

**BRITISH COLUMBIA
MINISTRY OF FORESTS**

**Rationale for
Allowable Annual Cut (AAC)
Determination for
Lillooet
Timber Supply Area**

Effective October 12, 2023

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Objective of this document

This document provides an accounting of the factors I considered, and the rationale I employed in making my determination, of the allowable annual cut (AAC) for the Lillooet Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Acknowledgement

For preparation of the information I considered in this determination, I am indebted to staff of the BC Ministry of Forests, (the “Ministry”) in the Cascades Natural Resource District, the Thompson-Okanagan Natural Resource Region, and the Forest Analysis and Inventory Branch (FAIB). I am also grateful to the First Nations, forest industry representatives, local residents, individuals and other stakeholders who contributed to this process.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to determine AACs for TSAs and Tree Farm Licences (TFL) after considering certain specified factors. Section 8 of the *Forest Act* is reproduced in full as Appendix 1 of this document.

Description of the Lillooet Timber Supply Area

The Lillooet TSA covers approximately 1.125 million hectares in southwestern British Columbia, between the Coast Mountains and the Thompson-Okanagan Plateau. The TSA is administered by the Ministry’s Cascades Natural Resource District (CNRD) in Merritt, BC, with a small field office in Lillooet.

Rugged topography and the dramatic climatic variations of mountainous terrain result in seven biogeoclimatic zones with 30 variants in the Lillooet TSA. The varied landscapes include dry grasslands, coniferous forests, and alpine tundra. In the western portion of the TSA, temperate rainforest conditions predominate, while eastern areas are dominated by the semi-arid and dry grassland landscapes of the province’s interior dry belt. These wide-ranging landscapes support diverse forest types dominated by lodgepole pine, Douglas-fir and spruce-leading stands. Less abundant tree species include ponderosa pine, white bark pine, subalpine fir (balsam), western redcedar and hemlock.

The varied landscapes and the lakes and streams in the Lillooet TSA support a wide variety of wildlife, bird, and fish species, some of which have declining populations across the province. Ten red-listed species (endangered or threatened), and 30 blue-listed species (species of concern) may be found in the TSA. Several provincial parks and protected areas located in the TSA support significant recreation activities, including mountain biking, hiking, climbing, fishing, camping, wildlife viewing, white-water boating, heli-skiing, snowmobiling, ski mountaineering, and cross-country skiing.

The regional service centre in the TSA is the town of Lillooet which accounts for roughly 40 percent of the relatively small population of about 6500 in the TSA. The village of Lytton is the only other incorporated settlement in the TSA. Large unincorporated communities include Bralorne, Gold Bridge, Spences Bridge and the First Nations communities of Tsal’alh, Xwisten, Sekw’el’was, T’it’q’et, Xaxli’p, Ts’kw’aylaxw, Kanaka Bar, Skuppah, Nicomen, Lytton, Cook’s Ferry and Siska. It is estimated that about one half of the residents within the TSA are Indigenous.

The communities in the TSA have long based their economy on natural resources, with forestry-related activities continuing to be the largest industry. However, the only major timber processing facility remaining in the TSA is Aspen Planer’s veneer plant located in Lillooet. As there are currently no primary breakdown facilities for sawlogs, timber must leave the TSA to be processed, typically in Merritt. Other contributors to the regional economy include tourism, agriculture, and mining. Outdoor recreation

opportunities in the TSA are exceptional. The area is well linked to the rest of BC by four highways and three rail lines.

History of the AAC

Prior to 1982, the AAC for the Lillooet TSA was 650 000 cubic metres. In 1982, the AAC was temporarily increased to 800 000 cubic metres to allow for the salvage of timber killed during the mountain pine beetle (MPB) infestation. The temporary increase expired in 1985 and the AAC was lowered to 650 000 cubic metres. In 1996, the AAC was reduced to 643 500 cubic metres to account for the designation of the Stein Valley Nlaka'pamux Heritage Park. The AAC was further reduced to 635 900 cubic metres in 2002 to account for the issuance of new woodlot licences. In May 2009, a formal timber supply review was conducted and the chief forester set the AAC for the Lillooet TSA at 570 000 cubic metres. Of this AAC, non-pine species could comprise a maximum of 400 000 cubic metres to the annual harvest.

New AAC determination

Effective October 12, 2023, the new AAC for the Lillooet TSA will be 375 000 cubic metres. Within this AAC, there are two partitions:

- a maximum of 300 000 cubic metres attributable from live trees;
- a maximum of 180 000 cubic metres attributable to live trees on slopes less than 40 percent.

This new AAC is 34 percent below the current AAC. The live portion of this AAC is 47 percent lower than the current AAC. This AAC will remain in effect until another AAC is determined, which must take place within 10 years of this determination.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester, in determining AACs, to consider biophysical, social, and economic information. Most of the technical information used in AAC determinations is in the form of a timber supply analysis and its inputs related to forest inventory, growth and yield and management practices. The factors used as inputs to timber supply analysis have differing levels of uncertainty associated with them, due in part to variation in physical, biological, and social conditions.

Computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Technical information and analysis, therefore, do not necessarily provide the complete answers or solutions to forest management decisions such as AAC determinations. Such information does provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information I must consider in AAC determinations.

In determining the AAC for the Lillooet TSA I have considered known limitations of the technical information provided. I am satisfied that the information provides a suitable basis for my determination.

Guiding principles for AAC determinations

Given the large number of periodic AAC determinations required for British Columbia's many forest management units, administrative fairness requires a reasonable degree of consistency of approach in addressing relevant factors associated with AAC determinations. In order to make my approach in these matters explicit, I have considered and adopted the following body of guiding principles, which have been developed over time by BC's chief foresters and deputy chief foresters. However, in any specific circumstance in a determination where I consider it necessary to deviate from these principles, I will explain my reasoning in detail.

When considering the factors required under Section 8, I am also aware of my obligation as a steward of the forests of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests and Range Act*, and of my responsibilities under the *Forest Act*, *Forest, and Range Practices Act* (FRPA), and *Forester's Act*.

AAC determinations should not be construed as limiting the Crown's obligations under court decisions in any way, and in this respect, it should be noted that AAC determinations do not prescribe a particular plan of harvesting activity within the management units. They are also independent of any decisions by the Minister of Forests with respect to subsequent allocation of wood supply by way of an apportionment decision.

These guiding principles focus on responding to uncertainties; incorporating information related to First Nations' rights, titles, and interests; and considering information related to integrated decision making, cumulative effects, and climate change.

Information uncertainty

Given the complex and dynamic nature of forest ecosystems coupled with changes in resource use patterns and social priorities there is always a degree of uncertainty in the information used in AAC determinations.

Two important ways of dealing with this uncertainty are:

- (i) managing risks by evaluating the significance of specific uncertainties associated with the current information and assessing the potential current and future social, economic, and environmental risks associated with a range of possible AACs; and
- (ii) re-determining AACs regularly to ensure they incorporate current information and knowledge, and greater frequency in cases where projections of short-term timber supply are not stable and/or substantial changes in information and management are occurring.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, it is important to reflect those factors, as closely as possible, that are a reasonable extrapolation of current practices. It is not appropriate to base decisions on proposed or potential practices that could affect the timber supply but are not consistent with legislative requirements and not substantiated by demonstrated performance.

It is not appropriate to speculate on timber supply impacts that may eventually result from land use designations not yet finalized by government. Where specific protected areas, conservancies, or similar areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are not considered to contribute any harvestable volume to the timber supply in AAC determinations, although they may contribute indirectly by providing forest cover that helps meet resource management objectives such as biodiversity.

In some cases, even when government has made a formal land use decision, it is not necessarily possible to fully analyze and immediately account for the consequent timber supply impacts in an AAC determination. Many government land use decisions must be followed by detailed implementation decisions requiring, for instance, further detailed planning or legislated designations such as those provided for under the *Land Act* and FRPA. In cases where government has been clear about the manner in which it intends land use decisions to be implemented, but the implementation details have yet to be finalized, I will consider information that is relevant to the decision in a manner that is appropriate to the circumstance. The requirement for regular AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

Where appropriate, information will be considered regarding the types and extent of planned and implemented silviculture practices as well as relevant scientific, empirical, and analytical evidence on the likely magnitude and timing of their timber supply effects.

I acknowledge the perspective that alternate strategies for dealing with information uncertainty may be to delay AAC determinations or to generally reduce AACs in the interest of caution.

However, given that there will always be uncertainty in information, and due to the significant impacts that AAC determinations can have on communities, I believe that no responsible AAC determination can be made solely on the basis of a precautionary response to uncertainty with respect to a single value.

Nevertheless, in making a determination, allowances may need to be made to address risks that arise because of uncertainty by applying judgment as to how the available information is used. Where appropriate, the social and economic interests of the government, as articulated by the Minister of Forests, can assist in evaluating this uncertainty.

First Nations

The BC government has committed to true, lasting reconciliation with Indigenous peoples, including fully adopting and implementing the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Reconciliation and implementation of UNDRIP will likely require changes to policies, programs, and legislation, which will take time and involve engagement with Indigenous peoples. While this work is undertaken, BC is committed to fulfilling its legal obligations to consult and accommodate Aboriginal Interests consistent with the Constitution, case law, and relevant agreements between First Nations and the government of BC.

Where First Nations and the province are engaged in collaborative land and resource planning, the province may make general commitments regarding stewardship and other aspects of resource management. Where such commitments have been made, I will consider them when determining AACs, within the scope of my statutory authority.

As is the case for land use and management planning in general, where land use zones or management objectives resulting from collaborative planning between First Nations and the Province have not been finalized, it is beyond the statutory authority of the chief forester to speculate on final outcomes. If the timber supply implications of final designations are substantial, application of the Allowable Annual Cut Administration Regulation to reduce a management unit AAC between Section 8 determinations, or a new AAC determination prior to the legislated deadline may be warranted.

Where the nature, scope and geographic extent of Aboriginal rights and title have not been established, the Crown has a constitutional obligation to consult with First Nations regarding their Aboriginal Interests in a manner proportional to the strength of those Interests and the degree to which they may be affected by the decision. The manner of consultation must also be consistent with commitments made in any agreements between First Nations and the Province.

In this regard, full consideration will be given to:

- (i) the information provided to First Nations to explain the timber supply review process and analysis results;
- (ii) any information brought forward through consultation or engagement processes or generated during collaboration with First Nations with respect to Treaty rights or Aboriginal Interests, including how these rights or interests may be impacted.
- (iii) any operational plans and/or other information that describe how First Nations' Treaty rights or Aboriginal Interests are addressed through specific actions and forest practices; and

- (iv) existing relevant agreements and policies between First Nations and the BC Government.

Treaty rights or Aboriginal Interests that may be impacted by AAC decisions will be addressed consistent with the scope of authority granted to the chief forester under Section 8 of the *Forest Act*. When information is brought forward that is outside of the chief forester's scope of statutory authority, this information will be forwarded to the appropriate decision makers for their consideration. Specific considerations identified by First Nations in relation to their Aboriginal Interests that could have implications for the AAC determination are addressed in the various sections of this rationale where it is within the statutory scope of the determination.

Established Aboriginal title lands (meaning declared by a court or defined under an agreement) and other areas, such as Treaty Settlement Lands or Indian Reserves, are not provincial Crown land.

Consequently, the timber on these lands does not contribute to the AAC of the timber supply area or tree farm license with which they overlap. Prior to establishment of Aboriginal title, it is not appropriate for the chief forester to speculate on how potential establishment of Aboriginal title in an area, either by court declaration or by agreement, could affect timber supply, given uncertainties about the scope, nature, and geographic extent of title. Until land has been established as Aboriginal title land, it remains as provincial land managed by the province, and will contribute to timber supply.

Integrated decision making and cumulative effects

One of the responsibilities of the Ministry is to plan the use of forest and range resources such that the various natural resource values are coordinated and integrated. In addressing the factors outlined in Section 8 of the *Forest Act*, I will consider relevant available information on timber and non-timber resources in the management unit, including information on the interactions among those resources and the implication for timber supply.

