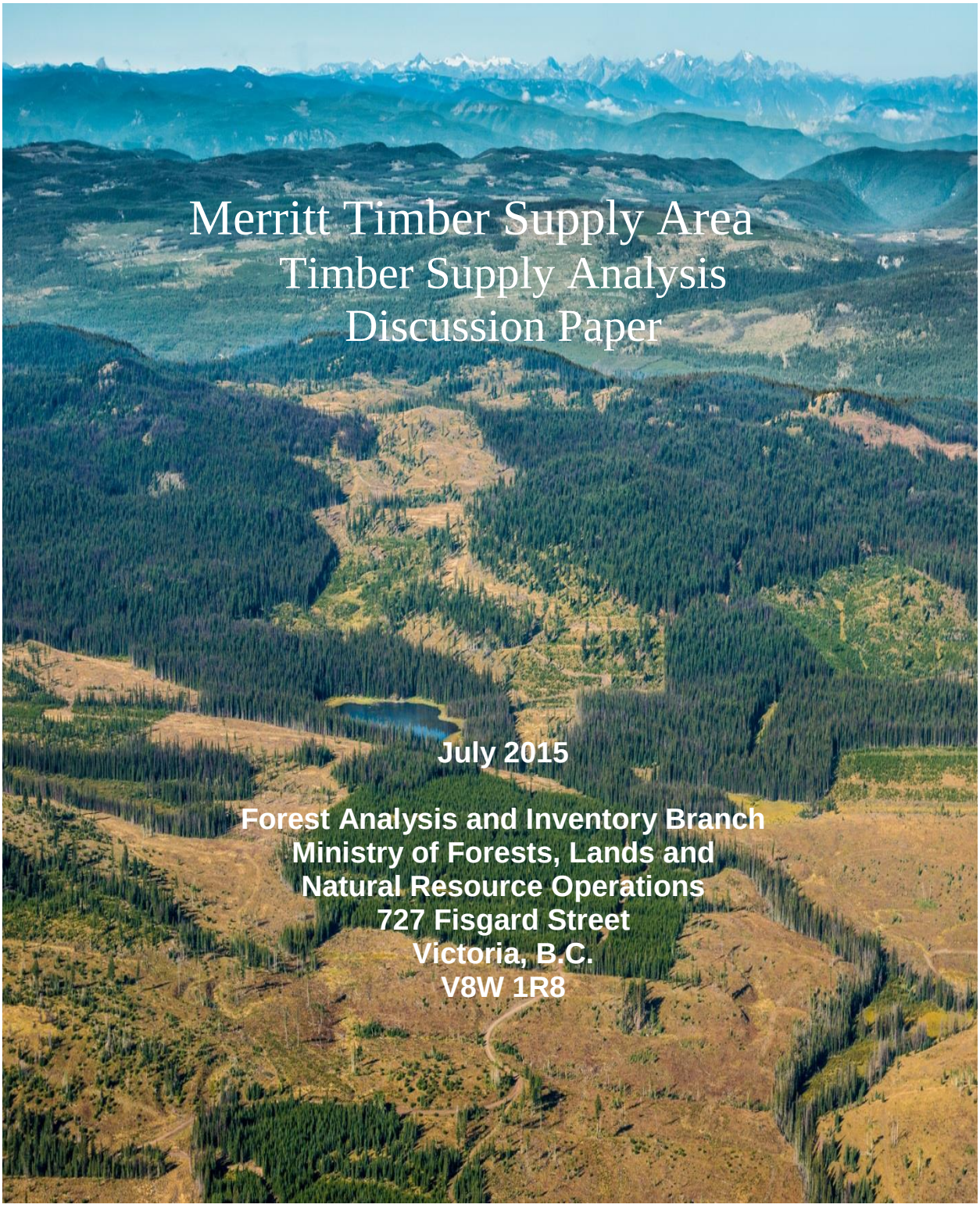

Merritt Timber Supply Area
Timber Supply Analysis
Discussion Paper

July 2015

Forest Analysis and Inventory Branch
Ministry of Forests, Lands and
Natural Resource Operations
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BRITISH COLUMBIA

Ministry of
Forests, Lands and
Natural Resource Operations

Cover photograph by B. Walters

Merritt TSA Public Discussion Paper July 2015

Introduction

The British Columbia Ministry of Forests, Lands and Natural Resource Operations (FLNR) regularly reviews the timber supply[a] for all timber supply areas[b] (TSAs) and tree farm licences[c] (TFLs) in the province. This review, the fifth for the Merritt TSA, examines the impacts of current legal requirements and demonstrated forest management practices on the timber supply, economy, environment and social conditions of the local area and province. Based on this review the chief forester will determine a new allowable annual cut (AAC)[d] for the Merritt TSA.

According to Section 8 of the *Forest Act* the chief forester must regularly review and set new AACs for all 38 TSAs and 34 TFLs in the Province of British Columbia (BC).

The objectives of the timber supply review are to:

- examine relevant forest management practices, economic, environmental and social factors, and input from First Nations, forest licensees and the public;
- set a new AAC; and
- identify information to be improved for future timber supply reviews.

In May 2012, a Special Committee on Timber Supply was appointed by the Legislative Assembly of British Columbia to make recommendations to address the reduction of mid-term timber supply due to mountain pine beetle (MPB) in the central interior of BC. Following its review of technical information and public, stakeholder and First Nations input, the special committee issued a report entitled *Growing Fibre, Growing Value* (August 2012). As described in *Beyond the Beetle: A Mid-term Timber Supply Action Plan* (October 2012), FLNR has responded to the special committee's recommendations. Key ministry responses related to the provincial timber supply review program include:

- Review marginally economic forest types within each timber supply area (TSA) and quantify the types and areas of forest that might justifiably be included in a partition[e] within the timber harvesting land base[f] (THLB), while respecting resource objectives for other values, such as wildlife and water.
- Where feasible and appropriate, provide information from the timber supply review to enhance public discussion of resource management objectives.

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

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

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

[d] **Allowable annual cut (AAC)**
The maximum amount of timber harvest permitted each year from a specified area of land, usually expressed as cubic metres of wood.

[e] **Partition**
Under Section 8(5) of the Forest Act *the chief forester in determining an AAC can specify a portion of the AAC that is attributable to certain types of timber, terrain or areas of the TSA.*

[f] **Timber harvesting land base (THLB)**
An estimate of the area within the Crown forest land base (CFLB) that is managed for timber supply by FLNR where timber harvesting is both legally allowed and economically feasible, while meeting objectives for all relevant forest values, existing timber quality, market values and applicable technology.

With regard to the ministry's responses to the special committee, the potential contribution of marginally economic stand types to the wood fibre supply of the Merritt TSA have been examined. The results are discussed in this paper under "*sensitivity analysis"*.

The chief forester does not have the legal authority to establish or modify land use objectives. Consequently, timber supply reviews undertaken in support of AAC determinations are based on current resource management objectives that have been formalized by government. However, the information compiled to support this timber supply review can be made available to support land use planning activities outside of the timber supply review process. In the event that resource management objectives and practices change, these changes can be reflected in future timber supply reviews.

Timber supply review in the Merritt TSA

On December 2, 2010, the chief forester set the AAC for the Merritt TSA at 2.4 million cubic metres of which no more than 720 000 cubic metres is to consist of non-pine species volume, as identified in the ministry's harvest billing system. In his rationale, the chief forester noted that the partition was intended to maximize the conservation of non-pine species stands for harvest in the mid-term, while allowing for the salvage of beetle-infested stands. To this end, he indicated that of the 720 000-cubic metre partition attributable to non-pine species volume, about two-thirds is for the incidental non-pine volume resulting from the salvage of mountain pine beetle infested, pine-leading stands. The remaining one-third is for the volume resulting from the focused harvesting of spruce bark beetle-infested stands.

In addition, the chief forester requested that district and licensee staff continue to monitor the extent of beetle infestation and salvage and to report the results to the chief forester on an annual basis. He also indicated that in the event that there were significant changes in beetle infestation or management, it might be necessary to re-determine the AAC earlier than the 10-year maximum required under the *Forest Act*.

