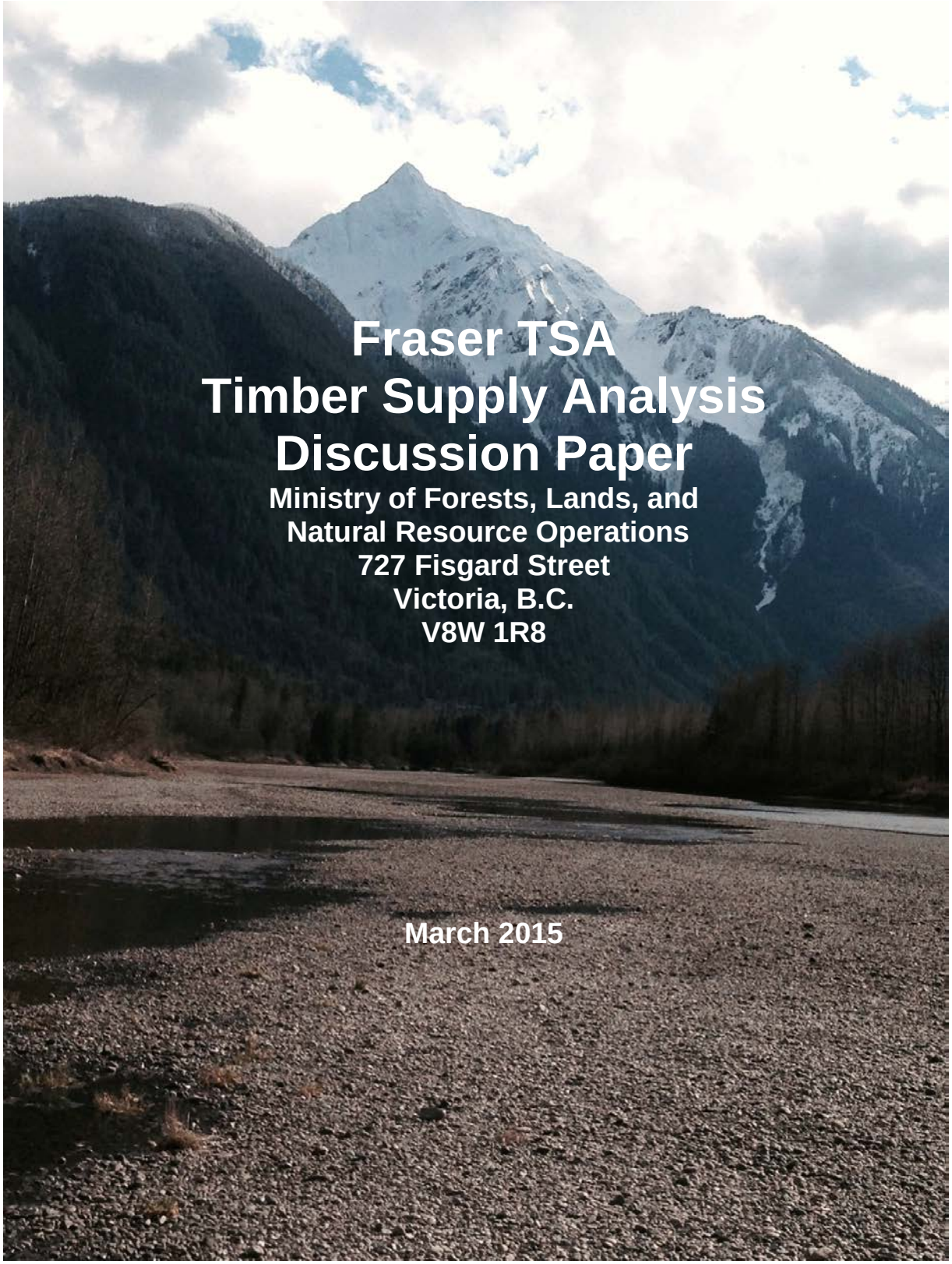

Fraser TSA
Timber Supply Analysis
Discussion Paper

Ministry of Forests, Lands, and Natural Resource Operations
727 Fisgard Street
Victoria, B.C.
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BRITISH COLUMBIA

Ministry of
Forests, Lands and
Natural Resource Operations

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Cover photograph by L. Feldes

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] (TSA) and tree farm licences[c] (TFL) in the province. This review for the Fraser TSA, examines the impacts of current forest management practices on the timber supply, economy, environment and social conditions of the local area and the province. Based on this review, the chief forester will determine a new allowable annual cut[d] (AAC) for the Fraser 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.

The objectives of the timber supply review are to:

- examine relevant forest management practices, 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.

This discussion paper provides a summary of the results of the timber supply analysis for the timber supply review of the Fraser TSA. Details about the information used in the analysis are provided in an October 2013 data package. Additional technical detail is available upon request from the Ministry of Forests, Lands and Natural Resource Operations, Forest Analysis and Inventory Branch. Contact information is provided at the end of this document.

The timber supply analysis should be viewed as a "work in progress". Prior to the chief forester's AAC determination for the TSA, further analysis may need to be completed and existing analysis reassessed as a result of inputs received during this review process.

In May 2012, a Special Committee on Timber Supply was appointed by the Legislative Assembly of British Columbia to make recommendations to address the loss of mid-term timber supply due to mountain pine beetle 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), the FLNR has responded to the special committee's recommendations.

[a]**Timber supply**
Timber supply is the amount of timber available for harvesting over a specified period of time.

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

[c]**Tree farm licences (TFLs)**
Tree farm licences are tenures that grant exclusive rights to harvest timber and manage forests in a specific area; may include private land.

[d]**Allowable annual cut (AAC)**
Allowable annual cut is the maximum volume of timber available for harvesting each year from a specified area of land, usually expressed as cubic metres of wood.

Key ministry responses relating to the provincial timber supply review program include:

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

With regard to the ministry's responses to the special committee, marginally-economic stands and operability are noted under 'Key sensitivity analyses' outlined later in this public discussion paper.

It is expected that this discussion paper will stimulate discussion of how resource management objectives and practices within the Fraser TSA were reflected in the timber supply analysis. All relevant information will be provided to the chief forester for consideration in determining a new AAC.

