

**BRITISH COLUMBIA
MINISTRY OF FORESTS, LANDS AND
NATURAL RESOURCE OPERATIONS**

Tree Farm Licence 55

held by

Louisiana-Pacific Canada Ltd.

**Rationale for
Allowable Annual Cut (AAC)
Determination**

Effective March 24, 2017

Diane Nicholls, RPF

Chief Forester

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Objective of this document

This document provides an accounting of the factors I have considered and the rationale I have employed as Chief Forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, for Tree Farm Licence 55 (TFL 55). This document also identifies where new or better information is needed for incorporation in future determinations.

Acknowledgement

For preparation of the information that I have considered in this determination, I thank Louisiana-Pacific Canada Ltd. (‘the licensee’) and staff from BC Ministry of Forests, Lands and Natural Resource Operations (FLNRO) in the Selkirk Natural Resource District and the Forest Analysis and Inventory Branch (FAIB). I am also grateful to the First Nations, the public, and other government agencies that have provided input.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider a number of specified factors in determining AACs for TSAs and TFLs. Section 8 of the *Forest Act* is reproduced in full as Appendix 1 of this document.

Description of the Tree Farm Licence

TFL 55 is situated in the Selkirk Mountains north of Revelstoke, and is bounded by the Goldstream River, Mica Creek, and the Revelstoke Reservoir. The Revelstoke and Golden timber supply areas (TSAs) and TFL 56 are adjacent to TFL 55.

TFL 55 covers approximately 92 700 hectares and lies in rugged terrain characterized by sharp peaks; glaciers; and deep, narrow, forested valleys. The TFL lies in the interior wet-belt portion of the province, falling in three biogeoclimatic zones: Engelmann Spruce – Subalpine Fir (ESSF), Interior Cedar Hemlock (ICH), and Alpine Tundra. The lower elevation forests are primarily composed of western redcedar, western hemlock, and Douglas-fir; whereas higher elevation forests are predominantly spruce and subalpine fir (balsam).

Wildlife species are abundant and include small mammals, fur-bearers, birds, fish, and large mammals such as grizzly and black bears, mountain caribou, moose, and deer. Although no provincial parks or protected areas are found within TFL 55, protection of non-timber values is afforded through various legislation and regulation including the Revelstoke Higher Level Plan Order (RHLPO) that addresses old forests and a Government Actions Regulation (GAR) order for mountain caribou habitat. Given these regulations, and operability issues, only about 17 percent of the TFL is considered available for timber harvesting.

Three First Nation Councils and associated member bands have territories that encompass areas within TFL 55: the Ktunaxa Nation Council, the Shuswap Nation Tribal Council (Adams Lake Indian Band, Little Shuswap Lake Band, Neskonlith Indian Band, Shuswap Indian Band, Simpcw / North Thompson Indian Band, Splots’in) and the Okanagan Nation Alliance (Lower Similkameen Indian Band, Okanagan Indian Band, Penticton Indian Band, Upper Nicola Band). No First Nation communities are found within the TFL.

The TFL is managed by the licensee through their Malakwa Forest Resource Division (Malakwa, BC) and is administered by the FLNRO Selkirk Natural Resource District of the Kootenay-Boundary Natural Resource Region.

History of the TFL and the AAC

The current boundaries of TFL 55 were formed from two TFL subdivisions. In 1992, TFL 23 was subdivided and the area of TFL 23 located north of Revelstoke was used to form TFL 55. Subsequently, in 1993, the original area of TFL 55 was further subdivided into two roughly equal areas: the northern portion, assigned to Evans Forest Products Ltd., remained TFL 55 and the southern portion, assigned to the Revelstoke Community Forest Corporation, became TFL 56. TFL 55 was reassigned in 1999 to Louisiana Pacific Canada Engineered Wood Products Ltd. which is now known as Louisiana–Pacific Canada Ltd.

Following the subdivision in 1993, the AAC of TFL 55 was set at 100 000 cubic metres. In 1996 the chief forester determined the AAC to be 100 000 cubic metres; this AAC included a partition of 10 000 cubic metres attributable to timber classified at that time as inoperable. A subsequent AAC determination effective April 18, 2001, reduced the AAC to 90 000 cubic metres but did not include a partition. The AAC was unchanged in a determination made effective March 8, 2007, and is currently 90 000 cubic metres.

New AAC determination

Effective March 24, 2017, the new AAC for TFL 55 will be 83 000 cubic metres, a decrease from the current AAC.

This AAC will remain in effect until a new AAC is determined, which must take place within 10 years of this determination unless significant new information becomes available.

Information sources used in the AAC determination

- *Tree Farm Licence 55, Management Plan #5*, Louisiana-Pacific Canada Ltd., November 2016.
- *TFL 55 Management Plan #5 Proposed Referral and Public Review Strategy*, Louisiana-Pacific Canada Ltd., September 2015.
- *Tree Farm Licence 55 Management Plan #5 Information Package*, prepared for Louisiana Pacific – Malakwa Division by Ecora Engineering & Resource Group Ltd., November 2016.
- *Tree Farm Licence 55 Management Plan #5 Timber Supply Analysis Report*, prepared for Louisiana Pacific – Malakwa Division by Ecora Engineering & Resource Group Ltd., November 2016.
- *Summary of Public Input solicited by the licensee regarding the contents of Management Plan #5*, November 2016.
- *Letters from Minister of Forests and Range, conveying government's economic and social objectives of the Crown*, July 4, 2006, and October 27, 2010.
- *Forest Practices Code of British Columbia Guidebooks*, Ministry of Forests and Ministry of Environment Lands and Parks.
- *Forest Act*, current as of March 1, 2017.
- *Forest and Range Practices Act*, current as of March 1, 2017.
- *Forest Planning and Practices Regulation*, current as of February 29, 2016.
- *Government Actions Regulation*, current as of December 13, 2004.

- *Revelstoke Higher Level Plan Order*, Ministry of Sustainable Resource Management, March 25, 2005.
- *Order—Reve[l]stoke—01 Revelstoke Higher Level Plan Order cancelling the caribou objectives in the Revelstoke Higher Level Plan Order*, Ministry of Agriculture and Lands, January 8, 2009.
- *Order—Revelstoke—02 Revelstoke Higher Level Plan Order amendment to objectives 1 (Biodiversity emphasis) and 2 (old and mature forest)*, Ministry of Forests, Lands and Natural Resource Operations, December 16, 2011.
- *Accuracy assessment of a predictive ecosystem map – Tree Farm Licence 55*, prepared for Louisiana-Pacific Canada Ltd. by Dykstra, P., T. Braumandl and R. Fretwell, 2005.
- *Biodiversity management in the Revelstoke Timber Supply Area*, Complaint Investigation 121010. FPB/IRC/187, Forest Practices Board, 2013.
- *TFL 55 Site Index Adjustment, Final Report*, prepared for Louisiana Pacific Canada Ltd. by J.S. Thrower & Associates Ltd., 2005.
- *TFL 55 Forest Stewardship Plan 2016-2021*, Louisiana-Pacific Canada Ltd., July 19, 2016 draft.
- *TFL 55 2005 Operability Report*, Louisiana-Pacific Canada Ltd. 2005.
- *2015 Overview of Forest Health Conditions in the Southern British Columbia*, Ministry of Forests, Lands and Natural Resource Operations, Thompson Okanagan Region, 2016.
- *Harvest Billing System*, Ministry of Forests, Lands and Natural Resource Operations.
- *TSP and VDYP7 volume comparison*, Forest Analysis and Inventory Branch, BC Ministry of Forests and Range, 2009.
- *Provincial Logging Residue and Waste Measurement Procedures Manual*, Revenue Branch, Ministry of Forests and Range, Victoria, BC, 2005 with amendments to October 2013.
- *TFL 55 Change monitoring inventory sample plan*, prepared for Mike Copperwaite, Louisiana-Pacific Canada Ltd. by Timberline Natural Resource Group Ltd., 2008.
- *Vegetation Resource Inventory Statistical Adjustment*, prepared for Louisiana-Pacific by Timberline Natural Resource Group Ltd., 2005.
- *Predictive ecosystem mapping of Tree Farm Licence 55 – Final report*, prepared for Louisiana-Pacific Canada Ltd. by Timberline Natural Resource Group Ltd., 2005.
- *TFL 55 OGMA optimization caribou focus: Project summary report*, prepared for Louisiana-Pacific by Timberline Natural Resource Group Ltd., undated draft.
- *Adapting natural resource management to climate change in the Kootenay Boundary Region: Considerations for practitioners and Government staff*, Ministry of Forest Lands and Natural Resource Operations, February 22, 2016.
- *Consideration of information required by Section 8 of the Forest Act for TFL 55*, as presented to the Chief Forester by FLNRO district and branch staff at a meeting held December 12, 2016 in Victoria.