Since the current AAC was determined, licensees have focused on the harvest of pine-leading stands and salvage of dead pine. Based on harvest history and estimates of how long dead pine remains suitable for harvest after death only about 2.5 million cubic metres of dead pine remain on the THLB. However, this dead pine volume is dispersed throughout stands that include significant volumes of live timber. Based on the information reported, the chief forester has concluded that there is an urgent need to re-examine the Merritt TSA timber supply and to determine a new AAC. In order to expedite the timber supply review process, a data package was not provided for review and comment. Information regarding the technical details of the timber supply analysis will be provided on request (see last page of this document).

This discussion paper is being released in order to provide an overview of the timber supply review and to highlight the key findings of the timber supply analysis for the Merritt TSA. Before setting a new AAC, the chief forester considers all relevant information, including the results of the timber supply analysis and input from government agencies, the public and First Nations on both timber and non-timber values. Following this review, the chief forester's determination will be outlined in a rationale statement that will be publicly available.

The actual AAC determined by the chief forester during this timber supply review may differ from the harvest projections presented in this discussion paper, including the base case, as the chief forester must consider a wide range of information, some of which cannot be quantified. Ultimately, the chief forester's AAC determination is an independent, professional judgement based on the legal requirements set out in Section 8(8) of the *Forest Act*.

Once the chief forester has determined the new AAC, the Minister of Forests, Lands and Natural Resource Operations will apportion the AAC to the various licence types and programs as per Section 10 of the *Forest Act*. Based on the minister's apportionment, the regional executive director will establish a disposition plan that identifies how the available timber volume is assigned to the existing forest licences and, where possible, to new opportunities.

Description of the Merritt TSA

The Merritt TSA (Figure 1) is located in south-central British Columbia (BC). To the north of the Merritt TSA is the Kamloops TSA, to the west are the Lillooet and Fraser TSAs, and to the east is the Okanagan TSA. Manning Park, Cathedral Park and the Canada-United States border lie to the south. The TSA, which occupies a total area of about 1.13 million hectares, is located within the Thompson Okanagan Region and is administered by the Cascades Natural Resource District in Merritt.

The Merritt TSA includes the mountainous terrain and steep river valleys of the Cascade Mountains in the west and the relatively dry, flat Thompson Plateau in the east. The TSA encompasses two major river systems: the Similkameen and the Nicola. The major population centres are Merritt and Princeton. Smaller communities include Brookmere, Tulameen, Missezula Lake, Douglas Lake, Lower Nicola, Osprey Lake and Allison Lake.

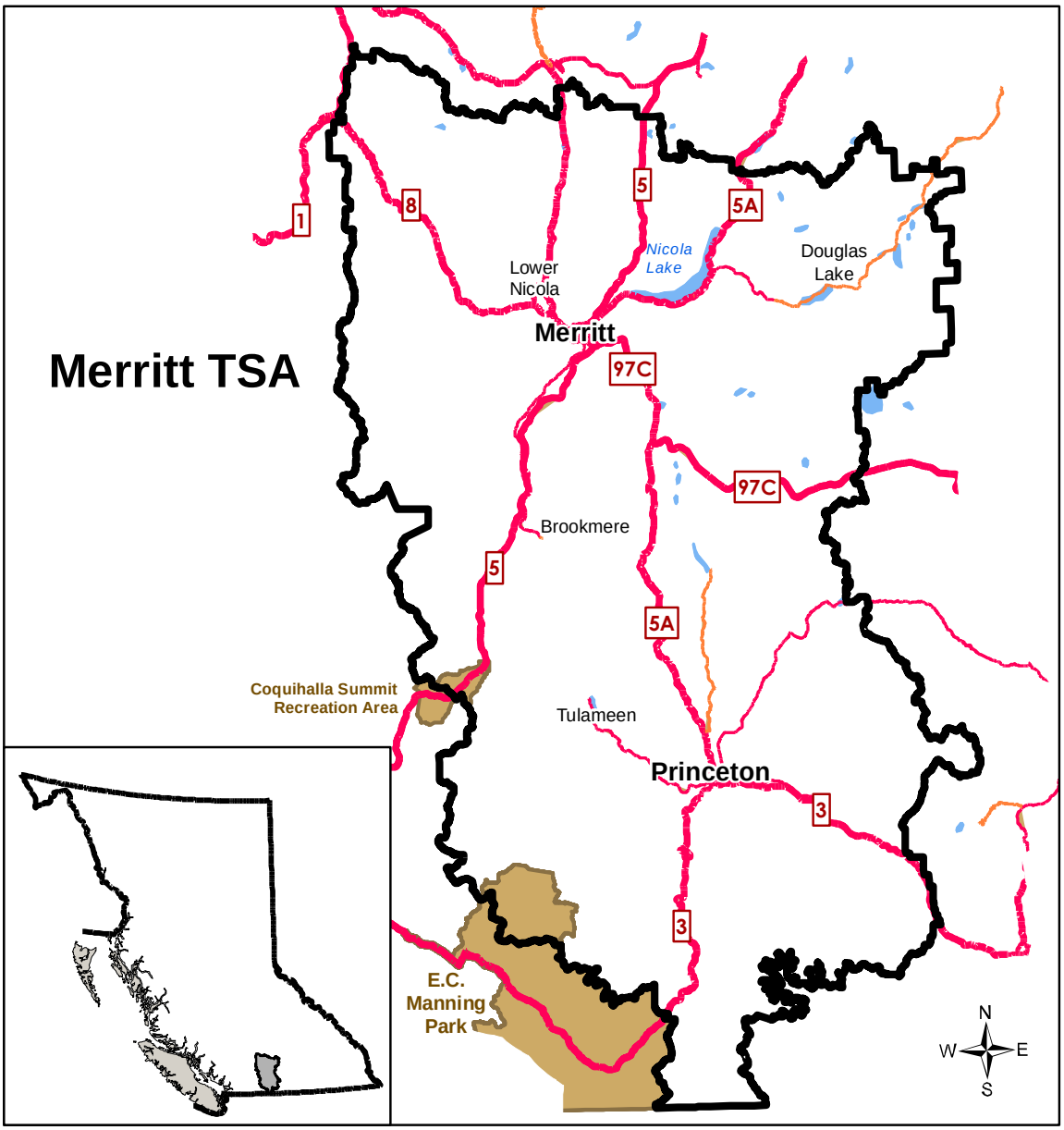

Figure 1. Overview map of the Merritt TSA.

First Nations

There is a large First Nations population that lives within or immediately adjacent to the Merritt TSA. First Nations represent approximately thirty percent of the area population. Members of both the Okanagan and Nlaka'pamux Nations live within the TSA. Members of both Nations also live in areas immediately adjacent to the TSA.

The Nlaka'pamux Nation for example, is represented by 15 communities with five of those being located within the TSA. The remaining Nlaka'pamux Nation communities are located adjacent to the Merritt TSA in the Fraser Canyon area. The Nlaka'pamux Nation represents approximately 7500 people with interests within the Merritt TSA.

The Okanagan Nation, the Syilx People, has the next largest representation with two communities living within the TSA. The remaining Okanagan Nation communities live adjacent to, and east of, the Merritt TSA. Six of the eight Okanagan communities have interests that overlap with the Merritt TSA. These communities represent approximately 5390 people.

While each of the Okanagan and Nlaka'pamux Nations has aboriginal interests extending over large areas of the Merritt TSA, the Secwepemc Nation also has interests in the northern portion of the TSA. Similarly the Sto:Lo Nation has interests in the south and west portions of the TSA. First Nations play a significant role in the economy of the Merritt area. First Nations play an active role in the management of forest resources having forest companies, resource based businesses and forestry consultation businesses.

An important aspect of an AAC determination is consultation with First Nations and the chief forester is working through staff at Cascades Natural Resource District to ensure consultation on the Merritt TSA determination is meaningful and complete. Information obtained through this process will be provided to the chief forester for her consideration prior to determination of the new AAC.