Current allowable annual cut

The current AAC for the Fraser TSA, is 1 239 100 cubic metres effective December 14, 2011. This was established in accordance with Section 11 of the *Allowable Annual Cut Administration Regulation* which reduced the AAC following the creation of the Cascade Lower Canyon Community Forest Agreement (effective October 3, 2007). Previous to this, the AAC was 1 270 000 cubic metres (effective August 1, 2004). On July 11, 2008, the chief forester postponed the next AAC determination to August 1, 2014, under Section 8(3.1) of the *Forest Act.*

In October 2013, a data package documenting the information requirements and assumptions for the timber supply analysis was released for public review and to assist with First Nations' consultation. This public discussion paper is being released to provide an overview of the timber supply review process and to highlight the results of the timber supply analysis, including harvest forecasts for the Fraser TSA.

Before determining a new AAC, the chief forester will review all relevant information, including the results of the timber supply analysis, socio-economic information, and input from government agencies, the public, licensees and First Nations. Following this review, the chief forester's determination will be outlined in a rationale statement that will be publicly available.

The actual AAC that is determined by the chief forester during this timber supply review may differ from the harvest projections presented in this discussion paper, as the chief forester must consider a wide range of information including the social, economic and environmental implications associated with a given harvest level. Ultimately, the AAC is not a calculation based on the results of timber supply analysis, the chief forester's determination is a 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. 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 Fraser TSA

The Fraser TSA (see *Figure 1*) is located in the southern mainland portion of the South Coast Region. It is bounded on the west by Howe Sound; on the north by the Soo (Sea to Sky) TSA; on the east by the Cascade District and south by the Canada-United States border.

This TSA is administered by the FLNR Chilliwack Natural Resource District office located in Chilliwack. It is the most densely populated TSA in the province, encompassing the major population centres of Metro Vancouver and the Fraser Valley, as well as many smaller communities such as Hope, Yale and Boston Bar. A significant number of large provincial parks, including Golden Ears, Garibaldi, Mehatl, Manning, Skagit Valley, Cultus Lake, Chilliwack Lake, Pinecone-Burke, Seymour, and Indian arm are located partially or wholly within the boundaries of the TSA.

Tourism, recreation, biodiversity and conservation values are also very important in the Fraser TSA. The area provides easy accessible forest recreation opportunities for people living in or near the Lower Mainland, and scenic values along several major highway corridors that transect the TSA.

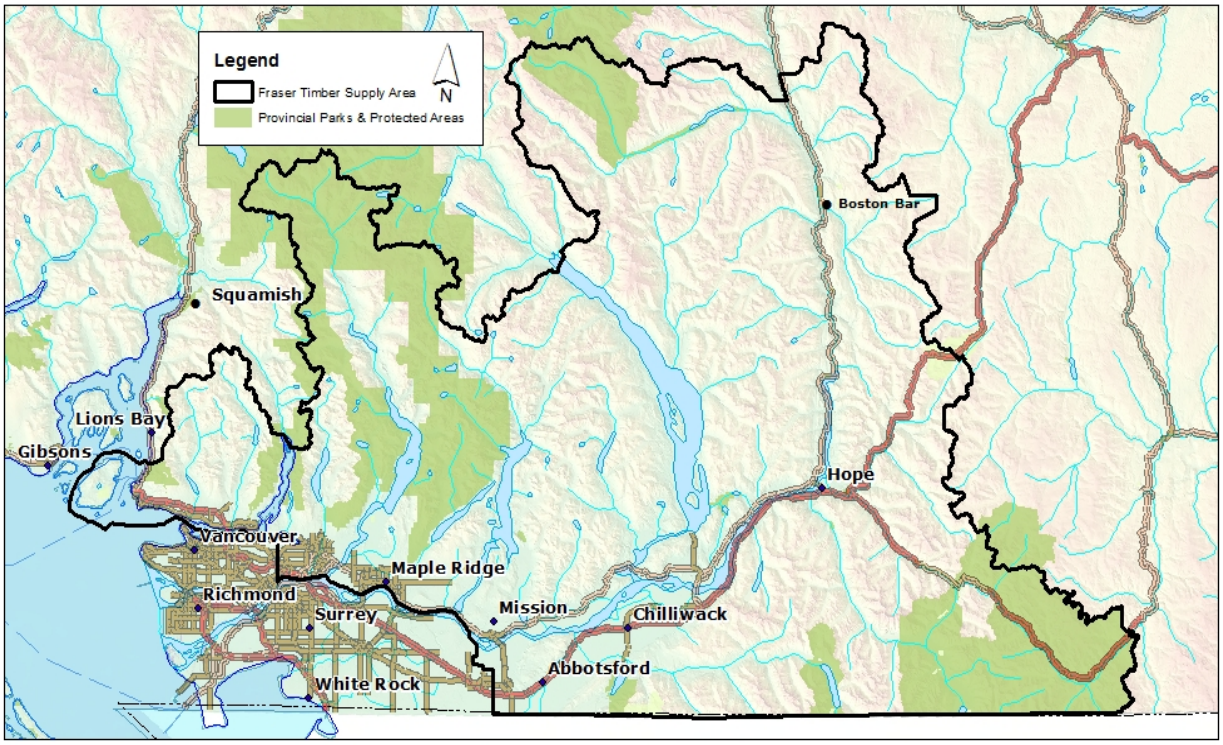

Figure 1. Map of the Fraser TSA.

First Nations

There are 38 First Nations and five tribal organizations located in the TSA that have asserted traditional territories within the Fraser TSA. In addition, there are 14 First Nations and seven tribal organizations located outside the TSA that have traditional territories that extend into the Fraser TSA. A key to reconciliation and relationship building are many collaborative understandings between government and First Nation communities through, but limited by, agreements, tenures, and treaties. Conducting assessments pertaining to heritage and cultural use are also a means to build relationships and reach reconciliation by recognizing possible important areas of aboriginal interests.