With respect to cumulative effects, I must interpret related information according to my statutory authority. As emphasized above, the chief forester is authorized only to make decisions on allowable harvest levels, not to change or institute new management regimes for which other statutory decision makers have specific authority. However, cumulative effects information can highlight important issues and uncertainties in need of resolution through land use planning, which I can note and pass to those responsible for such planning. Information on cumulative effect can also support considerations related to Aboriginal Interests.

Climate change

One key area of uncertainty relates to climate change. There is substantial scientific agreement that climate is changing and that the changes will affect forest ecosystems. Forest management practices will need to be adapted to the changes and can contribute to climate change mitigation by promoting carbon uptake and storage. Nevertheless, the potential rate, amount, and specific characteristics of climate change in different parts of the province are uncertain.

This uncertainty means that it is not possible to confidently predict the specific, quantitative impacts on timber supply.

When determining AACs, I consider available information on climate trends, potential impacts to forest ecosystems and communities that depend on forests and related values, and potential management responses. As research provides more definitive information on climate change and its effects, I will incorporate the new information in future AAC determinations. Where forest practices are implemented to mitigate or adapt to the potential effects of climate change on forest resources, or where monitoring information indicates definite trends in forest growth and other dynamics, I will consider that information in my determinations.

I note, however, that even with better information on climate change, in many cases there will be a range of reasonable management responses. For example, it is not clear if either increases or decreases to current harvest levels would be appropriate in addressing potential future increases in natural disturbance due to climate change, which appear to be likely in some areas. Hypothetically, focused harvests in at-risk forests could forestall losses of timber and allow for planting of stands better adapted to future conditions. Conversely, lower harvest levels could provide buffers against uncertainty. The appropriate mix of timber supply management approaches is ultimately a social decision.

Deciding on the preferred management approach will involve consideration of established climate change strategies, and available adaptation and mitigation options together with social, economic, cultural, and environmental objectives. Analysis will be useful for exploring options and trade-offs. Any management decisions about the appropriate approach and associated practices will be incorporated into future AAC determinations. In general, the requirement for regular AAC reviews will allow for the incorporation of new information on climate change, on its effects on forests and timber supply, and on social decisions about appropriate responses as it emerges.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* in AAC determinations, I am assisted by timber supply projections provided to me through the work of the Timber Supply Review (TSR) Program for TSAs and TFLs.

For most AAC determinations, a timber supply analysis is carried out using a data package including data and information from three categories: land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply projections can be produced to reflect different starting harvest levels, rates of decline or increase, and potential trade-offs between short- and long-term harvest levels.

From a range of possible harvest projections, one is chosen in which an attempt is made to avoid both excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the base case harvest projection, and it forms the basis for comparison when assessing the effects of uncertainty on timber supply. The base case is designed to reflect current management practices, demonstrated performance, and established management requirements.

Because it represents only one of several theoretical timber supply projections, and because it incorporates information about which there may be some uncertainty, the base case is not an AAC recommendation. Rather, it is one possible projection of timber supply, whose validity, as with all the other projections provided, depends on the validity of the data and assumptions incorporated into the computer model used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which the assumptions made in generating the base case are realistic and current, and the degree to which resulting projections of timber supply must be adjusted to more properly reflect the current and foreseeable situation.

These adjustments are made based on informed judgment using currently available information about forest management, and that information may well have changed since the original data package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines, or plans.

Thus, in reviewing the considerations that lead to the AAC determination, it is important to remember that the AAC determination itself is not simply a calculation. Even though the timber supply analyses I am provided are integral to those considerations, the AAC determination is a synthesis of judgment and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these

considerations, the AAC determined may or may not coincide with the base case. Judgments that in part may be based on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, particularly in cases characterized by a large degree of unquantified uncertainty, once an AAC has been determined, no additional precision or validation would be gained by attempting a computer analysis of the combined considerations.

Base case for the Lillooet TSA

The base case, as well as all the other timber supply projections for the Lillooet TSA, was prepared by the FAIB analyst using Remsoft's Spatial Woodstock modelling platform. The timber supply model built by the analyst was used to maximize timber supply subject to a number of constraints, including a stable future growing stock. Since the model maximizes timber supply across the entire analysis horizon, the timber supply projection is usually shown as the maximum even-flow for the analysis horizon. The data and assumptions used in the base case are intended to reflect current legal requirements, the best available information, demonstrated forest management practices and current conditions in the Lillooet TSA as documented in the *Lillooet TSA Data Package* (January 2021).

The timber supply projections are not predictions, because many unforeseeable events will certainly occur, and practices and knowledge will change and evolve. Given this change and uncertainty, the projections may change in the future. Changes in practices and information will be incorporated into future AAC determinations. However, the harvest projections developed to support this AAC determination were designed to provide a rigorous and reasonable basis for the AAC decision and be consistent with the '*Guiding principles for AAC determinations*'.

A *Discussion Paper*, which contained the results of the timber supply analysis, was published in August 2022. The published base case harvest projection begins in 2019 and maintains a harvest level of 311 359 cubic metres per year for 100 years. The base case is used as reference point to assess the timber supply in Lillooet TSA, including exploration of the potential impacts of uncertainties through sensitivity analyses.

I reviewed all inputs to the base case, including how the environmental objectives in the draft Lillooet Land and Resource Management Plan (LRMP) were incorporated into the analysis. I also reviewed in detail the assumptions and methodology incorporated in the base cases, as well as the model output, including species distribution over time; growing stock projections by age class over time; average age, area, and volume harvested annually; and other factors as described in my considerations below. For this determination I am satisfied that the base case harvest projection and the sensitivity analyses have provided a suitable basis for my assessment of timber supply for the Lillooet TSA.

First Nations engagement

The Lillooet TSA overlaps the traditional territory of four Nations: St'at'imc, Nlaka'pamux, Secwepemc and Tsilhqot'in. The St'at'imc and Nlaka'pamux Nations are comprised of many communities and tribal councils, of which 12 communities reside within the TSA. Members of the Nlaka'pamux Nation Tribal Council (NNTC) who reside within the TSA are the Boothroyd Indian Band, Lytton First Nation, Oregon Jack Creek Indian Band, and Skuppah First Nation. Members of the St'at'imc Chiefs Council (SCC) who reside within the TSA includes the T'it'q'et First Nation, Ts'kw'aylaxw First Nation, Tsal'alh, Xwisten (Bridge River Indian Band), Sek'wel'was (Cayoose Creek Indian Band), and the Xaxli'p First Nation.

Since initiating the Lillooet TSR in 2018, Ministry staff contacted the St'at'imc and Nlaka'pamux communities to discuss their perspectives on timber supply within their respective territories. The provincial government has committed to collaborative engagement with Indigenous communities on the Lillooet TSR and AAC determination.

The provincial government and the NNTC have signed a shared decision-making pilot agreement. Under this agreement, the Province of BC and the NNTC created a Shared Decision-Making Board (SDMB) to

engage in a collaborative timber supply review process for the Lillooet TSA. The collaborative timber supply review process includes: the establishment of a Forestry Technical Working Group comprising members of the NNTC and Ministry staff, information sharing within the group, preparation of a technical report, preparation of a shared decision-making board report, and delivery of the board report to the chief forester. I met with NNTC on March 1, 2023 where the SDMB report was presented and discussions took place regarding the role this report would have in my final determination. In addition, a recently signed comprehensive forestry agreement between the NNTC and the provincial government commits the parties to further develop their new and innovative model of forestry relations and include forest licensees in tri-partite relations. Together the parties are working towards principles of a decision-making process that reflects the standard of free, prior, and informed consent and shared decision-making.

I met with representatives of the SCC on March 6, 2023, in Lillooet. The desire for a government-to-government agreement was expressed again. I heard the importance of retaining old growth for resilience against climate change and flooding, as well as to protect mule deer, cultural plants, and wild salmon. I heard the desire for respect of St'at'imc laws. The need was expressed for St'at'imc guiding land use planning for sustainability and better riparian management. I heard about the effects of fire and the impacts to the sustainability of cultural practices. The SCC highlighted earlier letters describing that BC does not have their knowledge and interests contained within the BC government TSR analysis.

Cook's Ferry Indian Band (an Nlaka'pamux nation that is not a member of the NNTC) met with Ministry staff in October 2020 at Spences Bridge. During the meeting, Cook's Ferry indicated mountain tops are sacred to their community. They stated that Horn Mountain holds significant cultural values for them and are concerned that this area may be contributing to the AAC.

Lower Nicola Indian Band (an Nlaka'pamux nation that is not a member of the NNTC) indicated that the Botanie Creek Watershed has significant cultural heritage values. They also stated that government is overlooking the biodiversity of culturally important plants in drier portions of the TSA.

Lil'wat Nation (a member of the SCC residing outside the TSA) expressed concern with the achievability of the AAC. Lil'wat Nation would like to acquire harvest volume in the Cascade Natural Resource District, in the Duffy and Hurley area under their Lil'wat Forestry Ventures.

High Bar First Nation (a member of the Secwepemc Nation) engaged later in the process and had several virtual meetings with Ministry staff during 2022 and 2023. On March 7, 2023, I met with representatives of the High Bar First Nation in Merritt. High Bar was concerned about the effects of climate change on water values, berry gathering and on animals they hunt for sustenance. They asked how climate change is being factored into the TSR and how burnt OGMAs will be considered or replaced in this determination. High Bar also provided data and recommendations regarding five of their cultural values.

N'Quatqua First Nation (a member of the SCC) indicated to staff that they would like additional volume to harvest in the Lillooet TSA.

In my considerations for the Lillooet TSA, I am mindful of the significant interest shown by First Nations in the harvest level and the effect that past and present harvesting has had on their interests and ability to meaningfully practice their rights. I am also aware of the government's desire for reconciliation with First Nations and the government's intention to change the way forests are managed in this province as described in the June 2021 document titled *Modernizing Forest Policy in British Columbia: Setting the intention and leading the forest sector transition* (Intentions Paper).

I reviewed the entire First Nations consultation record provided by staff and I will reflect on what I read as well as what I heard during my meetings with First Nations as I make this AAC decision.

Licensee engagement

Aspen Planers sent written comments on the *Discussion Paper* to District staff on October 18, 2022. I reviewed the letter and discussed the comments with staff as I considered each of the factors during the AAC determination meeting held on March 7 and 8, 2023 in Merritt.

On March 27, 2023, I met with representatives from Aspen Planers to discuss their concerns and recommendations regarding this TSR and AAC decision.

Aspen Planers expressed disappointment that a socio-economic analysis was not conducted for the Lillooet TSA. They informed me about the number of employees in their mills at Lillooet and Savona and described how the operations of these mills are integrated.

Aspen Planers indicated that they have been building better relations with First Nations over the past few years and they expect to have access to areas where First Nations have previously prevented logging.

The representatives also stated that the company recently restarted operations and even though they have not harvested low volume stands in the past, they are capable of harvesting stands where the volume is lower than the 150 cubic metres per hectare assumed in the base case. This means that the THLB and timber supply could potentially be greater than what is shown in the base case when performance in these stands is demonstrated.

Consideration of factors as required by Section 8 (8) of the *Forest Act*

I have reviewed the information for the factors required to be considered under Section 8 of the *Forest Act*. Where I have concluded that the modelling of a factor in the base case is a reasonable reflection of current legal requirements, demonstrated forest management and the best available information, and uncertainties about the factor have little influence on the timber supply projected in the base case, no discussion is included in this rationale. These factors are listed in Table 1.

For other factors, where more uncertainty exists or where public or First Nations' input indicates contention regarding the information used, modelling, or some other aspect under consideration, this rationale incorporates an explanation of how I considered the issues raised and the reasoning that led to my conclusions.

