

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

Arrowsmith Timber Supply Area

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

February 9, 2018

**Diane Nicholls, RPF
Chief Forester**

Table of Contents

Objective of this document.....3

Acknowledgement.....3

Statutory framework.....3

Description of the TSA.....3

History of the AAC4

New AAC determination.....4

Information sources used in the AAC determination5

Role and limitations of the technical information used.....6

Guiding principles for AAC determinations6

 Integrated decision making7

 Information uncertainty.....7

 Climate change.....8

 First Nations.....8

The role of the base case9

Base case for the Arrowsmith TSA9

Consideration of factors as required by Section 8(8) of the *Forest Act*10

 Land base contributing to the timber harvest.....12

 - general comments12

 - area-based tenures.....12

 - miscellaneous Crown lands12

 - economic and physical operability13

 - environmentally sensitive areas13

 - low stocking.....13

 - roads, trails and landings13

 - vegetation resources inventory14

 - dead potential volume.....14

 - minimum harvest age and volume15

 Expected time to re-establish the forest following denudation.....15

 - regeneration delay and impediments to prompt regeneration15

 Silvicultural treatments.....16

 - silvicultural systems.....16

 incremental silviculture.....16

 Utilization17

 - decay, waste and breakage and residual waste17

Integrated resource management	17
- Vancouver Island land use plan	17
- Clayoquot Sound Land Use Decision area	18
- First Nations cultural heritage resources and archaeological resources	19
- recreation resources	20
- landscape-level biodiversity, old growth management areas	20
- stand-level biodiversity	21
- shading	22
- community interface areas	22
- riparian management	23
- ungulate winter range	23
- Coastal Douglas-fir	23
- Gulf Islands	24
- land interests, First Nations and other	24
- First Nations consultation	24
-Nanwakolas First Nation decision making	28
Other information	29
- harvest performance	29
- unused AAC disposition	29
- partitions	30
Economic and social objectives	31
- Minister's letter	31
Abnormal infestations, devastations, and salvage programs	31
- unsalvaged losses	31
Reasons for Decision	32
Determination	34
Implementation	34
Appendix 1: Section 8 of the <i>Forest Act</i>	37
Appendix 2: Section 4 of the <i>Ministry of Forests and Range Act</i>	40
Appendix 3: Minister of Forests and Range's letter of July 4, 2006	41
Appendix 4: Minister's letter of April 12, 2013	43

List of Tables

TABLE 1. LIST OF ACCEPTED FACTORS	11
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Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia (BC) in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Arrowsmith Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Acknowledgement

For preparation of the information I have considered in this determination, I am indebted to staff of the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (the 'Ministry') in the South Island Natural Resource District (SINRD), the West Coast Natural Resource Region, and the Forest Analysis and Inventory Branch (FAIB). I am also grateful to the First Nations, local residents, individuals and companies who contributed to this process.

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 TSA

The Arrowsmith TSA is located on the southern half of Vancouver Island, south of Campbell River and bordering on Tree Farm Licences (TFLs) 44, 46, 54, 57, and 61. In contrast to other TSAs in British Columbia, this TSA is made up of many disconnected parcels of land ranging in size from a few hectares to a few thousand hectares. These parcels are interspersed with private land, TFLs, urban and sub-urban areas, rural agricultural lands, and parks and reserves. The Arrowsmith TSA is administered by FLNRO (the ministry), South Island Natural Resource District (the district). Although the TSA encompasses 1 574 719 hectares, the actual productive forest land managed by the district is only 122 445 hectares.

Spanning Vancouver Island from the west to east coast, the terrain of the TSA varies from lowland valleys, with nutrient rich, moist sites to mountainous areas, with poorer, drier sites. Most of the productive forest land lies within the Coastal Western Hemlock (CWH) biogeoclimatic zone, where cool, wet summers and mild winters support stands with a significant proportion of western hemlock. The Coastal Douglas-fir (CDF) zone occurs on the eastern side of the southern portion of the TSA, which is comparatively drier with gentler topography than the western portions of the TSA. Here warm, dry summers and cool, wet winters result in stands dominated by Douglas-fir. At higher elevations, the Mountain Hemlock (MH) zone occurs and at the highest elevations, there are isolated occurrences of Coastal Mountain-heather Alpine (CMA) zone.

The forests of the TSA are diverse, and slightly more than half of the forests on the land base contributing to timber supply are considered to have medium or good site productivity. Major tree species include: Douglas-fir, western redcedar, western hemlock and true firs, while other species such as cypress, spruce, red alder, and maple also occur. The forests of the TSA have a relatively long history of harvesting, and as a result there are rapidly maturing second-growth forests on the lower elevation sites that are accessible and highly productive. Almost half of the stands on the THLB are between 21 and 100 years of age.

In 2014, the population of the SINRD was 638,000 people, of which about 58% reside within the Capital Regional District, including the City of Victoria. Other major population centres include Duncan, Ladysmith, Nanaimo, North Cowichan, Parksville, Qualicum Beach and Port Alberni; smaller communities include Tofino, Ucluelet, Lake Cowichan, Nanoose, Chemainus, Union Bay and Fanny Bay. Other notable communities in the surrounding areas include: Campbell River, Courtenay, Maple Ridge, Delta, and Richmond.

Thirty-six First Nations have asserted and/or established Aboriginal interests within the traditional territories within the SINRD that overlap the Arrowsmith TSA, including: the Ahousaht Band, Cowichan Tribes,

Ditidaht First Nation, Esquimalt First Nation, Halalt First Nation, Hesquiaht First Nation, Homalco First Nation, Huu-ay-aht First Nation, Ka:'yu:k'tkh_Che:k:tles7et'h' First Nations, Komoks First Nation, Lake Cowichan First Nation, Lyackson First Nation, Malahat Nation, Mowachah/Muchalat First Nations, Pacheedaht First Nation, Pauquachin First Nation, Penelakut Tribe, Qualicum First Nation, Scia'new First Nations, Sliammon First Nation, Snaw-naw-as First Nation, Snuneymuxw First Nation, Songhees First Nation, Stz'uminus First Nation, Toquaht Band, Tla-o-qui-aht First Nation, Tseshaht First Nation, Tsartlip First Nation, Tsawout First Nation, T'Sou-ke First Nation, Tseycum First Nation, Tsawwassen First Nation, Uchucklesaht First Nation, Ucluelet First Nation, We Wai Kai Nation, and Wei Wai Kum First Nation.

All but seven First Nations in the Arrowsmith TSA are represented by the following tribal councils and treaty associations: Nuu-Chah-Nulth Tribal Council, Hul'qumi'num Treaty Group, Nanwakolas Council Society, Laich-kwil-tach (Hamatla) Treaty Society, Wei Wai Kum Kwiakah Treaty Society, Kwakiutl District Council, Te'Mexw Treaty Association, Naut'sa mawt Tribal Council and Maa-nulth. The seven independent First Nations include Esquimalt First Nation, Qualicum First Nation, Pacheedaht First Nation, Pauquachin First Nation, Tsartlip First Nation, Tsawout First Nation, Tseycum First Nation.

History of the AAC

In 1986, the Arrowsmith TSA was formed from portions of the former Nootka and Quadra TSAs. At that time, the AAC was set at 392 890 cubic metres. An additional allocation of 3870 cubic metres was made in 1989 for deciduous species. In 1992, the AAC was increased to 498 250 cubic metres to account for a transfer of land from TFL 46 to the TSA.

In 1996, the chief forester set the AAC at 400 000 cubic metres, a decrease of 20 percent from the previous level. This AAC was partitioned as follows: 380 000 cubic metres for areas outside of Clayoquot Sound, 13 700 cubic metres for areas inside Clayoquot Sound, and 6300 cubic metres for red alder-leading stands.

In 2002, the AAC was set at 373 300 cubic metres and the partitions for Clayoquot Sound and deciduous tree species continued. Later in the year, the AAC increased to 393 496 cubic metres due to a transfer of land from TFL 46.

In 2004, a Part 13 Order for the Hill 60 Designated Area, reduced the AAC to 391 796 cubic metres. Also that year, a land transfer from TFL 44 resulted in an increase in the AAC to 418 796 cubic metres.

In 2009, a new AAC was set for the Arrowsmith TSA at 420 000 cubic metres, a slight increase from the previous AAC. This AAC included a partition of 13 700 cubic metres attributable to Clayoquot Sound, and 6300 cubic metres attributable to deciduous-leading stands.

Since the last determination in 2009, there was a land base exclusion for a First Nations Woodlot Licence (FNWL) awarded to Qualicum First Nation. Volume was also removed due to Maa-nulth Treaty settlement lands, and the Barkley Community Forest Area.

In December 2016, following the release of the *Arrowsmith TSA Discussion Paper*, a FNWL was issued to K'omoks Nation for 34 221 cubic metres, further decreasing the AAC of the Arrowsmith TSA to 385 779 cubic metres.

New AAC determination

Effective February 9, 2018, the new AAC for the Arrowsmith TSA will be 348 000 cubic metres. This AAC is about 10 percent lower than AAC in place prior to this determination (originally set in 2009 and adjusted in 2016). This AAC is partitioned as follows:

1. *Eastern Portion of the TSA*: A maximum of 50 000 cubic metres from the Eastern portion of the TSA (Nanaimo and Cowichan timber supply blocks);
2. *The Clayoquot Sound Land Use Decision area*: A maximum of 6850 cubic metres from the Clayoquot Sound Land Use Decision area; and
3. *The Western portion of the TSA*: A maximum of 291 150 cubic metres from the Western portion of the TSA, comprised of the area outside of Clayoquot Sound (Barkley timber supply block).

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

Information sources used in the AAC determination

Information considered in determining the AAC for the Arrowsmith TSA includes the following:

- The Scientific Panel for Sustainable Forest practices in Clayoquot Sound. 1995. Report 5 – Sustainable Ecosystem Management in Clayoquot Sound. Planning and Practices. Victoria, BC 296 p.
- Clayoquot Sound Technical Planning Committee. Watershed Planning in Clayoquot Sound, Volumes 1 through 10, July 31, 2006.
- Land Use Order Objectives for Clayoquot Sound, May 28, 2008.
- Land Use Objectives for the Vancouver Island Land Use Plan Area – Higher Level Plan Order, October 24, 2000.
- Data Package Arrowsmith Timber Supply Area, Timber Supply Review 2007. Arrowsmith TSA Licensee Group, April 2007.
- Timberline Natural Resources Group. Site Index Adjustment of the Arrowsmith Timber Supply Area. 2007.
- Timber Supply Analysis Report: Arrowsmith Timber Supply Area, Timber Supply Review 2007. Arrowsmith TSA Licensee Group, February 2008.
- BC Ministry of Forests, *Arrowsmith Timber Supply Area: Rationale for Allowable Annual Cut determination*. Forest Analysis and Inventory Branch, Victoria, BC (2009).
- BC Ministry of Forests, Lands, and Natural Resource Operations, Harvest Billing System - Mark Monthly Billing History Reports (2009-2015).
- RESULTS data from 2003 to 2013, Mei-Ching Tsoi.
- Arrowsmith TSA Harvest Profile Monitoring from 2010 to 2016, Adrian Walton FAIB.
- Arrowsmith TSA: Evaluating Provincial Site Productivity Layer with Ground Sample Data, Rene de Jong, FAIB, March 2017.
- BC Ministry of Forests, Lands, and Natural Resource Operations, Arrowsmith Timber Supply Area Timber Supply Review: Updated Data Package following the completion of the timber supply analysis, Forest Analysis and Inventory Branch, Victoria, BC (2016).
- BC Ministry of Forests *Procedures for Factoring Visual Resources into Timber Supply Analyses*, For Forest Practices Branch, MFR, Victoria, B.C. REC-029 (1998).
- BC Ministry of Forests, Lands, and Natural Resource Operations, *Arrowsmith TSA Timber Supply Review: Public Discussion Paper*, Forest Analysis and Inventory Branch, Victoria, BC (2016).
- BC Ministry of Forests, Lands, and Natural Resource Operations, *Major Primary Timber Processing Facilities in BC 2013*, Competitiveness and Innovation Branch, Victoria, BC (2015).
- BC Ministry of Forests, Lands and Natural Resource Operations, Coast Area 2015-17 Coastal Timber Supply Areas Forest Health Overview, Regional Operations Division, Nanaimo, BC (2015).
- BC Ministry of Forests, Lands and Natural Resource Operations, *2014/15 Report: Provincial Targets – Arrowsmith Timber Supply Area*, Resource Practices Branch, Victoria, BC (2015).
- First Nations Consultation Summary review, including input received from First Nations through the consultation process and comprehensive discussions with Ministry staff, including the AAC determination meeting held in Port Alberni on April 11 through April 13, 2017.