Regional economy

Regional economy

The Merritt TSA lies within the Thompson-Nicola Regional District. The public sector, forestry, and tourism are the major employment sectors, with agriculture, construction and mining also contributing to the local economy.

Forestry and the public sector are overwhelmingly the largest contributors to the region's economy. According to the report *British Columbia Local Area Dependencies: 2006*, the forest sector accounts for approximately 25 percent of the basic income in the Merritt area and the public sector accounts for approximately 20 percent (numbers are average of Merritt and Princeton). The forest sector supports many jobs in the area through companies and employees purchasing goods and services.

Natural resources

Numerous natural resources are associated with the forest land in the Merritt TSA. These include forest products (timber and non-timber), forage, minerals, fish, wildlife, and recreation and tourism opportunities. Extensive grassland and forested areas provide important forage for both livestock and wildlife.

Parks, recreation sites and trails, and roaded and non-roaded areas provide opportunities for many outdoor activities. Residents and tourists enjoy recreation activities such as hiking, camping, hunting, fishing, wildlife watching, boating, mountain-biking, snowmobiling, and ski touring. The TSA includes a number of small parks and popular recreation areas in the vicinity including the Coquihalla Summit Recreation Area and Manning Park. Recreation visits have increased significantly since the completion of the Coquihalla Highway and the Okanagan Connector.

Environmental values

The diverse landscapes of the Merritt TSA provide a variety of wildlife habitats, including grasslands, lakes and wetlands, forested slopes, and alpine areas. At lower elevations mule deer, moose, black bear and many smaller fur bearers, as well as many species of birds and amphibians, are common. Grizzly bears also occur within the TSA.

Current forest management is governed by a range of natural resources legislation, including the legal requirements of the *Forest and Range Practices Act* (FRPA) and associated regulations, including legal orders. Currently, a number of species identified as 'at risk' may be found in the Merritt TSA, among them are the tailed frog, Williamson's sapsucker and white-headed woodpecker.

Water is a primary and fundamental resource of the Merritt TSA. The rivers, lakes and streams support many species of fish, such as rainbow trout, kokanee, burbot, mountain whitefish, eastern brook trout, bull trout and steelhead. Coho, chinook and pink salmon spawn in the Nicola River. Significant demands are placed on water resources for domestic and agricultural purposes. There are currently nine designated community watersheds within the Merritt TSA.

This timber supply analysis reflects the current land use requirements and management practices designed to maintain biodiversity, wildlife habitat, visual quality, recreation areas, riparian areas, and protection of unstable terrain. Ultimately the area available for timber harvesting is the area that remains once all other factors have been considered.

Cumulative effects

Cumulative effects (CE) are the changes in environmental, social, and economic values that result from the combined effect of past, present, and reasonably foreseeable future activities or events. The province has developed, and is in the early stages of implementing, a cumulative effects framework (CEF). The CEF provides a strategic-level approach to assess and manage CEs. It provides for the periodic assessment over broad areas of the current condition and trend of key values.

An assessment of cumulative effects on the current condition and 10-year historic trends of six resource values: fish, moose, mule deer, grizzly bear, visual quality and old growth management areas (OGMA) is being piloted in the Merritt TSA. Information regarding the current condition of these values and the potential effect of harvesting at the base case initial harvest level for 10 years will be provided to the chief forester for consideration in determining the new AAC.

Significant changes since the last TSR

The timber supply analysis presented in this discussion paper differs from the analysis used in the 2010 AAC determination. Significant changes include:

- The forest inventory was updated for depletion, including harvesting that has occurred since 2010.
- Ground-sampling data were used to verify inventory estimates that were originally based on aerial photography.
- The productivity of young stands was refined using young stand monitoring field data from the Merritt TSA and results of a site index adjustment project.
- The assumptions for stand level tree retention were revised using Forest and Range Evaluation Program field data.
- Ungulate winter range modelling was refined.
- Adjacency requirements and provincial visual quality objectives were modelled from the beginning of the harvest forecasts rather than later in the harvest forecasts.

Timber harvesting land base

The total area within the boundaries of the Merritt TSA is approximately 1.13 million hectares. After accounting for lands that are not Crown-owned or are under area-based forest tenures, and for areas that are either not forested (alpine areas, rock, gravel pits, water bodies, roads etc.) or are occupied by low productivity stands, the Crown forest land base[g] (CFLB) is approximately 800 000 hectares.

In order to define the area that is both legally available for timber harvesting and suitable for timber production, referred to as the "timber harvesting land base (THLB)", a series of areas are excluded from the CFLB (see Table 1).

The THLB is a strategic-level estimate used for the purposes of timber supply analysis and consequently inclusion or exclusion of any particular area has no bearing on how the area will actually be managed. At an operational level, there will always be areas that are excluded from the THLB that can be harvested and areas within the THLB that may not be harvested. For the current Merritt TSA timber supply review, the THLB is approximately 590 000 hectares or about half of the total TSA.

Note that the area numbers provided below may differ slightly from previously published numbers for the Merritt TSA. These differences are relatively minor and are due to the way in which the land base was modelled in the timber supply analysis.

[g] **Crown forest land base (CFLB)**
The forested area of the TSA that the provincial government manages for a variety of natural resource values. This excludes non-forested areas (e.g., water, rock and ice), non-productive forest (e.g., alpine areas, areas with very low productivity), and non-commercial forest (e.g., brush areas). The CFLB does include federal protected areas because of their contribution to biodiversity.

Table 1. Derivation of the timber harvesting land base (THLB) for the Merritt TSA – 2015

	Gross area (hectares)	Net area (hectares)
Merritt TSA	**1,131,178**	**1,131,178**
Private land, Federal land, etc.	195,093	
Community Forest	12,925	
Woodlots	14,734	
Crown land base (including parks and reserves)		**908,426**
Non-forest netdowns		
Alpine	16,427	
Rock, gravel pits and bar and mine pit	13,682	
Water bodies/ wetland	17,786	
Non-forest vegetation	134,266	
Low productivity	3,388	
Urban	10,417	
Unclassified	239	
Roads, trails and landings	24,705	
Crown forest land base (excluding roads)		**805,857**
Parks, reserves and protected areas	16,951	
Forest area administered by FLNR		**792,557**
Operability netdowns		
Environmentally sensitive areas	68,141	
Physically inoperable	86,435	
Physically operable land base		**709,247**
Non-timber management netdowns		
Archaeological sites	2,159	
Riparian areas	38,775	
Heritage trails	933	
Wildlife habitat areas	6,004	
Old growth management areas	114,467	
Ungulate snow interception areas	43,165	
Wildlife tree patches	15,665	
Current THLB		**592,687**
Future roads	12,796	
Future wildlife tree patches	33,697	
Future THLB		546,194

The forests of the Merritt TSA include Douglas-fir, spruce, ponderosa pine, and subalpine fir. Lodgepole pine is the dominant species in the TSA and lodgepole pine-leading stands occupy about half of the CFLB and about two-thirds of the THLB. Trembling aspen is also present in the TSA; however, deciduous-leading stands are not included in the THLB as these species are not commercially harvested. The composition of the CFLB and THLB by leading species appears below in Figure 2.

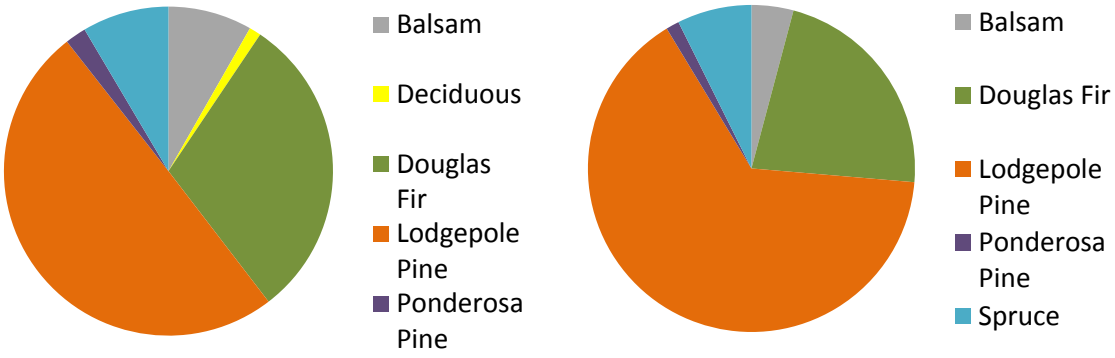

Figure 2. Proportion of leading species for the Crown forest land base and timber harvesting land base of the Merritt TSA.