Table 1. List of factors accepted as modelled in the base case

<i>Forest Act</i> section and description	Factors accepted as modelled and not discussed further in the rationale
8(8)(a)(i) the composition of the forest and its expected rate of growth on the area	<ul style="list-style-type: none"> • Excluded non-Crown land • Non-forest and non-productive forest • Parks and protected areas • Non-commercial brush • Areas removed for deciduous-leading stands • Inoperable areas • Terrain stability and environmentally sensitive areas • Volume estimates for existing natural stands • Site productivity estimates • Volume estimates for managed stands
8(8)(a)(ii) the expected time that it will take the forest to become re-established following denudation	<ul style="list-style-type: none"> • Genetic gain • Operational adjustment factors
8(8)(a)(iii) silviculture treatments to be applied to the area	<ul style="list-style-type: none"> • Stand establishment
8(8)(a)(iv) the standard of timber utilization and the allowance for decay, waste, and breakage expected to be applied with respect to timber harvesting on the area	<ul style="list-style-type: none"> • Utilization standards, waste, and waste reporting • Decay, waste, and breakage for existing natural stands • Minimum harvest criteria
8(8)(a)(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production	<ul style="list-style-type: none"> • Old-growth deferral areas • Visual quality objectives • Adjacency, green-up, and maximum cutblock size • Recreation resources
8(8)(a)(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber	<ul style="list-style-type: none"> • Grade 4 credit • Occupant Licence to Cut
8(8)(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area	<ul style="list-style-type: none"> • Harvest rules and priority • Alternative rates of harvest
8(8)(d) Economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia	<ul style="list-style-type: none"> • Economic and social objectives expressed in the Minister's letter • Summary of public input
Section 8(8)(e) Abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area	<ul style="list-style-type: none"> • Natural disturbances

Forest Act Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area

- general comments

The total land area of the Lillooet TSA is 1.125 million hectares. After removing areas not managed by the province, non-forest and non-productive areas, and areas managed by area-based tenure holders the remaining forested area is 513 859 hectares (46 percent of the TSA area). This area is referred to as the analysis forest land base (AFLB) and contributes to timber and non-timber objectives.

The timber harvesting land base (THLB) is an estimate of the land where timber harvesting is considered both legally available and economically feasible, given the objectives for all relevant forest values, market values and applicable technology. It is a strategic-level estimate developed specifically for the timber supply analysis and, as such, could include some areas that may never be harvested or could exclude some areas that may be harvested.

As part of the process used to define the THLB, a series of deductions were made from the AFLB. These deductions account for biophysical, economic, or ecological factors that reduce the forested area available for harvesting. For the Lillooet TSA, the THLB that is available after deductions are applied is 163 040 hectares. The THLB represents about 14 percent of the total area of the TSA and about 32 percent of the AFLB.

In reviewing these deductions, I am aware that some areas may have more than one classification. To ensure accuracy in defining the THLB, care was taken to avoid any potential double-counting associated with overlapping objectives. Hence, a specific deduction for a given factor reported in the analysis or the AAC rationale does not necessarily reflect the total area with that classification; some portion of it may have been deducted earlier under another classification.

For this determination, I accept that the approach used to determine the THLB for the Lillooet TSA base case was appropriate.

- estimates for roads, trails, and landings

Forest roads, logging trails, and landings are considered permanent access structures as they are constructed through soil or rock that is not suitable to the growth of a commercial crop of trees or because they are required for a long enough time that prevents the timely growth of a commercial crop of trees. For these reasons, they are considered non-forest and are removed from the AFLB.

In the base case the gross area removed from the AFLB to account for roads, trails, and landings was 21 484 hectares, or 1.91 percent of the total TSA area. After the timber supply analysis was completed, District staff noticed that there was an error in the estimate for roads, trails, and landings. The corrected gross area is 17 686 hectares (3798 hectares less than what was assumed in the base case). Staff concluded that the THLB and timber supply was underestimated by 1205 hectares, or 0.7 percent.

Forest roads are returned to a productive state when they are decommissioned through a rehabilitation process where all structures (including bridges, culverts, water bars and cross ditches) are removed, the road surface is loosened, the surface is re-contoured, the natural drainage pattern is restored, and trees are planted. A member of the public noted that some roads which are considered deactivated are not and this may adversely affect wildlife. While I do not have the authority to direct road rehabilitation, I am aware that under forest landscape planning, which is underway in some TSAs, the participants will consider access planning and provide direction regarding road rehabilitation. I strongly urge licensees increase road rehabilitation efforts and reduce the impacts to wildlife.

For this factor, I conclude that the base case underestimated timber supply by about 0.7 percent. I account for this underestimation in my determination as discussed under ‘**Reasons for Decision**’.

- registered archaeological sites

Archaeological sites are defined in the *BC Archaeological Resource Management Handbook* as sites that “consist of the physical remains of past human activity”. Archaeological sites which include culturally modified trees, pictographs, petroglyphs, and burial sites that pre-date 1846, are protected under the *Heritage Conservation Act*. Archaeological overview assessments (AOA) and Archaeological Impact Assessments (AIA) are used to identify potential archaeological sites. An AOA was completed for the TSA in 1998. Since the AOA is not a reliable predictor of archaeological sites, District staff require licensees to conduct preliminary field reconnaissance to determine which areas require further archaeological studies.

The province keeps track of registered archaeological sites in their Remote Access to Archaeological Data (RAAD) application. Archaeological sites in RAAD were mapped and excluded from the THLB in this analysis. In the base case, a gross area of 724 hectares was removed from the THLB.

In the Lillooet TSA there are a relatively high number of known archaeological sites (recorded and unrecorded). Some of the known but unrecorded sites are identified during the First Nations information sharing processes. Information about these sites is rarely available to government and therefore not included in the RAAD or the timber supply analysis. Members of the St’at’imc Nation belonging to the Lillooet Tribal Council provided information about newly exposed archaeological sites in areas burned by the McKay wildfire. Typically, reserves such as wildlife tree retention areas are used to protect archaeological sites.

I conclude that there are archaeological sites which were not accounted for in the timber supply analysis and under ‘**Reasons for Decision**’ I will account for an unquantified overestimation of the base case timber supply.

- First Nations cultural heritage resources

A cultural heritage resource is defined in the *Forest Act* as, "an object, site, or location of a traditional societal practice that is of historical, cultural or archaeological significance to the province, a community, or an aboriginal people". Cultural heritage resources include archaeological sites, structural features, heritage landscape features, and traditional use sites. The base case mistakenly included archaeological sites in the THLB. Excluding these sites will reduce the THLB by 265 hectares or 0.02 percent.

Indigenous cultural heritage, however, is broader in its definition. Indigenous cultural heritage encompasses land, resources, creation stories, histories, knowledge, practices, relations, and language. It also includes all the places, spiritual areas, and objects that are linked to Indigenous history and traditions: transformer places, archaeological sites, trails, hunting grounds, gathering areas, burial grounds, artifacts, and cultural objects and materials.

While the base case accounts for some sensitive sites, there are significant areas where harvesting is not allowed by First Nations but are included in the THLB.

Indigenous Protected and Conserved Areas (IPCA) are a component of the federal government’s Nature Fund Target 1 Challenge initiative led by Environment and Climate Change Canada. In 2022, the Kanaka Bar Indian Band proposed the T’eqt’aqtn IPCA which encompasses the Kwoiek and Four Barrel watersheds and adjacent parts of the Fraser canyon. In addition, I was informed that there is an ongoing blockade affecting the Junction Creek/Yalakom and Melvin Creek watersheds. Cook’s Ferry Indian Band highlighted the importance of mountain tops including Horn Mountain. The SDMB recommended enhanced buffers around heritage and cultural features. Staff estimated that removal of these areas from the THLB would reduce the base case timber supply by about seven percent.

Although it is beyond the scope of my authority to make land use decisions attributable to the amount of area to be reserved for cultural heritage resources, I expect that the emerging forest landscape planning process will resolve these land use issues over time. I am aware that the current practice is for licensees to avoid harvesting in areas that are important to protect First Nations values and interests. If the AAC I determine includes these areas, then it will result in overharvesting elsewhere in the TSA. I am also aware of government's desire for reconciliation with First Nations and the government's intention to change the way forests are managed in this province. In the spirit of reconciliation and recognizing that it is current practice to avoid these areas, I will account for an approximately seven percent overestimation of the base case timber supply projection as discussed under '**Reasons for Decision**'.

- areas excluded for old growth management

In the Lillooet TSA, landscape-level biodiversity is primarily managed through old-seral forest retention as specified by the *Order Establishing Provincial Non-Spatial Old Growth Objectives* dated June 2004. This legislation specifies the required distribution and amount of old growth retention by ecosystem type and Biodiversity Emphasis Option (BEO). The retention is distributed over the land base by requiring targets for old growth retention to be met in each landscape unit.

Draft Old Growth Management Areas (OGMA) have been spatially located in the Lillooet TSA to meet landscape biodiversity objectives for old-seral forest types. The draft OGMA are not legally established but are recognized by licensees through the Managing OGMA Consolidation Mapping agreement that was jointly signed by the District Operational Implementation Team in 2013. Licensees have committed in their forest stewardship plans to not harvest within OGMA except under specific circumstances. Any area removed from OGMA through harvesting will be replaced with equal area and characteristics.

In the base case, draft OGMA were excluded from the THLB and were assumed to reserve a sufficient area of old forest to meet the old-seral biodiversity requirements for those landscape units. The total area identified as OGMA was 74 854 hectares, with 49 568 hectares of net area removed from the THLB.

The government's Old Growth Technical Advisory Panel (TAP) identified 72 000 hectares to be deferred from harvesting but to date there has not been a final decision on whether, and how much of these areas will become OGMA. It is also unclear whether any of these TAP areas overlap the existing draft OGMA. I expect that during the forest landscape planning process participants will consider aligning the TAP areas with OGMA.

The SDMB recommended that there should be an additional 600 hectares removed from their territory to account for areas deficient in both old and mature forest.

I do not have the authority to make land use decisions such as the amount of area to be set aside for old growth in any areas of the province. When the government makes a final decision on the amount of OGMA in the TSA, the AAC may be adjusted to account for that decision if necessary, and it will be reflected in future AAC decisions. For this determination, I will not make any adjustments to the base case harvest projection to account for additional old growth management areas.

- wildlife habitat areas and species of concern

Wildlife habitat areas (WHA) are established to provide habitat for identified wildlife species that are at risk or are of regional importance. Management objectives may prevent harvest or set conditions under which harvesting can occur. Since 2001, 31 WHAs have been established in the Lillooet TSA for grizzly bear, spotted owl, coastal tailed frog, Western screech owl, and Lewis' woodpecker.

The gross area of WHAs in the TSA is 21 398 hectares. After accounting for overlaps with areas removed earlier in the netdown process, a net area of 13 590 hectares is removed from the THLB in the base case.

Wildlife species of concern include red-listed (i.e., extirpated, endangered, or threatened), or blue-listed (i.e., special concern) species. These species are often sensitive to disturbance and habitat changes, have intrinsic low reproductive rates or high mortality rates (or both) and often have specific habitat requirements. In the Lillooet TSA there are 29 wildlife species, 3 fish species, 7 invertebrate species and 32 plant species categorized as either red-listed or blue-listed.

In addition to the area removed for current WHAs, a further reduction of one percent to the THLB was modelled in the base case to account for future WHAs as well as for the protection of red- and blue-listed species not covered under existing WHAs.

The SDMB noted that whitebark pine-leading stands were not excluded in the base case. There is established guidance for the protection of whitebark pine. The SDMB recommended that 1100 hectares be removed from the base case to account for management of this species.

I note that whitebark pine usually grows at high elevations and as discussed under ‘*grizzly bear*’, often overlap with grizzly bear habitat. It is unclear how much of the area recommended for removal by the SDMB is already removed. As discussed under ‘**Reasons for Decision**’, I will consider that the base case timber supply was overestimated by an unquantified amount to account for whitebark pine.

- riparian management areas

Riparian areas are transition zones between aquatic areas such as streams or wetlands, and drier upland areas. Riparian areas provide habitat for various of plant and animal species and provide for habitat connectivity.