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 determinations is in the form of a timber supply analysis and its inputs. These inputs are concerned primarily with biophysical factors—such as the rate of timber growth and the definition of the land base considered available for timber harvesting—and with management practices.

The analytical techniques used to assess timber supply necessarily are simplifications of the real world. Many of the factors used as inputs to timber supply analysis are uncertain, due in part to variation in physical, biological, and social conditions. Ongoing scientific studies of ecological dynamics will help reduce some of this uncertainty.

Furthermore, 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 this AAC for TFL 55 I have considered the 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

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining the AACs for timber supply areas and tree farm licences.

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 mindful of my obligation as a steward of the forests of British Columbia, of the mandate of the FLNRO as set out in Section 4 of the *Ministry of Forests and Range Act*, and of my responsibilities under the *Forest Act* and *Forest and Range Practices Act* (FRPA).

Integrated decision making

One of the key purposes of the FLNRO 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 all available information on timber and non-timber resources in the management unit, and all available information on the interactions of the management of those resources on timber supply.

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:

1. managing risks by evaluating the significance of specific uncertainties associated with the current information and assessing the various potential current and future, social, economic, and environmental risks associated with a range of possible AACs; and
2. re-determining AACs frequently, in cases where projections of short-term timber supply are not stable, to ensure they incorporate current information and knowledge.

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 substantiated by demonstrated performance or are beyond current legal requirements.

In many areas, the timber supply implications of some legislative provisions remain uncertain, particularly when considered in combination with other factors. In each AAC determination, this uncertainty is taken into account to the extent possible in the context of the best available information.

It is not appropriate to speculate on timber supply impacts that may eventually result from land-use decisions not yet finalized by government, nor is it possible at this time to speculate about the possible effect on timber supply that could result from possible eventual legal proof of Aboriginal title. However, 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 (THLB) 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 to help in meeting resource management objectives such as for biodiversity.

In some cases, even when government has made a formal land-use decision, it is not necessarily possible to fully analyse and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring, for instance, further detailed planning or legal designations such as those provided for under the *Land Act* and FRPA. In cases where there is a clear intent by government to implement these decisions that have not yet been 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 are 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 response to uncertainty.

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

Climate change

One key area of uncertainty relates to climate change. While some controversy appears to remain on the causes of climate change, there is substantial scientific agreement that climate is changing, that the changes will affect forest ecosystems, and that forest management practices will need to be adapted. Nevertheless, the potential rate, amount, and specific characteristics of climate change in different parts of the province are uncertain. As research provides more definitive information on climate change, I will consider the findings in AAC determinations. Where forest practices are implemented to mitigate or adapt to the potential effects of climate change on forest resources, I will consider related information in my determinations.

In addition, vulnerability assessments can provide information on the potential risks associated with climate change, and could be useful in defining how to consider climate change in different AAC determinations. Such assessments could also highlight key topics in need of research that could improve climate change considerations for future determinations.

I note, however, that even with better information on climate change there will be a range of reasonable management responses. Considerations of how to respond in anticipation of uncertain, potential future impacts and risks differ from those related to responding to known or ongoing processes such as the recent mountain pine beetle (MPB) infestation. 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. Conversely, the present forest conditions resulting from the MPB infestation provide a clearer circumstance to which to respond.

To some extent, decisions on the preferred management responses to potential future risks, including potential changes to allowable timber harvests, are appropriately informed by broad discussion among interested parties. I will monitor such discussions and consider them insofar as they are relevant to AAC determinations. In general, the requirement for regular AAC reviews will allow for the incorporation of new information on climate change and its effects on forests and timber supply as it emerges.

First Nations

Established (declared) Aboriginal title lands 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 licence with which they overlap. For other areas, where Aboriginal title has not been legally proven, the Crown has a constitutional obligation to consult with First Nations regarding their asserted Aboriginal rights and title (Aboriginal Interests) in a manner proportional to the strength of their Aboriginal Interests and the degree to which the decision may impact these interests. In this regard, full consideration will be given to:

- (i) the information provided to First Nations to explain the timber supply review process;
- (ii) any information brought forward through engagement and consultation respecting First Nations' Treaty rights or Aboriginal Interests, including how these rights or interests may be impacted; and
- (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.

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 and the AAC determination are addressed in the various sections of this rationale.

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, Lands and Natural Resource Operations with respect to subsequent allocation of wood supply.

The role of the base case

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

For most AAC determinations, a timber supply analysis is carried out using an information 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 forecasts 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 forecasts, 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* forecast and forms a 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 legal requirements.

Because it represents only one in a number of theoretical forecasts, 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 forecast of timber supply, whose validity—as with all the other forecasts 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 all the assumptions made in generating the base case are realistic and current, and the degree to which resulting predictions of timber supply must be adjusted to more properly reflect the current and foreseeable situation.

These adjustments are made on the basis of informed judgment using currently available information about forest management where information has changed since the original information 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 analysis with which I am provided is 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, once an AAC has been determined, no additional precision or validation would be gained by attempting a computer analysis of the combined considerations.

Timber supply analysis

The timber supply analysis for TFL 55 Management Plan No. 5 (MP #5) was prepared for the licensee by Ecora Engineering & Resource Group Ltd. using the forest estate model Patchworks. Patchworks is a spatially explicit forest management planning model in which targets for multiple objectives can be set within a goal planning framework. Based on review by FLNRO staff and my previous experience reviewing the results of this model, I am satisfied that Patchworks is capable of providing reasonable projections of timber supply and a sound basis for AAC determinations.

The MP #5 timber supply analysis included assumptions based on the licensee's assessment of the best available information on current forest management and the land base available for timber harvesting within the TFL. These assumptions are discussed in the information package and in the timber supply analysis documentation, which form integral components of the management plan.

The base case projection in MP #5 was initiated at the current AAC of 90 000¹ cubic metres for one decade followed by a seven percent drop for a decade and then a 10 percent drop to the mid-term low level of about 73 000 cubic metres. From the mid-term low, the timber supply gradually increases—reaching 87 000 cubic metres in 250 years.

The area identified as contributing to the THLB of TFL 55 has decreased by 28 percent as compared to the THLB of MP #4. While the base case harvest flow of MP #5 is able to maintain the current AAC for one decade, the MP #4 base case demonstrated higher timber supply levels throughout the modelled planning horizon.