- Letter from the Minister of Forests and Range to the Chief Forester stating the economic and social objectives of the Crown. July 4, 2006.
- Order Establishing Provincial Non Spatial Old Growth Objectives (2004).
- *Forest Act* and Regulations, R.S.B.C. c.157 (1996).
- *Forest and Range Practices Act* and Regulations, S.B.C. c.69 (2002).
- Forest Practices Code of British Columbia Act and Regulations, R.S.B.C. c. 159 (1996).
- *Heritage Conservation Act*, R.S.B.C. c. 187 (1996).
- *Land Act*, R.S.B.C. c. 245 (1996).
- Ministry of Forests and Range Act, R.S.B.C. c. 300 (1996).
- Ministry of Forests and Range (2006). Summary of dead potential volume estimates for management units within the Coast Forest Region.
- Nanwakolas Reconciliation Protocol – Appendix 2 Schedule B (Forestry Schedule), Shared Decision Making Process, April 16, 2013.

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 of inventory and growth and yield data. These 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 the AAC for the Arrowsmith TSA I have considered and discussed known limitations of the technical information provided, and 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 Ministry is to plan the use of forest and range resources such that the various natural resource values are coordinated and integrated. In addressing the factors outlined in Section 8 of the *Forest Act*, I will consider 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:

- (i) 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
- (ii) 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, Natural Resource Operations and Rural Development, 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 Aboriginal title lands (meaning declared by a court or defined under an agreement) and other areas, such as Treaty Settlement Lands or Indian Reserves, are not provincial Crown land. Consequently, the timber on these lands does not contribute to the AAC of the timber supply area or tree farm 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 Treaty rights 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, Natural Resource Operations and Rural Development 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 (TSR) program for TSAs and Tree Farm Licences (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 simulation model, a series of timber supply forecasts can be produced, reflecting 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 the basis for comparison when assessing the effects of uncertainty on timber supply. The base case is designed to reflect current management practices.

Because the base case represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA 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 simulation 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 forecast are realistic and current, and the degree to which any adjustments to its predictions of timber supply must be made, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgment using currently available information about forest management, and that information may well have 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 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.

Base case for the Arrowsmith TSA

The current base case was prepared by FAIB and SINRD staff in 2016 using the Forest Service Spatial Analysis Model (FSSAM). This base case represents a more typical Ministry standard timber supply analysis compared to the previous base case Timber Supply Review (TSR) completed in 2008 by Timberline Natural Resource Group Ltd. Apparent differences in how the constraints were modelled in the

mid- to long-term resulted in a much lower mid term and long-term harvest projection for this base case compared to the 2008 base case.

Land base changes or updates to the data used in this base case included: removals from the Crown forest management land base for the Maa-nulth Treaty lands, Barkley Community Forest, and Coastal Douglas-fir (CDF) moist maritime biogeoclimatic subzone; new provincial site productivity map and economic operability information; increased old growth management area (OGMA) reductions; delineation and application of community interface zones and rate-of-cut constraints; application of objectives for mature forest; modelling for shading and competition; and a large increase in unsalvaged loss estimates (9105 cubic metres per year).

Assumptions used in the base case harvest projection included: achieving the current AAC if possible with the immediate concern of achieving social economic objectives and maintaining non-timber values in the short term (first decade), managing the transition to regenerated forest without falling below the even-flow harvest level of 392 000 cubic metres per year in the mid term (decades two to eight), and maintaining a sustainable long-term harvest level with the goal of a level growing stock for the long term (decades 9 to 25).

In the 2016 base case projection, an initial harvest level of 420 000 cubic metres per year was maintained for one decade before declining to 392 000 cubic metres per year. This harvest level was maintained for the next 130 years before slightly increasing to 399 000 cubic metres per year for the remaining project period. Harvest targets were set for:

- a) deciduous stands (6300 cubic metres per year);
- b) Clayoquot Sound (13 700 cubic metres per year); and,
- c) the east side of the TSA (100 000 cubic metres per year).

These targets were consistent with the partitions in place for deciduous and Clayoquot Sound, and past harvest history for the east side of the TSA.

The initial volume of the stands growing on the THLB (19.5 million cubic metres) decreases to 17 million by year 35 before gradually increasing to 20 million cubic metres by the end of the projection. The available growing stock is much less due to a heavily constrained timber supply. Harvesting of managed stands begins by the seventh decade into the future.

The average annual area harvested is stable, and increases over this transition, from 600 hectares to 800 hectares, as younger second-growth stands make up more of the harvest. After year 110, the annual harvest stabilizes at around 746 hectares per year. The average harvest age drops for the first nine decades from 150 years to 44 years where it maintains this age for the rest of the forecast period. The mean harvest volume declines from 673 cubic metres per hectare to a minimum of 502 cubic metres per hectare, before rising to 543 cubic metres per hectare for the rest of the forecast period.

I have reviewed in detail the assumptions and methodology incorporated in the base case, as well as: the total growing stock; the harvest contributions from managed and unmanaged stands; the average volumes per hectare; the total area harvested annually; and the average ages of the forest stands harvested. Based on my review, I am satisfied, subject to the qualifications accounted for in various sections of this document, that the information presented to me provides a suitable basis from which I can assess the timber supply for the Arrowsmith TSA.

Consideration of factors as required by Section 8(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 is a reasonable reflection of current legal requirements, demonstrated forest management and the best available information, and uncertainties about the factor have little influence on the timber supply projected in the base case, no discussion is included in this rationale. These factors are listed in Table 1.

For other factors, where more uncertainty exists or where public or First Nations' input indicates contention regarding the information used, modelling, or some other aspect under consideration, this rationale

incorporates an explanation of how I considered the essential issues raised and the reasoning that led to my conclusions.

Table 1. List of accepted factors

<i>Forest Act</i> section and description	Factors accepted as modelled
8(8)(a)(i) the composition of the forest and its expected rate of growth on the area	<ul style="list-style-type: none"> • Ocean or large waterbody • Non-crown • Parks and protected areas • Non-forest • Research installations and permanent sample plots • Economic and physical operability • Low stocking • Non-commercial forest types • Sites with low timber growing potential • Timber licence reversions • Volume estimates for natural existing stands • Volume estimates for managed stands • Site productivity estimates • Genetic gains • Operational adjustment factors
8(8)(a)(ii) the expected time that it will take the forest to become re-established following denudation	<ul style="list-style-type: none"> • Not satisfactorily restocked
8(8)(a)(iv) the standard of timber utilization and the allowance for decay, waste, and breakage expected to be applied with respect to timber harvesting on the area	<ul style="list-style-type: none"> • Utilization standards
8(8)(a)(v) constraints on the amount of timber produced by use of the area for purposes other than timber production	<ul style="list-style-type: none"> • Vancouver Island land use plan • Scenic areas and visual quality objectives • Recreation resources • Adjacency and green-up • Karst • Community and domestic watersheds • Fisheries sensitive/coastal watershed assessment procedure (CWAP) watershed • Identified wildlife (wildlife habitat areas)
8(8)(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area	<ul style="list-style-type: none"> • Harvest sequencing and alternative harvest flows
8(8)(d) Economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia	<ul style="list-style-type: none"> • Economic and social objectives of the Crown • Socio-economic information • Summary of public input • First Nations Consultation

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

(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

Land base contributing to the timber harvest

- general comments

The total land area of the Arrowsmith TSA, as reported in the 2015 timber supply analysis report is 840 356 hectares. Land not contributing to the TSA Crown forest land base, or towards achieving integrated resource management objectives, includes: non-Crown land (e.g. private land), area-based tenures (e.g., community forests and woodlots), non-forest areas (such as alpine, lakes and rock), and existing roads. Excluding these areas leaves 114 940 hectares (13.7 percent) are classified as productive Crown forest management land base.

As part of the process used to define the timber harvesting land base (THLB), i.e., the land base estimated to be economically and biologically available for timber harvesting, a series of deductions was made from the productive forest land base. These deductions account for economic or ecological factors that operate to reduce the forest area available for harvesting.

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

For the Arrowsmith TSA, I acknowledge that the above approach was used in the base case timber supply analysis, resulting in a THLB of 59 721 hectares. Following the release of the data package, a land base exclusion of 5277 hectares was made to account for First Nations Woodlot Licence (FNWL) N2L in the Rosewall Creek area of the TSA, issued to the K'omoks Nation. This resulted in an effective THLB of 54 444 hectares or approximately 6.5 percent of the total land area of the TSA.

- area-based tenures

Area-based tenures that are deducted from the THLB land base include: woodlot licences, community forest agreements (CFA), and First Nations Woodlands Licences (FNWLs). Their AAC is determined using a separate process and does not contribute to the Arrowsmith TSA AAC. Area-based tenures that are proposed or that have not been awarded at the time of the timber supply analysis should not be deducted from the THLB as it is not appropriate to speculate on the final outcome of those tenures. Tenures awarded after the analysis was completed, but before the release of the decision, are accounted for in this rationale.

In the base case analysis, three tenures were incorrectly excluded in the THLB and two issued tenures were incorrectly included, resulting in an overall net effect of 25 465 cubic metres per year (six percent) overestimate in the base case timber supply.

I therefore recognize in my '**Reasons for Decision**' a six percent overestimation in the overall timber supply.

- miscellaneous Crown lands

The Crown forest management land base (CFMLB) is the forested area within the TSA administered by the Ministry for long-term timber supply or for other resource objectives such as water quality, wildlife and recreation. Miscellaneous Crown lands within the Arrowsmith TSA that were deducted from the THLB and did not contribute to the AAC include: ecological reserve, Forest Service recreation reserve, miscellaneous reserves less than 100 hectares (with or without an order in council), Crown and timber alienated in a

watershed, Christmas tree permit, and miscellaneous lease. Generally, these areas were not large in size and were excluded from the THLB appropriately.

Ownership contributions were determined using the FAIB provincial ownership layer (F_OWN) codes and forest vegetation cover attributes. In order to more accurately represent the local issues that are occurring on the land base, this is an area of data uncertainty that requires improvement for the next TSR. For example, F_OWN does not include some permits issued under the *Land Act* (often local in nature) that may restrict the harvest of timber. These should be modelled as a deduction on the THLB. In the base case, they represent a small unquantifiable overestimate for which I will make no adjustment.

Discrepancies also occurred where the provincial F_OWN layer used to assign the Crown land categories, did not distinguish if the Crown land was within a municipal boundary. In practice, such land may be encumbered by municipal planning requirements and bylaws preventing the harvest of timber. Similar issues were found where the district boundary overlapped with private land.

Therefore under ‘**Implementation**’, I expect FAIB and district staff will work together to regularly review, correct and update the F_OWN layer in order to obtain more accurate ownership information that is representative of activities occurring on the land base.

- economic and physical operability

An economic operability assessment was completed (April 2014) by Forest Ecosystems Solutions, to determine the area where the value of merchantable timber is greater than the cost to access or harvest it. Two meetings with several licensees were conducted to review the minimum economic volumes and preliminary economic classifications. Feedback from licensees was used to set the final minimum volumes and to refine the economic classification. The economic operability model was applied to forest cover data, for the 2013 Arrowsmith TSA VRI and TFL 46 (in TFL take back areas with no VRI coverage), to determine the area of the land base considered economic, resulting in 12 611 hectares being removed from the THLB. I am satisfied that the operability assumptions were appropriately applied in the base case.

- environmentally sensitive areas

In the base case analysis, 1135 hectares were excluded from THLB to account for environmentally sensitive areas where there were sensitive soils or suspected regeneration problems. The area excluded for ESAs in this timber supply analysis was considerably less than the previous TSR (2009). Updated assessment information (refer to ‘*economic and physical operability*’) resulted in most of the economically inoperable areas being co-located with ESAs, resulting in the amount of area exclusively excluded for ESAs in this analysis being much smaller.

Although ESAs represent only a small area in this base case analysis, the vintage of the ESA data is very old and a new terrain stability methodology should be incorporated in the future if deemed to have a large impact in future analyses. Based on my review of the information regarding environmentally sensitive areas, I conclude that the estimates used in the analysis reflect the best available information and are therefore, appropriate for use in this determination.