Riparian management objectives have been established to minimize or prevent impacts of forest and range practices on these aquatic resources. Riparian areas along lakes, wetlands and streams provide key habitat for fish and wildlife and help conserve water quality and biodiversity. The Forest Planning and Practices Regulation requires protection of riparian areas. The *Riparian Management Area Guidebook* defines riparian classes and specifies minimum widths of reserve and management zones for streams, wetlands, and lakes. In this analysis, staff used riparian management practices as outlined in licensees’ Forest Stewardship Plans.

The gross area of riparian areas in the Lillooet TSA is 54 278 hectares while the net area excluded from the THLB is 17 092 hectares. The Forest and Range Evaluation Program (FREP) conducted an effectiveness evaluation of streams in the TSA between 2009 to 2021. During that period eight S6 classed streams and three S5 streams were sampled. The results show that licensees are meeting the requirements of the *Riparian Management Area Guidebook*.

The SDMB recommended that I consider management practices such as a minimum buffer of 10 metres on either side of all streams to mitigate future hazards to riparian ecosystems. It is beyond the scope of my authority to require forest practices beyond those specified in legislation. Future AAC decisions will account for any changes in forest practices. For this determination, I will not make any adjustments to the base case harvest projection to account for enhanced riparian practices.

- low productivity sites

Stands growing on low productivity sites are not considered economically harvestable and are excluded from the timber harvesting land base. Data from the Ministry’s Electronic Commerce Appraisal System (ECAS) showed that between 2002 and 2017, approximately 99 percent of the harvest volume in Lillooet TSA was from stands with a volume greater than 147 cubic metres per hectare.

In this analysis, sites growing stands that cannot attain 150 cubic metres per hectare within 160 years were excluded from the THLB as low productivity sites. However, areas with a logging history were included in the THLB regardless of site productivity. The gross area of sites considered as low

productivity in the Lillooet TSA is 767 932 hectares while the net area excluded from the THLB is 96 758 hectares.

Aspen Planers suggested that the THLB in this analysis would have been significantly larger if this analysis had adopted the criteria used in the previous analysis to remove non-merchantable and low sites from the THLB. Aspen Planers also asked that volume harvested from areas not in the THLB should not be attributed to the AAC.

Staff commented that the criteria used in the previous analysis were not field validated. The criteria for the exclusion of low sites used in this analysis are based on actual harvest records. I also wish to point out that the THLB is an estimate of the area that is legally and economically available for harvesting based on actual licensee practices. All wood harvested in the TSA counts towards the AAC. If Aspen Planers are able to harvest significant volumes from stands assumed to be not economical in this analysis, then that will be considered in future AAC determinations. For this determination, I will not make any adjustments to the base case harvest projection to account for low productivity sites.

- stand-level retention

Stand-level retention provides important structural attributes such as coarse woody debris, tree species diversity, and wildlife habitat in managed stands. The Forest Planning and Practices Regulation (FPPR) requires that enough, suitable trees be retained at the stand level to provide for wildlife and biodiversity. Specifically, the FPPR requires licensees to retain seven percent of the total area harvested over a twelve-month period as wildlife tree retention areas (WTRA) with a minimum of 3.5 percent retained for each cutblock.

In the base case, the legal target for WTRAs from the FPPR was modelled by applying a seven percent reduction to the THLB. The result was a reduction of 12 341 hectares from the THLB. Since WTRAs often overlap with other forest values, such as riparian reserves zones, that could meet the objectives of stand-level retention, the actual WTRA retention varies from the amount specified in the FPPR.

Aspen Planers pointed out that the analysis did not consider the overlap of WTRAs with other forest values. Correction of this oversight resulted in an increase in the THLB of 4137 hectares which represents an increase in timber supply of 2.54 percent.

Under '**Reasons for Decision**', I will consider an increase of 2.54 percent to the base case timber supply projection to account for the overestimation of areas removed for stand-level retention.

- forest inventory

The Vegetation Resources Inventory (VRI) is the standard for forest cover inventories in the province of British Columbia. The VRI is a photo-based, two-phase program. Phase 1 delineates polygons of homogenous land cover types through photo interpretation and provides estimates of the vegetation attributes for each polygon. Phase 2 is ground sampling that is carried out to verify the accuracy of stand volumes and some key phase 1 vegetation attributes.

The forest inventory used in this analysis is based on phase 1 aerial photographs taken in 1990 and phase 2 ground sampling completed in 2003. The forest inventory was updated for harvesting, fires, and tree growth to 2019.

A new forest inventory for the Lillooet TSA was completed in 2022. Since this timber supply analysis was completed and the results published before the new forest inventory was available, it was decided to complete an alternative analysis using the new inventory and present the findings to the chief forester at the AAC determination meeting.

Using the new forest inventory, it was possible to increase the harvest level to 317 782 cubic metres per year (2.1 percent greater than the base case) for 100 years. Some key sensitivity analyses were completed

based on the alternative new inventory analysis, and they will be discussed in this rationale where necessary.

Under ‘**Reasons for Decision**’, I will consider an increase of 2.1 percent to the base case timber supply projection to account for the forest inventory used in the analysis.

- dead potential volume

Prior to April 1, 2006, grade 3 endemic (the ‘normal’ mortality observed in a mature stand) and grade 5 (dead trees with greater than 50% firmwood and has defects such as twists, knots and heart rot) were not charged to the AAC if harvested.

In April 2006, changes were made to the Interior log grades to enable logs that were previously considered grade 3 endemic or grade 5 to be charged to the AAC. Estimates of timber volume in the base case do not include the dead logs that could potentially be used as sawlogs (dead potential). Possible sources of data about dead potential include inventory audit plots, VRI phase II ground samples, permanent sample plots, and temporary sample plots.

At this time, the inventory audit is considered the best of the above-mentioned sources of data regarding dead potential timber in the Lillooet TSA. These data indicate that dead potential volume could be up to 9.3% of the live volume for the forest over 60 years of age in this TSA.

As discussed under ‘*harvest performance*’ and ‘*forest health*’, licensees have harvested some dead timber, but it is likely that the dead timber harvested was killed during the mountain pine beetle epidemic or the current spruce beetle outbreak. In these cases, the mortality is tracked in the inventory as dead volume estimated using the BCMPB model or live volume that has been killed since the inventory was completed. I will discuss the harvest of dead timber further under partition options and implications and I will not make any adjustments to the base case harvest projection to separately account for dead potential volume.

(iii) silviculture treatments to be applied to the area

- silvicultural systems

A silviculture system is a planned program of silvicultural treatments (harvesting, regeneration and stand tending) intended to achieve a predictable yield of benefits from a forest stand over time. In the Lillooet TSA, about 99 percent of the area harvested was by the clearcut with reserves silviculture system.

Dry sites for the Lillooet TSA include forest stands within the Interior Douglas-fir (IDF) and the Ponderosa Pine (PP) biogeoclimatic ecosystem classification (BEC) zones. Approximately 14 percent of the THLB is classed as dry-belt fir stands (IDFdk1, IDFdk2, IDFdk3, IDFxh2, IDFxc, and IDFxw subzones). These dry sites are particularly difficult to regenerate after clearcut harvesting and District staff recommend that a partial cutting silviculture system with assisted reforestation should be encouraged in the Douglas-fir dry-belt stands to protect and maintain other resource values.

I concur with District staff and will discuss this further under ‘*very dry sites*’. I am aware that under forest landscape planning, which is underway in some TSAs, the participants will consider a broad range of silvicultural systems to be practiced in the TSA. For this determination, I will not make any adjustments to the base case to account for silvicultural systems.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production

- ungulate winter ranges

Ungulate winter ranges (UWR) are established to provide habitat for wildlife species that are at risk or are of regional importance. As with all wildlife, ungulates rely on well distributed quality habitat throughout the year to meet their life requisites. The focus for habitat management has been on winter ranges which

are critical for their survival. Ungulates present in the TSA include mule deer, white tailed deer, elk, mountain goat, bighorn sheep, and moose. Ungulates are highly valued by First Nations, recreational hunters, and for their biodiversity and ecosystem values.

An FPPR Section 7 Notice for the winter survival of ungulates in the Lillooet TSA was passed in December 2004. The Notice specified winter range management practices for ungulates in the TSA. Management objectives may prevent harvest or set conditions under which harvesting can occur.

The base case modelled forest cover constraints as specified in the Section 7 Notice concerning snow interception cover by snowpack zones for mule deer, bighorn sheep, and elk. Mountain goat winter range was identified but no forest cover constraints were required. Management for mountain goats in the province recommends work buffers of 500 meters during the sensitive winter and calving seasons. The Section 7 Notice also identified moose winter range, but no forest cover constraints or other restrictions were specified.

Section 10 of the Government Action Regulation (GAR) authorizes the Minister of Environment to establish wildlife habitat areas for the protection of certain species. Staff informed me that there is a draft GAR order for the management of mule deer winter range in the Lillooet TSA. An assessment of the draft GAR order for mule deer winter range indicates that approximately 50 percent of the areas are at moderate or high risk of not meeting the intention of the draft GAR order.

The SDMB recommended that the draft GAR Order be implemented to ensure appropriately distributed mule deer winter range across the landscape. The SDMB also identified 94 hectares of THLB within the wetlands buffer that should be excluded to protect moose habitat. I recognize the importance of wetlands for moose, and I expect this area of moose habitat will be managed at the operational level. It is beyond the scope of my authority to require forest practices beyond those specified in legislation. Future AAC decisions will account for any changes in forest practices. For this determination, I will not make any adjustments to the base case harvest projection to account for ungulate winter ranges.

- grizzly bear

Grizzly bears are ecologically significant and important to British Columbians. They are federally listed as a species of special concern under SARA and are blue-listed by the BC Conservation Data Centre. The conservation ranking for the Stein-Nahatlatch population unit and South Chilcotin Ranges in the TSA is extreme concern and high concern respectively. Grizzly bears are found throughout the Lillooet TSA with their densities varying based on habitat quality, habitat fragmentation, and human activity.

In 2021 a Specified Area GAR order for grizzly bears in the TSA was approved. The order provides measures for important habitats including spring foraging habitat, whitebark pine stands, and berry producing sites. The Specified Area applies to the southern half of the TSA covering a portion of the Stein-Nahatlatch and a portion of the South Chilcotin Ranges grizzly bear population units.

An analysis conducted by FAIB indicated that the effect of the GAR order is a 3.5 percent reduction to the long-term timber supply. The SDMB and District staff projected further timber supply impacts if actions are taken to limit access and improve core grizzly bear habitat elsewhere in the TSA. When management practices change, their effects will be captured in future AAC determinations. For this determination, I will not make any adjustments to the base case harvest projection to account for grizzly bears.

- community watersheds

The objective set by government contained in Section 8.2 (2) of the FPPR stipulates that the cumulative hydrological effects of primary forest activities in a community watershed do not have a material adverse impact on the quantity of water or the timing of the flow of the water to the waterworks, or do not have a material adverse impact on human health that cannot be addressed by water treatment.

Forest management constraints for community watersheds are not standardized but are based on a hydrological assessment of the watershed by qualified professionals. At present, licensees in the Lillooet TSA have commitments in forest stewardship plans requiring them to complete hydrologic assessments of community watersheds and to abide by the recommendations stipulated in the assessments.

There are 24 community watersheds designated in the Lillooet TSA covering a total area of 40 974 hectares. In the base case, the effect of management practices in designated community watersheds on timber supply was estimated by not allowing more than 30 percent of the forested area within any watershed to be less than 15 metres in height at any given time over the planning horizon.

There are seven non-designated community watersheds within the TSA where there are significant social concerns. In these watersheds the management practices are more restrictive than those applied elsewhere. A sensitivity analysis was conducted where non-designated community watersheds were modelled as designated watersheds. This sensitivity analysis showed that there was no impact to the base case harvest projection.

The H60 is the elevation line above which 60 percent of the watershed area exists. This area generally has snow cover in the spring when water flows begin to increase and can therefore contribute meltwater to spring floods. Timber harvesting in this “snow zone” has the potential to have a greater influence on peak flows because of changes in snow accumulation and snowmelt when the forest canopy is removed. The SDMB recommended that harvesting in the H60 areas be limited to mitigate existing and future streamflow hazard.