The THLB decrease is primarily attributable to changes in how mountain caribou habitat is legally protected. A 2009 GAR order established no-harvest zones (i.e., area that is excluded from the THLB) to protect mountain caribou habitat; these no harvest zones replaced retention objectives of the higher level plan order (i.e., objectives on area that is included in the THLB). This THLB reduction was offset for the following reason: the spatial placement of old growth management areas was modified to have a greater overlap with areas already excluded from the THLB—primarily the no harvest zones for mountain caribou habitat. Overall, the 2009 GAR order resulted in a large THLB reduction; but given it replaced the previous higher level plan retention objectives, a smaller disproportionate timber supply reduction was expected.

It is important to look at the potential implications for timber supply that can arise from the uncertainty in data and model assumptions to understand both the effect of the uncertainty and the underlying dynamics of the base case. The 2016 timber supply analysis report included a number of alternative and sensitivity analyses that looked at changes in the assumption of the base case harvest objectives and the model assumptions. All of these analyses have been of assistance to me in considerations leading to my determination.

As discussed throughout this rationale, and in consideration of the items described above, I am satisfied that base case forecast and associated analyses presented in MP #5 provide an adequate basis from which I can assess the timber supply for TFL 55 in this determination.

¹ In the timber supply analysis provided with the TFL 55 management plan, the timber supply was projected for five year periods; in this rationale I have described the timber supply projections with rounded values for decadal periods.

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

I have reviewed the information for all of 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 appropriately represents current management or 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.

Table 1. List of factors for which base case modelling assumptions have been accepted

<i>Forest Act</i> section and description	Factors accepted as modelled
8(8)(a)(i) Land base contributing to timber harvesting	<ul style="list-style-type: none"> • Non-provincial crown lands • Non-forest non-productive • Parks • Roads, trails and landings • Terrain stability • Economic and physical operability • Non-merchantable – deciduous • Non-merchantable – old hemlock & balsam • Non-merchantable – low sites • Cultural heritage & archaeological sites
8(8)(a)(i) Composition of the forest and expected rate of growth	<ul style="list-style-type: none"> • Forest inventory • Genetic gains
8(8)(a)(ii) Expected time for the forest to be re-established following denudation	
8(8)(a)(iii) silviculture treatments to be applied to the area	<ul style="list-style-type: none"> • Regeneration regimes • Silvicultural systems • Incremental silviculture
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"> • Minimum harvestable criteria • Merchantability specifications • Waste and residual
8(8)(a)(v) Constraints on the amount of timber produced by use of the area for other purposes	<ul style="list-style-type: none"> • Scenic areas/visuals • Watersheds • Riparian • Cutblock adjacency & patch size objectives
8(8)(a)(vi) Other information	<ul style="list-style-type: none"> • Socio-economic
8(8)(b) Short and long-term implications of alternative rates of timber harvesting from the area	
8(8)(d) Economic and social objectives of the government	
8(8)(e) Abnormal infestations in and devastation of, and major salvage program planned for, timber on the area	<ul style="list-style-type: none"> • Unsalvaged losses

I discuss below those factors where more uncertainty exists, where public or First Nations' input indicates contention, or where the issue is integral to my reasoning for this decision. I present these factors in accordance to the relevant section of the *Forest Act*.

Section 8 (8)

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

Section 8 (8) (a) the rate of timber production that may be sustained on the area, taking into account

Section 8 (8) (a) (i) the composition of the forest and its expected rate of growth on the area

Land base contributing to timber harvesting

- general comments

As part of the timber supply modelling process, the land base that will be available for harvesting in the model (i.e., the THLB) is derived based on consideration of ecological, economic, and social factors. These considerations may be legally established no-harvest zones or may be modelling surrogates for current practices that restrict harvesting within the crown managed forest land base. As such, because the THLB is a strategic level estimate derived for the purpose of timber supply modelling, the inclusion or exclusion of an area in the THLB may not always agree with whether or not it will be harvested operationally.

The total area of TFL 55 is 92 700 hectares. Of this total area, 16 007 hectares are deemed to be available as THLB after deductions are applied for factors noted in Table 1 above and in factors discussed below. This THLB is 28 percent smaller than the THLB identified in the previous management plan. Reasons for the smaller THLB are identified in the factors below.

- landscape-level biodiversity

Landscape-level biodiversity requirements in TFL 55 consist of aspatial old-seral distribution requirements established under the Revelstoke Higher Level Plan Order (RHLPO). To operationally address these requirements, non-legal OGMAs have been identified within the TFL and, in the base case, the licensee chose to remove the non-legal OGMAs from the THLB in order to meet the old-seral distribution requirements.

In TFL 55 the current old-seral distribution requirements are based upon a 2011 RHLPO amendment; this amendment reduced the requirements for old-seral distribution in response to the 2009 GAR order establishing no-harvest zones for mountain caribou. For TFL 55, the most significant change due to the amendment was to delete the requirement that old-seral objectives must be met both above and below a 1994 timber harvesting operability line (also known as the caribou line). For the Revelstoke TSA, the 2011 amendment also removed mature-plus-old objectives, matching the TFL requirements of the original RHLPO.

Following the establishment of the RHLPO, OGMAs were delineated by the licensee in conjunction with government to address the old-seral distribution requirements. These OGMAs, though considered in operational planning, were not legally established. Following a 2009 GAR order that replaced requirements for mountain caribou habitat protection with no-harvest zones, the licensee engaged a consultant to revise the original non-legal OGMAs while minimizing THLB impacts. This exercise identified that, except for 36 hectares, the old-seral distribution requirements could be met on land base that was already considered outside of the THLB, particularly within mountain caribou no-harvest zones.

The North Columbia Environmental Society (NCES) identified that “Most of the old growth forests have been lost throughout the Interior Wetbelt. The few remaining stands are important areas that need to be protected for their unique biodiversity.” NCES expressed strong concerns that areas previously identified as OGMAs should not be harvested as they are needed for biodiversity; the protection of flora and fauna of concern, threatened, or endangered; and that these forests serve as carbon sinks. They identified that harvesting is likely to fragment lower elevation connectivity corridors. Further, as in a 2012 complaint to the Forest Practices Board, NCES expressed concerns about the changed requirements under the 2011 RHLPO amendment for biodiversity objectives.

The Forest Practices Board investigated NCES concerns about the 2011 RHLPO amendment. The board reported in 2013 that the “On balance, the amendment will not substantially affect biodiversity conservation as originally provided by the RHLPO, so long as forests that are currently considered inoperable remain unharvested.” Nevertheless, the board did express concerns that it is unknown, as it is not monitored, whether the RHLPO provisions will actually be effective at maintaining biodiversity.

In TFL 55, most of the landscape-biodiversity requirements can be addressed on land base that was excluded from the THLB for other purposes; about 70 percent of the productive forested land base in the TFL is outside of the THLB. This allows most of the required old-seral objectives to be aligned with areas removed from the THLB for operability concerns or for non-timber objectives. Such alignment for the most part can be seen to stabilize both the location of old forest and the THLB; and thus increase the certainty of objectives on a land base. It will remain important to continue to monitor that the landscape-biodiversity objectives are being met; and as the Forest Practices Board stated, it will be important to determine how effective the objectives are at actually achieving the conservation of biodiversity.

In the base case scenario, the licensee chose to model landscape-biodiversity requirements based on the 2010 delineation of OGMAs rather than the non-legal OGMAs that had been identified prior to the 2009 GAR order.

For this determination, I accept that the 2010 modelled delineation of old forests is reasonable to address the higher level plan objectives for landscape-level biodiversity.

- stand-level biodiversity

Stand-level biodiversity management includes the retention of wildlife trees and wildlife tree patches (WTPs) within or adjacent to cutblocks to provide structural diversity and wildlife habitat. Section 66 of the Forest Planning and Practices Regulation requires that a minimum of seven percent of the total area related to cutblocks harvested in a 12 month period be covered by wildlife tree retention areas, and that within any cutblock there be a minimum of 3.5 percent wildlife tree retention.