There are several First Nations within the Fraser TSA that are in treaty negotiations and one First Nation with a signed treaty. On April 3, 2009, the Tsawwassen First Nation Treaty came into effect. It is the first urban treaty in British Columbia and the first treaty negotiated under the British Columbia Treaty Commission (BCTC) process. On June 19, 2013, the Yale First Nation had the *Yale Final Agreement Act* receive Royal Assent from the federal government, and subsequently implementation of the treaty is now being negotiated. The Katzie First Nation, which entered the treaty process in 1994, is now in stage 4 of the six-stage process with an Agreement-in-Principle (AIP) being negotiated including the identification of an area of interest.

In addition to the Katzie First Nation, the Stó:lō Nation (which includes Aitchelitz, Leq'a:mel, Popkum, Skawahlook, Skowkale, Tzeachten, and Yakweakwioose First Nations), Musqueam First Nation, and Tsleil-Waututh Nation are all in stage 4 negotiations.

Since 2010, approximately 31 of the 38 First Nations with asserted traditional territories within the Fraser TSA have signed Forest Consultation and Revenue Sharing Agreements (FCRSA). These agreements provide First Nation communities with economic benefits returning directly to their community based on harvest activities in their traditional territory, as well as a consultation process for operational decisions related to forestry in the area. As well, many First Nations have obtained area or volume-based tenures within the Fraser TSA providing them with an opportunity to increase their participation in the forestry sector.

In June, 2008, the Kweh-Kwuch-Hum (Mt. Woodside) Spiritual Areas were identified as cultural heritage resource features by a *Government Action Regulation* (GAR) Order. The Kweh-Kwuch-Hum protects and conserves spiritual areas as noted in the order.

In April, 2014, 14 Stó:lō First Nations and the BC Government signed a Stó:lō First Nations Strategic Engagement Agreement (SEA) to create a more efficient consultation process and foster more effective engagement between the BC Government and First Nations in the Fraser Valley.

The Ministry of Forests, Lands, and Natural Resource Operations has been consulting with First Nations about this timber supply review and the cultural interests with various communities.

Environmental values

Current forest management must be consistent with the requirements of the *Forest and Range Practices Act* (FRPA) and associated regulations, which are designed to maintain a range of biodiversity and wildlife values. All forest lands, whether they contribute to timber supply or not, help to maintain critical habitats for many species. The timber supply analysis includes forest resource values or cover requirements for biodiversity, visual quality, wildlife habitat, community watersheds, recreation features, riparian management and protection of environmentally sensitive areas. These requirements are applied to the Crown forest land base (CFLB). In the Fraser TSA, about 43 percent of the CFLB is neither suitable nor available for timber harvesting given the various forest resource values or cover requirements.

The Fraser TSA has a wide range in climate (from coastal to interior) and elevation (from sea level to 2400 metres). Three broad physiographic units shape the area: the Coast Mountains border the TSA to the north and east; the Fraser Lowland, a broad plain of riverine and glacial deposits, extends east from Vancouver to the community of Hope; and the downstream Fraser River Estuary that includes the delta and tidal areas surrounding the river outlet to the Pacific Ocean. The Fraser TSA is one of the most biologically diverse regions in the province with ecosystems in five biogeoclimatic zones: Coastal Western Hemlock (CWH), Mountain Hemlock (MH), Interior Douglas-fir (IDF), Engelmann Spruce-subalpine fir (ESSF), and Alpine Tundra (AT) in the TSA.

The TSA's varied topography and climate support a rich variety of wildlife. More than 300 species of migratory and resident birds, 45 species of mammals and 13 species of amphibians and five species of reptiles range throughout the area. Native mammals include black-tailed deer, black and grizzly bear, mountain goat, beaver, wolverine and weasel. Native and migratory birds in the forests of the area include species of management concern such as spotted owl, marbled murrelet, northern goshawk, and great blue heron. Adjacent marine and foreshore habitats and estuaries, and river riparian ecosystems support populations of bald eagles, peregrine falcons, trumpeter swans, harlequin ducks and over-wintering birds. Several river systems support salmon, steelhead, trout, white sturgeon and numerous other fish species.

Land use planning in the Fraser TSA

Timber supply reviews undertaken in support of AAC determinations are based on the land use objectives established by government and current forest management. In the Fraser TSA these include:

- Old growth management areas (OGMAs) established in 21 of the 24 landscape units within the Fraser TSA.
- Spotted owl wildlife habitat areas (WHA) and general wildlife measures (GWM) established under *Government Action Regulation* (GAR) orders to implement the Spotted Owl Management Plan (SOMP2). These WHAs and GWMs replace the SOMP1 reserves and forest cover objectives modelled in the previous timber supply review (TSR3).
- Ungulate winter range (UWR) for mountain goat (over 35 000 hectares) and for black-tailed and mule deer (over 31 000 hectares) established under GAR orders.
- Scenic areas and visual quality objectives (VQOs) for the Chilliwack Natural Resource District established under Section 17 of the GAR (2005) as updated in 2013.

As in previous timber supply reviews, the information compiled during this review can be made available to support a variety of other processes, including land-use planning. In the event that new legal objectives are issued prior to the chief forester's AAC determination, sensitivity analyses may be used to assess the impact, if any, on the base case. Any changes in legal objectives that occur following the determination can be addressed in subsequent timber supply reviews or earlier if the chief forester thinks that that the changes could significantly affect timber supply.

Regional economy

According to population estimates provided by BC Stats, between 2004 and 2013, the population of the Metro Vancouver and Fraser Valley area increased by 14 percent from 2.41 million to 2.74 million. In comparison to the total BC population of 4.58 million, this represents about 60 percent of the population adjacent to, or residing within the Fraser TSA. The large urban centres within this TSA, particularly Vancouver, are economically supported by large business, consumer services and public sector employment. Its labour force is dominated by public service, health and education, wholesale and retail trade, and manufacturing.

Primary sectors such as forestry make up a larger proportion of the labour force east of Metro Vancouver, especially in the upper Fraser Valley and Fraser Canyon. For example, agriculture, forestry, fishing and hunting account for eight percent of the labour force in the Fraser Valley Regional District and one percent of the Metro Vancouver's labour force. These jobs are located both within and outside of the TSA and are connected to harvesting, milling, or secondary manufacturing and support functions.