- low stocking

Stands older than 250 years with a volume less than 300 cubic metres per hectare are not harvested under current logging practices, and were removed from the THLB. In the base case analysis, 1882 hectares were excluded to account for low stocking. When the new VRI becomes available, better stand delineation will result and I expect the district to update their information for low stocking. Based on my review of the information regarding low stocking, I conclude that the areas were excluded appropriately.

- roads, trails and landings

Existing roads, trails and landings were accounted for in one of two ways. Large roads such as a highway having a wide right-of-way, were categorized in the forest cover inventory as non-forest land polygons, and were removed from the land base considered available for timber supply. Smaller roads, as well as trails and landing, were considered available for timber supply as they were not classified in the 1:20 000 scale

forest cover inventory because of their linear shape and small size. Unclassified roads and trails accounted for 1451 hectares.

Buffers were applied to either side of all roads and this buffer area was removed from the THLB. The buffer width varied depending on the category of the road and its location and was assumed to be an average loss of growing space due to roads, trails and landings.

The economic operability assessment mapping identified where future access roads would be built. These areas were assumed to be not currently developed with roads. Future roads were projected to be approximately five percent of logged areas based on current performance. Therefore, all stands above 100 years of age that were not currently roaded had a five percent reduction applied at the time of harvest.

Input received from Interfor, based on an analysis completed by FPInnovations, indicated that the road exclusions were too high and should be viewed as an underestimation in the base case timber supply since the Arrowsmith TSA has a significant second growth (managed stand) forest component. The Ministry responded that due to a limited sample size there was not satisfactory confidence in the FP Innovations study to apply the results broadly across the TSA. In addition, the road widths calculated in the previous TSR (3900 hectares) were significantly higher than those used in the current base case (1877 hectares). For these reasons, the Ministry decided to use their own road data for the purposes of this timber supply analysis.

I am confident that the data used for roads, trails and landings in this analysis represents the best available information and the buffer widths and projection of future roads were applied appropriately. Therefore under '**Implementation**', given the disparate views regarding road widths, I expect the district to work with industry to obtain better data such as LiDAR (already in use operationally for road engineering) that would better quantify the accounting of roads, trails and landings.

- vegetation resources inventory

A new VRI is underway, with an anticipated completion of 2018. This addresses the limitations of the current inventory which is a complex mix of varying currencies, standards, formats, and gaps in the data found in the current inventory for the Arrowsmith TSA and other inventories across the South Island Natural Resource District.

Interfor recommended leaving the current AAC of 420 000 cubic metres unchanged until the new inventory is completed. They believe that the new inventory will be a more accurate reflection of the forest on the Arrowsmith TSA. While I agree that a new inventory is required to replace the current mixture of inventories within the Arrowsmith TSA, I do not see a need to delay my AAC determination. The current inventory has been updated to 2015 for harvest depletions and natural disturbances, which are the major changes likely to affect my AAC decision. This approach of using the best available information and not delaying an AAC decision is consistent with my previously noted principles. Therefore under '**Implementation**', once the new inventory and inventory analysis report is released in 2018, I expect FAIB to follow-up in determining if any changes are substantial and the impacts for the next TSR.

- dead potential volume

The Ministry's timber volume tables do not account for volume from dead trees that could potentially be used as sawlogs. The base case analysis for the Arrowsmith TSA, therefore, did not include any assumed contribution for dead volume.

VRI ground sample data for this TSA indicates the incremental dead potential volume ranges from three percent to 14 percent of the green volume (for stands over 60 years of age). The average value, for all coastal TFLs and TSAs, is nine percent.

I have considered the information regarding dead potential volume and discussed it with district staff. I am aware that the potential volume available from dead yet merchantable stems in harvested stands was not accounted for. I consider that some portion of this volume in stands is likely economical to harvest; therefore, represents a level of available volume in addition to what was projected in the base case. For this determination, I conclude that the potential volume contribution from dead stands represents a three percent

underestimation in short-term timber supply projected in the base case. I will discuss this further in '**Reasons for Decision**'.

- minimum harvest age and volume

Minimum harvestable criteria are used to define when existing and future managed stands become merchantable and available for harvest. While harvesting may occur in stands that meet the minimum requirements, in order to meet forest level objectives, most stands will not be harvested until well past the minimum criteria because other resource values take precedence (e.g. requirements for the retention of older timber). In the base case, a stand was considered merchantable if it contained 350 cubic metres per hectare for coniferous ground/cable harvesting, 450 cubic metres per hectare for coniferous helicopter harvesting, and 200 cubic metres per hectare for deciduous ground/cable harvesting.

A sensitivity analysis was completed to test the effect of replacing the minimum harvestable volume criteria with criteria based on a combination of volume and age, and age by itself. The short- and mid-term harvest levels were very sensitive to higher minimum harvestable ages while the long-term harvest level showed modest improvements over the base case harvest level. This indicates that deviations from the base case merchantability assumptions will affect future sustainability of timber supply in this TSA.

In this TSA forest stands can reach merchantable volumes and piece sizes at an early age. Between 2010 and 2016, 25 percent of the area harvested was from stands that were less than 60 years old. Over an entire TSA, this fast growth allows for a trade-off between maximizing long-term harvest levels and maintaining mid-term harvest flow. The analysis presented to me demonstrated that, in order to maintain higher mid-term levels, a trade-off is necessary that would have a modest long term impact.

Interfor (operating mostly in the west side of the TSA), expressed concern that the minimum volume threshold used in the base case allows for the harvest of younger stands (age class 3) resulting in a long-term harvest of much younger stands on average than what is being harvested today. Interfor felt that the harvest of predominantly young stands that produce small logs is not economically viable.

One of the recommendations from the Nanwakolas Council was that the Chief Forester should specify that stands should not be harvested until they reach an age where their rate of growth is at least 95 percent of the maximum rate of growth. This recommendation stemmed from the concern that under the base case assumptions, the average age of stands harvested in the long term – approximately 90 years from now – was 44 years.

I understand these concerns raised by Nanwakolas and Interfor. However, it is recognized that the base case was modelled based on achieving certain volumes regardless of age and this best represents current practice. I consider the minimum volume criteria used in the base case reasonable and the resulting timber supply forecast fairly stable. I have considered this information in my decision and am confident that the volume thresholds used in the base case were appropriately modelled. I therefore make no adjustments to the base case minimum merchantability criteria. If harvest practices change, these will be reflected in future TSRs.

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

Expected time to re-establish the forest following denudation

- regeneration delay and impediments to prompt regeneration

Regeneration delay is the period between harvesting an existing stand and the re-establishment of the next stand to an improved standard. Regeneration delay assumptions used in the timber supply analysis for managed stands are based on data from the Ministry silviculture database RESULTS, and range from one to four years with shorter delays for planted stands and longer delays common for stands that are naturally regenerated.

Growth of recent plantations and future stands were projected using the TIPSy growth and yield model and assumed a two-year regeneration delay. A review of RESULTS data (2015) indicated that the earliest regeneration activity is an average of 1.6 years while the latest regeneration activity averaged over the same

time frame was 1.9 years. Discussion with some licensees indicated that they believe the regeneration delay should be closer to one year. BCTS indicated that their regeneration delay is often dictated by the length of time that it takes a timber sale holder to harvest the cutblock and may be three to four years depending on the circumstances.

I note under ‘**Implementation**’ that I expect district staff to work with FAIB to follow-up on a ground sampling plan to implement young stand monitoring in the Arrowsmith TSA, and use this information to increase the alignment between the regeneration delay observed on the ground with how it is applied in TIPSy.

The district informs me that to date there are no concerns regarding impediments to prompt reforestation, therefore based on my review of the information, I conclude that the information regarding regeneration delay is appropriate for use in this determination.

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

Silvicultural treatments

- silvicultural systems

Silvicultural systems that include various levels of retention are employed throughout the Arrowsmith TSA and need to be considered as a prelude to volume table development. There were two types of harvesting modelled in the base case: clearcut (21 percent of the harvested area); or clearcut with reserves (43 percent of the harvested area). It was assumed that there was no harvesting in the CSLUD area.

Based on the summary of the silviculture systems employed in the South Island Natural Resource District, 34 percent of the harvested area in the Arrowsmith TSA included retention; however, there was difficulty in determining the type of retention and how it was categorized, e.g. dispersed reserves, aggregated reserves, or wildlife tree retention. Further discussion of this is included under ‘*stand-level biodiversity*’. I have reviewed the information regarding silvicultural systems, as applied in the base case, and am satisfied it reflects current practice.

incremental silviculture

Based on a review of RESULTS data from 2016, fertilization has been conducted once or multiple times on 22 947 hectares in the Arrowsmith TSA. The Integrated Resource Management Plan (IRMP) is reviewing the fertilization opportunities in the Arrowsmith TSA and is expected to provide direction for prioritizing future fertilization treatments.

The base case modelled the fertilization of Douglas-fir good and medium sites in the Rosewall for 1867 hectares. Assuming the treated stands captured the volume increase prior to harvest, the model estimated an extra 84 000 cubic metres of volume available in the mid term. At the forest estate level this is estimated to represent 3000 to 5000 cubic metres per year for 30 years.

Historic spacing is defined as spacing activities that occurred prior to the late 1980s. This type of spacing was prevalent in the east zone within Douglas-fir stands and may have reduced stand densities to a sub-optimal level. The effects of this type of spacing have not been modelled in the base case and there is concern that the timber value and volume in such stands is lower due to wider spacing promoting retention of branches for a long period of time and increased knot size in the resultant lumber.

During the Integrated Resource Management Plan (IRMP) process, the Silviculture Working Group reviewed a number of these stands in the field. Field review determined that the spacing had occurred late enough in the stand’s development that the crowns had already begun to lift, knot size was reasonable and therefore loss was not considered significant. A review of RESULTS data indicated that from 2009 to 2014, a total of 32 hectares were juvenile spaced in the TSA. Historic spacing (up to the late 1980s) activity was significant in the TSA particularly in the Douglas-fir stands within the East portion of the TSA. A number of historic spacing stands have already been harvested with 725 hectares remaining.

The IRMP also modelled the effect of historic spacing on timber volume. It was concluded that the effect on Douglas-fir volumes on good sites is negligible as growth rates essentially correct any negative impact over time. Modelling of Douglas-fir on medium sites has shown more of an impact but is estimated at this time to have negligible impact.

Based on my review of the information regarding incremental silviculture and discussions with district staff, I conclude that the assumptions used in the base case were a reasonable reflection of current practice and were appropriate for use in this determination. I make note that the district continue to ensure that future TSRs model the silvicultural treatment activities carried out on the land base.

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

- decay, waste and breakage and residual waste

Estimates of decay, waste and breakage are a critical component in the calculation of accurate natural stand yield volumes. Biogeoclimatic ecosystem classification (BEC) based loss factors (used in VDYP7) were applied to generate the natural stand yields used in the base case. These factors incorporated stratified, destructive sampling data to eliminate bias and provide an unbiased estimate of net merchantable volume.

The previous TSR applied forest inventory zone (FIZ) based loss factors (used in VDYP6). The volumes produced using these factors had overestimated the decay, particularly in cedar-leading stands. These are the same loss factors that are applied in appraisal cruising and have been deemed not comparable to the BEC-based loss factors applied in VDYP7.

Given that cedar is a dominant tree species in about one-third of the stands in the THLB, as well as its prominence in the harvest profile of the licensees in the area, I expect the district to follow up with FAIB growth and yield specialists and pricing staff to obtain information or studies confirming the cedar volumes produced by VDYP7, with the associated BEC-based loss factors applied, are accurate.

For managed stands, the standard operational adjustment factors (OAF) were used to address decay, waste and breakage.

The maintenance of coarse woody debris (CWD) following harvesting is an important component of biodiversity. For the most part, CWD requirements are being met in the TSA. I expect the district and licensees to work together to utilize the waste fibre being left onsite (if possible) as per the *Forestry and Fibre Action Plan*, rather than leaving it or burning it. There are tenure tools being made available to make residual fibre available to secondary users. This reduces the amount of carbon emissions from burning of slash piles (<https://www2.gov.bc.ca/gov/content/industry/forestry/supporting-innovation/bio-economy>)

I have reviewed the information regarding decay, waste and breakage, and coarse woody debris in the Arrowsmith TSA and conclude it represents the best available information. I note under ‘**Implementation**’ that I expect the district to work with FAIB to ensure that cedar volumes are accurate and waste fibre being left onsite is appropriately utilized.