For the base case scenario, the THLB was reduced by 402 hectares to account for existing WTPs that have been explicitly mapped within the TFL.

To account for future WTP requirements, the licensee completed a strategic spatial analysis that looked at available WTPs outside of the THLB and determined where WTP retention would be required within the THLB to meet the seven percent minimum required. From this analysis, they determined that an additional 0.94 percent of the land base should be excluded from the THLB to account for future WTPs. The licensee removed this 0.94 percent in addition to 402 hectares in existing WTPs from the THLB for the base case scenario.

I am informed by FLNRO staff that retention level actually achieved in operations in TFL 55 has been higher than the strategically identified WTP requirement and that more tree retention is being left in harvested areas than estimated in the strategic spatial analysis. To assess this, the licensee provided operational information on the overlap of WTPs with other retention found on the cutblocks harvested over the last 10 years. This information showed that about 15.1 percent of the gross cutblock area was

left in some form of retention (e.g., WTP, riparian) of which only 1.4 percent of the gross area was uniquely attributed to wildlife tree retention—about 0.5 percent higher than the modelled 0.94 percent.

For this determination, I find that the reduction for stand-level retention has been underestimated in the base case scenario by at least 0.5 percent and will discuss this further under ‘**Reasons for Decision**’.

- *mountain caribou*

To assist with the recovery of mountain caribou populations across the province, the BC government, in 2009, established multiple GAR orders to protect mountain caribou habitat. In TFL 55 the GAR order for the Revelstoke Shuswap Planning Unit (UWR U-3-005) replaced the RHLPO retention requirements for mountain caribou habitat with no-harvest zones. For timber supply modelling purposes, this change results in a large reduction of the THLB but given the previous RHLPO retention requirements also restricted harvest, the impact to timber supply is proportionately less.

In the base case scenario, the 18 838 hectares of no-harvest zones identified under the GAR order were excluded from the THLB. This exclusion resulted in about 6400 hectares of harvestable land base being uniquely removed for mountain caribou habitat. If the order was not in place, these 6400 hectares would have been in the THLB.

The North Columbia Environmental Society identified that “some caribou habitat in the operable forest previously protected by the RHLPO requirements for biodiversity may now be logged. If it is logged, caribou recovery may become more difficult.” I am mindful of the society’s concern around mountain caribou recovery; however, I also recognize that the GAR order, as part of government recovery plans for mountain caribou, is expected to protect sufficient habitat.

Considering the above information, I conclude that the base case adequately accounts for the managing the legal objectives of mountain caribou habitat.

Expected rate of growth

- *volume estimates for natural stands*

In the base case scenario, volume estimates for natural stands were derived for each individual forest polygon—using the Vegetation Resource Inventory (VRI) attributes of the polygon as input to the growth and yield model, VDYP7. VDYP7 is an empirically-derived growth and yield model, developed by FLNRO, that provides yield projections for natural stands in inventory and timber supply applications.

For the VRI, the forest polygon attributes are derived from interpreting aerial photography; this is called the VRI Phase 1. For TFL 55, a further ground sample, called the VRI Phase 2, was completed in 2005. The VRI Phase 2 process involves the collection of data on the age, height, and volume of stands and, using these data, confirming or adjusting attributes in the VRI Phase 1. For TFL 55, the VRI Phase 2 sample (85 ground sample plots and 63 trees for a net volume factor sample) suggests higher stand volumes than found in VRI Phase 1—this comparison is based on volume calculated with VDYP6, the predecessor to VDYP7.

For the base case scenario, the licensee used existing stand volume estimates projected with VDYP7, and in a comparison scenario, used estimates projected with VDYP6 that were statistically adjusted with the VRI Phase 2 information. In the VDYP6-Phase 2 adjusted scenario, the initial harvest level of 90 000 cubic metres per year was extended almost two decades further than in the base case scenario: one further decade at 90 000 cubic metres per year (*versus* 83 000 cubic metres per year in the base case) followed by a decade at 88 000 cubic metres per year (*versus* 73 000 cubic metres per year in the base case) after which the harvest declined to the base case mid-term level.

I recognized that the VRI Phase 1 in conjunction with the VRI Phase 2 provides the best available inventory information and that VDYP7 is the appropriate model, provincially, for the unadjusted projection of natural stands from VRI Phase 1 attributes. As such, I believe that the VDYP6-based volume tables adjusted for the VRI Phase 2 information should—at least in the short term—provide the best available projections for natural stand volume; the analysis shows that most natural stands in the THLB will be harvested within three decades.

My preference for the base case would have been to compile a VRI Phase 2 adjustment based on VDYP7 projections. I recognize that there is a cost and expertise need for such an exercise; but the effort would have enabled stakeholders a clearer interpretation of the VRI Phase 2 information. I also recognize a concern about the 2005 Phase 2 information being out-of-date; however, in the absence of more current data, I accept that it is the best available information for use in the MP #5 analysis. This information will not be acceptable for use in the next timber supply review, 10 years from now, due to further changes in the relevant population (i.e., harvesting changes the population) and changes in stand characteristics (i.e., growth and decay may be different due to weather, pests, or other disturbances).

I have considered the information presented regarding how natural stand volumes were modelled in the base case. I accept that the base case was reasonably modelled using VDYP7, and that such use is appropriate for my understanding of the timber supply dynamics on TFL 55. However, I also find that it is reasonable to assume that greater volume, as identified through the VRI Phase 2, may exist. In the sensitivity analysis that applied the VDYP6-Phase 2 volume tables, the resulting increased timber supply was primarily shifted to increases in decades 2 and 3 in order to try to maintain the initial harvest level. Alternative harvest flow choices for the use of increased natural stand volumes are possible; the increase could have been proportionately spread across all decades that existing stands are harvested or made available in the mid-term. The increased timber supply observed in the sensitivity analysis is an additional 8.5 percent if averaged over the first three decades or 5.3 percent over the first five decades.

In this determination, I will account for the possibility that the short-term timber supply is up to five percent greater than the base case due to the underestimation of natural stand volumes; but I am mindful that there are multiple harvest flow alternatives in both short- and mid-term timber supply. I discuss this further under ‘**Reasons for Decision**’. Further, as described under ‘**Implementation**’, my expectation is that the licensee will assess the current forest inventory (e.g., VRI Phase 2) and modelling needs (e.g., adjustment of VDYP7) for the next timber supply review and, where necessary, improve upon the current information used to estimate the timber volume for natural stands.

- volume estimates for managed stands

Since 1970 most stands harvested in TFL 55 have been planted and managed to ensure an appropriate stocking level. As such, the licensee has chosen to model all stands established after 1970 as managed stands. Currently, managed stands (< 50 years old) occupy over half of THLB of TFL 55; and are important to not only the long-term timber supply but also influence the mid- and short-term timber supply dynamics.

In British Columbia, legislation changes in 1987 assigned a silvicultural obligation to licensees following the harvest of a cutblock. In many management units, the date used to separate the modelling of managed and natural stands is around 1987; as such, I had initial concerns that the earlier stands modelled in the base case might not have the characteristics of a managed stand. However, my concerns are lessened given that the licensee conducted free-to-grow silvicultural surveys of all stands harvested with the results demonstrating that it may be reasonable to assume the stands harvested after 1970 can be considered managed.