At present, about 75 to 85 percent of the logs harvested in the TSA are sold on the Vancouver Log Market, while the remaining 15 to 25 percent are sold in the USA and China, Korea, and Japan. A significant proportion of the timber harvested in the Fraser TSA is processed in the lower mainland. In addition to this volume from the TSA, another 20 to 25 percent of logs processed and sold within the district come from districts in the southern interior or coast. This is somewhat offset by the transportation of about five percent of the logs harvested from the district to the southern interior for processing.

Land base and forest management changes since the last TSR

The AAC currently in effect was determined on August 1, 2004. Since then, several changes have occurred to the land base and forest management information that are reflected in the new timber supply analysis. The major changes are:

- The Cascade Lower Canyon Community Forest (CLCCF), with an AAC of 30 000 cubic metres and several new woodlots have been established since the 2004 determination. Issuance of area-based tenures such as these result in the transfer of area and AAC from the "parent TSA" to the new tenure. The resultant lower TSA AAC is referred to as the "effective AAC".
- The Tsawwassen First Nation Treaty (April 3, 2009) removed non-forest Crown land within urban areas of the TSA.
- The *Yale Final Agreement Act* removed a small area of forested Crown forest land from the TSA.
- The site productivity estimates for managed stands from a provincial biophysical site index model were used in place of the site index adjustment project information used in the previous timber supply review (TSR3).
- New natural stand yield projections were developed using the ministry's Variable Density Yield Prediction model (VDYP) version 7.
- Old growth management areas (OGMAs) have been established in 21 of the 24 landscape units within the Fraser TSA to meet landscape-level biodiversity requirements.
- Spotted Owl Management Plan (SOMP2) designated areas were legally established (March 1, 2011) through the approval of 17 wildlife habitat areas (WHAs) and general wildlife measures (GWM). These replace the SOMP1 reserves and cover objectives modelled in TSR3.
- *Government Action Regulation* (GAR) orders established over 35 000 hectares of ungulate winter range for mountain goat and over 31 000 hectares of winter range for black-tailed deer and mule deer. The deer winter range replace the draft UWR modelled in TSR3.
- GAR orders established WHAs for grizzly bear, spotted owl, Pacific water shrew, mountain beaver, Pacific giant salamander, and tall bugbane.
- Scenic areas and visual quality objectives (VQOs) were continued for the Chilliwack Natural Resource District in 2005 under Section 17 of the GAR were updated in 2013.
- The Kweh-Kwuch-Hum (Mt. Woodside) Spiritual Areas were identified as cultural heritage resource features by a GAR order, June 23, 2008.
- A GAR order was issued in April 2010 to protect of surface and subsurface karst system (caves) within the area identified in the Karst GAR Order.
- Several new recreation sites and trails have been established.

Several of the above listed changes (i.e. wildlife areas, new old growth management areas, visuals, spotted owl areas etc.), refine or supplant forest management practices or assumptions applied in the last analysis. For example, spotted owl wildlife habitat areas replaced the former spotted owl management plan used in the reflected in the 2004 analysis.

Forest management

Area available for timber harvesting

As part of the process used to define the timber harvesting land base (THLB)[e] in the timber supply analysis, a series of deductions are made from the TSA land base (See *Table 1*). The total area of the TSA is 1 423 038 hectares. After accounting for lands that are administered under separate area-based tenures, not Crown land or forested, the Crown forest land base (CFLB)[f] is 816 847 hectares.

After further reductions for areas not suitable or available for timber harvesting because of ecological, economic, or social considerations, the THLB is 250 405 hectares. This is four percent smaller than in the 2004 timber supply analysis with the difference largely attributable to removal of the Cascade Lower Canyon Community Forest Area, old growth management areas and wildlife habitat areas.

About 82 percent of the total TSA area is not available for timber harvesting. Areas excluded from harvest include land base designated for the protection of wildlife, riparian reserves, old growth values and archaeological sites, potentially unstable or unstable terrain, inoperable conditions, and uneconomic stands or areas otherwise unsuitable for timber harvesting.

As well, there are several areas that have seen limited harvesting. These include areas such as Bowen Island where urban development or other non-timber factors increase the complexity of forest operations or areas that First Nations have identified as having significant cultural values. A low level of operating performance has been demonstrated within the provincial forest lands in these complex operating areas. However, as the chief forester does not have the legal authority to make land use decisions or establish land use requirements, and government has not provided legal direction that excludes timber harvesting, these areas are assumed to contribute to timber supply for the purposes of timber supply analysis.

The THLB is a strategic level estimate of the area available for timber harvesting for the purposes of modelling timber supply. However, inclusion or exclusion of an area in the THLB does not imply a change in operational management and consultation must occur before any operational decisions are made. Operationally, there may be areas that were not included in the THLB where harvesting does occur. Likewise, there may be areas within the THLB that never actually get harvested. Where government is expected to issue a land use order or the ownership classification of an area may change prior to the AAC determination, a sensitivity analysis may be prepared to assess what, if any, effect it may have on timber supply.

[e]**Timber harvesting land base (THLB)**
The THLB is an estimate of the land where timber harvesting is considered both acceptable and economically feasible, given the objectives for all relevant forest values, existing timber quality, market values and applicable technology. The THLB is derived from the data, forest management practices and assumptions described in the data package. It is a theoretical, strategic-level estimate used for timber supply analysis and could include areas that may never be harvested or may exclude areas that will be harvested.

[f]**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

Current forest management must be consistent with the requirements of the *Forest and Range Practices Act* (FRPA) and associated regulations that are designed to maintain a range of biodiversity and wildlife values. All forested lands, whether they contribute to timber supply or not, help to maintain critical habitat for many species. Therefore, the timber supply analysis includes constraints or forest cover requirements for biodiversity, visual quality, wildlife habitat, community watersheds, recreation features, riparian management and protection of environmentally sensitive areas. These requirements are applied to the CFLB in the timber supply analysis.

The various land base classes including the THLB assumed in the analysis are listed in Table 1.