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

- Vancouver Island land use plan

The Vancouver Island Land Use Plan (VILUP) and associated Higher Level Plan Order (HLPO) cover all of the SINRD outside of the Clayoquot Sound land use decision area and the Gulf Islands. The VILUP and HLPO identify three management zone classifications: special management zone (SMZ); enhanced forestry

zone (EFZ); and general management zone (GMZ). The base case analysis incorporated specific aspects of the SMZ and EFZ that influence harvesting rates.

The SMZs within the Arrowsmith TSA include: Barkley Sound, Alberni Canal, San Juan Ridge, Upper Qualicum and Nahmint. The forest cover constraints used in the analysis assumed a three-metre green-up height and a target for mature seral forest of 25 percent of the CFMLB of each SMZ.

The EFZs associated with the TSA include: Effingham, Maggie, Corrigan, Sarita and Loss-Jordan. The forest cover constraints used in the analysis assumed a 1.5 m green-up height with no constraint on cutblock size. A three-metre green-up height was assumed for all GMZs.

Based on my review of the strategic land-use planning and objectives information and my discussions with district staff, I conclude that the base case analysis appropriately modelled the constraints outlined in the VILUP.

- Clayoquot Sound Land Use Decision area

In 1993, the provincial government's Clayoquot Sound Land Use Decision established management practices for a 265 000 hectare area on the west coast of Vancouver Island. Of this area, 23 060 hectares are in the Arrowsmith TSA but only 9034 hectares contribute to the THLB. An order (2008) established land-use objectives for Clayoquot Sound including the implementation of watershed plans and adoption of recommendations that follow the Clayoquot Sound Scientific Panel (CSSP). The watershed plans identify harvestable areas and areas that are set aside as reserves to protect a range of forest values. Areas where logging is permitted must adhere to Scientific Panel recommendations that include: watershed rate of cut, old-seral forest requirements, visual quality objectives, and variable retention silviculture systems.

In the base case, the CSLUD area was modelled separately from the remainder of the Arrowsmith TSA in order to provide a close approximation of the Scientific Panel's recommendations. A reserve network (7806 hectares) was excluded from the THLB to ensure the protection of the following values:

- hydro-riparian resources;
- sensitive soils and unstable terrain;
- red- and blue-listed plant and animal species;
- forest-interior conditions in late successional forest areas;
- ecosystem representation;
- linkages among watershed-level planning areas; and
- culturally significant areas.

Landscape-level biodiversity was modelled using a 40 percent old-seral target requirement at the watershed level. This limit was reduced if part of the requirement was met by old-growth stands in watershed reserves, adjacent parks and protected areas.

Watershed rate of cut constraints were applied for each of the three sub-basin levels, as set out in watershed plans. In all watersheds, either a five percent per five-year or a 10 percent (per 10-year) constraint was applied. The productive forest land base of the watershed was used in applying this constraint. Where watersheds overlap parks, the limits were adjusted since no harvesting will occur in parks.

Stand-level biodiversity was modelled in accordance with watershed plans that require variable retention harvesting within the harvestable area. Retention ranged from 15 to 70 percent depending on the values present in the stand. The base case assumed 40 percent retention at the stand level to account for trees left unharvested in variable retention blocks. This is consistent with what was modelled in the last TSR and was recently verified in TFL 57 where harvest performance was monitored for the past decade.

Visual objectives were modelled in the base case using scenic class objectives that included: small scale alteration, minimal alteration and natural appearing. These were translated into provincial visual quality objective (VQO) classes and maximum allowable disturbance levels were applied.

Area incorrectly identified as vacant crown land outside the TSA (adjacent to Strathcona Provincial Park), resulted in an additional 465 hectares (0.8 percent) of THLB in the Arrowsmith TSA. This additional area represents a negligible underestimate in the overall base case timber supply; therefore, I will not make an adjustment to the base case.

Although there is harvestable timber within the CSLUD area, no harvesting has occurred since the last AAC determination. In order to address district concerns over this lack of harvest, I am decreasing the contribution from the CSLUD area to 6850 cubic metres. Due to an already constrained THLB, it is important for the licensees and BCTS to demonstrate performance inside the CSLUD. Although I recognize the harvesting challenges of operating here, the partition is necessary to avoid overharvesting in areas of the TSA outside of the CSLUD. This partition is therefore one half of the amount the area is capable of contributing, to account for the lack of harvest, as discussed under ‘**Reasons for Decision**’.

As noted under ‘**Implementation**’, I expect the district to work with licensees and BCTS to monitor and assess harvest performance inside the CSLUD area and report back to me annually. I will evaluate the harvest performance and, if necessary, make adjustment to the AAC in the next AAC determination.

- *First Nations cultural heritage resources and archaeological resources*

A cultural heritage resource (CHR) is defined under the *Forest Act* as “an object, site or location of a traditional societal practice that is of historical, cultural or archaeological significance to the province, a community, or an aboriginal people”. CHRs include, but are not limited to, archaeological sites, structural features, heritage landscape features and traditional use sites. In practice, most of these sites overlap with areas already excluded from the THLB to account for non-timber resources due to *Forest and Range Practices Act* (FRPA) constraints such as riparian area, ungulate winter range, wildlife habitat area, wildlife tree retention area, and old growth management area. Where there is no overlap, legal requirements for their protection are outlined below.

Archaeological sites, including culturally modified trees (CMT) that pre-date 1846, are protected under the *Heritage Conservation Act*. Archaeological overview assessments (AOA) have been completed for the TSA, providing baseline information on archaeological resource potential, to guide field-level archaeological impact assessments (AIA). Both are used to identify potential archaeological sites which include cultural and historic use sites. Once they have been field verified, archaeological sites, including buffer strips, are protected and recorded in the remote access to archaeological data (RADD).

In the base case, a 50-metre buffer was applied to sites identified in the RADD and excluded from the THLB. In the Arrowsmith TSA there were 1479 hectares attributed to archaeological sites. Of this, eight hectares were accounted for through previous exclusions resulting in a net effect of 1471 hectares being removed from the THLB.

Areas with CHR where harvesting has been avoided are called log arounds. They have not been formally excluded from the THLB (through a temporary Part 13 Order) or informally (through the placement of recognized retention such a wildlife tree patches). In total, log arounds represent approximately 11 587 hectares (66 775 cubic metres) which presents an additional pressure on the rest of the available THLB since they were not excluded from the THLB.

Maa-nulth Nations have been in discussions with the Province regarding the Cultural Site Protection Protocol (CSPP), a Maa-nulth Treaty obligation for the designation of up to 300 hectares of Crown land to be protected as cultural sites. Some of the cultural sites identified to date will meet criteria for protection under the *Heritage Conservation Act* (HCA) and some sites will require or have had applied other mechanisms for protection. The cultural sites identified by Maa-nulth overlap only marginally with the THLB. In the short term, these sites will be managed through existing Forest Stewardship Plan (FSP) requirements under the Forest Planning and Practices Regulation (FPPR), specifically FSP results and strategies that manage for cultural heritage resources.

Maa-nulth First Nations has a treaty right to access monumental cedar and cypress for cultural purposes according to the Maa-nulth Final Agreement, and the subsequent Monumental Cedar and Cypress Harvest Agreement with individual Maa-nulth Nations that are meeting their needs.

First Nations have successfully accessed monumental cedar through active operations by forest licensees. Because of this success, there is small observed demand for First Nations access to monumental cedar outside of the active forest licensee operations and therefore there was no specific constraint applied in this analysis.

During First Nations consultation, input was received from Tla-amin First Nation (TFN) on the *Discussion Paper*. TFN had questions regarding the scope of the TSR and were interested in determining the extent that the TSR could potentially impact TFN Treaty Rights. In response, the SINRD First Nations advisor explained that TSR process, the extent of the Arrowsmith TSA overlap with the TFN treaty area (which is limited to Hornby and Denman Island). TFN explained that the area of Hornby and Denman Islands are important to TFN because of archaeological sites and herring spawning grounds. Following this discussion, TFN had no further concerns.

Known and identified archaeological sites were adequately excluded from the THLB in the base case. Non-archaeological cultural heritage resources have been adequately accounted for through existing FRPA requirements. Although log rounds have not been modelled as excluded from the THLB, these as well as other areas such as the Gulf Islands that have not been legislatively excluded and have had no logging for over two decades, pose harvesting pressure on the rest of the land base as harvesting in the short term is concentrated in a smaller area.

In keeping with my guiding principles, should new significant information become available regarding First Nations archaeological sites and cultural heritage resources, including any new findings or recommendations by government, I may revisit the AAC determination for the Arrowsmith TSA prior to the 10-year deadline provided for in legislation. For this determination, I note that the AAC I determine does not prescribe any particular plan of harvesting activity within the TSA by requiring any particular area to be harvested or to remain unharvested. Harvesting activities are guided by requirements such as those contained in the *Heritage Conservation Act*, *Forest Act*, FRPA, the CSSP and other resource management legislation.

- recreation resources

Recreation features on the land base are important for public recreational activities and may include: campsites, trails, cabins, wildlife viewing locations, staging areas and boat launch sites. Such features may result in the exclusion of harvesting activities on the land base.

Sources of recreation data used in the base case included: recreation reserves, legally established recreation sites, trails and interpretative forest sites; reserves for the use, recreation and enjoyment of the public (UREPs); and the 1993 recreation features inventory (RFI). UREPs (established under the *Land Act*) less than 100 hectares were excluded from the THLB and UREPs greater than 100 hectares were left in the THLB.

Legislated recreation trails were treated as line features and a 25-metre buffer was applied as a reduction. Management practices related to recreation trails included buffering where possible, selective harvesting and tree retention along the trail, relocating sections of the trail to non-productive areas and excluded the trail post-harvest. The net area removed for all recreation trails was less than 100 hectares total. Undesignated recreational trails were typically managed operationally in conjunction with other non-timber objectives.

The methodology applied for this TSR was consistent with what was used in the previous TSR. Changes in RFI coding resulted less area being excluded for recreation values. Most of these areas were co-located with areas already excluded for other values.

In the base case, area was mistakenly removed from the THLB to account for recreation sites and trails. As partial harvesting is allowed, these areas should have been kept in the analysis. This represents a 0.2% (900 m³) underestimate in timber supply. I account for this very minor underestimation in the overall timber supply in my '**Reasons for Decision**'.

- landscape-level biodiversity, old growth management areas

This factor covers the old growth management that is outside of CSLUD area. Old growth management occurring inside the CSLUD was discussed above under the factor ‘*Clayoquot Sound Land Use Decision area*’.

Landscape-level biodiversity can be conserved by maintaining forests with a variety of patch sizes and seral stages across a variety of ecosystems and landscapes. Given other forest management provisions that provide for a diversity of forest stand conditions, old forest retention is a key landscape-level biodiversity consideration and is a requirement under FRPA. In the base case, the protection of biodiversity was modelled at the landscape level through the retention of old forest in every landscape unit (LU) and natural disturbance type. The order establishing provincial non-spatial old growth objectives (2004) identifies the amount of old forest to be maintained across a landscape unit where old-growth targets or old growth management areas have not yet been established. It is consistent with the Vancouver Island Land Use Plan (VILUP).

In 24 of the 39 LUs outside of Clayoquot Sound, old forest retention requirements were modelled by assuming spatial OGMAs were not harvested. In the remaining 15 LUs without OGMAs, where old-seral requirements apply, old forest retention was accounted for by applying forest cover requirements as defined by the 2004 order establishing provincial non-spatial old growth objectives.

A number of organizations have identified to the ministry a need to increase the protection of old growth forest on Vancouver Island. They include: the Ancient Forest Alliance, the Sierra Club, the Wilderness Committee, BC Chamber of Commerce, the Union of BC Municipalities, and the Public and Private Workers of Canada.

In response, the Ministry is moving forward with a *Vancouver Island Old Growth Forest Initiative* which will include a “big tree policy” that sets species and diameter limits, as well as suggested buffer widths that would preserve old growth habitat. A pilot, collaborating with FN and industry, was initiated by the Ministry’s resources practices branch with results pending.

Other public concerns felt that the cost/benefit ratio of employment benefit from logging old growth in the Arrowsmith TSA is low given the unique ecosystem at stake. The Ministry responded that old growth in the SINRD, outside of parks and protected areas is managed through a number of administrative and policy mechanisms including: the Provincial Non-spatial Old Growth Order, landscape unit-specific old growth management areas (OGMAs), the Clayoquot Sound land use decision, wildlife habitat areas (WHAs), designated riparian areas, ungulate winter ranges, and wildlife tree retention areas.