Managed stands were modelled based on the grouping of stands into analysis units around BEC classes and leading tree species. The licensee summarized silvicultural records and site index projects to obtain inputs for the TIPSY model. FLNRO staff identified that the regeneration inputs are reasonable, except for regeneration delay and identified concerns around the application of estimates for decay, waste, and breakage. These differences are discussed further under the sections ‘impediments to prompt regeneration’ and ‘decay, waste, and breakage’.

The model TIPSY and the related TASS model have been developed and calibrated by the FLNRO for managed stand yield projections; TIPSY was used to project the managed stands in the base case. Operationally, the future yield of an individual stand may differ from model projections given differences (and variability) from the assumptions modelled for stand and site conditions. I am confident that TIPSY provides appropriate yield projections given the appropriate inputs, however, I do recognize that where there are inputs or externalities that are not modelled appropriately, the yield expectations can differ and that often such differences may result in lower or higher yields than expected.

For this determination, I was presented with sensitivity analyses that showed the mid-term timber supply is sensitive around the transition between the harvesting of natural stands and the harvesting of managed stands. In particular, this sensitivity was observed in analyses that either changed the overall volume available from managed stands or changed the timing of the availability of managed stands for harvest.

FLNRO staff has recommended monitoring of managed stands in order to verify that managed stand growth follows expectations. On TFL 55, following the previous AAC determination, the licensee initiated a change monitoring inventory (CMI) program to address this need. CMI is similar to the FLNRO recommended ‘Young Stand Monitoring’, differing mainly in how samples are chosen. The initial results for TFL 55, based on 26 CMI sample plots compared to the projections from 2007 MP#4 timber supply analysis, suggested a 5.5 cubic metre per hectare overestimation of projections. Given the sample size and current ages, this difference did not raise a major concern with the licensee. I concur with the licensee’s conclusion based on the MP#4 but I would have preferred that the comparison was based on the current, MP#5, analysis. The licensee expects to do further CMI sampling in 2017.

I accept that the base case scenario has used appropriate managed stand yields, except as noted under the sections ‘impediments to prompt regeneration’ and ‘decay, waste and breakage’ but I am mindful of the sensitivity of the mid-term timber supply and the short-term implications. To increase the certainty of managed stand yield projections, it would be beneficial if the licensee continued to monitor volume growth from managed stands and I have noted this direction in the ‘**Implementation**’ section of this rationale.

- site productivity

Site productivity information, as expressed by site index, is an important input for projecting the volume and height growth of managed forests. Provincially, studies have demonstrated that estimates of site index from forest inventory attributes for older and younger stands underestimate the potential productivity of a site. Sampling methodologies to capture the potential site index, such as the provincial SIBEC program or site index adjustment (SIA) procedures, have enabled the identification of higher timber supply in most forest management units of British Columbia.

The licensee developed potential site index estimates for TFL 55 from both SIBEC and SIA methodologies. Estimates based on SIBEC methodology were used in the base case and estimates based on SIA methodology were used in a sensitivity analysis. SIBEC methodology, which is the preferred methodology used within the FLNRO provincial site productivity layer, is based on applying average site indices for a site series to predictive ecosystem mapping (PEM) or terrestrial ecosystem mapping (TEM)—standard ministry procedures must be followed for the collection, modelling, and accuracy assessment of TEM/PEM and the field collection of site indices. SIA methodology involves statistically adjusting mapped initial estimates of site productivity (e.g., derived by expert opinion,

biophysical modelling, or another method) with management unit specific site index information obtained from a statistical field sample—the procedures include appropriate statistical design but modelling and data collection can vary among individual projects.

I have not been presented with substantive reasons why either SIBEC or SIA methodology would provide a better estimate of site productivity for TFL 55; and I recognize that estimates determined under either method are variable and may not be significantly different (though this was not tested). While improvements to potential site index estimates will be useful, ultimately, my interest is knowledge of whether growth and yield projections are being realized—as obtained through monitoring programs such as the licensee’s CMI sampling and FLNRO’s Young Stand Monitoring program. I note that the sensitivity analysis that applied the SIA estimates showed that the long-term timber supply may be higher than forecasted in the base case scenario. If the productivity represented by the SIA estimates is present, my concerns are lessened with respect to mid-term sensitivities caused by lower managed stand yields or the timing of such yields.

FLNRO staff have identified the BEC mapping within TFL 55 is to be updated in 2018; the ESSF very wet cold (vc) subzone, that likely has low accuracy for estimates of productivity, will be split into three subzones of differing productivity and operability. Given distinct differences in site productivity between the new subzones, this updated classification may enable refinements to site productivity estimates that are significant to understanding future timber supply.

I accept that the SIBEC based site productivity estimates used in the base case are reasonable; but I am mindful of the future optimism suggested by the SIA estimates. Improving information that helps the projection of future managed yields is important; as such, I encourage the licensee and the ministry to improve upon information on site productivity. I have noted in the ‘**Implementation**’ section of this rationale, the desire that the licensee and FLNRO staff investigate the need for updating site productivity estimates given future changes to the BEC mapping.

Section 8 (8) (a) (ii) the expected time that it will take the forest to become re-established on the area following denudation:

Regeneration delay and impediments to prompt regeneration

- impediments to prompt regeneration

Regeneration delay reflects the time from harvesting to regeneration, adjusting if necessary, for the age of the planted stock. In the base case scenario, the licensee has modelled all stands with a regeneration delay of two years. However, in information provided to FLNRO staff, the licensee showed the actual regeneration delay for 1970-1986 as 6.8 years, for 1987-2005 as 2.5 years, and for 2006 to the present as 1.95 years.

While no sensitivity analysis was presented that demonstrated the impact of using the observed regeneration delay, I expect that a regeneration delay longer than two years will have some, likely small, impact on long-term timber supply and could have an important mid-term impact.

I will account in this determination for the possibility that the use of a regeneration delay of two years for all managed stands influences the mid-term harvest levels and I discuss this further under ‘**Reasons for Decision**’.

Section 8 (8) (a) (iii) silvicultural treatments to be applied to the area:

No factors considered under this section require additional comment.

Section 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:

Utilization and decay, waste, and breakage

- decay, waste, and breakage

The growth and yield model TIPSYS projects live tree volumes that can be adjusted for decay, waste and breakage by applying generalized operational adjustment factors (OAFs) or by applying the same decay, waste, and breakage factors developed for the natural stand model VDYP. In the base case scenario, both the OAF and decay, waste, and breakage options were used to determine managed stand volumes.

FLNRO growth and yield staff identify that, for managed stands, the application of both adjustments has likely led to an overestimation of the decay, waste, and breakage losses over the life of the stands. However, FLNRO staff note that given the relatively young age at which managed stands are harvested in the base case, the overestimation from the combined adjustments at the age of harvest would in most cases be small.

I will account in this determination for the possibility that some underestimation in managed stand volumes may occur that could influence the mid-term and long-term harvest levels. I discuss this further under '**Reasons for Decision**'.

- log grade-dead potential

On April 1, 2006, new log grades were implemented for the BC Interior. Under the previous grade system, logs were assessed according to whether the trees they came from were alive or dead at the time of harvest; certain classes of dead trees were not billed against a licensee's cut control nor were they considered as part of the volume identified in a determination of an AAC. Under the current system, a log is graded based on its size and quality at the time it is scaled or assessed, without regard to whether it was alive or dead at the time of harvest. These dead potential trees (i.e., dead trees that are potentially merchantable) are to be accounted for in a licensee's cut control position and need to be considered in AAC determinations.

Existing inventory and modelling tools do not explicitly identify dead potential volumes. Possible sources of data for assessing the 'dead potential' volume in a TFL include inventory audit plots, VRI Phase 2 ground samples, permanent sample plots, temporary sample plots, and cruise data. In the 2007 AAC determination for TFL 55, FLNRO staff used VRI Phase 2 sample plots from TFL 55 to provide an estimate of dead potential volume (about 10.6 percent of live volume) and data from the Harvest Billing System between 1995 and 2004 (about six percent of live volume).