Table 1. Fraser TSA land base netdown table

Land class		Removal (hectare)	Category total (hectare)
TSA gross area			1,423,038
Community forests		26,060	
Other tenures and leases		58,639	
Private and federal land		155,490	
TFL lands		18,325	
Ocean		15,569	
Crown land in TSA			1,148,955
Not productive forests		312,650	
Hydro transmission line corridors		3,663	
Existing roads		15,795	
Crown forest land in TSA			816,847
Parks and reserves		185,536	
Managed forest land base in TSA			631,310
Inoperable stands	258,789	258,789	
Non-merchantable	17,952	10,905	
Low site stands	20,202	10,789	
Old growth management areas	75,513	22,440	
Wildlife habitat areas(WHAs) - reserve areas	79,357	34,392	
Goat winter ranges - reserve area	50,650	2,111	
Registered archaeological sites	1,070	525	
Environmentally sensitive areas	97,039	13,200	
Research plots & PSPs	928	482	
Riparian management area	34,472	13,364	
Deer winter ranges	7,589	1,947	
WHAs partially reserved		173	
Recreation sites	5,911	306	
Wildlife tree patches	10,716	10,716	
Yale First Nation Part 13 area		622	
Kweh-Kwuch-Hum Spiritual Areas		145	
Current timber harvesting land base			250,405

Forest composition

Figure 2 illustrates the distribution of timber volume and area of stands within the timber harvesting land base (THLB) grouped by dominant tree species: hemlock-balsam, Douglas-fir, cedar, pine, spruce and alder.

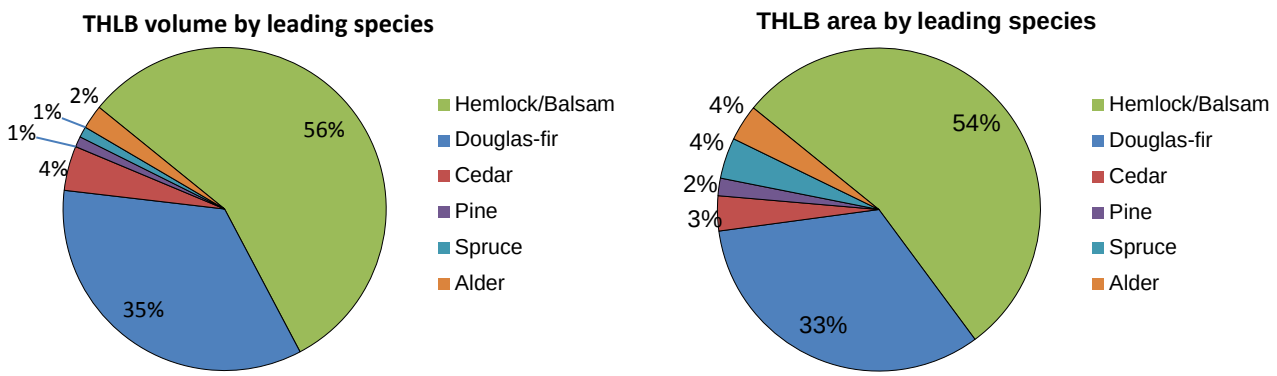

Figure 2. Tree species composition in the Fraser TSA by area and volume.

Age class distribution

Figure 3 shows the current age class distribution of stands in the forested land base. The area within the THLB is indicated separately from the non-THLB area. Within the THLB, managed stands, which were generally established by planting, are younger than 35 to 60 years old, depending on the species. Stands that are older than that generally originate from natural regeneration and are considered unmanaged in the analysis. Old stands, that are more than 120 years in age, occupy a small portion of the THLB within the TSA but are abundant in areas outside the THLB.

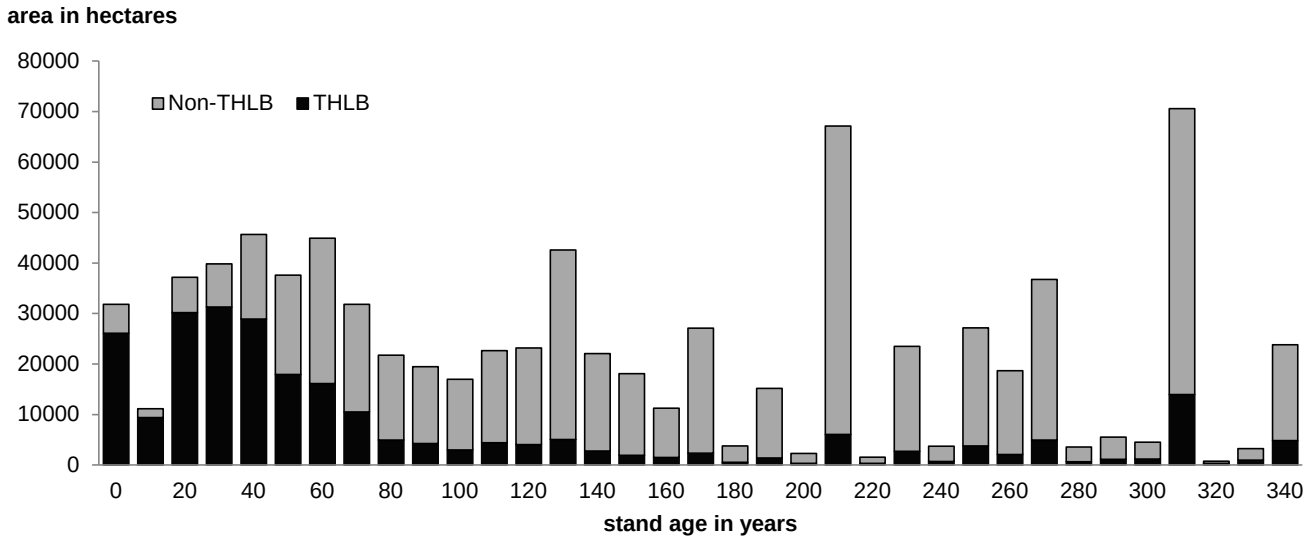

Figure 3. Stand age class distribution for the managed forest land base in the Fraser TSA showing THLB and non-THLB portions.

Harvest performance

Data from VRI forest inventory intersected with harvest area maps provide the proportion of inventory volume by trees species in areas harvested from the Fraser TSA between 2004 to 2013. The Harvest Billing System (HBS) provides the proportion scaled volume by tree species harvested from the TSA between 2004 and 2014. The distributions of timber volume form these two sources are illustrated in Figure 4.