In addition, protection of the Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic subzone is a priority for the SINRD. Two land use Orders (2010 and 2011), under the *Land Act*, grant protection from forestry and land development for 2028 hectares of the CDFmm zone; these areas have been excluded from the modelled THLB.

Based on my review, I conclude that the landscape-level biodiversity and old growth management area information used in the analysis is consistent with the legal requirements. Therefore, I will make no adjustments to the base case on this account. With regards to the harvesting of old-growth stands, I acknowledge that individual opinions regarding the level of old-growth retention on Crown land is very diverse and there is a balance between the need for retention and the need for harvest opportunities within the TSA. Harvest opportunity in the Arrowsmith TSA is reliant on the harvest of natural stands that contribute to the harvest profile for the next 30 to 40 years. However, it is not within the scope of my AAC determination to make land use decisions regarding the nature and extent of old growth protection.

- *stand-level biodiversity*

Stand-level biodiversity can be conserved through stand-level retention as it maintains or restores important structural attributes such as wildlife trees, tree species diversity, and understory vegetation diversity. In managed stands, stand-level retention is provided through wildlife tree patches (WTPs) and dispersed wildlife tree retention.

Objectives for stand structure through wildlife tree retention (WTR) are described in the *Landscape Unit Planning Guide* (1999). Further to this, higher level plan objectives for stand structure through retaining

trees in harvested areas are described in VILUP and Clayoquot Sound Watershed Plans. Retention targets for stand structure, if necessary, are considered and described in forest stewardship plans.

The practice of leaving trees for wildlife and for assisting in conservation of stand-level biodiversity is modelled in the base case by reducing the land base available for harvest to account for trees that must be left standing in harvested areas (net area). Under FRPA a minimum of seven percent of the total area must be covered by wildlife tree retention areas across cutblocks, 3.5 percent within cutblocks. In the base case this 3.5 percent is accounted for through a land base reduction. The remaining 3.5 percent to meet the 7 percent total is assumed to be obtained within other retention areas such as riparian buffers.

Three different data sources were queried to determine the actual amount of retention occurring operationally at the stand level. Although there was some variability in the data, the amount of retention shown by the data (18 to 24 percent) was much higher than what was modelled.

In order to investigate the timber supply impact of the uncertainty associated with the area lost to retained overstory, a sensitivity analysis was conducted that adjusted the in-block stand retention from 3.5 percent to seven percent. This increase resulted in an 8.9 percent decrease in timber supply over the first 10 years of the harvest projection. The mid- and long-term timber supply decreased by 3.7 percent and four percent respectively.

After accounting for other forms of retention, district staff concluded that retention is closer to approximately five percent or 20 000 cubic metres per year. I therefore recognize in my **'Reasons for Decision'** an overestimation in the timber supply base case of at least five percent in the short term.

I note that the area retained for stand-level biodiversity needs to be more accurately quantified. I recommend under **'Implementation'** that this information be improved for the next determination via research information provided by silviculture treatments for ecosystem management in the Sayward (STEMS) data, and improved FREP and RESULTS information.

- shading

Shading by mature trees within or around the edge of a cutblock can reduce the growth of a regenerating stand. In the base case the effect of shading was modelled in SMZs by applying an 18 percent volume reduction to yield curves for cutblocks harvested after the year 2000 to account for smaller cutblock size (limited to five hectares) and variable retention harvesting. Outside of SMZs, this 18 percent volume reduction was also applied in retention and preservation VQOs, for managed stands (established after 1998) to account for smaller openings and partial retention.

An analysis was conducted by a consultant to assess the effects of shading for variable retention harvesting. Limited data resulted in inconclusive results and further work was deemed necessary to determine a response between low basal area retention reductions on growth and higher residual basal area ranges.

A sensitivity analysis was conducted to investigate the impact of shading on future yields. The effects of shading as applied to SMZs and retention and preservation VQOs in the base case marginally reduced the long-term timber supply, as such, I will not consider the implications around the uncertainty of differences in shading effects from that modelled in the base case. Similar to *'stand-level biodiversity'* I expect a more accurate quantification of shading be investigated in combination with stand-level biodiversity as noted under **'Implementation'**.

- community interface areas

Community interface areas are identified contentious areas in close proximity to an urban area, and are managed similarly to designated community watersheds. Approximately half of these watersheds are within the issued Rosewall Creek FNWL that is no longer part of the TSA. In the base case, forest cover constraints were applied to limit the rate of harvest within each watershed to five percent of the Crown productive forest area over a five-year period. Although there is no legal requirement for these watersheds to be subject to this rate of cut constraint, they resulted in a marginal increase to the mid- and long-term base case timber supply. Because most of this area was excluded with the award of the FNWL, I have considered

the impact of this information on the base case timber supply in the context of the entire TSA and will make no adjustment.

- riparian management

Riparian reserve zones and riparian management zones for streams were estimated using GIS tools. Each stream was spatially identified, classified, and buffered consistent with the requirements under the Forest Planning and Practices Regulation. Lakes and wetlands were not addressed by riparian layer information. These features were taken into account in estimates of area retained under the factor ‘*stand-level biodiversity*’.

Various basal area retention percentages were applied to riparian management zones depending on the stream classification, resulting in a 1.4 percent of the total productive land base deduction from the THLB for riparian reserve zones.

The French Creek conservation society had concerns with the protection of the upper fingers of the creek where old growth resides, as well as other water collection areas. The Ministry identified that these areas represent about 800 hectares mostly located within the municipality of Qualicum Beach. The remainder of the watershed is privately managed forest land of Timber West and Island Timberlands. As such, this area of concern is not considered as part of the timber supply within the current AAC determination.

I am satisfied that streams were adequately modelled in the base case analysis and that retention for lakes and wetlands were co-located with exclusions for stand-level biodiversity. However, as noted under ‘**Implementation**’, I expect the inclusion of buffered lakes and wetlands, in the riparian layer, for the next TSR.

- ungulate winter range

Ungulate winter ranges (UWRs) are established under Section 12 of the Government Actions Regulation (GAR) for a category of specified ungulate species for the purpose of the *Forest and Range Practices Act*. In 2003, GAR Order U-1-107 established winter ranges for mule deer and Roosevelt elk in the Arrowsmith TSA. This order includes a set of general wildlife measures (GWMs) that prohibit or constrain primary forestry activities within each UWR unit. The GWM was modelled in the base case by applying appropriate THLB exclusion factors.

For U-1-107 both no harvest and conditional harvest GWMs are established. No harvest zones of the UWR were modelled in the base case and account for less than 2 percent of the land base exclusions; however, conditional GWM were not modelled in the base case.

The conditional harvest GWM is meant to provide for elk habitat (forage and cover) by maintaining an approximate seral-stage distribution of 25 percent in each age class category (0 to 20; 21 to 40; 41 to 60; and 61 to 80 year old stands). Not including this objective in the base case results in a slight unquantified overestimation of the base case within the 1364 hectares of conditional harvest UWR polygons (south of the Nanaimo River) for which I recognize but will not make an adjustment to the base case.

The Maa-nulth Treaty (signed in 2011) includes a reasonable opportunities agreement which identifies important Maa-nulth wildlife harvest areas in the Arrowsmith TSA. This agreement may increase the need to manage for ungulate habitat outside and adjacent to UWRs, however, at this time no additional management objectives have been determined.

Following discussions regarding this factor with staff, I am satisfied that the requirements for ungulate winter range were appropriately accounted for in the base case.

- Coastal Douglas-fir

A Ministerial Order to protect the Coastal Douglas-fir maritime (CDFmm) biogeoclimatic subzone came into effect in 2010. It established land-use objectives, resulting in 1600 hectares of Crown land being protected in the Arrowsmith TSA. In 2011, an Order (under the *Land Act*) established land-use objectives for old growth in the CDF, resulting in the protection of an additional 428 hectares of Crown land predominantly in the Arrowsmith TSA. The lands under both orders were excluded from the THLB.

Further to this, the Gulf Islands, which contain some CDF, were erroneously excluded from the analysis. This is described further under the factor '*Gulf Islands*'.

A number of comments from the public requested that the remaining CDF on Crown land be removed from the THLB as a conservation measure. In the base case, there are 900 hectares in the Coastal Douglas-fir BEC zone (1.4 percent of the TSA) contributing to the AAC. Of this area, 600 hectares is within the BC Timber Sales (BCTS) Strait of Georgia chart area where they have no plans for harvesting.

I conclude that the legally protected CDF areas were accounted for and correctly modelled in the base case and therefore, I will make no further adjustment.

- Gulf Islands

Currently, there are 810 hectares of Crown forest on the Gulf Islands (504 hectares in the CDF and 306 hectares in the CWH BEC zones). Despite this area being legislatively defined as part of the Crown forest, little or no harvesting has occurred on many of the Gulf Islands for the past 20 years. This is due to increasing pressure to manage these islands for non-timber values such as the conservation of the Coastal Douglas-fir biogeoclimatic zone (CDF). In the base case, the Crown forest within the Gulf Islands was erroneously excluded.

Due to this oversight, further analysis was conducted to determine the impact of adding the Gulf Islands to the THLB. The result was a total of 416 hectares (110 hectares of CDF and 306 hectares of CWH) could be considered THLB.

Although I recognize the harvesting challenges of operating here, this area is still legally part of the THLB. Therefore, until there is a land use decision made by government, I will account for half of the potential THLB (208 hectares) contributing to the timber supply of this TSA. As discussed under '**Reasons for Decision**', this represents a 1248 cubic metres per year or 0.3 percent underestimate in the base case timber supply.

As noted under '**Implementation**', I expect the district to work with licensees and BCTS to monitor harvest performance on the Gulf Islands. I will evaluate the harvest performance, and if necessary reconsider a further adjustment to the AAC for the next determination.

- land interests, First Nations and other

Within the Arrowsmith TSA, there were a number of areas that were transferred to First Nations, sold by the province, or not under provincial jurisdiction that should have been excluded from the THLB.

Incremental Treaty Agreement (ITA) lands for Te'mexw Treaty Association, Ditidaht, and Pacheedaht; as well as a Snueymuxw reconciliation agreement (RA) Phase 1 land transfer, accounted for 1864 hectares that should have been excluded from the THLB. There were 4255 hectares and 200 hectares that should have been excluded for municipal lands within the Capital Regional District (CRD) and land sold to the District of Highlands/private interests respectively. Both of these oversights were the result of a misclassification in the ownership (F_OWN) layer. Finally, 45 hectares should have been excluded to account for areas within the Port Alberni city limits where there are dedicated right-of-ways owned by the city preventing harvesting opportunities.

The total area resulting from the land transfers summarized above represent a 6364 cubic metres per year or a two percent overestimation in the base case timber supply that I will account for under '**Reasons for Decision**'.

In addition, as already mentioned under the '**Implementation**' for the factor '*miscellaneous Crown lands*', I expect FAIB and district staff work together to regularly review, correct and update the F_OWN layer corporately to obtain more accurate ownership information.

- First Nations consultation

The Crown maintains a duty to consult with and accommodate, as necessary, those First Nations for whom it has knowledge of claimed Aboriginal rights and/or title (Aboriginal Interests) that may be impacted by a proposed decision, including strategic level decisions such as AAC determinations. The AAC determination

as a strategic decision sets the stage for other decisions such as AAC apportionment and disposition, leading to issuance of cutting authorities. AAC determinations do not determine particular harvesting areas or patterns, and as a result do not relate directly to the manner in which timber is utilized or managed on the ground. The relationship to claims of Aboriginal title is not a direct one. The AAC considers the sustainable harvest level from a particular geographic area which may include lands claimed as Aboriginal title lands but not yet declared by a court to be such. While under claim, such lands remain Crown lands and are considered to be part of the harvestable land base. Whether timber is ultimately harvested from those lands is an issue that is subject to allocation decisions, and the AAC determination does not determine that matter.

Aboriginal Interests or treaty rights may be connected to biophysical, spatial, social, cultural, spiritual or experiential values. The overall AAC can affect various resource values and therefore the ability of Aboriginal peoples to meaningfully exercise their Aboriginal rights. Information gained through consultation with potentially affected First Nations about Aboriginal rights claims has been taken into account in the development of this determination. Where the Province and First Nations have negotiated a treaty or have contractually agreed to a process for consultation, that process was followed.