Reducing or eliminating harvesting in community watersheds are land use decisions which are beyond the scope of the chief forester. I am aware that under forest landscape planning which will require First Nations participation, the participants will consider forest practices as well as land use decisions. The results of those decisions will be reflected in future AAC decisions. For this determination, I will not make any adjustments to the base case harvest projection to account for community watersheds.

- wildland urban interface

The Wildland Urban Interface (WUI) is a 2.75-kilometre buffer zone around communities with more than 25 structures per hectare. A total of 10 923 hectares of THLB is within the WUI in the Lillooet TSA. Community wildfire interface projects are managed by the district manager in conjunction with local groups and industry. Treatments have primarily been focused on thinning the stands, removing ladder fuels through pruning, and surface fuels through prescribed burning.

Stand thinning and fuel removal is primarily done under Forestry Licences to Cut to remove non-merchantable timber which are then piled and burned. Aspen Planers suggested accelerated harvesting in the WUI to improve public safety and reduce the risk of catastrophic loss of infrastructure due to wildfires. To date, there has not been any harvesting of merchantable timber from the WUI. Removing the WUI from the THLB reduced the base case harvest level by 6.7 percent.

I note the significant contribution from the WUI to the base case harvest projection and I ask that activities in the WUI be monitored over the next 10 years and that those practices be reflected in the next timber supply review. For this determination, I will not make any adjustments to the base case harvest projection to account for the wildland urban interface.

- very dry sites

As discussed under ‘*silviculture systems*’, approximately 14 percent of the THLB is classed as dry-belt fir stands (IDFdk1, IDFdk2, IDFdk3, IDFxh2, IDFXc, and IDFXw subzones). These dry sites are particularly difficult to regenerate after clearcut harvesting.

District records indicate that in the very dry IDF subzones (IDF_{xh2} and IDF_{xc}) licensees were showing a preference for partial cutting silviculture systems. However, in the other IDF subzones, the records indicate a preference for clear cut with reserves.

In 2020, the Forest Practices Board published a report *Reforestation in the Interior Douglas-fir Subzone: Are Reforestation Choices Meeting Objectives?* which suggested that more than 60 percent of reforested cutblocks in dry-belt Douglas-fir stands in the Southern Interior were in poor or marginal stand condition because licensees did not follow best management practices. The Board recommended using partial cutting systems as a means to mimic natural disturbances and to provide favorable natural site conditions for regenerating trees in IDF stands. The report also stated that partial cutting systems can help reduce the uncertainties added by climate change, drought, fires, and forest health to regenerating stands.

During the past 10 years approximately 35 percent of the area harvested in the Lillooet TSA was from the IDF zone, whereas in the base case only 11 percent of the area harvested is from the IDF. Following the MPB epidemic harvesting was concentrated outside the IDF zone to maximize potential salvage. Since salvage is complete it is expected that harvesting would transition to the IDF to balance harvesting in this profile. However, the base case indicates that IDF stands are currently harvested at a disproportionately greater rate than required and licensees will have to shift harvesting to other stand types to balance the harvest profile.

I concur with the Forest Practices Board recommendations regarding practices in the IDF BEC zone. Under '**Implementation**' I request that licensees practice more partial cutting silviculture systems when operating in dry sites. I am aware that under forest landscape planning, the participants will consider a broad range of silvicultural systems to be practiced in the TSA. For this determination, I will not make any adjustments to the base case to account for silvicultural practices in dry ecosystems.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber

- climate change

Data from Environment and Climate Change Canada weather stations within the Lillooet TSA show that during the period 1945 to 2012, mean annual temperature increased by 1.3°C. Mean winter temperature increased by 2.1°C, and mean summer temperature increased by 1.3°C. There were no significant changes in extreme minimum or maximum temperatures during this period.

The data also indicated significant changes in precipitation. Mean winter precipitation decreased by 13 percent, whereas mean spring precipitation increased by 58 percent, and mean fall precipitation increased by almost 17 percent.

Using a mid-range greenhouse gas emission scenario and an average of climate model output, an additional 3.1°C increase in mean annual temperatures is projected for the Lillooet TSA during the period 2041 to 2070. Summer is projected to warm the most at 4.0°C, followed by fall at 3.2°C, spring at 2.7°C, and winter at 2.6°C. Extreme maximum temperatures may increase by 3.4°C and extreme minimum temperatures by 4.0°C.

Precipitation is projected to increase in the fall by 10.5 percent and by 9.5 percent in the spring. However, summers are projected to be drier with about 10 percent less precipitation.

The projected changes in temperature and precipitation may increase tree growth, however, evaporative demand will increase which may lead to moisture stress, limited growth potential or mortality from drought and secondary insect attack. Projections of increasing temperatures, reduced snowpack, longer snow-free season, and enhanced evaporative demand are conducive to increasing fire frequency, severity, and season length within the Lillooet TSA.

Increasing drought and heat risk in the IDF ecosystems will impact current and future crop establishment as these factors are likely to increase mortality of seedlings. Forest pests are also likely to increase tree mortality due to increased susceptibility of trees to lethal pests, increased likelihood of sub-lethal insects causing mortality, and shorter reproductive cycles of some insect pests.

Some of the adaptation and mitigation measures recommended by staff include: use the Ministry's Climate-based Seed Transfer guidelines to plant species suitable for future climates; use genetically improved seed (e.g., pest resistance, drought tolerance); promote diversity of species and age classes; increase fire resiliency using strategic fuel breaks, prescribed fires in appropriate locations, and consider fire management stocking standards; manage for drought risk using the stand-level drought risk assessment tool; increase the use of partial cutting systems on dry sites to retain shelter and soil moisture for understory trees and seedlings; increase riparian buffers and avoid degradation of stream bank stability.

The SDMB recommends that due to anticipated increases in wildfires, old growth forest should be retained and recruited. The SDMB also recommended measures should be taken to provide climate refugia for species of concern; riparian retention should be increased to mitigate projected increases of stream temperature; and climate data should be collected and analyzed to better understand the implications for timber supply.

High Bar First Nation asked how climate change is factored in the timber supply review and technical staff met with representatives to provide clarity.

Given the uncertainty about the rate and specific characteristics of climate change, and the uncertainty around the impact to the forest and how forest managers will respond, it is not possible to quantify climate change impacts on timber supply with confidence. I agree with the recommendations provided by staff and the SDMB, and I expect that most will be considered during forest landscape planning for the TSA. As discussed under '*very dry sites*', I request that licensees practice more partial cutting silviculture systems when operating in dry sites.

Under '**Implementation**', I request that staff integrate the implications of climate change projections such as growth and yield and natural disturbance in timber supply analyses to better inform future decisions. Under '**Reasons for Decision**', I will account for the uncertainty to timber supply resulting from projections of climate change.

- forest carbon

The 'carbon cycle' refers to the constant movement of carbon from land and water through the atmosphere and living organisms. Forests are a vital part of the carbon cycle, both storing and releasing carbon in a dynamic process of growth, decay, disturbance and renewal, thus making them important from a carbon and climate change mitigation perspective.

Forests act either as carbon sources or carbon sinks. A forest is considered a carbon source if it releases more carbon than it absorbs. A forest is considered a carbon sink if it absorbs more carbon from the atmosphere than it releases. The net ecosystem carbon balance (NECB) is used to describe the net change between the given ecosystem and atmosphere. If the atmosphere is used as a base, a positive NECB means the atmosphere carbon pool is increasing and the given ecosystem is a carbon source, while a negative NECB means the atmosphere carbon pool is decreasing and the ecosystem is a carbon sink.

Five terrestrial carbon pools have been defined by the Intergovernmental Panel on Climate Change (IPCC): above ground biomass carbon, below ground biomass carbon, dead organic matter, forest floor litter, and soil organic carbon. The sum of all five pools is referred to as total ecosystem carbon (TEC).

A carbon analysis of the base case harvest projection was completed using carbon budget model – Canadian forest sector version 3 (CBM-CFS3) to project carbon dynamics over the first 100 years in the

TSA. Sources of greenhouse gases modelled were harvesting, wildfires, non-recoverable losses due to insects and disease, and road building. In accordance with the *British Columbia Greenhouse Gas Offset Protocol: Forest Carbon* (Draft, 2022), the retention factor for harvested wood product (HWP) in use after 100 years was 0.06, and the HWP in landfill was treated as a one-time emission.

TEC (THLB and non-THLB) increased by about 3.8 percent over the 100 years modelled. In the THLB, TEC decreased by about 8.9 percent largely due to harvesting and non-recoverable losses.

The TSA is a net carbon sink (NECB < 0), with an annual carbon gain of about 0.2 Mt CO₂e over the 100-year projection period. The major source of carbon is timber harvesting, which releases about 0.24 Mt CO₂e per year (all the harvested logs are treated as one-time emission). Slash burning is the second largest carbon source, releasing about 0.07 Mt CO₂e per year. Other sources of carbon were from wildfires, insect damage, windthrow and future road building.

The carbon analysis conducted for the Lillooet TSA provides useful information to understand the impact of the base case harvest projection on forest carbon and greenhouse gas emissions. Specifically, I note the significant loss of ecosystem carbon from slash burning and I urge licensees to increase biomass utilization to reduce greenhouse gas emissions. I will not make any adjustment to the base case harvest projection to account for forest carbon.

- cumulative effects

Cumulative effects are changes to social, economic, and environmental conditions caused by the combined impact of past, present, and potential human activities or natural events. The provincial cumulative effects team has developed policies and procedures for assessing cumulative effects on high priority values and implementing cumulative effects assessments across the province. The Thompson Okanagan Region's cumulative effects team selected seven values in the Lillooet TSA for cumulative effects assessments: watersheds/aquatic ecosystems, forest biodiversity, pine mushrooms, grizzly bears, mule deer, visual quality, and moose. Assessments were provided for the current condition of the values and for the condition 10 years from now if the base case harvest projection was followed.

Watersheds

The watershed hazard assessment was conducted by an expert using indicators derived from data in a geographic information system. Streamflow hazard (high peak flows that affect channel stability), sediment hazard (potential for sediment input), and riparian hazard (clearing of areas near streams) were assessed in this exercise.

Streamflow hazard is currently very low in most watersheds due to low timber volumes being harvested. Sediment hazard is high in the lower elevation watersheds. The mountainous terrain of the TSA naturally leads to high sediment loads. Riparian hazard is low to moderate across the TSA except for some areas near Lytton.

After 10 years of harvest at the base case level most watersheds are likely to remain at a low streamflow hazard. However, about six watersheds would increase to moderate or higher levels. Road densities are expected to increase in several watersheds, and this could increase the sediment hazard for those watersheds. Existing riparian buffers are expected to be insufficient to mitigate rising stream temperatures from projected climate change.

Biodiversity/old growth

The old growth assessment compared forest composition to legal and policy targets while the forest biodiversity assessment compared forest composition to the historic range and variability (HRV). Currently most ecosystem types in the Lillooet TSA are meeting targets for old and mature forest and are

well within or exceeding the HRV for old and mature forest. However, there is a deficit of old growth in many landscape units (particularly in drier, lower elevation zones).

Landscape units with a deficit of old growth could meet old seral targets if harvesting is limited or if the proportion of THLB is small. However, old seral targets will likely not be met in landscape units with a greater proportion of THLB and recruitment of mature stands to eventually meet the targets will be required. In addition, future wildfires are expected to make it more difficult to meet old seral targets. Wildfires and other disturbances induced by climate change are expected to alter the existing biodiversity of the TSA.

Pine mushroom

Potential pine mushroom habitat was identified based on BEC zone and leading tree species. The current state of pine mushroom habitat was assessed by evaluating overlap of potential mushroom habitat with interior mature and old forest, and roadless areas. There is considerable overlap of potential pine mushroom areas with interior mature and old forest, and while there is some overlap with road buffers, much of the potential pine mushroom area is not directly adjacent to roads.