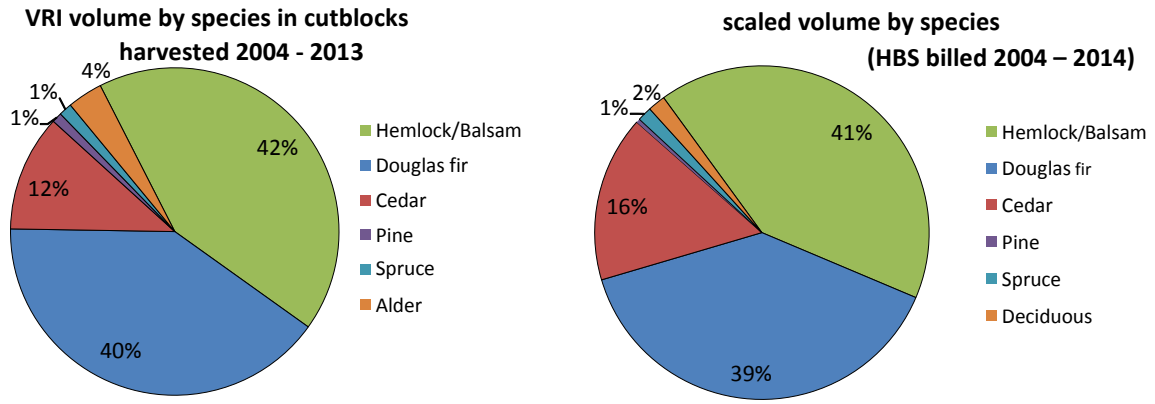

Figure 4. Proportion of species harvested (harvested area inventory versus scaled volumes).

Compared to the volume of various tree species reported in the forest inventory for the THLB (Figure 2), proportionately less hemlock-balsam has been harvested over the last 10 years than currently occurs in the THLB inventory. However, the proportion of hemlock-balsam harvested has increased over the last four years as seen in Figure 5 which shows volume by species and year information from the ministry's Harvest Billing System. A sensitivity analysis prepared to explore the timber supply implications of assuming hemlock-balsam leading-stands will contribute to future timber supply at levels indicated in Figure 4 appears on page 13 of this document.

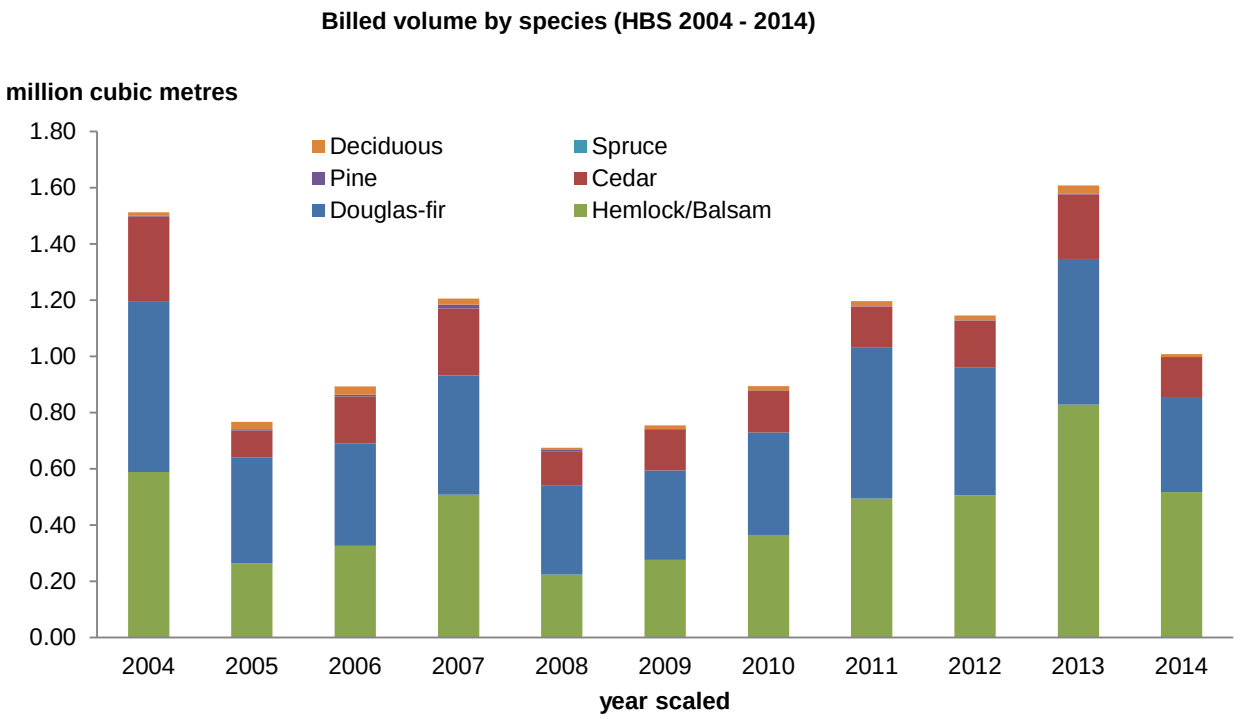

Figure 5. Volume harvested in the Fraser TSA by species and year.

Timber supply analysis

In order to determine an AAC, the chief forester reviews many sources of information including a timber supply analysis that models the development of the forest through time and its response to harvesting while respecting government's many timber and non-timber objectives. This section highlights some of the important findings from the timber supply analysis.

The base case

For most AAC determinations, a timber supply analysis is carried out using data and information from three categories: land base inventory, timber growth and yield, and management practices. Using this information, a computer model is used to produce a series of theoretical timber supply forecasts. These forecasts examine the timber supply effect of using different starting harvest levels, rates of decline or increase, and potential trade-offs between short- and long-term harvest levels.