Thirty-six First Nations have asserted and/or established Aboriginal Interests within the traditional territories within the SINRD that overlap the Arrowsmith TSA, including: the Ahousaht Band, Cowichan Tribes, Ditidaht First Nation, Esquimalt First Nation, Halalt First Nation, Hesquiaht First Nation, Homalco First Nation, Huu-ay-aht First Nation, Ka:'yu:k'tkh_Che:k:tles7et'h' First Nations, Komoks First Nation, Lake Cowichan First Nation, Lyackson First Nation, Malahat Nation, Mowachaht/Muchalat First Nations, Pacheedaht First Nation, Pauquachin First Nation, Penelakut Tribe, Qualicum First Nation, Scia'new First Nations, Sliammon First Nation, Snaw-naw-as First Nation, Snuneymuxw First Nation, Songhees First Nation, Stz'uminus First Nation, Toquaht Band, Tla-o-qui-aht First Nation, Tseshaht First Nation, Tsartlip First Nation, Tsawout First Nation, T'Sou-ke First Nation, Tseycum First Nation, Tsawwassen First Nation, Uchucklesaht First Nation, Ucluelet First Nation, We Wai Kai Nation, and Wei Wai Kum First Nation.

All but seven First Nations in the Arrowsmith TSA are represented by the following tribal councils and treaty associations: Nuu-Chah-Nulth Tribal Council, Hul'qumi'num Treaty Group, Nanwakolas Council Society, Laich-kwil-tach (Hamatla) Treaty Society, Wei Wai Kum Kwiakah Treaty Society, Kwakiutl District Council, Te'Mexw Treaty Association, Naut'sa mawt Tribal Council and Maa-nulth.

Within the Arrowsmith TSA there are ongoing treaty negotiations, three signed modern-day treaties (Tla'amin First Nations, Tsawwassen First Nation and the Maa-nulth Nations) and nine Douglas Treaty First Nation Nations.

On April 3, 2009, the Tsawwassen First Nation Treaty came into effect. It is the first urban treaty in British Columbia and the first treaty negotiated under the British Columbia Treaty Commission (BCTC) process. The treaty brings certainty with respect to all of Tsawwassen First Nation's Aboriginal rights throughout the Tsawwassen First Nation claimed traditional territory, which covers approximately 279 600 hectares including the waters of the southern Strait of Georgia.

On April 1, 2011, the Maa-nulth Treaty came into effect. The Maa-nulth Treaty includes five First Nations, the Huu-ay-aht First Nation, Ka:'yu:k'tkh_Che:k:tles7et'h' First Nations, Toquaht Band, Uchucklesaht Tribe and Ucluelet First Nation. On May 22, 2014, the Maa-nulth Nations and the Province signed a Reasonable Opportunity Agreement (ROA) with the objective of defining the collaborative process to evaluate the impact of authorized uses or dispositions of Crown land on each Maa-nulth First Nations' reasonable opportunity to harvest fish and aquatic plants, wildlife, and migratory birds in the Maa-nulth Harvest Areas.

On April 5, 2016, the Tla'amin First Nation final agreement came into effect. The Tla'amin Reasonable Opportunity Agreement (ROA) provides an engagement framework for engaging on the potential impacts to harvest fish and aquatic plants within the Tla'amin Fishing Area, harvest wildlife and Migratory Birds within the Wildlife and Migratory Birds Harvest Area, and gather plants within the Tla'amin plant gathering area.

The Douglas Treaties, signed in 1852, grant First Nations the rights to hunt over the unoccupied lands, and to carry on their fisheries. The following First Nations are Douglas Treaty First Nations: Esquimalt First Nation, Scia'new First Nations, Pauquachin First Nation, Snuneymuxw First Nation, Songhees First Nation, Tsartlip First Nation, Tsawout First Nation, Tseycum First Nation, and T'Sou-ke First Nation.

The Ministry of Indigenous Relations and Reconciliation (MIRR) is currently negotiating modern day treaties for several First Nations in the SINRD. On the path to Final Agreement, MIRR often negotiates interim agreements including Incremental Treaty Agreements and Agreements-in-Principal which may include land transfers with potential to impact the Arrowsmith TSA (see *Land Interests, First Nation and Others*). Other agreements available to First Nations through MIRR negotiations include First Nations Consultation and Revenue Sharing Agreements (FCRSAs), Reconciliation Agreements and Strategic Engagement Agreements (SEAs).

There are currently 21 First Nations with signed FCRSAs within the Arrowsmith TSA. FCRSAs provide First Nation communities with economic benefits returning directly to their community based on harvest activities in their traditional territory.

On November 15, 2011 the government of BC and five First Nations signed the Nanwakolas Strategic Engagement Agreement (Nanwakolas SEA) to create more streamlined consultation processes and promote more effective engagement between government and First Nations. The Nanwakolas SEA has a co-ordinated approach of evaluating engagement levels where overlaps with individual Nanwakolas Nations are identified.

The SINRD was instructed that FAIB has taken the lead for implementation of the shared-decision making process and the SINRD is to handle consultation requirements. The details of this process are outlined in '*Nanwakolas First Nation decision making*'.

The SINRD initiated First Nation consultation through the Nanwakolas Clearinghouse for First Nation consultation on the *Data Package* and the *Discussion Paper*. The Nanwakolas Portal contact confirmed overlap with the traditional territory with the K'omoks, We Wai Kai and Wei Wai Kum First Nations and forwarded the referrals to these First Nations accordingly. No concerns or further information was identified through First Nation consultation.

On April 5, 2016, the Tla'amin First Nation final agreement came into effect. Engagement was undertaken according to the Tla'amin Reasonable Opportunity Agreement (ROA). The 2014 notification letter and the 2015 initial engagement were initiated according to the Haida spectrum.

The Tla'amin treaty area overlaps with a small area of the Arrowsmith TSA, specifically Hornby and Denman Island. The *Arrowsmith TSA TSR Discussion Paper* made the assumption that no forest harvesting will occur on the Gulf Islands. This was communicated to Tla'amin during ROA engagement on the discussion paper.

As described under '*Gulf Islands*', there is currently no land use decision made by government excluding the 810 hectares of Crown forest on the Gulf Islands. Despite this area being legislatively defined as part of the THLB, little or no harvesting has occurred on many of the Gulf Islands for the past 20 years. This is due to increasing pressure to manage these islands for non-timber values such as the conservation of the Coastal Douglas-fir biogeoclimatic zone (CDFmm). In the future, if harvesting is planned, I expect the district and BCTS will work together to ensure that formal consultation is followed and any First Nations impacted by the decision are engaged in the process.

During the Timber Supply Review, the Province and Ahousaht First Nation signed the Ahousaht Protocol Agreement on July 18, 2016. This agreement will bring \$1.25 million to Ahousaht over five years. The parties have agreed to work together to identify and develop business ventures and provide jobs for the Ahousaht people. One commitment in the Ahousaht Protocol is for the parties to develop an Engagement Framework to identify a process for First Nation consultation within Ahousaht traditional territory. Discussions regarding the Ahousaht Engagement Framework are ongoing. Ahousaht publicly released the Ahousaht Land Use Vision on August 12, 2016 which prioritizes economic development in Ahousaht traditional territory. The Province has not agreed to the Land Use Vision.

A review of available information for the First Nations was conducted in order to assess the level of consultation given the strength of claims made by First Nations and the degree of impact the AAC determination may have on those claims.

Information that was reviewed as part of the preliminary assessment included: existing FCRSAs, ethno-historical reports as prepared by the Aboriginal Law Group of the Ministry of Attorney General, available traditional use studies, past consultation processes, Remote Access to Archaeological Data (RAAD), and available wildlife studies.

First Nation consultation was completed in three stages as follows:

- 1) December 16, 2014 - A letter was sent to all First Nations to inform them that the Arrowsmith TSA TSR would be starting in the Fall of 2015.
- 2) October 9, 2015 - An initial engagement letter was sent to all First Nations initiating First Nation consultation on the *Arrowsmith TSA Timber Supply Review Data Package*. The initial engagement letter requested review and input with a proposed normal engagement level and a suggested engagement time frame of 60 days (unless other agreements suggested a different engagement level and time frame).
- 3) November 9, 2016 - An initial engagement letter was sent to all First Nation initiating First Nation consultation on the *Arrowsmith TSA Timber Supply Analysis Discussion Paper*. This initial engagement letter requested review and input with a proposed normal engagement level and suggested engagement time frame of 60 days (unless other agreements suggested a different engagement level and time frame).

First Nations review and comment on the *Discussion Paper* and/or *Data Package* were received from Stz'uminus First Nation (SFN), Pacheedaht First Nation (PFN), Cowichan Tribes (CT), and Tla-o-qui-aht First Nation (TFN).

SFN asked if there is a third party review during the Arrowsmith TSA TSR. Although there is not, there is an Integrated Resource Management Plan (IRMP) running as a parallel process. The Province presented the landbase exclusions and the process used to derive the THLB, and indicated there is an opportunity for SFN to meet with the Chief Forester upon request.

PFN had the following comments: they noted that the Incremental Treaty Agreement lands that have been transferred to PFN prior to the treaty are included on the map included as Arrowsmith TSA area. Further information regarding Incremental Treaty Agreement lands is available in the '*land interests, First Nations and other*'. They also noted that the Cowichan Lake Community Forest Co-op and BC Timber Sales have been invited to apply for a Community Forest Agreement (CFA). The volume for the CFA would be coming from the Arrowsmith TSA and Pacific TSA. Further information on this proposed CFA is available in *Area-based Tenures having separate AAC: Woodlots, CFAs and FNWLs*. If these areas are to be removed from the Arrowsmith TSA, only a small amount of the Arrowsmith TSA remains within PFN traditional territory along the highway. PFN indicated they do not have any further input into the *Arrowsmith TSA Timber Supply Analysis Discussion Paper*.

CT responded regarding the *Discussion Paper* First Nation consultation asking if CT's socio-economic situation and population is considered in the determination of the allowable annual cut (AAC) and if CT will be given another window to provide comments after the chief forester has made the AAC determination. The Province responded to CT by letter dated February 24, 2017 explaining the chief forester considers the socio-economic profile of the Arrowsmith TSA as a whole during the TSR. The letter also explained that any further comments should be sent to the Province as soon as possible if they are to be considered by the chief forester and that the *Discussion Paper* is the last formal opportunity for review and comment in the TSR process. No further comments were received from CT.

During First Nation consultation on the *Arrowsmith TSA Timber Supply Analysis Discussion Paper*, TFN responded with a letter dated February 22, 2017 indicating that TFN does "not support any AAC activities that would be intended within the TFN traditional territory". Furthermore, TFN requested that no harvesting

occur without adequate consultation and accommodation, if it has not already been built into Tla-o-qui-aht Land Use Plans.

The Province responded to TFN on February 24, 2017 by letter explaining the scope of the Arrowsmith TSA TSR. It was explained that any proposed forest harvesting in TFN traditional territory would require an approved Forest Stewardship Plan and a cutting permit, both of which require First Nation information sharing and/or First Nation consultation. The Province also highlighted the watershed plans in Clayoquot Sound which are subject to special forest management practices.

The SINRD engaged in consultation with the relevant First Nations in accordance with government direction, the provisions outlined in Treaty and non-Treaty agreements, or according to the Haida spectrum. The level of consultation was appropriate given the Aboriginal interests expressed by each First Nation, available information regarding their interests and the potential impact that this AAC determination may have on those interests. The proposed timber harvesting scenarios are not expected to change forest practices or management method, or the consideration of Aboriginal Interests and treaty rights at the operational level.

In summary, I am satisfied that all potentially impacted First Nations were consulted in accordance with current Provincial guidance and applicable case law. Any adverse impacts upon asserted Interests and treaty rights within the area of the Arrowsmith TSA stemming from forest development activities that occur subsequent to the AAC determination, can be appropriately mitigated or minimized through existing legislation and regulation, planning documents and meaningful engagement at the operational level.

-Nanwakolas First Nation decision making

In the Arrowsmith TSA, the K'omoks First Nation, Wei Wai Kum First Nation and Wei Wai Kai First Nation are signatory members of the Nanwakolas Reconciliation Protocol (NRP) with the Province. This protocol outlines a shared decision making process for allowable annual cut land use objective decisions, and provides the opportunity to make recommendations regarding allowable annual cut decisions and conditions that may apply to allowable annual cut decisions related to their asserted traditional territories.

Provincial government and Nanwakolas First Nations representatives met several times during the timber supply review process to share information and develop recommendations regarding the AAC for the Arrowsmith TSA. The final recommendations were forwarded to the chief forester in January 2018.