As shown in Figure 3, the acceleration of harvesting in the TSA to salvage beetle-killed timber has resulted in a THLB that consists primarily of stands less than 30 years.

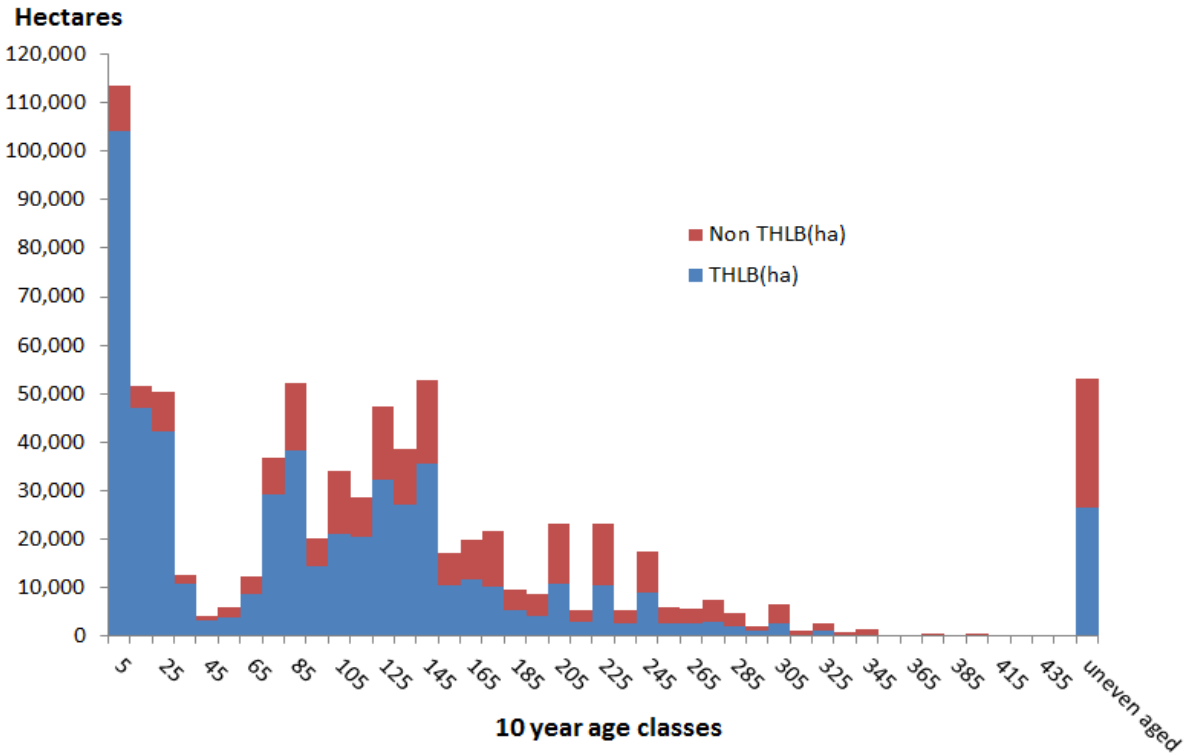

Figure 3. Current age class distribution of stands in the Crown forest land base and timber harvesting land base in the Merritt TSA.

The maps in Figures 4 and 5 below show the geographic distribution of stands by age. Stands older than 29 years are shown in green, stands between the ages of 10 to 29 years are shown in yellow and stands younger than 10 years, including cutblocks yet to be planted, are shown in orange.

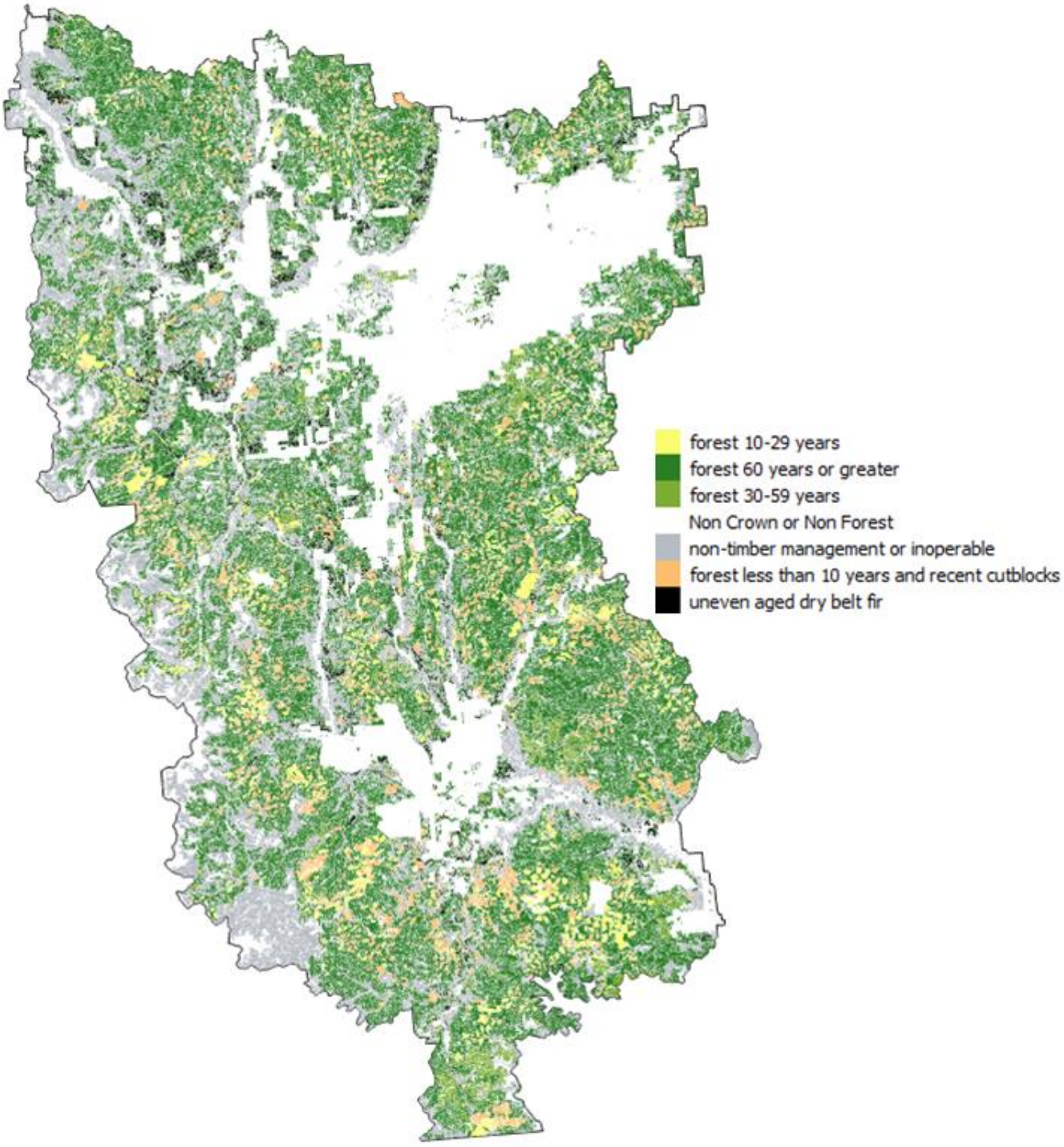

Figure 4. Stand age composition of the Merritt TSA in 2000.