A timber supply analysis provides an assessment of the existing land base and forest management information. From this information, a number of timber supply forecasts can be prepared. Of these, one is selected for use by the chief forester for use as a reference when considering the effect of uncertain information on the timber supply. This timber supply forecast is called the base case. The base case is not an AAC recommendation, but rather one of many sources of information the chief forester will consider when setting the AAC. Ultimately the AAC determined by the chief forester is an independent, professional judgment that considers timber supply analysis, numeric and qualitative information and uncertainty. Consequently, the AAC determined by the chief forester may be greater or less than the initial level forecasted in the base case.

In the base case selected for this AAC determination, a harvest level of 1.26 million cubic metres per year can be maintained for the entire forecast period. This level is 1.7 percent higher than the effective AAC of 1.239 million cubic metres, and one percent lower than the AAC determined in 2004 of 1.27 million cubic metres.

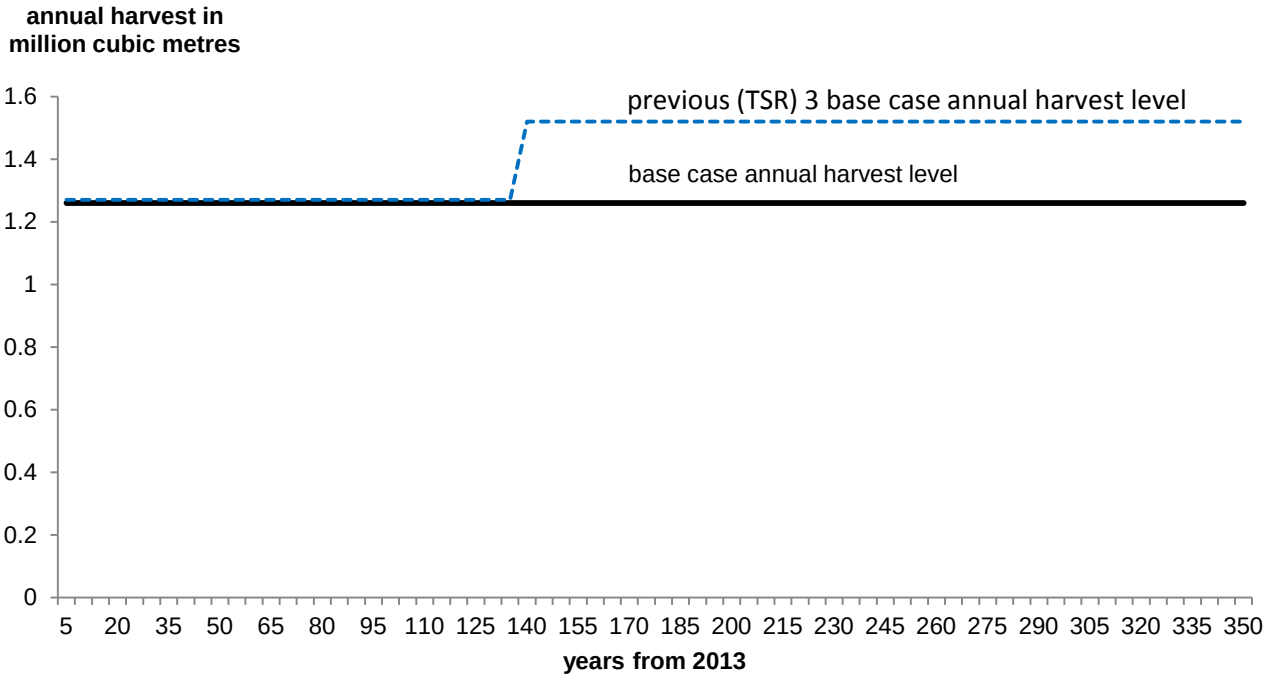

Figure 6. The base case harvest level compared to the previous TSR3 (2004) base case harvest level for the Fraser TSA.

An important assumption applied in the base case is the amount of volume that will be harvested from forests over 115 years old. Currently, the majority of harvesting in the TSA occurs in second-growth stands. The proportional contribution of conifer stands that are over 115 years old on the THLB is limited to 40 percent of the total harvest in base case. This amount is consistent with proportion of old-conifer volume scaled in the TSA between 2005 and 2014 as illustrated in Figure 7.

Figure 7. The percentage of conifer volume billed from the Fraser TSA within Selling Price Zone groups (SPZ) SPZ-52 (green) is second-growth; and SPZ 50 et. al. (orange) is older timber.

Sensitivity analysis

The base case projects an even-flow harvest level of 1.26 million cubic metres per year for the forecast horizon of 350 years. It 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 how the base case would vary if assumptions were changed. For the Fraser TSA, the following assumptions were assessed: the harvest level, the contribution of old stands to the harvest, minimum harvestable ages, minimum merchantable volume, operational adjustment factors, inventory volume estimates and the proportional contribution of hemlock-balsam stands.

Key properties of timber supply forecasts include: the short-term or initial harvest level, the long-term harvest level and the projected growing stock. Growing stock is the total volume of timber on the THLB. Ideally the projected growing stock is stable over the long term, as this indicates that harvesting is in balance with timber growth. Table 2 is a summary of key results from the sensitivity analysis.

