity values, and developing retention strategies to maintain or enhance those values in a manner consistent with the Chief Forester's December 2005 "*Guidance on Landscape- and Stand-level Structural Retention in Large-Scale Mountain Pine Beetle Salvage Operation"*.
- Minimizing impacts to the non-pine component of the timber supply area, other than to address forest health factors associated with that component.
- Notwithstanding the Forest Health impacts associated with the current mountain pine beetle infestation that, the licensees will proactively address other forest health factors in a manner consistent with the District Forest Health Strategy.

Implications of changes in the AAC

Environmental implications

The impacts of the current mountain pine beetle infestation in the 100 Mile House TSA will inevitably affect the structure of the forests. The 100 Mile House Forest District is revising forest management strategies where necessary to mitigate the impact on the environment.

To offset environmental implications, the forest district will develop management strategies to consider, among other things, values related to First Nations, watersheds, old-growth management areas, visual quality objectives, harvesting priorities, non-susceptible species retention and wildlife trees.

Regardless of the allowable annual cut 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

Three First Nations have communities in the 100 Mile House timber supply area. All three — Tsq'escen (Canim Lake), High Bar and Xatl'tem/Stwecem'c (Canoe Creek) bands — are Secwepemc (Shuswap) people. Other First Nations with traditional territories in the timber supply area are Williams Lake, Esketemc, Pavilion, Bonaparte, Whispering Pines (Clinton), Skeetchestn and Simpcw (North Thompson).

First Nations in the 100 Mile House timber supply area have been involved in several forestry-related activities including harvesting, silviculture, and firefighting, and have frequently expressed an interest in increasing that involvement. The Tsq'escen (Canim Lake) and Xatl'tem/Stwecem'c (Canoe Creek) bands both have woodlots in the timber supply area. In addition the Tsq'escen (Canim Lake) band currently holds a non-replaceable forest license. The Bonaparte band was one of the first to enter into a Forest and Range Agreement and has been diligently implementing the commitments associated with that agreement. Several First Nations are in various stages of negotiations with respect to accommodation agreements which could significantly increase their forestry involvement.

In the event of an allowable annual cut increase, additional opportunities should exist for First Nations to increase their involvement in the forestry sector.

First Nations have expressed concerns regarding possible impacts on their values including ethno-botanical forest resources and areas of cultural, medicinal and spiritual importance, as well as on fisheries and wildlife resources. These concerns need to be considered in the planning process.

An archeological overview assessment was completed over most of the 100 Mile House timber supply area in 1998. This assessment indicates the relative potential for archeological resources to be found, based on terrain features and anthropological factors, and is used to determine where on-the-ground archeological impact assessments are to be carried out.

The Ministry of Forests and Range has already begun consultation efforts with respect to this timber supply review and intends to continue to fulfill its legal obligations to consult with First Nations in conjunction with the release of this public discussion paper.

Community Implications

The implication of changes in the allowable annual cut for local communities is an important consideration in the timber supply review. The current allowable annual cut for the 100 Mile House timber supply area is 1.334 million cubic metres. The harvest forecast associated with this timber supply analysis suggests that the harvest level could be increased to 1.87 or 2.1 million cubic metres for a period of 10 years in response to the mountain pine beetle infestation, depending on the shelf life of dead pine within the TSA.

There would be a short-term increase in direct and indirect forestry-related employment, as well as other industry-related changes in the 100 Mile House timber supply area forestry sector if the suggested increases were fully harvested. In addition, the added fibre availability would provide stability for the current milling capacity within the timber supply area.

Your input is needed

Public input is a vital part of establishing the allowable annual cut. Feedback is welcomed on any aspect of this discussion paper or any other issues related to the urgent timber supply review for the 100 Mile House timber supply area. 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 June 7, 2006.

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.

For more information contact and/or mail your comments to:

District Manager
BC Ministry of Forests and Range
100 Mile House Forest District
300 South Cariboo Highway
PO Box 129
100 Mile House, BC, V0K 2E0

Phone: (250) 395-7800
Fax: (250) 395-5586

Or by electronic mail to
Christine.Lohr@gov.bc.ca

Visit our website at
http://www.for.gov.bc.ca/hts

Background information regarding TSR

The chief forester's responsibility

Determining the allowable annual cuts (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 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. 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 when determining AACs. In these determinations, the chief forester considers relevant information from all sources.