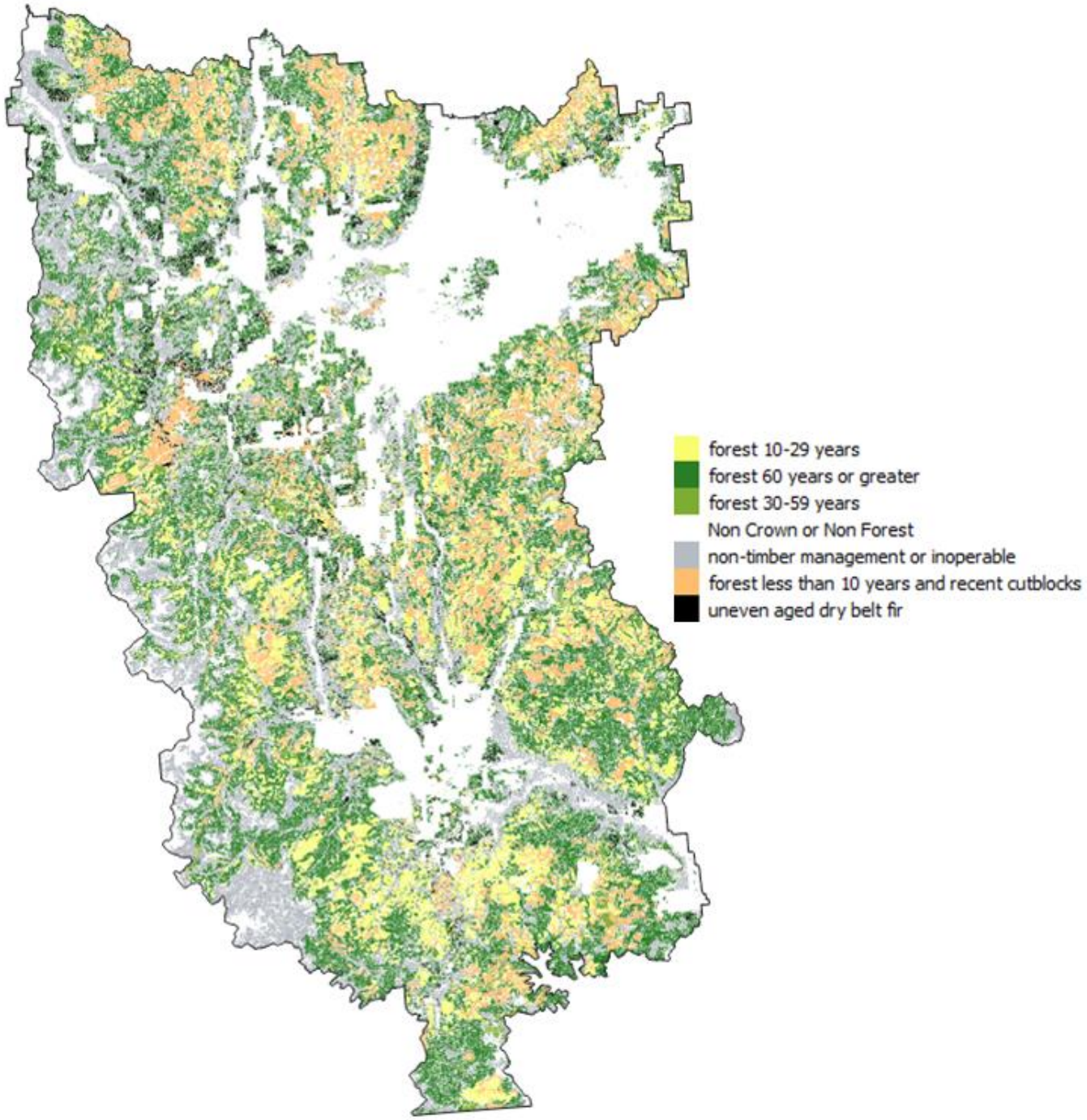

Figure 5. Stand age composition of the Merritt TSA in 2014.

History of the allowable annual cut

The history of the allowable annual cut (AAC) for the Merritt TSA is presented in Figure 6 below. The details for each of the AACs are provided below.

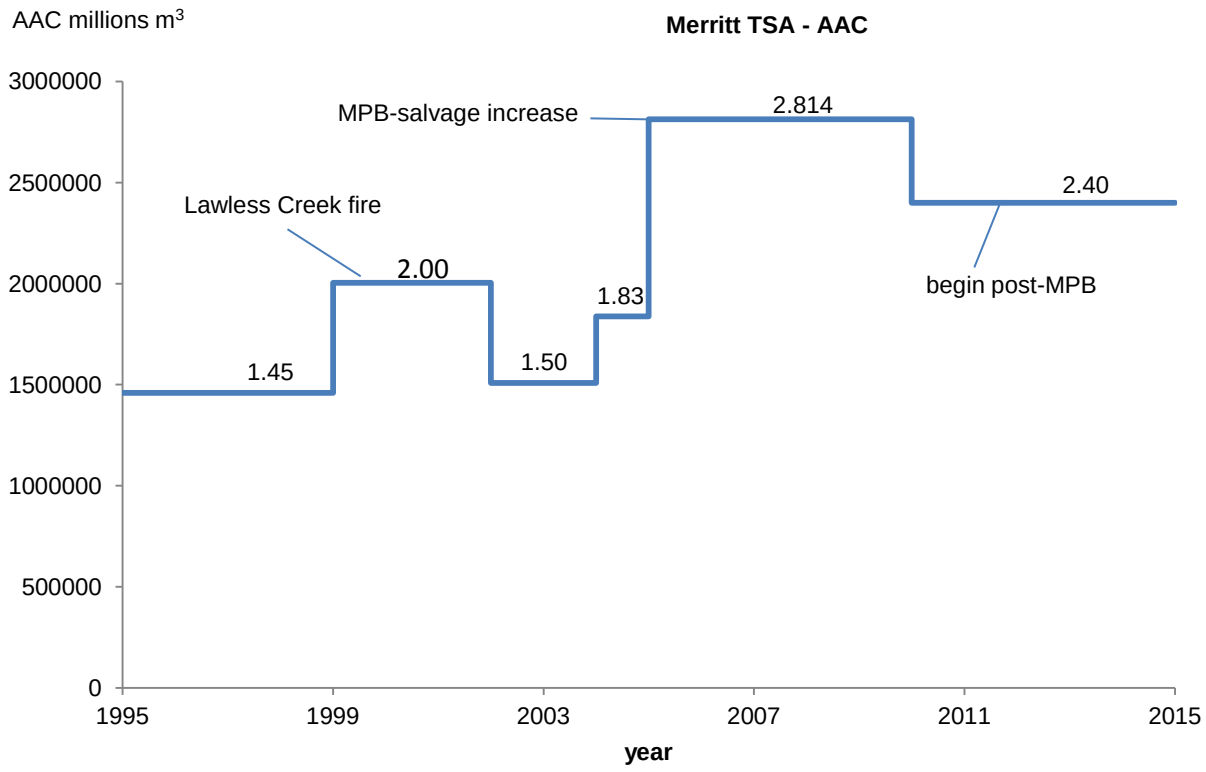

Figure 6. History of the Merritt TSA allowable annual cut.

In 1996, the chief forester established an allowable annual cut (AAC) for the Merritt TSA of 1 454 250 cubic metres, including a 250 000-cubic metre partition attributable to small-diameter pine stands.

In 1999, the AAC was increased to 2 004 250 cubic metres to allow for the salvage of timber damaged in the 1998 Lawless Creek Wildfire and a mountain pine beetle infestation. The 250 000-cubic metre partition for small-diameter pine was continued.

In 2002, most of the economically-viable damaged timber had been salvaged and the AAC was reduced to 1 508 050 cubic metres. The small-diameter pine partition in the 2002 AAC was increased to 312 500 cubic metres.

In 2004, the AAC was increased by 330 700 cubic metres to 1 838 750 cubic metres due to an Innovative Forest Practices Agreement (IFPA). The 312 500-cubic metre small-diameter pine partition was continued.