Several difficulties are present in identifying the most appropriate amount of dead potential volume. Dead potential volume extracted from forest stands can vary significantly over time, depending on markets and other factors. The accounting is also complicated by the relationship between dead potential volume and the requirement to leave coarse woody debris on the ground for biodiversity objectives.

As part of the previous determination, the chief forester urged that the licensee and FLNRO staff to work together to determine an appropriate method of identifying actual use of dead potential volumes, so that this factor can be more fully accounted for in the next determination.

To address this recommendation, the licensee tracked and determined that the average dead potential on the MP#4 cutting permits was about 12 cubic metres per hectare or 2.76 percent of the average net live volume of 424 cubic metres per hectare. The licensee also stated that the dead potential is typically harvested and charged against cut control.

Having reviewed this information with FLNRO staff, I conclude that on this account timber supply has been underestimated by about three percent and I will discuss this further under '**Reasons for Decision**'.

- Grade 4 credits

Operationally, the AAC within a TSA is monitored through various tenure decisions and the billing of harvest to those tenures. Volumes attributed to Grade 4 credits under Section 17(6) of the Cut Control Regulation are an exception for which volume is not accounted against the AAC of a specific tenure. Section 17(6) allows licence holders to remove Grade 4 timber without having it counted against their licence's cut control position if the timber goes to a primary facility (i.e., pulp/paper, bio-energy, etc.) other than a sawmill, veneer plant, or a facility that only produces cants (time limited) and application is made to the government for a credit. The Grade 4 credit provision of the Cut Control Regulation was developed to provide an incentive for the harvest of low quality logs and higher levels of fibre utilization, particularly in areas impacted by mountain pine beetle.

The licensee conducted a review of their 2007 to 2015 harvest records and found that a total of 119 338 cubic metres, or an average of 13 259 cubic metres per year (15 percent of current AAC), was claimed as Grade 4 credit under the Cut Control Regulation and delivered to non-sawlog facilities. During the cut control period 2007 to 2011, the total harvest in TFL 55 including Grade 4 credit did not exceed the AAC; but, during 2012 to 2015 (first four years of the current cut control period) the harvest in TFL 55 including Grade 4 was about 114 percent of the AAC.

The use of Grade 4 credit in TFL 55 causes me concern about the sustainability of the management unit's timber supply. I recognize the importance of the short-term harvest level of TFL 55 and how it directly impacts the timber supply availability in the mid-term. While future analysis and my AAC decisions will account for all past harvesting, including Grade 4 credits, short-term harvest above AAC expectations may accelerate or deepen future declines in AAC over the next couple decades.

As the TFL holder is the only licensee able to utilize Grade 4 credits in TFL 55, the TFL holder will need to carefully consider the implications of their total harvest and not just the volume under their licence cut control. Ultimately, there will be a necessity to step down to the lower harvest levels in the mid-term; and an excessive use of the Grade 4 credit in the short term could hasten this step down or result in a lower mid-term levels than projected if managed stand yields expectations are achieved in the mid-term.

As Grade 4 credits have been claimed in the past, I do not feel that it is appropriate for me to ignore the potential future use of Grade 4 credit; as such I will account in this determination for a reduction of up to 15 percent that reflects the average use of Grade 4 credits in the period 2007-2015. I will discuss this further under '**Reasons for Decision**'.

Section 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:

Integrated resource management objectives

- recreation

Heli-skiing opportunities are integrated within the forestry practices in TFL 55. These practices include harvesting to create gladed areas and regenerating harvested blocks within ski runs to a spacing of 700 stems per hectare.

The licensee, in response to a question from a heli-ski operator, identified that they felt the impact of current practices had negligible impact: no or little loss of THLB and small volume loss (between 0 to 10 percent of the stand volume) due to regeneration modifications. Additionally, the licensee indicated that they will continue to monitor the gladed and run spacing areas.

Although, I do not find the current activity significantly impacts timber supply, I request under ‘**Implementation**’ that the licensee and FLNRO continue to monitor the glading and silviculture activity of these areas and report of this information in preparation for the next timber supply review for TFL 55.

Section 8 (8) (a) (vi) any other information that, in the chief forester’s opinion, relates to the capability of the area to produce timber:

First Nations Considerations

The Crown has a duty to consult with, and accommodate as necessary, those First Nations for whom it has knowledge of the potential existence of Aboriginal Interests that may be impacted by a proposed decision. I must therefore consider information arising from the consultation process with First Nations respecting Aboriginal Interests and Treaty rights that may be affected by my AAC determination. As well, I will consider other relevant information available to the ministry regarding Aboriginal Interests, including information gathered during other consultation processes.

The member bands of three First Nation Councils (Ktunaxa Nation Council, the Okanagan Nation Alliance and the Shuswap Nation Tribal Council) have asserted traditional territory covering all or part of TFL 55; but no First Nation communities are within or border TFL 55. The licensee shared a draft information package, timber supply analysis report, and the overall management plan with First Nations: Adams Lake Indian Band, Ktunaxa Nation Council, Little Shuswap Lake Indian Band, Lower Similkameen Indian Band, Neskonlith Indian Band, Okanagan Indian Band, Okanagan Nation Alliance, Penticton Indian Band, Shuswap Indian Band, Simpcw First Nation, Splots'in First Nation, and Upper Nicola Indian Band. Further, FLNRO staff consulted with the above First Nations specifically on the TFL 55 AAC determination and management plan approval.

All First Nations, with the exception of the Okanagan Nation Alliance, have entered into one or more of the following agreements with the province: Strategic Engagement Agreement, Secwépemc Reconciliation Framework Agreement (RFA), Forestry Consultation and Revenue Sharing Agreements (FCRSAs), Economic Development Agreements (EDAs), Forest Tenure Opportunity Agreements (FTOAs), Interim Agreement on Forest and Range Opportunities (IAFRO), or Mountain Pine Beetle Agreements. These agreements provide revenue sharing or forest tenure opportunities to First Nations. All agreements are designed to aid in improving the government-to-government relationship between the province and each First Nation and to close the social and economic gap between First Nations and other British Columbians.

SEAs, RFAs, FCRSAs, and IAFROs provide for revenue sharing and contain a framework for establishing processes to guide consultation on administrative decisions, including AAC determinations. The First Nations consultation requirements specified in these agreements were followed during the consultation conducted as part of this timber supply review. For those First Nations communities, who have not established a consultation process, consultation was conducted in accordance with the provincial policy *Updated Procedures for Meeting Legal Obligations When Consulting First Nations*.

Ktunaxa Nation Council

The Ktunaxa Nation, represented by the Ktunaxa Kinbasket Treaty Council, has been engaged in treaty negotiations and is nearing completion of Stage 4 where the Agreement-in-Principle is under review by Ktunaxa communities and Ktunaxa government sectors. The Ktunaxa Nation has entered into several agreements with the province of British Columbia including a SEA, FTOA and a FCRSA. The consultation with the Ktunaxa Nation for the TFL 55 AAC determination and management plan approval was in accordance with the existing SEA Level 2. No response with specific concerns about the current decision was provided.

Okanagan Nation Alliance (ONA)

The Okanagan bands are not currently engaged in the British Columbia Treaty Process. In 2013, the Province signed a memorandum of understanding with the ONA that provides a potential opportunity to work collaboratively, to advance government-to-government relationship, and to discuss natural resource interests. No response with specific concerns about the current decision was provided.