There are six joint recommendations, for the determination of an AAC for the Arrowsmith, including:

1. *East area partition:* The chief forester should specify an AAC partition in a manner that does not permit AAC attributed to the portion of the landbase on the West Side of the TSA to be harvested on the East Side of the TSA.
2. *Coastal Douglas-fir partition:* The chief forester should specify an AAC partition in a manner that does not permit AAC attributed to the portion of the landbase in the Coastal Douglas-fir BEC zone to be harvested in portions of the landbase outside of this zone.
3. *Minimum harvest age:* The chief forester should use a harvest flow rule for minimum harvest age based on 95% of the culmination of mean annual increment.
4. *Large cultural cedar:* The chief forester should instruct licensees and FLNRORD staff to continue working with Nanwakolas Council member First Nations in the development and implementation of a strategy to identify and manage the supply of large cultural cedar in the Arrowsmith TSA and assess implications on operational and strategic level management.
5. *Cedar partition:* The chief forester should instruct licensees and FLNRORD staff to monitor and assess harvest performance across the forest profile, and if redcedar and yellow-cedar are being

disproportionately harvested relative to their modeled contribution in the base case, then a cedar partition should be specified.

6. *Information sharing and cultural heritage features:* The chief forester should instruct licensees and FLNRORD staff to continue improving the processes for information sharing with First Nations, and to monitor the actual outcomes and impacts of forest practices on cultural heritage features and resources and on the associated assumptions used in timber supply modeling.

Having considered the information presented, I am satisfied that the province and Nanwakolas First Nations have successfully implemented a protocol for shared decision making process pursuant to the Nanwakolas Reconciliation Protocol (RP). I have reviewed the recommendations provided, and have determined they were adequately considered in my determination for the Arrowsmith TSA. I discuss my considerations of all the information provided to me, including these recommendations and other First Nations input, further in my '**Reasons for Decision**'.

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

Other information

- harvest performance

The average volume harvested in the last seven years (2009 to 2016) was approximately 314 000 cubic metres, which is about 25 percent lower than the 2009 AAC. Annual harvest fluctuations reflected in this average were mainly due to variations in BCTS' sales activity.

Since 2009, there has been no harvesting in Clayoquot Sound Land Use Decision area. A more detailed description of this land-use decision is provided under '*Clayoquot Sound Land Use Decision area*'.

Licensees are harvesting close to the species profile of the TSA, with the exception of cedar and hemlock. A comparison of scale data versus forest inventory data for the West side of the TSA (excluding Clayoquot Sound) showed that while cedar comprised 33 percent of the THLB volume, it accounted for 41 percent of the harvested volume between 2009 and 2015. In contrast, hemlock comprised 37 percent of the THLB volume but only 28 percent of the harvested volume. Since there was no helicopter harvesting of stands with less than 20 percent cedar, a sensitivity analysis was run for the west side of the TSA that excluded them. It showed an initial harvest which was 6.6 percent lower in the short term, 1.5 percent lower in the midterm and 1.2 percent lower in the long term. As this reflects actual performance, I recognize a 27 700 cubic metres per year or seven percent overestimate in short term timber supply in my '**Reasons for Decision**'.

I am concerned that the harvested species profile is not aligned with that of the inventory on the land base for cedar and hemlock. Therefore, I have noted an '**Implementation**' task that should be undertaken before the next determination. If the demonstrated species harvest performance profile does not align with that of the inventory on my next determination, I will consider the implementation of a partition.

- unused AAC disposition

The district informs me that approximately 547 801 cubic metres of unused volume has accumulated in the Arrowsmith TSA and that this number may actually be higher as it does not include all volumes from 2016. Although BCTS intends to harvest some unused volume, nothing has been confirmed.

The base case harvest forecast is predicated on the condition of the forest, including the amount of merchantable timber growing stock present as of the date of the timber supply analysis. The standing forest was not depleted to account for potential harvesting of any accumulated unharvested ('undercut') volume in the Arrowsmith TSA. Therefore, any volume harvested (including undercut volume) that is above the AAC in this determination, constitutes use of the growing stock at a greater rate than projected in the base case, if the AAC were fully utilized. This could threaten the stability of future timber supply.

Due to the fragmentation and constraints on the land base, in the Arrowsmith TSA, I conclude there is not much flexibility to achieve the base case mid-term harvest levels if an additional 547 801 cubic metres of growing stock is harvested over the next eight to 10 years. I note that any allocation and utilization of volume above what is provided for within my AAC, puts the timber supply for the TSA at risk.

The continuous underharvest in the Arrowsmith TSA relative to the AAC is cause for caution. I am concerned that the continuation of an AAC that is unlikely to be achieved will lead to further accumulation of undercut volume. It also potentially places additional harvesting pressure on the younger stands in the east side of the TSA. I have included instruction on this under ‘**Implementation**’.

- *partitions*

The previous AAC (2009) of 420 000 cubic metres included two partitions:

1. Red alder-leading stands: 6300 cubic metres from red alder-leading stands with at least 50 percent deciduous by volume; and,
2. Clayoquot Sound: 13 700 cubic metres from the Clayoquot Sound area of the TSA.

District staff reported that the amount of harvest in the red alder-leading partition has decreased in recent years due to an insufficient supply of red alder stock. The main reason for this reduced supply is because of a land base withdrawal in 2016, over the Rosewall Creek area (containing a significant supply of red alder), for a FNWL awarded to K’omoks First Nation. For this reason, I am discontinuing the red alder partition.

Nanwakolas Council suggested a geographic partition is necessary between the east and west portions of the TSA in order to prevent overharvesting of the east area.

District staff informed me that despite yearly fluctuations in annual harvest levels in the east area of the TSA, the overall level has been consistent with what was modelled in the base case forecast of approximately 100 000 cubic metres. With the recent land base withdrawal for the FNWL awarded to K’omoks First Nation, and other smaller land base withdrawals, the contribution from the east side of the TSA (Nanaimo and Cowichan supply blocks) is reduced to approximately 50 000 cubic metres. In support of the recommendation from the Nanwakolas Council, and to underscore the importance of not overharvesting the east area, I will implement a geographic partition. This is noted under “**Reasons for Decision**”.

As discussed under *Coastal Douglas-fir* and under *Gulf Islands*, I recognize there should be some contribution from the Gulf Islands and the CDF on Vancouver Island. If the full AAC is realized and there is no harvest from the CDF or the Gulf Islands, there is the risk for overharvest in the rest of the TSA. At this time I do not want to complicate the administration of this AAC decision by setting partitions for the CDF and the Gulf Islands. Therefore, I am requesting licensees and BCTS to work with the district to monitor the harvest contribution from the CDF and Gulf Islands. I will review this information annually to determine whether I need to institute a partition to limit the harvest on the rest of the TSA.

Within the CSLUD area, some logging is permitted while emphasizing the protection of wildlife, recreation and scenic values. Other areas outside of watershed reserves are also available for harvesting, subject to meeting Clayoquot Sound Scientific Panel (CSSP) recommendations. There has been no harvesting in the CSLUD area since the last determination. For further details, refer to ‘*Clayoquot Sound Land Use Decision area*’.

In order to address district concerns over the lack of harvest in the CSLUD, I am decreasing the contribution from the Clayoquot Sound to 6850 cubic metres. Due to an already constrained THLB, it is important for the licensees and BCTS to demonstrate performance inside the CSLUD. Although I recognize the harvesting challenges of operating here, the partition is necessary to avoid overharvesting in areas of the TSA outside of the CSLUD. This partition is therefore one half the amount the area is capable of contributing to account for the lack of harvest, as discussed under ‘**Reasons for Decision**’.

As noted under ‘**Implementation**’, I expect the district to work with licensees and BCTS to monitor harvest performance in the east and CSLUD areas of the TSA to ensure the partitions are observed.

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 letters

The Minister of Forests and Range (now the Minister of Forests, Range, Natural Resource Operations and Rural Development) has expressed the economic and social objectives of the Crown for the province in a letter to the chief forester, dated July 4, 2006 (attached as Appendix 3).

The letter stresses the importance of a stable timber supply to maintain a competitive and sustainable forest industry while being mindful of other forest values. As well, the minister requested the chief forester to consider the local and social and economic objectives expressed by the public and relevant information received from First Nations.

In respect of this, in the base case projection and in all of the alternative harvest flow projections with which I have been provided for reference in this determination, a primary objective in the harvest flow has been to attain a stable, long-term harvest level where the growing stock becomes stable, neither increasing nor decreasing over time. In my determination, I have been mindful of the need for the allowable harvest in the short term to remain consistent with maintaining the integrity of the timber supply projection throughout the planning horizon. I have also considered with care the adequacy of the provisions made both in current practice, and assumed in the analyses, for maintaining a range of forest values. Therefore, I am satisfied that this determination accords with the objectives of government as expressed by the Minister.

A range of alternative harvest flows were examined with different initial harvest levels and merchantability criteria. They confirmed that meeting the AAC in the short term depends on flexibility to harvest younger stands and that there is sufficient short-term growing stock in the TSA to meet the current AAC for the next decade.

In a letter dated April 12, 2013 (attached as Appendix 4), the Minister expressed the government's social and economic objectives for signatory First Nations of the Nanwakolas Reconciliation Protocol (NRP), and asked the chief forester to consider these objectives, in addition to others expressed in the earlier letter, when making determinations of allowable annual cut within the traditional territories of the Nanwakolas First Nations. I am aware that the asserted traditional territories of the Nawakolas First Nations overlap with the Arrowsmith TSA. I discuss my consideration of the Nanwakolas under '*Nanwakolas First Nations Decision Making*'.

During my consideration of the factors required under Section 8 of the *Forest Act*, I have been mindful of the local objectives and legal orders under the Land Use Objectives Regulation or Government Actions Regulation. I have also reviewed the public and First Nations consultation process undertaken by the district and considered the input in making my determination. I have accounted for this input in the various applicable factors described in the document, and as noted below. On this basis, I am satisfied that this determination accords with the objectives of government expressed by the minister.

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

Abnormal infestations, devastations, and salvage programs

- unsalvaged losses

Unsalvaged loss is the volume lost to periodic natural disturbances in stands caused by extreme weather, fire, or epidemic forest health factors that are not salvaged. Unsalvaged loss is accounted for by averaging the recorded periodic volume losses over the recorded time frame to approximate an average annual volume loss attributable to the THLB. The total volume attributed to unsalvaged losses for the Arrowsmith TSA was 9105 cubic metres per year; this represents a large increase from the previous TSR (2000 cubic metres) due to the use of aerial overview assessment data (2010 to 2014) that assessed areas damaged annually by

root diseases and beetles. In the base case, losses due to fire were inadvertently missed when modelling unsalvaged losses. This resulted in 1067 cubic metres or a 0.3 percent overestimation in the base case which I will account for in my '**Reasons for Decision**'.

Reasons for Decision

In reaching my AAC determination for the Arrowsmith TSA, I have considered all of the factors required under Section 8 of the *Forest Act*, as documented above, and have also reasoned as follows.

I note that the base case harvest forecast presented in the *Arrowsmith TSA Timber Supply Analysis Discussion Paper* (November 2016) showed an initial harvest level of 420 000 cubic metres per year for 10 years before decreasing to a mid-term level of 392 000 cubic metres per year. This harvest level was projected to remain at 392 000 cubic metres per year for the next 130 years before increasing slightly to 399 000 cubic metres for the remainder of the projection period.

The base case forecast modelled two partitions:

1. *Deciduous stands* - 6300 cubic metres per year from deciduous stands; and
2. *Clayoquot Sound* – 13 700 cubic metres per year attributable to stands in Clayoquot Sound.

The analysis also limited the contribution from the Eastern portion of the TSA (Cowichan and Nanaimo timber supply blocks) to 100 000 cubic metres per year.

I am satisfied that the assumptions applied in the base case forecast for the majority of the factors applicable to the Arrowsmith TSA were appropriate, as detailed in Table 1 or elsewhere in this rationale. Following is my consideration of those factors for which I consider it necessary in this determination to further take into account implications to the timber supply projected in the harvest forecasts.

In determining an AAC for the Arrowsmith TSA, I have identified factors that, considered separately, indicate that the timber supply may be either greater or less than projected in the base case. Some of these factors can be readily quantified and their impact on the harvest level assessed with reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be readily quantified at this time. Following is my consideration of those factors for which I consider it necessary in this determination to further take into account implications to the timber supply as projected in the base case forecast.