Table 2. Key results from the sensitivity analysis for the Fraser TSA

Analysis forecast	Assumption change	Impact to short-term harvest level	Impact to long-term harvest level	Impact to growing stock volume	Other Comment
Base case (reference forecast)	Even-flow: 1.26 million m³/year	None	None	Stable	Maximum even-flow
Higher harvest levels	Increased harvest level to 1.29 million m³/year for the entire forecast	Increase 2%	Increase 2%	Declining	Harvesting exceeds the growth of trees in the long term.
	Initial harvest level increased to 1.35 million m³/year, then declines after 140 years to 1.29 million m³/year	Increase 7%	Increase 2% (to 1.29 million m³/year)	Stable but at levels lower than the base case	Short term can be maintained for 140 years. Long term same as in the base case.
Increase the contribution of old forest (>115 years)	Allow up to one million m³/year of harvest from forest over 115 years old and using the base case harvest priority	Increase 6%	Increase 6%	Stable	Current harvest contribution approx. 40% ~(540 000 m³/year)
	Allow up to one million m³/year of harvest from forest over 115 years old and using an oldest-first harvest priority.	Increase 9%	Increase 9%	Stable	Base case increased by 9%
Decrease the contribution of old forest (>115 years)	Allow 350 000 m³/year of harvest from forest over 115 years old (using the base case harvest priority).	Decrease 4%	No change	Stable	Base case decreased by 3%
Change the minimum harvest age (MHA) and minimum harvest volume (MHV) criteria	Reduce the MHA by 10 years and reduce MHV to 300 m³/ha (using the base case harvest priority)	Increase 2%	Increase 2%	Stable at increase level	Mean harvest age is reduced
Adjust natural stand inventory volumes based on inventory audit results	Apply inventory audit adjustment ratios to natural stand volumes based on analysis unit (AU)	No change	No change		S/T volume available mitigates these reduced volume ratios
Reduce managed stand Operational Adjustment Factor (OAF1)	Reduce managed-stand OAF1 to 12% for Fd-leading stands	Increase 2%	Increase 2%		Base case OAF1 is 15%
Control the contribution of hemlock-balsam leading stands	Contribution of hemlock/balsam stands are held to within 45 percent of the total harvest (as per 10-year harvest history)	Minimal effect	Minimal effect		Old natural stands are converted to managed stands at a slower rate
Adjust the THLB	Change the THLB to test uncertainty related management issues (e.g. in complex operating areas)	Impacts are generally proportional to percent THLB change			

Sensitivity forecast showed that if the overall timber harvest in the forecast were raised by two percent to 1.29 million cubic metres the total growing stock on the THLB would decline through the forecast which indicates harvest volumes are greater than annual growth and the forecast harvest level may not be sustainable.

The contribution of old stands is a key factor affecting the Fraser TSA timber supply. The remaining old forests in the TSA carry high stand volumes but are often on poorer sites or located in areas that are more expensive to harvest. The contribution of these stands was limited in the base case to no more than 40 percent of the total harvest in any period, which is the level harvested in recent years. If old forests were allowed to contribute by as much as one million cubic metres (80 percent) in any period, with no other assumption changes, then they are converted to managed stands sooner in the forecast and the sustainable harvest level for the TSA could be increased by six percent. If old forest were allowed to contribute by as much as one million cubic metres in any period and an oldest-first harvest rule was used to rank stands for harvest (a highest volume-first rule is applied in the base case), then slower growing old forest are converted to managed stands even sooner and the sustainable timber supply could be increased by nine percent.

Decreasing the maximum contribution of old forest has a negative effect on the short-term harvest level. When these stands do not contribute more than 350 000 cubic metres per year, the maximum initial harvest is decreased by four percent, relative to the base case. The length of time required to convert old natural stands to managed stands is also increased by more than five decades.

The minimum harvestable age (MHA) and minimum harvestable volume (MHV) are assumptions used to define when a stand has reached a merchantable age and size. These assumptions guide when second-growth stands become available for harvest and are important inputs in the Fraser TSA forecast. The base case assumption is that conifer stands become merchantable at the age when they achieve 95 percent of their highest annual increment and a volume of at least 350 cubic metres per hectare. When the MHA is reduced by 10 years and the minimum volume is reduced by 50 cubic metres per hectare, managed stands become merchantable sooner in the forecast and the total sustainable harvest can be increased by two percent.

The timber volume in natural stands is estimated from the Vegetation Recourse Inventory. Ground sampling undertaken to check inventory volumes estimates suggest that, overall, the VRI volumes may be overestimated in the TSA by 2.4 percent. When the natural stand volumes estimates were adjusted downward by this amount there was a reduction in the short-term growing stock but the base case harvest level was maintained.

Managed stand yield estimates in the base case are adjusted downward to account for certain operational conditions, such as a less-than-ideal distribution of trees, the presence of small non-productive areas and endemic pests and diseases. In the base case, two operational adjust factors (OAF) were applied: an OAF-1 of 15 percent and an OAF-2 of five percent, which are the default modelling assumptions in TSR. A sensitivity forecast was produced to test the impact of assuming a three percent lower OAF1. The affect was a two percent increase in the harvest forecast.

Information on actual harvest levels suggest that the proportion of hemlock-balsam leading stands harvested in the last decade is less than the proportion these stands occur in the THLB. A sensitivity forecast was run to test the implications of limiting the contribution of these stands to the total harvest so that it aligns with actual performance; it kept the proportion of hemlock balsam to within 45 percent of the total harvest. This change did not reduce the total harvest volume in the base case though it did lengthen the time period in which old natural stands are converted to managed stands.

Summary

The base case harvest forecast indicates that an initial harvest of 1.26 million cubic metres can be maintained for the duration of the forecast period. This level is 1.7 percent higher than the current AAC of 1.239 million cubic metres, but is 17 percent lower than the long-term harvest level in the base case used to determine the current AAC in 2004. The short term timber supply appears to be robust with additional potential volume from older age stands greater than 115 years of age. These stands are not the same as old—growth stands which are protected under old-growth management areas.

In an alternative harvest forecast, the initial harvest level was increased to 1.35 million cubic metres per year resulting in a seven percent increase to short-term timber supply. This could be maintained for 140 years. The long-term timber supply in this forecast also increases by two percent, and growing stock remains stable.

The harvest level achieved in the base case forecast is sensitive to changes in the assumed contribution of old natural stands and minimum harvestable age.

These results suggest that if harvesting is done in proportion to the species profile and across the various landscape units on the timber harvesting land base, the timber supply in the Fraser TSA will remain robust.

The provincial chief forester's AAC determination is a judgment based on her professional experience and her consideration of a wide range of information as required under Section 8 of the *Forest Act*. 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 forecasts included in this document.

Your input is needed

Public input is a vital part of establishing the allowable annual cut. Feedback is welcomed on any aspect of this public discussion paper or any other issues related to the timber supply review for the Fraser timber supply area. Ministry staff would be pleased to answer questions to help you prepare your response. Please send your comments to the district manager at the address below (via email if possible).

Your comments will be accepted until May 3, 2015.

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 or to send your comments, contact:

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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 or the analyst Jim Brown at WJim.Brown@gov.bc.ca

Visit the Forest Analysis and Inventory Branch web site at http://www.for.gov.bc.ca/hts/