It is projected that after 10 years of harvesting at the base case harvest level there will be small (three percent) impact to availability of potential pine mushroom habitat.

Grizzly bears

The Lillooet TSA overlaps three grizzly bear population units (GBPU): the southern third of the South Chilcotin Ranges, the northern third of Stein-Nahatlach, and the northern tip of North Cascades GBPU. A threat assessment and ranking for each GBPU was completed by the Ministry of Environment in 2019.

The Stein-Nahatlach and North Cascades GBPUs are of extreme conservation concern because they are isolated, have a small population with a decreasing population trend, have significant natural resource or urban development, and have high a presence of humans through recreation or communities. The South Chilcotin Ranges GBPU is classified as moderate conservation concern because it is somewhat isolated but face threats from natural resource development and recreation; this GBPU has also shown an increasing population trend in recent years.

Timber harvest in the TSA is projected to increase road densities beyond the already relatively high densities. Three landscape units (Bridge, Texas Creek, and Duffy Lake) are of particular concern if the base case harvest is realized and if there is not action to mitigate access management and improve core secure habitat for grizzly bear.

Mule deer

The cumulative effects assessment for mule deer estimated whether objectives for mule deer winter range are being met. Currently there is a FRPA Section 7 notice specifying the characteristics of mule deer winter habitat and management practices to be observed in those areas. Draft mule deer winter range areas were used to see if the intent of the existing Section 7 notice was being met in the Lillooet TSA. Approximately 50 percent of the draft winter range areas were at moderate or high risk of not meeting the requirements of the Section 7 notice.

It is projected that after 10 years of harvesting at the base case harvest level approximately four percent (3000 hectares) of potential mule deer winter range area will be affected.

Visual quality

The cumulative effects assessment for visual quality estimated whether existing visual quality objectives are being met. The analysis found that about five percent of the visual areas exceeded the maximum disturbance allowed. These areas were mostly along highways and settlements.

It was projected that fires and natural disturbance from climate change would pose the major threat to visual quality in the future.

Moose

The cumulative effects assessment for moose evaluated whether the Lillooet draft LRMP objective to “Maintain self-sustaining populations of moose throughout their current range and provide opportunities for consumptive and non-consumptive use” is being met. The analysis found that targets for moose are likely being met in the area, and populations are greater than 50 percent of expected carrying capacity. However, there is high predation hazard from wolves and some areas have moderate to high hunting pressure.

It was projected that climate change may decrease forage quality, increase tick infestations, and cause heat stress in moose populations.

Conclusions and Recommended Mitigation Measures

Some key issues identified by the cumulative effects analysis include the risk to sensitive watersheds damaged by fire, increased road densities in areas with high-risk grizzly bear populations, risk to old growth forest in the low elevation subzones, and the timber supply impacts of a more spatially constrained mule deer GAR order. The assessment also flagged the importance of riparian areas to mitigating watershed risk, and the importance of pine mushroom habitats, particularly to Indigenous communities.

The following actions are recommended from the Thompson Okanagan Region’s cumulative effects team to mitigate projected cumulative effects on the values assessed.

- Greater riparian retention on small streams to mitigate projected climate impacts.
- Old growth forest management planning should prioritize landscape units with a deficit of old growth as well as those where old and mature forest is limited.
- Avoid timber harvesting in pine mushroom habitat.
- Finalize and implement draft grizzly bear stewardship plans that are being developed in collaboration with Indigenous communities and include access management components.
- In partnership with Indigenous communities, implement spatially constrained mule deer winter range management practices similar to those contained in the draft GAR order.
- Maintain moose populations by controlling road access and protect important moose habitat particularly in dry ecosystems.

I fully endorse the recommendations of the Thompson Okanagan Region’s cumulative effects team. While it is beyond the scope of the chief forester to give direction on forest practices while making AAC decisions, I am aware that under forest landscape planning, which will require First Nations participation, the participants will consider forest practices as well as land use decisions. The results of those decisions will be reflected in future AAC decisions. Under ‘**Reasons for Decision**’, I will account for the uncertainty to timber supply stemming from projected cumulative effects to forest values.

- harvest performance

The AAC for the Lillooet TSA effective May 1, 2009, was 570 000 cubic metres, of which no more than 400 000 cubic metres could be from non-pine species. Data from the Ministry’s harvest billing system (HBS) indicate that during the period 2016 to 2021 an average of 51 percent of the AAC was harvested annually. The average non-pine volume harvested was about 50 percent of the limit set by the partition.

Dead timber averaged 20 percent (57 471 cubic metres) of the total volume harvested. Approximately 60 percent of this dead volume was lodgepole pine and the remainder was spruce. Staff indicated that the

dead volume harvested was likely from stands killed by the mountain pine beetle (MPB) and by the spruce bark beetle.

I commend licensees for salvaging dead timber, and as discussed under '*forest health*', it is expected that there will be increased losses in the future due to insects and other climate-induced factors. The base case does not include existing dead timber. Future increases in expected non-recoverable losses are also not included in the base case harvest projection.

I will discuss the harvest of dead timber further under '*partition options and implications*'. I will not make any adjustments to the base case harvest projection to account for harvest performance.

- steep slopes

In this analysis, slopes greater than 40 percent are considered steep. Inoperable areas and unstable terrain were removed from the THLB, but there was no reduction for steep slopes.

During the first 40 years of the base case harvest projection, the contribution from steep slopes ranged from 38 to 46 percent of the volume. The Ministry's harvest records show that during the past 10 years about 20 percent of the harvest was from steep slopes.

I am concerned that if this practice continues, the lower slopes of this TSA will be harvested at an unsustainable level. I will discuss the harvest of timber on steep slopes further under '*partition options and implications*'. I will not make any adjustments to the base case harvest projection to account for harvest on steep slopes.

- low volume stands

Low volume stands in the Lillooet TSA are stands containing between 150 and 220 cubic metres per hectare of merchantable volume. These stands comprise 32 percent, or 52 300 hectares, of the THLB in the TSA.

In the base case harvest projection, low volume stands contribute 49 to 85 percent of the harvest volume for the first 40 years. However, the District records for the period 2010 to 2020 indicate that low volume stands account for only 25 percent of the total volume harvested.

A sensitivity analysis, using the new forest inventory, shows that limiting the contribution from low volume stands to 25 percent reduced the harvest projection by about 12 percent. It is unclear whether licensees would be able to harvest low volume stands to the extent required to meet the base case harvest projection. Under '**Reasons for Decision**', I will account for the uncertainty to timber supply resulting from licensees' ability to harvest significant amounts of low volume stands.

- undercut and unused AAC disposition plans

In January 2018 the Ministry introduced a *Policy Regarding the Administration of Unharvested Volumes, Uncommitted Volumes and Unused BCTS Volumes* (collectively referred to as accumulated volume). Accumulated volume in the Lillooet TSA is currently seven million cubic metres. The base case harvest projection is predicated on the condition of the forest, including the amount of merchantable timber growing stock present, as of the date of the timber supply analysis. The standing forest was not depleted to account for potential harvesting of any accumulated ('undercut') volume in the Lillooet TSA. Therefore, any volume harvested (including accumulated volume) that is above the AAC in this determination, constitutes use of the growing stock at a greater rate than projected in the base case, if the AAC was fully utilized.

This timber supply analysis was conducted using an optimization model. As such, if all the data and assumptions used to create the base case remain unchanged, it is not possible to increase the harvest in any period without reducing the base case harvest projection.

First Nations within the Lillooet TSA have requested forest tenures that are sourced from the unharvested, uncommitted, and unused volumes. This request is beyond the scope of my authority.

The Regional Executive Director and the Executive Director of BC Timber Sales are authorized to dispose of accumulated volume. At the time of this determination, I was not informed of any disposition plans for accumulated volume. I will therefore not make any adjustments to the base case harvest projection to account for accumulated volume.

- partition options and implications

When making AAC determinations, the chief forester can specify portions of the harvest attributable to different timber types, geographic areas, or types of terrain. This is referred to as an AAC partition. The purpose of a partition is to ensure that the harvest attributable to certain types of timber, terrain or geographic areas of the TSA is not taken from another (potentially higher value) area or type of forest. A partition may also be applied to encourage use of the timber from different areas and timber types that may not be otherwise harvested.

Licensees decide where to harvest while complying with all applicable legislative objectives. The chief forester does not have the authority to direct where harvesting occurs. The AAC partition I set limits the amount of harvest that can take place in certain geographic areas, terrain, or timber types but it does not require licensees to harvest in specific areas or timber types.

In 2009, the AAC limited the harvest of non-pine stands; it did not limit the harvesting of pine stands. It was possible, and acceptable, for the entire AAC to be harvested from pine stands. As discussed under ‘*harvest performance*’, licensees have not exceeded the harvest of non-pine species. District staff recommend that this species partition is no longer necessary.

The base case harvest projection does not include any dead timber. As discussed under ‘*harvest performance*’, even though focused salvage following the MPB epidemic no longer occurs, dead timber averaged 20 percent (57 471 cubic metres) of the total volume harvested during the period 2016 to 2020. District staff recommend that I include dead timber in the AAC but also limit the harvest of live timber. I agree with this recommendation, and under ‘**Reasons for Decision**’, I will provide an incentive for licensees to continue harvesting dead wood.

As discussed under ‘*steep slopes*’, licensees have not harvested on steep slopes to the extent required to meet the base case harvest projection. District staff recommend that the AAC should limit the harvest of live volume on slopes less than 40 percent. I agree with this recommendation, and under ‘**Reasons for Decision**’, I will limit the harvest of live volume on this type of terrain.

The SDMB recommended partitions for low volume stands as well as for steep slopes. I discussed this request with staff and decided not to implement a low volume partition as this would become too complicated to enforce along with the other partitions already contemplated.

8(8)(e) Abnormal infestations in and devastations of, and major salvage programs planned for, the timber on the area

- forest health

Between 2005 and 2017, more than 4.5 million cubic metres of merchantable lodgepole pine was killed by MPB in the TSA. Although MPB continues to be a significant forest health concern, there has been a steady decline in lodgepole pine volume killed since 2016. However, staff reported the MPB is now affecting whitebark pine. Spruce bark beetle populations are increasing especially in the Duffy Lake Landscape Unit where almost all drainages have been affected. Western balsam bark beetle is also present in trace amounts in the TSA.

Forest health staff stated that the effects of bark beetles will continue into the foreseeable future. Considering the wide-ranging effects of projected climate change, I agree that insects and disease will cause increasing mortality of forests in this province.

Under ‘**Implementation**’ I ask District staff to work with forest health staff to monitor the impacts of bark beetles and pathogens in the TSA so that the Ministry can respond appropriately. I will not make any adjustments to the base case harvest projection to account for forest health.

- *wildfires*

In the Lillooet TSA a total of 78 112 hectares were affected by fires in 2021, 15 700 hectares in 2022, and 39 577 hectares in 2023. Not all of the timber within a fire perimeter is consumed by the fire. Depending on the severity of the fire, some of the burned timber may be salvageable, some unsalvageable and some stands that the fire skipped would remain green.

After the 2021 wildfires, FAIB prepared a document, *Estimates of mortality in areas affected by the 2021 wildfires*, which provides a detailed description of the process used to quantify timber volume losses within the fire perimeters.

The impacts of the 2021 wildfires were incorporated in the new forest inventory for the TSA and are reflected in the base case. In 2022, wildfires affected a total area of 15 700 hectares. Of this area approximately 2150 hectares were in the THLB (1.3 percent of the total THLB) and it was estimated, from fire severity mapping, that about 65 percent of the volume within the fire perimeters remained alive.

In 2023, the total area within the fire perimeters of the Lillooet TSA was 39 577 hectares. Of this area, approximately 11 792 hectares were in the THLB (6.2 percent of the total THLB volume). Based on initial fire severity estimates, staff estimate that about 50 percent of the volume within the fire perimeter would remain alive and available for harvesting. As discussed under ‘**Reasons for Decision**’, I expect that there will be significant amounts of dead timber throughout the TSA in the foreseeable future and will include a dead component to this AAC determination. I will not make any adjustments to the base case harvest projection to account for wildfires.