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

- *Area-based tenures* - The base case mistakenly excluded some proposed area-based tenures that should have been included and *vice versa* included some issued area-based tenures that should have been excluded. This oversight represents about 25 465 cubic metres per year. I therefore recognize a six percent overestimation in the overall base case timber supply.
- *Stand-level biodiversity* – The base case did not account for increased stand level retention levels due to wildlife tree patches. I therefore recognize a 20 000 cubic metre per year or five percent overestimate in the base case timber supply.
- *Land interests, First Nation and other* - Areas transferred to First Nations for incremental treaty agreements and Crown land either sold or no longer under provincial jurisdiction should have been excluded from the THLB. This resulted in a 6364 cubic metres per year or two percent overestimation in the projected timber supply throughout the forecast period.
- *Harvest performance* – For the past seven years, licensees have harvested approximately 25 percent less than the AAC. This is due in part to underperformance in hemlock-leading stands with less than 20 percent cedar on the west side of the TSA. I therefore recognize a 27 700 cubic metres per year or 6.6 percent overestimation in the short-term timber supply.

- *Unsalvaged losses* – The base case did not account for losses due to fire which represents a 1067 cubic metres per year or 0.3 percent overestimation in the projected timber supply throughout the forecast period.
- *Clayoquot Sound Land Use Decision area* – The base case assumed 13 700 cubic metres per year to be contributed from the CSLUD area. Although there is harvestable timber within the CSLUD, no harvesting has occurred since the last determination. In order to address district concerns over this lack of harvest, I am decreasing the contribution from the CSLUD area to half of its potential contribution. This represents a 6850 cubic metres or 1.6 percent overestimation in timber supply.

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

- *Utilization standards* - The need to account for a small difference between operational utilization standards and the utilization specifications used in the timber supply base case forecast for stands between 81 and 120 years of age results in a 0.2 percent (840 cubic metres per year) underestimation on the projected timber supply through the forecast period.
- *Recreation sites* - In the base case, area was mistakenly removed from the THLB to account for recreation sites and trails. As partial harvesting is allowed, these areas should have been kept in the analysis. This represents a 0.2% (900 m³) underestimate in timber supply.
- *Gulf Islands* – Although I recognize the harvesting challenges of operating here, this area is still legally part of the THLB. Therefore, until there is a land use decision made by government, I will account for half of the THLB (208 hectares). This represents a 1248 cubic metres per year or 0.3 percent underestimate in the base case timber supply.
- *Dead potential* - The volume contribution from dead trees that could be used for sawlogs but not included in the base case harvest forecast represents a three percent (12 600 cubic metres per year) underestimation of short-term timber supply.

From reviewing the over- and underestimation in the projected timber supply listed above, the combined result is a 71 858 cubic metres per year or 17 percent net overestimation in the base case timber supply. Decreasing the base case initial harvest level by this amount results in an initial harvest level of 348 000 cubic metres per year.

In support of the recommendation from the Nanwakolas Council, and to underscore the importance of not overharvesting the east area, I will specify a geographic partition:

1. *Eastern Portion of the TSA*: A maximum of 50 000 cubic metres from the Eastern portion of the TSA (Nanaimo and Cowichan timber supply blocks).

I am mindful that there is significant Crown forest land fragmentation in the Arrowsmith TSA as well as increasing pressure to manage these lands for non-timber values which presents a harvesting challenge. Due to an already constrained THLB, it is important for the licensees and BCTS to demonstrate performance inside the CSLUD. Although I recognize the harvesting challenges of operating here, a partition is necessary to avoid overharvesting in areas of the TSA outside of the CSLUD. I will therefore specify a partition that is one half of the amount the area is capable of contributing:

2. *The Clayoquot Sound Land Use Decision area*: A maximum of 6850 cubic metres from the Clayoquot Sound Land Use Decision area.

To ensure the Western portion of the TSA (outside of the Clayoquot Sound Land Use Decision area) is not overharvested, I will specify a third partition:

3. *The Western portion of the TSA*: A maximum of 291 150 cubic metres from the Western portion of the TSA, comprised of the area outside of Clayoquot Sound (Barkley timber supply block).

In making this AAC determination I have considered the joint recommendations provided to me in January 2018 by representatives from the Nanwakolas First Nations and the Province under the Nanwakolas Reconciliation Protocol, as presented under ‘*Nanwakolas First Nation decision making*’. Specifically, I note

that the AAC determination and AAC partitions outlined in my reasons are consistent with recommendations #1 and #2. With respect to recommendation #3, I note that my considerations include the combined effect of the factors influencing the timber supply projected in the base case and that I am taking into account in this determination. Further discussion of this recommendation is addressed under ‘*minimum harvest age*’. I have addressed the remaining recommendations in ‘**Implementation**’.

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 the Arrowsmith TSA by establishing an AAC of 348 000 cubic metres.

This AAC is partitioned as follows:

1. *Eastern Portion of the TSA*: A maximum of 50 000 cubic metres from the Eastern portion of the TSA (Nanaimo and Cowichan timber supply blocks);
2. *The Clayoquot Sound Land Use Decision area*: A maximum of 6850 cubic metres from the Clayoquot Sound Land Use Decision area; and
3. *The Western portion of the TSA*: A maximum of 291 150 cubic metres from the Western portion of the TSA, comprised of the area outside of Clayoquot Sound (Barkley timber supply block).

I have noted that there is significant accumulation of unused volume (‘undercut’) in the Arrowsmith TSA. It is recommended that undercut volume only be harvested if the total rate of timber harvest can be maintained at the level of the AAC that I have determined. If the harvest of undercut volume results in a harvest level greater than the management unit AAC, it may require me to consider a re-determination of the AAC earlier than required. To facilitate such considerations, I therefore ask district staff to track and report annually (to the FAIB director), the level of harvest on the TSA from all tenures including the amount of undercut volume harvested.

This determination becomes effective on February 9, 2018, and will remain in effect until a new AAC is determined, which must take place within ten years of the effective date of this determination.

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

Implementation

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

I recognize that the ability of staff and licensees to undertake projects is dependent on available resources, including funding. However, the following projects are important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Arrowsmith TSA.

1. *Miscellaneous Crown lands, ownership layer* - I expect FAIB and district staff to work together to regularly review, correct and update the F_OWN layer corporately to obtain more accurate ownership information representative of activities occurring on the land base.
2. *Roads, trails and landings* - I expect the district to work with industry to obtain more accurate estimates of roads, trails and landings using LiDAR data when available (already in use operationally for road engineering).
3. *Vegetation resources inventory* - I expect the district to work with FAIB to determine the nature and extent of changes resulting from the new inventory, and quantify the impacts for the next TSR.

4. *Regeneration delay* – I expect the district to increase the alignment between operational versus modelled (TIPSY) regeneration delay.
5. *Young stand monitoring* – I expect district staff to work with FAIB ground sampling staff to follow-up on a ground sampling plan to implement young stand monitoring in the Arrowsmith TSA.
6. *Decay, waste and breakage and cedar volumes* – I expect the district to work with FAIB to ensure that calculated western red cedar volumes are accurate.
7. *Clayoquot Sound Land Use Decision area* - I expect the district to work with licensees and BCTS to monitor and assess harvest performance inside the harvestable portion of the CSLUD area and report back to me annually. If there is a lack of demonstrated performance, I will consider an adjustment to the AAC at the next determination.
8. *Stand-level biodiversity and shading* - I expect the district to more accurately quantify the percent area retained for stand-level biodiversity and the effects of shading for the next determination using research information provided by silviculture treatments for ecosystem management in the Sayward (STEMS) data, and improved RESULTS and FREP information.
9. *Residual waste* – I expect the district to work with licensees to ensure that waste fibre being left onsite is appropriately utilized via the forest carbon strategy if possible.
10. *Riparian management* - I expect buffered lakes and streams to be included in the riparian layer for the next determination.
11. *Gulf Islands* - I expect the district to work with licensees and BCTS to monitor harvest performance on the Gulf Islands. I will evaluate the harvest performance, and if necessary reconsider a further adjustment to the AAC for the next determination.
12. *East area of the TSA*: of no more than 50 000 cubic metres from the east area of the TSA. I expect the district to work with licensees and BCTS to monitor the harvest performance in the east area to ensure this threshold is not exceeded.
13. *Cultural Heritage Resources* – I request that licensees and BCTS continue to work with First Nations to obtain clear quantifiable cultural heritage resource information that can be brought into the timber supply review.
14. *Large Cultural Cedar* – I encourage industry, BCTS and the Nanwakolas Council to continue working on a Large Cultural Cedar Strategy (LCCS) and known inventory of cultural cedar. First Nations have indicated that based on their estimates of large cultural cedar requirements, there is still an adequate supply available but they would like to see a more proactive approach to management of this important cultural resource.
15. *Information sharing with First Nations* – I request that licensees, BCTS and district staff continue improving the processes for information sharing with First Nations, and to monitor the actual outcomes and impacts of forest practices on cultural heritage features and resources and on the associated assumptions used in timber supply modelling.
16. *Harvest performance* - I expect licensees to work with district and FAIB analysis staff to develop measures that will ensure progress is made towards achieving a harvest distribution that better represents the species profile, especially with regards to cedar and hemlock.
17. *Unused AAC disposition* – It is recommended that undercut volume only be harvested if the total rate of timber harvest can be maintained at the level of the AAC that I have determined. District staff are requested to track and report annually (to the FAIB director), the level of harvest on the TSA from all tenures including the amount of undercut volume harvested.

18. *LiDAR* – I expect district and licensees to investigate the acquisition of LiDAR data for roads, which could be applied for other values such as: scenic resources, visual quality objectives, and karst.



Diane Nicholls, RPF
Chief Forester

February 9, 2018

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, c. 157, (current to October 25, 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 October 25, 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 of Forests and Range'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.

Page 1 of 2

Minister of
Forests and Range
and Minister Responsible
for Housing

Office of the
Minister

Mailing Address:
PO Box 9049 Stn Prov Govt
Victoria BC V8W 9E2
Telephone: 250 387-6240
Facsimile: 250 387-1040

Location:
Parliament Buildings
Victoria BC V8V 1X4
e-mail: FDR.Minister@gov.bc.ca

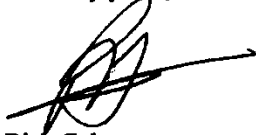
Jim Snetsinger

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 'Rich Coleman', with a long horizontal stroke extending to the right.

Rich Coleman
Minister

Appendix 4: Minister's letter of April 12, 2013



Ref: 196701

April 12, 2013

Dave Peterson
Chief Forester and Assistant Deputy Minister
Ministry of Forests, Lands & Natural Resource Operations
Tenures, Competitiveness and Innovation Division
PO Box 9352 Stn Prov Govt
Victoria, British Columbia
V8W 9M1

Dear Dave Peterson:

The *Forest Act* gives you the responsibility and authority to make allowable annual cut determinations.

Section 8 of the *Forest Act* requires you to consider the government's social and economic objectives, as expressed by the Minister, as well as the other items listed in section 8.

As provided for in Section 1.1 of the Shared Decision Making Process agreed to as part of Schedule B, Appendix 2 (the Forestry Schedule) of the Nanwakolas Reconciliation Protocol, this letter provides government's social and economic objectives for signatory First Nations. In addition to government's social and economic objectives provided in other letters, please consider these objectives when making determinations of Allowable Annual Cut within the traditional territories of Nanwakolas First Nations:

- To share in economic development initiatives within the Traditional Territories of the Nanwakolas First Nations that facilitate, over time, the individual members of the Nanwakolas First Nations obtaining a quality of life that is equal to or better than the national Canadian average;
- To become full partners with the Province (i.e. to the fullest or maximum extent possible) in the forest sector within the Nanwakolas Traditional Territories including, but not limited to, opportunities for shared decision-making, forest tenures and revenue sharing;
- To develop significant involvement with the forest industry operating within their Traditional Territories, through the development of measures that will facilitate new relationships with industry;

Page 1 of 2

Ministry of Forests, Lands and
Natural Resource Operations

Office of the Minister

Mailing Address:
PO BOX 9049 Stn Prov Govt
Victoria, BC V8W 9E2

Tel: 250-387-6240
Fax: 250-387-1040
Website: www.gov.bc.ca/for

- To significantly increase employment opportunities in the forest industry, over time, for N^anwa^kolas First Nations members, within their Traditional Territories; and
- To consider the value of forest resource development in the Traditional Territories of N^anwa^kolas First Nations when developing appropriate strategies for full N^anwa^kolas First Nations participation in the management and operation of the forest resource sector in the Traditional Territories.

Sincerely,

A handwritten signature in black ink that reads "Steve Thomson". The signature is written in a cursive style with a long horizontal flourish at the end.

Steve Thomson
Minister