Lower Similkameen Indian Band

The Lower Similkameen Indian Band has a FCRSA and two FTOAs. The FTOAs are replaceable forest licences in the Okanagan TSA. The Lower Similkameen Indian Band also shares a community forest with the community of Keremeos. Consultation followed a normal level under the FCRSA. No response with specific concerns about the current decision was provided.

Okanagan Indian Band

The Okanagan Indian Band has a FCRSA and two FTOAs. The FTOAs are replaceable forest licences in the Okanagan TSA. Consultation followed a normal level under the FCRSA. No response with specific concerns about the current decision was provided.

Penticton Indian Band

The Penticton Indian Band has a FCRSA. FLNRO have offered the Penticton Indian Band a new tenure opportunity and a reply is pending. Consultation followed a normal level under the FCRSA. The Penticton Indian Band requested and was provided further information about the boundaries of TFL 55; but no response with specific concerns about the current decision was provided.

Upper Nicola Indian Band

The Upper Nicola Indian Band has a FTOA that includes a replaceable forest licence in the Okanagan TSA. Consultation followed a normal level under government policy. No response with specific concerns about the current decision was provided.

Shuswap Nation Tribal Council (SNTC)

SNTC member bands are not involved in the British Columbia treaty process but have been engaged with the province in New Relationship and other discussions associated with land and resource use within asserted traditional territories. Several member bands participate in the Secwépemc Reconciliation Framework Agreement with the province of British Columbia. The purpose of the RFA is to identify shared decision structures and processes intended to mitigate, reduce or avoid disputes over land and resource management. The RFA expired in April 2016 but has been extended for one year while government staff and the signatory bands explore renegotiating the agreement. Consultation was with SNTC member bands, not with the SNTC, as described below.

Adams Lake Indian Band

The Adams Lake Indian Band is a signatory to the RFA, has a FTOA, and a FCRSA in place. The FTOA is for a replaceable forest licence within the Kamloops TSA. Consultation followed a normal level under the RFA. No response with specific concerns about the current decision was provided.

Little Shuswap Lake Indian Band

The Little Shuswap Lake Indian Band is not a signatory to the RFA. The Little Shuswap Indian Band has a FTOA, a FCRSA and an EDA. The FTOA is for a replaceable forest licence within the Kamloops TSA. Consultation followed a normal level of the FCRSA. No response with specific concerns about the current decision was provided.

Neskonlith Indian Band

The Neskonlith Indian Band is not a signatory to the RFA. The Neskonlith Indian Band has a FCRSA and multiple FTOAs. The FTOAs include replaceable and non-replaceable forest licences within the Kamloops TSA. Consultation followed a normal level under the FCRSA. No response with specific concerns about the current decision was provided.

Shuswap Indian Band

The Shuswap Indian Band is a signatory to the RFA. The Shuswap Indian Band has a FCRSA and two FTOAs. The FTOAs include replaceable forest licences in the Invermere and Golden TSAs. Consultation followed a normal level under the RFA. The Shuswap Indian Band identified a lack of capacity to fully review the information supporting the decision; but based on a brief review they noted there was nothing of significance.

Simpcw First Nation

The Simpcw First Nation is not a signatory to the RFA. The Simpcw First Nation has a FCRSA and multiple FTOAs. The FTOAs include replaceable forest licences within the Kamloops TSA. Consultation followed a normal level under the FCRSA. No response with specific concerns about the current decision was provided.

Splats'in First Nation

The Splats'in First Nation is a signatory to the RFA. The Splats'in First Nation has a FCRSA and two FTOAs. The FTOAs include replaceable forest licences in the Arrow TSA. Consultation followed a normal level under the RFA. No response with specific concerns about the current decision was provided.

Conclusions

I have reviewed the information regarding the information sharing and consultation undertaken with First Nations and I discussed it in detail with FLNRO district and branch staff. I am satisfied that the information sharing and consultation was conducted appropriately and that reasonable efforts were made by the licensee and district staff to engage and inform First Nations with interests within the TFL 55 boundaries, to collect information regarding their Aboriginal Interests, and to understand how these Aboriginal Interests may be affected by this determination.

While no specific concerns about Aboriginal rights within TFL 55 were identified by First Nations during the timber supply review or consultation process for this determination, I encourage First Nations to continue to engage with the licensee at the operational planning phase to ensure that their interests are considered. Such engagement may inform future AAC determinations. For the current determination, I conclude that my AAC determination is unlikely to have a significant adverse effect on the Aboriginal Interests of the First Nations in the area of TFL 55. I expect that any adverse impacts upon any Aboriginal Interests within the area of TFL 55, stemming from forest development activities that occur subsequent to the AAC determination, can be appropriately mitigated or minimized through existing legislation, regulation, and most importantly through engagement with First Nations at the decision-making level where harvestable volume is converted into specific timber allocations on the ground and where impacts on Aboriginal Interests of actual harvesting carried out in realizing the AAC can be assessed and properly addressed/accommodated. If new information regarding First Nations' Aboriginal Interests becomes available that significantly varies from the information that was available for this determination, I am prepared to revisit this determination sooner than the 10 years required by legislation.

Section 8 (8) (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area:

Alternative rates of harvest

The TFL holder provided two forecasts showing alternative rates of harvest where the initial harvest level was set below the base case level. In both cases the projected harvest level shows an increase in the mid-term level before returning to similar long-term levels as the base case.

Short-term timber supply is often a trade-off with mid-term timber supply in that one can harvest now or one can harvest later. The rate at which existing stands can be harvested is also dependent on when sufficient managed stands volumes become available to harvest. The alternative forecasts demonstrate that the base case is trading off some mid-term harvest enable to support the current AAC level; however, for modelling purposes the base case is suitable to portray the timber supply dynamics of TFL 55.

I have considered the information about alternative rates of harvest, and discussed this information with FLNRO staff. I accept that the base case harvest flow provides an acceptable representation of timber supply available on the TFL; but I also acknowledge that to maintain the current AAC level some trade-off with mid-term timber supply occurs.

Section 8 (8) (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:

Economic and social objectives

- Minister's letter

The Minister of Forests and Range (now Forests, Lands and Natural Resource Operations) has expressed the economic and social objectives of the Crown in a July 4, 2006, letter to the chief forester (attached as Appendix 3). Other letters have been presented about the economic and social objectives of the Crown but refer to specific areas or conditions not found in TFL 55.

In the 2006 letter, the Minister asked for consideration, during AAC determinations, of the importance of a stable timber supply in maintaining a competitive and sustainable forest industry while being mindful of other forest values. As well, the Minister suggested that the chief forester should consider the local social and economic objectives expressed by the public and relevant information received from First Nations.

With respect to the 2006 letter, I note that the base case and the sensitivity analyses provided helped to understand the timber supply dynamics found in TFL 55 and thus, the expectations possible for maintaining a stable timber supply while appropriately considering other forest values. As identified in other factors above, I have considered the relationship between short-term and mid-term timber supply, the uncertainty about timber supply in the mid-term, and the decrease to a lower timber supply in the mid-term before increasing to a stable long-term harvest level.

During my consideration of the factors required under Section 8 of the *Forest Act* I have been mindful of both the local objectives as well as the objectives of First Nations. I have also reviewed the public and First Nation consultation process undertaken by the district, and considered the input received in making my determination. On this basis, I am satisfied that this determination accords with the objectives of Government as expressed by the Minister.

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

No factors considered under this section require additional comment.

Reasons for Decision

In reaching my AAC determination for TFL 55, I have considered all of the factors required under Section 8 of the *Forest Act*. I have made the considerations described in this rationale document, all of which are integral to the reasons for my decision, and from which I have reasoned as follows.