Reasons for Decision

In reaching my AAC determination for the Lillooet TSA, I considered the factors required under Section 8 of the *Forest Act* and reasoned as follows.

The base case showed that a harvest level of 311 359 cubic metres per year can be maintained for 100 years. The THLB in this analysis is 28 percent lower than in the previous analysis mainly because of land exclusions for old growth management areas, riparian areas, and establishment of wildlife habitat areas. The actual harvest during the period 2016 to 2021 averaged 276 000 cubic metres per year. The live component of the average volume harvested during this period was about 219 000 cubic metres per year, and the dead component was about 57 000 cubic metres per year.

I am satisfied that the assumptions applied in the base case for many of the factors applicable to the Lillooet TSA were appropriate, as detailed in Table 1 or as described elsewhere in this rationale. However, I have identified factors which, considered separately, indicate that the timber supply may be either greater or less than projected in the base case. Some of these factors can be readily quantified and their impact on the harvest level assessed with reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be readily quantified at this time.

I have identified the following factors in my considerations as indicating that the timber supply projected in the base case may have been underestimated, to a degree that can be quantified:

- *estimates for roads, trails, and landings* – After the analysis was completed, staff noticed that the base case overestimated the area removed for roads by 3798 hectares. The THLB portion of this

area is 1205 hectares. Applying this correction would increase timber supply by 0.7 percent throughout the projection horizon.

- *stand-level retention* – A licensee observed that the reduction for stand-level retention did not account for the overlap among areas retained in the cutblock. Accounting for the overlap would increase timber supply by 2.5 percent throughout the projection horizon.
- *forest inventory* – A new forest inventory was prepared in 2022 after the analysis was substantially completed using the older existing forest inventory. Redoing the analysis using the new inventory increased the base case harvest projection by 2.1 percent.

I have also identified the following factors in my considerations as indicating that the timber supply projected in the base case may have been overestimated, to a degree that can be quantified:

- *cultural heritage resources* – There are sites that are culturally significant to First Nations that are not protected and have not been removed from the THLB. Licensees have either avoided these areas or have been prevented from harvesting in them. Exclusion of these areas from the THLB reduced timber supply by about seven percent.

I have identified the following factors in my considerations as indicating that the timber supply projected in the base case may have been overestimated, but are not quantifiable at this time:

- *registered archaeological sites* – Known archaeological sites in the Ministry’s database have been removed from the THLB. However, staff indicated that there are sites not included in the database. Avoiding harvesting in these sites will reduce the base case timber supply projection by an unknown amount.
- *wildlife habitat areas and species of concern* – The NNTC indicated that there are about 1100 hectares of whitebark pine that should be excluded from the THLB. There is established guidance for the protection of whitebark pine in BC. Since it is not clear whether these areas are already excluded because they overlap with other types of areas removed from the THLB, I recognize that there may be an unknown reduction in the base case timber supply.
- *low volume stands* – Low volume stands (containing 150 to 220 cubic metres per hectare of merchantable volume), contributed about 25 percent of the harvested volume historically. The base case projects that the harvest from this stand type ranges from 49 to 85 percent in the short term. These stands also usually occur on steeper slopes which makes them less economical to harvest. I consider the uncertainty of harvest from low volume stands to be an unquantified reduction of the base case timber supply projection.

In considering the above-mentioned influences, I find that the combined effect of accounting for the quantifiable factors represents a net overestimation of timber supply by about 1.7 percent. However, there were some factors mentioned above (*registered archaeological sites, wildlife habitat areas and species of concern, and low volume stands*) where I considered the impacts to timber supply were unquantified. In addition, the effects of climate change discussed earlier under ‘*areas excluded for old growth management*’, ‘*riparian management area*’, ‘*very dry sites*’, ‘*cumulative effects*’, and ‘*forest health*’, add considerable uncertainty to the base case timber supply projection. I reviewed and discussed the analyses and recommendations staff provided on these factors. While it is beyond the scope of my authority to prescribe remedies to maintain these values and to mitigate the risks to timber supply posed by climate change, I conclude that, taken together, these uncertainties pose a significant risk to timber supply.

As stated under ‘**Guiding principles for AAC determinations**’, one way of dealing with uncertainty is to manage risks by evaluating the significance of specific uncertainties associated with the current information and assessing the potential current and future social, economic, and environmental risks

associated with a range of possible AACs. Consequently, the AAC I determine will account for these unquantified risks and give staff the opportunity to adopt forest practices to mitigate the risk to these values and to timber supply.

As discussed under ‘*steep slopes*’, I am aware of the difficulties and high cost of operating on steep slopes (greater than 40 percent slope) in the Lillooet TSA. During the past 10 years licensees have procured about 20 percent of their harvest from steep slopes. However, steep slopes comprise 38 to 46 percent of the base case harvest projection during the next 40 years. I am concerned that harvesting may be concentrated in terrain where slopes are less than 40 percent. Therefore, I will set a limit on the amount of harvest from this type of terrain.

The previous AAC determination was set during a period of extensive salvage harvesting following the MPB epidemic. The infestation has now subsided, and the base case harvest projection does not include any contribution from dead trees because focused harvesting of dead stands no longer occurs. However, as discussed under ‘*harvest performance*’, during the course of regular harvesting licensees have harvested an average of 57 000 cubic metres per year of dead wood which staff have attributed to residual mortality from the MPB epidemic along with current mortality from the continued presence of MPB, expanding spruce bark beetle population, and recent fires. I expect that because of climate change, there will be significant amounts of dead timber throughout the TSA for the foreseeable future. I would like to encourage licensees to continue harvesting dead timber and I will therefore include a dead component to my AAC determination. I will, however, limit the amount of live volume harvested to ensure that this additional AAC is used to recover dead volume.

Following the comprehensive public review of the analysis results for the Lillooet TSA, I have considered the many comments and concerns regarding harvest levels expressed by First Nations, licensees, and residents of the TSA. The factors where the impact to timber supply were quantifiable indicate that short-term timber supply in the base case should be decreased by 1.7 percent. However, after considering the risk to timber supply posed by the unquantified factors and uncertainties, I decided that the live harvest level should not exceed 300 000 cubic metres per year (3.6 percent below the base case harvest projection).

Dead timber averaged 20 percent of the total volume harvested during the period 2016 to 2020. If this performance continues, it will amount to 60 000 cubic metres per year of dead volume harvested relative to the live level I have set. However, recognizing that climate change will result in an increasing amount of mortality, I added 75 000 cubic metres per year to encourage the harvest of dead timber. To avoid overharvesting of live volume on slopes less than 40 percent, I will limit the harvest of live volume on this type of terrain to 180 000 cubic metres per year. I expect that the reductions I made to the base case harvest projection, along with the partitions will address the concerns raised by First Nations, residents of the TSA and licensees.

Determination

I have considered and reviewed the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next 10 years and that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in Lillooet TSA by establishing an AAC of 375 000 cubic metres. Further, I specify under Section 8(5) of the *Forest Act*, that a maximum of 300 000 cubic metres is attributable to live trees. Of the 300 000 cubic metres of live volume, no more than 180 000 cubic metres is attributable to areas with slopes of less than 40 percent.

This new AAC is 34 percent below the current AAC. The live portion of this AAC is 47 percent lower than the current AAC.

This determination becomes effective on October 12, 2023, and will remain in effect until a new AAC is determined, which must take place within 10 years of the effective date of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination or partitions sooner than the 10 years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage Ministry staff, other agencies, and licensees (as appropriate) to undertake or support the tasks noted below, the particular benefits of which are described in greater detail in appropriate sections of this rationale.

I recognize that the ability of staff and licensees to undertake projects is dependent on available resources, including funding. However, I have highlighted here what I view to be the most critical needs to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Lillooet TSA.

1. *Very dry sites* – As recommended by the Forest Practices Board and by District staff, I ask licensees to practice partial cutting silviculture systems when operating in the Interior Douglas-fir (IDF) and the Ponderosa Pine (PP) biogeoclimatic zones to facilitate stand regeneration and to reduce uncertainties from drought and forest fires.
2. *Climate change* – I request FAIB staff to develop methods to integrate climate change into their timber supply projections to better inform future AAC decisions.
3. *Cumulative effects* – When Forest Landscape Planning takes place in this TSA, I ask the participants to consider where old forest retention is most urgently needed. I also ask that they consider ways to mitigate the projected climate impacts to fish-bearing streams, and to preserve pine mushroom habitat.
4. *Forest health* – In response to climate change, I ask District staff to work with forest health staff to monitor the impacts of bark beetles and pathogens in the TSA so that the Ministry can respond appropriately.
5. *Wildland urban interface* - I ask that District staff monitor activities in the WUI over the next 10 years and that those practices be reflected in the next timber supply review.



Shane Berg, RPF
Chief Forester



October 12, 2023

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157, (current to May 10, 2023), reads as follows:

Allowable annual cut

8 (1) The chief forester must determine an allowable annual cut at least once every 10 years after the date of the last determination, for

- (a) the Crown land in each timber supply area, excluding the Crown land in the licence areas of area-based licences, and
- (b) each tree farm licence area.

(2) If the minister

- (a) makes an order under section 7 (b) respecting a timber supply area, or
- (b) amends or enters into a tree farm licence to accomplish a result set out under section 39 (2) or (3),

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

- (c) within 10 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
- (d) after the determination under paragraph (c), at least once every 10 years after the date of the last determination.

(3) If

- (a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
- (b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 10 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(3.1) If, in respect of the allowable annual cut for a timber supply area or tree farm licence area, the chief forester considers that the allowable annual cut that was determined under subsection (1) is not likely to be changed significantly with a new determination, then, despite subsections (1) to (3), the chief forester

- (a) by written order may postpone the next determination under subsection (1) to a date that is up to 15 years after the date of the relevant last determination, and
- (b) must give written reasons for the postponement.

(3.2) If the chief forester, having made an order under subsection (3.1), considers that because of changed circumstances the allowable annual cut that was determined under subsection (1) for a timber supply area or tree farm licence area is likely to be changed significantly with a new determination, he or she

- (a) by written order may rescind the order made under subsection (3.1) and set an earlier date for the next determination under subsection (1), and
- (b) must give written reasons for setting the earlier date.

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In respect of an allowable annual cut determined under this Act, the chief forester may, at any time, specify that portions of the allowable annual cut are attributable to one or more of the following:

- (a) different types of timber or terrain in different parts of Crown land within a timber supply area or tree farm licence area;
- (a.1) different areas of Crown land within a timber supply area or tree farm licence area;
- (b) different types of timber or terrain in different parts of private land within a tree farm licence area.
- (c) [Repealed 1999-10-1.]

(5.1) The chief forester may, at any time, amend or cancel a specification made under subsection (5).

(6) The minister must determine an allowable annual cut for each woodlot licence area in accordance with the woodlot licence for that area.

(7) The minister must determine an allowable annual cut for

- (a) each community forest agreement area in accordance with the community forest agreement for that area, and
- (b) each first nations woodland licence area in accordance with the first nations woodland licence for that area.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

- (a) the rate of timber production that may be sustained on the area, taking into account
 - (i) the composition of the forest and its expected rate of growth on the area,
 - (ii) the expected time that it will take the forest to become re-established on the area following denudation,
 - (iii) silviculture treatments to be applied to the area,
 - (iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
 - (v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
 - (vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,
- (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,
- (c) [Repealed 2003-31-2.]
- (d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and
- (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

(9) Subsections (1) to (4) of this section do not apply in respect of the management area, as defined in section 1 (1) of the *Haida Gwaii Reconciliation Act*.

(10) Within one year after the chief forester receives notice under section 5 (4) (a) of the *Haida Gwaii Reconciliation Act*, the chief forester must determine, in accordance with this section, the allowable annual cut for

- (a) the Crown land in each timber supply area, except the areas excluded under subsection (1) (a) of this section, and
- (b) each tree farm licence area

in the management area, as defined in section 1 (1) of the *Haida Gwaii Reconciliation Act*.