In 2005, the AAC was increased to 2 814 171 cubic metres to address the mountain pine beetle epidemic that was underway in the TSA. The small-diameter pine partition was maintained at 312 500 cubic metres.

By 2010, the mountain pine beetle epidemic in the Merritt TSA had peaked and the volume of beetle-killed pine was decreasing. As a result, the chief forester decreased the AAC to 2 400 000 cubic metres. This AAC included a partition that limited the harvest of non-pine species volume to a maximum of 720 000 cubic metres. Of the non-pine partition, the chief forester expected that about two-thirds would be incidental non-pine harvest resulting from the salvage of mountain pine beetle stands. The remaining third was expected to come from spruce-beetle infested stands. The non-pine partition was intended to conserve non-pine species volume, while providing licensees with an opportunity to salvage the remaining dead pine. At this time the small-diameter pine partition was discontinued.

In 2013, the Regional Executive Director for the Thompson Okanagan Region determined an IFPA allowable annual cut of 373 000 cubic metres for three years. This AAC was considered to be within the Merritt TSA allowable annual cut of 2 400 000 cubic metres determined by the chief forester.

Data from the ministry's Harvest Billing System show that over the past five calendar years (2010-2014) a total of approximately 14.3 million cubic metres of timber were harvested. During this period, harvest was highest in 2010 at approximately 3.6 million cubic metres. After 2010, the annual harvest decreased steadily each year to approximately 2.3 million cubic metres in 2014.

Timber supply forecasts

For a timber supply review, a number of forecasts are prepared that are an outcome of the best available data and assumptions intended to reflect current management practices. However, more than one forecast can be prepared using the same data, information and timber supply model depending on the harvest flow objectives (rules) applied in the analysis. From these forecasts, the chief forester selects one to use as a reference for the purposes of assessing the uncertainty associated with the information and assumptions used in the analysis. This forecast is referred to as the "base case". The remaining forecasts that were not selected as the base case are still considered in the AAC determination and are referred to as "alternative harvest forecasts".

The base case and alternative harvest forecasts are not AAC recommendations, but rather one of many sources of information the chief forester will consider when setting the AAC. Furthermore, based on the input received from the public and First Nations or new information that becomes available following the review and consultation period for this discussion paper, the base case may be revised prior to use by the chief forester. The AAC determined by the chief forester may be different than the initial harvest level presented in the base case or the alternative harvest forecasts or any of the forecasts presented in this paper.

The base case

In the base case, the initial harvest level was set at the maximum level that could be maintained without decreasing over time. In addition:

- Both natural origin and regenerating even-aged stands were not eligible for harvest unless they had a minimum volume of 150 cubic metres per hectare and individual trees had reached an average volume of 0.2 cubic metres per stem.
- Regenerating stands were not available for harvest until they were 60 years old. This age was selected because it is the age at which the average pine stand within the TSA is estimated to reach peak productivity. Harvesting below this age would not capture the full productivity of a stand.

- The highest volume stands were given priority for harvesting in the model. The contribution of stands with less than 200 cubic metres per hectare was limited to less than 10 percent of the total clearcut harvest.
- The harvest contribution of uneven-aged dry belt Douglas-fir stands was forecast separately. These stand types are typically partially harvested rather than clearcut to ensure regeneration on these dry sites. They were forecast separately because there has been little harvesting in these stands over the past decade and it is uncertain to what extent harvesting will resume when the salvage of dead pine ends.

In the base case (Figure 7), the highest initial harvest level that can be sustained without subsequent decreases is 1.16 million cubic metres per year. This level, which is about one-half of the current AAC (2.4 million cubic metres) is maintained for 50 years before increasing to 1.34 million cubic metres per year. The long-term harvest level of 1.5 million cubic metres per year, which is about the same as the pre-2002 AAC, is reached 80 years in the future.

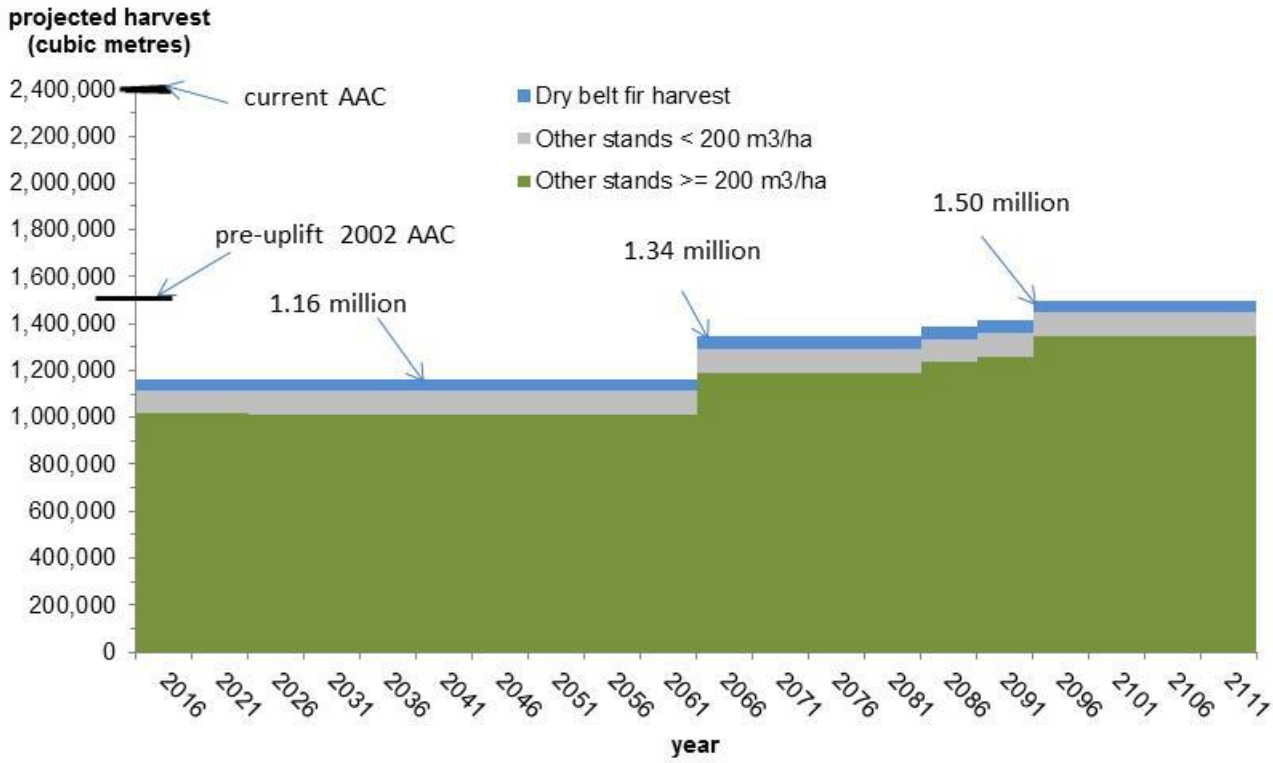

Figure 7. Base case for the Merritt TSA (2015).

Alternative harvest forecasts

In order to assess the timber supply implications of higher initial rates of harvest, the chief forester requested two alternative harvest forecasts. In these forecasts the initial harvest level was set between the level of the current AAC and the base case initial harvest level.

In the first alternative forecast (Figure 8), the initial harvest level was set at 2.0 million cubic metres per year for five years. After five years the harvest level decreases to 1.08 million cubic metres per year, a level that is about seven percent lower than in the base case. This level is maintained for 45 years before the harvest level begins to increase to the same long-term level as in the base case (1.50 million cubic metres per year).