The base case timber supply projection prepared for the TFL 55 suggests that an initial harvest level of 90 000 cubic metres could be maintained for one decade before declining over the next two decades to a mid-term low of about 73 000 cubic metres from which the timber supply gradually increases, reaching 87 000 cubic metres in 250 years.

I am satisfied that the assumptions in the base case forecast were appropriate for the majority of the factors applicable to TFL 55; however, I have summarized below my considerations for factors where I find a need for some adjustment and their implications can be assessed with reliability.

For the factors below I find that the timber supply projected in the base case might be underestimated.

- **Natural stand volumes** – as a result of natural-stand live volume estimates being underestimated as identified by VRI Phase 2 sampling, the available timber supply is underestimated by up to five percent in the short-term and mid-term forecast periods.
- **Dead potential** – as a result of natural stand volume estimates derived using VDYP7 not including dead potential volume, the available timber supply is underestimated by three percent in the short-term and mid-term.
- **Decay, waste and breakage** – as a result of applying to managed stand volume tables both an operational adjustment factor and a decay, waste, and breakage adjustment, the timber supply is underestimated by an unquantified, but likely small amount, across the mid-term and long-term.

For factors below I find that the timber supply projected in the base case might be overestimated.

- **Stand-level biodiversity** - as a result that higher operational levels of stand-level biodiversity are retained than are modelled in the base case, timber supply is overestimated by at least 0.5 percent across all periods.
- **Regeneration delay** – as a result of the actual regeneration delay of managed stands being higher than the modelled two-year regeneration delay, the timber supply is overestimated by an unquantified, but likely small amount, across the mid-term and long-term forecast periods.
- **Grade 4 credits** – as the result of the potential continued use of Grade 4 credit by the licensee in TFL 55, the timber supply is overestimated by about 15 percent, the average use of Grade 4 credits in the period 2007-2015.

For this determination, I was presented with sensitivity analyses that showed the mid-term timber supply, which begins in the third decade of the forecast, is particularly sensitive to changes in assumptions about the overall volume available from managed stands or the timing of the availability of managed stands. In order to lessen the risk to the mid-term supply from uncertain yield assumptions, I have chosen to account for the underestimation related to natural stand volumes and decay waste and breakage losses in managed stands by applying the adjustments over the short-term and mid-term parts of the forecast.

If I simply add the above factors with a quantified over- and underestimate of the short-term timber supply, I find that the short-term timber supply of the base case is overestimated by 7.5 percent, which suggests an initial harvest level of 83 000 cubic metres. Within this calculation, there is the implied assumption that licensee could also harvest an additional 13 000 cubic metres per year under Grade 4 credit.

I am mindful that the amount of Grade 4 credit harvest is a choice of the TFL holder and that the moderate use of Grade 4 credit has some risk to the timber supply but it is not a risk to other resource values; timber supply (and subsequent AAC determinations) is identified after consideration of the protection of other resource values as identified by existing legislation, regulation and policy. As such, I expect that the licensee, based on their understanding of the timber supply dynamics and concerns around mid-term harvest levels, will make prudent use of available Grade 4 credit. However, considering the base case, the various sensitivity analyses, and the data uncertainties, I expect that the TFL 55 harvest level, including Grade 4 credit, over the next decade should not be above the current AAC level of 90 000 cubic metres if an orderly transition to the mid-term level is expected.

Based on the considerations described throughout this document, in particular, given my uncertainty of the future harvest attributed to Grade 4 credit and the understanding of the harvest flow trade-offs identified for natural stand volumes, I find that an AAC of 83 000 cubic metres is an appropriate balance.

Determination

I have considered and reviewed all 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 TFL 55 by establishing an AAC of 83 000 cubic metres.

This determination is effective March 24, 2017, 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, I am prepared to revisit this determination sooner than the 10 years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage the licensee to work with FLNRO staff to undertake the tasks and studies noted below. I recognize that the ability to undertake these projects is dependent on available time and funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the TFL, as such my expectation is that these will be carried out and available for the next TSR for TFL 55:

- *Monitoring of managed stands* – the licensee to assess their change monitoring inventory (CMI) program and, if necessary, expand the monitoring of managed stands in order to compare actual stand condition and growth to modelled forecasts.
- *Existing stand volumes* – the licensee to assess the current forest inventory (e.g., VRI Phase 2) and modelling needs (e.g., adjustment of VDYP7) and improve timber volume estimates and yield projections for existing stands.

- *Monitor heli-skiing impacts* – the licensee and FLNRO staff collect and provide information on the amount of area in gladed ski runs and on the silvicultural activities applied in these areas to improve timber supply estimates for these areas.
- *Account for BEC changes* – FLNRO staff and the licensee update site productivity and other forest management information that may be associated with future changes to BEC mapping.



Diane Nicholls, RPF
Chief Forester

March 24, 2017



Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157, (consolidated to March 1, 2017), 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 tree farm licence areas, community forest agreement areas and woodlot licence areas, 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 determining an allowable annual cut under subsection (1) the chief forester may 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.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine an allowable annual cut for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(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 March 1, 2017) 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 July 4, 2006



JUL 04 2006

Jim Snetsinger
Chief Forester
Ministry of Forests and Range
3rd Floor, 1520 Blanshard Street
Victoria, British Columbia
V8W 3C8

Dear Jim:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the responsibility for determining Allowable Annual Cuts-decisions with significant implications for the province's economy, communities and environment. This letter outlines the economic and social objectives of the Crown you should consider in determining Allowable Annual Cuts, as required by Section 8 of the *Forest Act*. This letter replaces the July 28, 1994 letter expressing the economic and social objectives of the Crown, and the February 26, 1996 letter expressing the Crown's economic and social objectives for visual resources. The government's objective for visual quality is now stated in the Forest Practices and Planning Regulation of the *Forest and Range Practices Act*.

Two of this government's goals are to create more jobs per capita than anywhere in Canada and to lead the world in sustainable environmental management. The Ministry of Forests and Range supports these objectives through its own goals of sustainable forest and range resources and benefits. In making Allowable Annual Cut determinations, I ask that you consider the importance of a stable timber supply in maintaining a competitive and sustainable forest industry, while being mindful of other forest values.

The interior of British Columbia is in the midst of an unprecedented mountain pine beetle outbreak. Government's objectives for management of the infestation are contained in British Columbia's Mountain Pine Beetle Action Plan. Of particular relevance to Allowable Annual Cut determinations are the objectives of encouraging long-term economic sustainability for communities affected by the epidemic; recovering the greatest value from dead timber before it burns or decays, while respecting other forest values; and conserving the long-term forest values identified in land use plans.

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Minister of
Forests and Range
and Minister Responsible
for Housing

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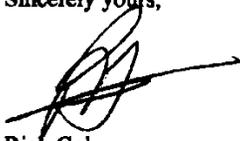
Jim Snetsinger

To assist the province and affected communities in planning their responses to the beetle infestation, it would be best to have realistic assessments of timber volumes that can be utilized economically. Therefore, in determining the best rate of harvest to capture the economic value from beetle-killed timber, I ask that you examine factors that affect the demand for such timber and products manufactured from it, the time period over which it can be utilized, and consider ways to maintain or enhance the mid-term timber supply.

The coast of British Columbia is experiencing a period of significant change and transition. In making Allowable Annual Cut determinations I urge you to consider the nature of timber supply that can contribute to a sustainable coast forest industry, while reflecting decisions made in land and resource management plans.

You should also consider important local social and economic objectives expressed by the public during the Timber Supply Review process, where these are consistent with the government's broader objectives as well as any relevant information received from First Nations.

Sincerely yours,

A handwritten signature in black ink, appearing to be 'RC', with a long horizontal stroke extending to the right.

Rich Coleman
Minister