(11) The aggregate of the allowable annual cuts determined under subsections (6), (7) and (10) that apply in the management area, as defined in section 1 (1) of the *Haida Gwaii Reconciliation Act*, must not exceed the amount set out in a notice to the chief forester under section 5 (4) (a) of that Act.

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

Section 4 of the *Ministry of Forests and Range Act* (current to August 30, 2023) reads as follows:

Purposes and functions of ministry

4 The purposes and functions of the ministry are, under the direction of the minister, to do the following:

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

Appendix 3: Minister's letter of November 24, 2021



Reference: 268022

November 24, 2021

Diane Nicholls, R.P.F.
Assistant Deputy Minister and Chief Forester

Dear Diane Nicholls:

The *Forest Act* gives you the authority to determine an allowable annual cut (AAC) for each timber supply area and tree farm licence in the province and specifies what you must consider when determining an AAC. Included in these considerations are the economic and social objectives of the government, which are provided below. These government objectives are to be considered as part of the comprehensive timber supply review process that your office has developed and implemented to ensure that your AAC determinations consider many forest management objectives and aligns with provincial statutes and regulations. They replace the objectives provided to you by the former minister, Doug Donaldson, on October 30, 2017.

British Columbians expect a government focused on building a strong sustainable economy that works for everyone, providing a path for lasting and meaningful reconciliation with Indigenous peoples, and developing strategies to address climate change. Government has committed to delivering on these priorities while recognizing that healthy, resilient forests are essential to the social, economic, and environmental interests of current and future generations. To advance these commitments, natural resource ministries, Indigenous partners, and stakeholders are collaborating to develop and implement forest management strategies and policies that will be relevant to your AAC determinations. I ask that you remain mindful of these commitments and as government approves related objectives, that you ensure they are fully considered within the timber supply review process.

The British Columbia (BC) government has committed to full and lasting reconciliation with Indigenous Peoples. As the provincial government implements the *Declaration on the Rights of Indigenous Peoples Act* and works toward aligning provincial laws with the United Nations Declaration on the Rights of Indigenous Peoples, I ask that your AAC determinations fully consider relevant outcomes of that work. For greater certainty, please continue to ensure that your AAC determinations are consistent with relevant agreements that are in effect between First Nations and the BC government, and court decisions that define Aboriginal title and rights. I expect you to continue to find ways to advance engagement and collaboration with Indigenous Peoples throughout the timber supply review process. In making your AAC determinations, I also ask that you continue to carefully consider Indigenous knowledge and other input that could have implications for your AAC determinations from First Nations and organizations whose traditional territories overlap the management unit under consideration.

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Ministry of Forests, Lands,
Natural Resource Operations
and Rural Development

Office of the Minister

Mailing Address:
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Website: www.gov.bc.ca/for

Diane Nicholls, Assistant Deputy Minister and Chief Forester

BC's forests provide fibre for forest products, habitat for plants, fish and wildlife, and many other benefits essential to diverse and resilient communities. The capacity of these forests to support economic and environmental sustainability and reconciliation with Indigenous peoples is challenged by insect infestations, increasing levels of wildfire activity and other risks related to climate change. As healthy forests are essential for a healthy industry and province, I ask you consider how your determinations may encourage economic recovery and forest revitalization, improve forest health, and support approved strategies to reduce wildfire.

Since a sustainable and resilient timber supply supports BC's goals for a better, cleaner future and environmental sustainability, your AAC determinations should continue to incorporate, as appropriate, the best available information on climate change and forest health. When making your AAC determinations, please consider ways to encourage management practices that reduce greenhouse gas emissions and support forest resiliency. Practices that are consistent with established climate change strategies, adaptation, and mitigation practices, including practices that result in better fibre utilization and sector diversity, should be explored.

As new land use policies are developed and implemented to support BC's goals for economic activity, environmental sustainability, and reconciliation with Indigenous peoples, I ask that your determinations continue to incorporate, as appropriate, the best available information on the cumulative effects of multiple activities on the land base. Where the cumulative effects of timber harvesting and other land-based activities indicate a risk to natural resource values, your determinations should identify those risks for consideration in land-use planning. I also ask that you consider ways in which your AAC determinations could encourage actions or practices to mitigate the identified risks to natural resource values.

Forests are essential to build a strong, sustainable economy that supports people, communities and competitiveness and this government is focused on transitioning the forestry sector from high volume to high value production. As part of the timber supply review process, I ask that you consider ways to foster and encourage the value-added sector and increase the use of fibre. Please identify timber types that may not be reflected in harvest choice, and in your AAC determinations, examine opportunities for these timber types to sustain clean-energy jobs and value-added products or enhance ecosystem health and resiliency.

In making your AAC determinations, I ask that you consider the needs of local communities as expressed by the public during timber supply review process. This includes input that contribute to the economic recovery and sustainability of communities and is consistent with the government's broader objectives. To ensure a sustainable future for BC's forest-dependent communities, I also ask that when faced with necessary reductions in AAC's that wherever possible those reductions be no larger than necessary to avoid significant longer-term impacts.

Thank you, Diane, for your service and your care and attention to these important matters.

Sincerely,



Katrine Conroy
Minister

Appendix 4: Information sources used in the AAC determination

The information sources considered in determining the AAC for the Lillooet TSA include the following:

- Aerial Overview Surveys. Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-health/aerial-overview-surveys>
- Approved Government Actions Regulation – Ungulate Winter Ranges. See https://www.env.gov.bc.ca/wld/frpa/urpa/approved_urpa.html
- Approved Government Actions Regulation – Wildlife Habitat Areas. See http://www.env.gov.bc.ca/cgi-bin/apps/faw/wharesult.cgi?search=show_approved;
- Approved Legal Orders. Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See <https://www2.gov.bc.ca/gov/content/industry/crown-land-water/land-use-planning/regions>;
- Archaeology in British Columbia. Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See <https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/archaeology>;
- Biodiversity Guidebook. Ministry of Forests. See <https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/frep/frep-docs/biodiversityguidebook.pdf>
- Berch, S.M. and J.M. Kranabetter. 2010. Compatible management of timber and pine mushrooms. B.C. Min. For. Range, For. Sci. Prog., and Cent. Non-Timber Resources, Royal Roads Univ., Victoria, B.C. Land Manag. Handb. 64;
- Braumandl, T. and P Dykstra. 2007. Accuracy assessment of a predictive ecosystem map – Lillooet Timber Supply Area. Prepared for Ainsworth Engineered Canada LP. March 15, 2007;
- British Columbia Geographic Warehouse. See <https://www2.gov.bc.ca/gov/content/data/geographic-data-services>;
- Bulletin-Modelling Visuals in TSR III (December 12, 2003). See https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/visual-resource-mgmt/vrm_modeling_visuals_bulletin.pdf (Accessed June 20, 2020);
- Electronic Commerce Appraisal System (ECAS). Ministry of Forests, Lands and Natural Resource Operations. See <https://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/electronic-commerce-appraisal-system>
- Extension Note 116: Revised Snow Recovery Estimates for Pine-dominated Forests in Interior British Columbia. R. Winkler and S. Boon. 2015. Ministry of Forests, Lands, Natural Resource Operations and Rural Development;
- *Forest Act*. See Section 8 Allowable Annual Cut. See https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96157_02#section8
- *Forest and Range Practices Act*. See http://www.bclaws.ca/civix/document/id/complete/statreg/02069_01;
- Forest Planning and Practices Regulation. See http://www.bclaws.ca/civix/document/id/complete/statreg/14_2004;
- Forest Practices Code Riparian Management Area Guidebook. Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silvicultural-systems/silviculture-guidebooks/riparian-management-area-guidebook>;

- Government Actions Regulations. See <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/legislation-regulation/forest-range-practices-act/government-actions-regulation>;
- Government of Canada. S.C. 2002, c.29. *Species at Risk Act*. Ottawa, Ont. Current to October 25, 2017. See <https://laws-lois.justice.gc.ca/eng/acts/S-15.3/>
- Harvest Billing System (HBS). Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See <https://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/harvest-billing-system>;
- *Heritage Conservation Act*. Section 9. Heritage designation. See https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96187_01#section9;
- *Heritage Conservation Act* OrderInCouncil #467. See [https://www.bclaws.gov.bc.ca/civix/document/id/oic/arc_oic/0467_1991/search/CIVIX_DOCUMENT_ROOT_STEM:\(Dewdney%20Heritage%20Trail\)?6#hit1](https://www.bclaws.gov.bc.ca/civix/document/id/oic/arc_oic/0467_1991/search/CIVIX_DOCUMENT_ROOT_STEM:(Dewdney%20Heritage%20Trail)?6#hit1);
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- Lil'wat Nation and Province of British Columbia. 2008. Land use planning agreement between The Lil'wat Nation and The Province of British Columbia as represented by the Minister of Agriculture and Lands. See https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/land-use-plans-and-objectives/southcoast-region/seatosky-lrmp/agreement_lrmp_lilwat_bc.pdf
- Lillooet Timber Supply Area Timber Supply Analysis Discussion Paper, Ministry of Forests and Range, August 2008. See https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/tsr-annual-allowable-cut/Lillooet_tsa_public_discussion_paper.pdf
- Lillooet Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination, Ministry of Forests and Range, May 2009. See https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/tsr-annual-allowable-cut/lillooet_tsa_rationale.pdf
- Lillooet Timber Supply Area Timber Supply Review Data Package, Ministry of Forests and Range, March 2004. See https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/tsr-annual-allowable-cut/lillooet_tsa_data_package.pdf
- Lillooet Timber Supply Area Timber Supply Review 3 Mountain Pine Beetle Impact Assessment, Addendum to the Lillooet TSR2 Analysis Report, March 2008. See https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/forest-analysis-inventory/tsr-annual-allowable-cut/lillooet_tsa_analysis_report_addendum.pdf
- Lillooet Timber Supply Area Timber Supply Review #3 Analysis Report. Version 1. Forsite Consultants Ltd., 2005;
- Lillooet TSA Visual Quality Objective Order. See <https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/legislation-regulation/gar-ministerial-orders/visualgarorder.pdf>
- *Land Act*. See https://www.bclaws.ca/civix/document/id/complete/statreg/96245_01;
- List of Wildlife Species at Risk, Schedule 1 (Subsections 2(1), 42(2) and 68(2)). See <https://laws.justice.gc.ca/eng/acts/S-15.3/page-10.html#h-435647>

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- Provincial Logging Residue and Waste Measurement Procedures Manual. Timber Pricing Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/timber-pricing/residue-and-waste/res_waste_interior_procedures_master_1a.pdf
- Provincial Timber Management Goals, Objectives & Targets for the Lillooet TSA. (September 12, 2022);
- Reforestation in the Interior Douglas-fir Subzone: Are Reforestation Choices Meeting Objectives? See bcfpb.ca/wp-content/uploads/2020/09/SIR53-Reforestation-in-IDF-Subzone.pdf
- Reporting Silviculture Updates and Land Status Tracking System (RESULTS) application. See <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silviculture-reporting-results>;
- *Resort Timber Administration Act*. Section 4 Power to make regulations. See https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/00_06030_01#section4;
- Seed Planning and Registry Application (SPAR). Forest Improvement and Research Management Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/tree-seed/seed-planning-use/spar>;
- Shamaya Consulting and Silvatech Group Consulting Ltd. 2004. Lillooet TSA Predictive Ecosystem Map final report. BAPID # 4021 (MSRM registry number). FIA Service Agreement Activity #4219003-01. Lillooet, BC;
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- Tree & Stand Simulator (TASS). Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-inventory/growth-and-yield-modelling/tree-and-stand-simulator-tass>;
- Variable Density Yield Projection (VDYP). Ministry of Forests, Lands, Natural Resource Operations and Rural Development. See <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-inventory/growth-and-yield-modelling/variable-density-yield-projection-vdyp>.