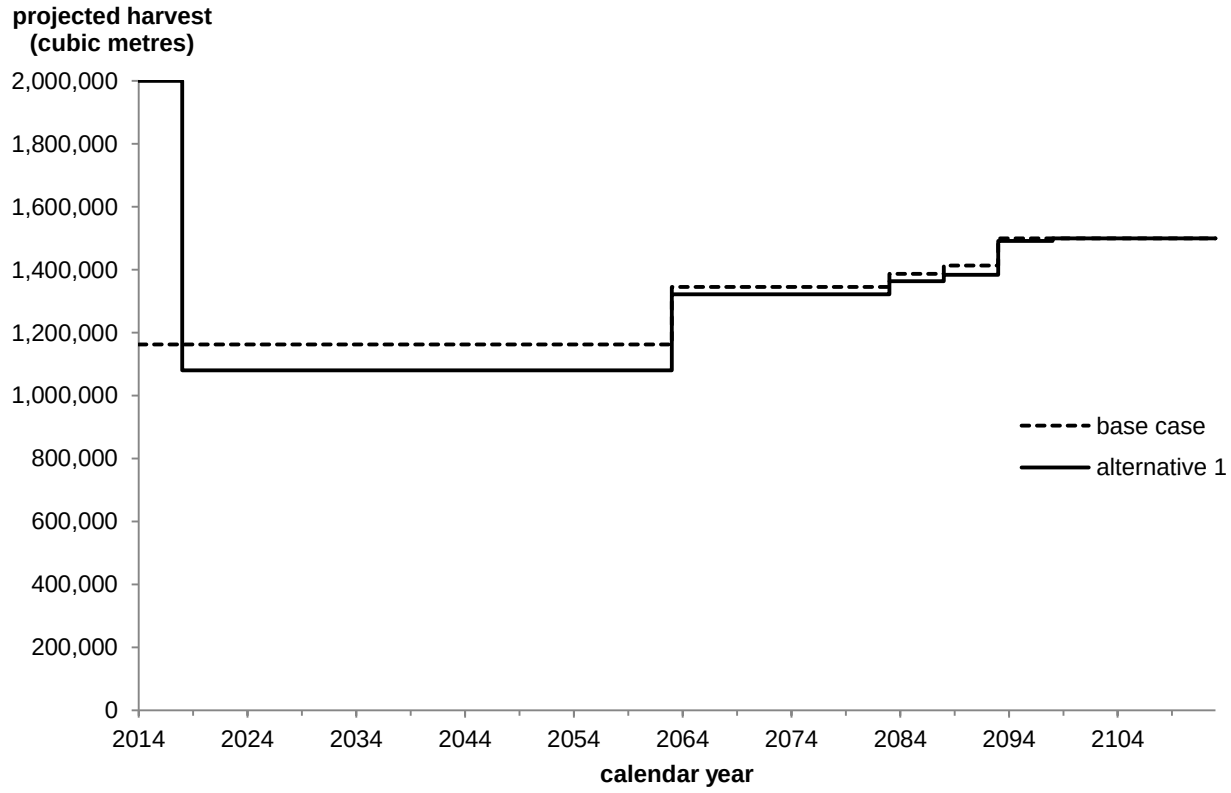

Figure 8. First alternative harvest forecast – initial harvest level 2.0 million cubic metres per year for five years (Merritt TSA 2015).

In the second alternative forecast (Figure 9), the initial harvest level is set at about the level of the 2002 AAC – 1.5 million cubic metres per year. After five years the harvest level decreases to 1.13 million cubic metres per year, a level that is about three percent lower than in the base case. This level is maintained for 45 years before the harvest level begins to increase to the same long-term level as in the base case.

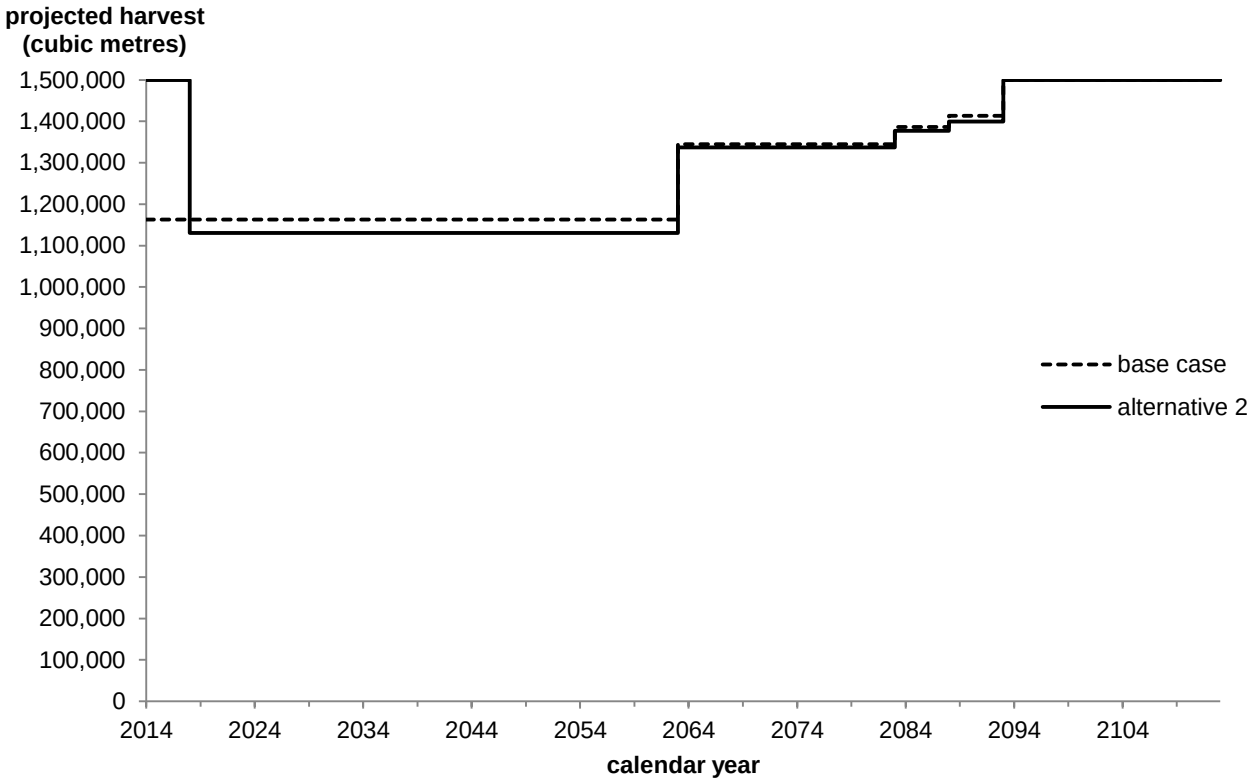

Figure 9. Second alternative harvest forecast – initial harvest level 1.5 million cubic metres per year for five years (Merritt TSA 2015).

Sensitivity analysis

The base case uses a specific set of available data and forest management assumptions that attempts to capture current forest composition and management. Sensitivity analysis is used to examine the effect on timber supply of uncertain information or known differences in the assumptions used in the base case.

Harvest profile - low volume stands

Based on a review of licensee cutting permit data for the last five years, the average volume of harvested stands in the Merritt TSA exceeded 300 cubic metres per hectare. In addition, 95 percent of the harvested blocks had volumes of more than 200 cubic metres per hectare. Stands with volumes between 150 cubic metres per hectare and 199 cubic metres per hectare accounted for about three percent of the overall harvest. In the base case, the contribution of low volume stands (150 cubic metres per hectare to 199 cubic metres per hectare) was limited to less than 10 percent of the clearcut harvest.

One source of uncertainty in this timber supply review is the extent to which licensees will be able to shift harvest operations into low volume stands as higher volume, existing natural stands are depleted. In a sensitivity analysis removing the constraint on low volume stands increased the harvest levels by 90 000-cubic metres per year over the base case level for the first 70 years.

During the first five years, low volume stands account for approximately 620 000 cubic metres per year of the projected clearcut harvest. This level decreases to approximately 400 000 cubic metres per year within 10 years and to less than 7000 cubic metres per year within 20 years. The contribution of low volume stands then increases again reaching approximately 560 000 cubic metres per year by 2066.

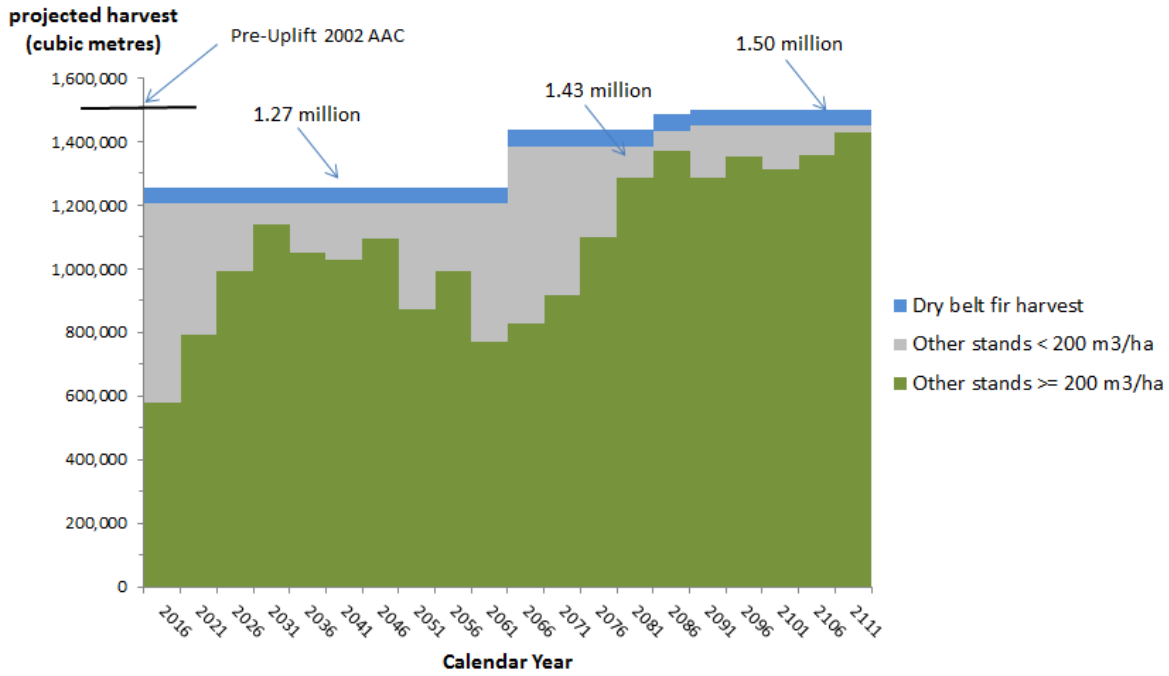

Figure 10. Harvest profile sensitivity analysis.

In addition to allowing more low volume existing natural stands to be harvested, removing the low volume constraint also increased the number of regenerating stands harvested closer to the minimum harvest age of 60 years. While this may be inconsequential for pine stands because on average they will have reached peak productivity it may be an issue for spruce and Douglas-fir stands that do not reach peak productivity until later.

Site productivity

Inventory data include estimates of site productivity for each forest stand. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up height (the height stands have to reach before adjacent areas can be harvested), the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

The most accurate estimates of site productivity come from stands between 30 years and 150 years of age. Estimates derived from older stands underestimate site productivity as these stands are often well past the age of maximum height growth and have often been affected by disease, insects and top damage as they reach advanced age. The underestimation of site productivity based on forest inventory estimates for older stands has

been verified in several studies in the province. These studies have confirmed that when old stands are harvested and regenerated, site productivity is generally higher than inventory-based site index estimates of older stands would predict.

In the base case, the inventory site productivity estimates for managed pine stands were increased by four percent using information collected from stands between the ages of 15 years and 50 years in the Merritt TSA. However, there was not enough field data from the Merritt TSA available to adjust the inventory site productivity estimates for the other tree species.

During the timber supply analysis, predictive ecosystem mapping (PEM) was completed in the TSA and using this information it was possible to develop an alternative set of managed stand site productivity estimates. In the case of pine, the PEM-derived site productivity estimates were significantly lower than those used in the base case.

The primary difference between the site productivity estimates used in the base case and the PEM-derived estimates is the age of the stands from which the data was collected. Research is ongoing to determine the effect of stand age on site productivity estimates.

In a sensitivity analysis, using the PEM-derived site productivity estimates resulted in harvest levels 13 percent lower than projected in the base case. The results of this sensitivity analysis will allow the chief forester to consider the effect of uncertain site productivity estimates for managed stands on the timber supply forecasts prepared for this determination.

Wildlife tree retention

Another significant source of uncertainty in this timber supply review is the amount of mature timber that will be reserved from harvest within cutblocks as the volume available for harvest decreases. For the base case and alternative harvest forecasts, data from cutblocks harvested in the Merritt TSA between 2005 and 2013 showed an average within block retention for wildlife of about eight percent. However, based on a review of the most recent approved forest stewardship plans, licensees have committed to a level of wildlife tree retention that averages about four percent. This average reflects a range of values from three percent in the Montane-Spruce ecosystem to 17 percent in the relatively less common Ponderosa Pine ecosystem.

In a sensitivity analysis, reducing wildlife tree retention from eight percent to four percent resulted in harvest levels that are four percent higher than in the base case.

Harvesting in dry-belt Douglas-fir

There has been no significant harvest of dry-belt Douglas-fir stands in the Merritt TSA for several years as recent efforts have been directed to the salvage of mountain pine beetle-impacted stands. For the base case and alternative forecasts it was assumed that some level of partial-harvesting will occur in dry-belt stands as pine salvage ends. However, due to the challenges in re-establishing these stands and the need to adapt uneven-aged stand management or special reforestation techniques, the level of actual harvesting in these stands is unknown. Allowing these stands to contribute to the base case may represent an over- or underestimation in the projected timber supply depending on the extent, if any, to which harvesting resumes in these stands.

Conclusions

The AAC for the Merritt TSA was accelerated in 2005 to allow for the salvage of mountain pine beetle-killed pine while it retained economic value. In 2010, the AAC was decreased (but still higher than the pre-2005 level) and a partition was instituted in the AAC to conserve non-pine (live) timber. Since then, the volume of dead pine suitable for salvage has decreased significantly and a large proportion of the harvest consists of green pine (pine live at the time of harvest). On this basis, the chief forester decided that there is an urgent need to review the timber supply and determine a new AAC for the Merritt TSA.

The base case for this determination indicates that an initial harvest level of 1.16 million cubic metres per year can be maintained for 50 years before increasing to 1.34 million cubic metres per year. The long-term harvest level of 1.5 million cubic metres per year, which is about the same as the pre-2002 AAC, is reached in 2096. In addition to the base case, two alternative harvest forecasts show that initial harvest levels of 2.0 million cubic metres per year and 1.5 million cubic metres per year can be maintained for five years before harvest levels decrease below the base case initial harvest level.

As discussed throughout this discussion paper, there are a number of significant sources of uncertainty affecting the timber supply. To a large extent the timber supply of the Merritt TSA will depend on the extent to which licensees will be able to shift harvest operations into existing low volume stands, delay the harvest of regenerating stands, and return to harvesting dry-belt Douglas-fir stands. Additional uncertainty is associated with the productivity of pine stands and the amount of future wildlife tree retention.

The provincial chief forester's AAC determination is a judgement based on professional experience and consideration of a wide range of information as required under Section 8 of the *Forest Act*. This is includes information obtained through the consultation process with First Nations. An AAC is neither the result of a calculation nor limited to the results of timber supply analysis; therefore, the new AAC may not be the same as any of the initial harvest levels depicted in any of the scenarios included in this document.

Your input is needed

Public input is an important part of establishing the new AAC. Feedback is welcomed on any aspect of this discussion paper or any other issues related to the timber supply review for the Merritt Timber Supply Area. Ministry staff would be pleased to answer questions to help you prepare your response.

Your comments will be accepted until September 23, 2015.

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:

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Further information regarding the technical details of the timber supply analysis is available on request by contacting Forests.AnalysisBranchOffice@gov.bc.ca

For more information, visit our website at https://www.for.gov.bc.ca/hts/