

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

**Rationale for
Allowable Annual Cut (AAC)
Determinations for
Tree Farm Licence 58,
Tree Farm Licence 60, and
Timber Supply Area 25**

Effective October 27, 2020

**Diane Nicholls, RPF
Chief Forester**

Table of Contents

Acknowledgement	1
Objective of this document	2
Description of the Haida Gwaii Management Area	2
Statutory framework	2
History of the AAC	3
New AAC determinations	3
Role and limitations of the technical information used	3
Guiding principles for AAC determinations	3
The role of the base case	7
Timber supply analysis and the base case forecasts	8
Base case forecasts	8
Consideration of factors as required by Section 8 (8) of the <i>Forest Act</i>	9
Land base contributing to timber harvesting	10
- general comments	10
- area-based tenures	11
- municipal lands	11
- economic operability	12
- geographically isolated areas	12
- roads	13
- existing and future managed stands	13
- genetic gains	13
- minimum harvestable criteria	14
- silviculture systems	14
- residual waste	15
- visual quality management	15
- karst management	15
- Mosquito Lake and Slatechuck Creek watersheds	16
- stand-level retention	16
Haida Gwaii Land Use Objectives Order	17
Cultural objectives	17
Aquatic habitat	19
Biodiversity	20
Wildlife	21
- forest carbon	22
- unused volume (undercut)	22
- socio-economic analysis (SEA)	23
- harvest practices	23
- log export	24
- alternative harvest flows	25
- cedar harvest	25
- Minister’s letter	26
- natural disturbances/non-recoverable losses	27
Consultation with the Haida Nation	28
Consistency with the Haida Gwaii Management Council AAC Determination	29
- consistency with Haida Gwaii Management Council determination	29
Reasons for Decision	29
Determination	31
Implementation	31

Appendix 1:	Section 8 of the <i>Forest Act</i>	33
Appendix 2:	Section 4 of the <i>Ministry of Forests and Range Act</i>	36
Appendix 3:	Minister’s letter of October 30, 2017	37
Appendix 4:	<i>Haida Gwaii Reconciliation Act</i> , Sections 3 and 5	40
Appendix 5:	History of the AAC	41
Appendix 6:	Information sources used in the AAC determination	42

List of Tables

Table 1.	List of factors accepted as modelled in the base case and not discussed further in the rationale	10
Table 2.	Total and timber harvesting land base areas for each management unit	11
Table 3.	Modelled cedar scenarios for Haida Gwaii management units	26
Table A-4.	History of the AAC for Haida Gwaii (excluding woodlot licences)	41

Acknowledgement

For preparation of the information I have considered in this determination, I am indebted to the members of the Haida-British Columbia Timber Supply Review Joint Technical Working Group. I am also grateful to the Haida Gwaii Management Council for its detailed and clear allowable annual cut rationale for the Haida Gwaii Management Area, which provided a clear basis for my considerations for determining the individual unit allowable annual cuts. Finally, I would like to thank all of those who have supported the various aspects of the Timber Supply Review process on Haida Gwaii through providing advice and information to the Joint Technical Working Group and providing feedback on related documents.

Objective of this document

This document provides an accounting of the factors I have considered, and the rationale I have employed in making my determinations, under Section 8 of the *Forest Act*, of the allowable annual cuts (AAC) for Tree Farm Licence (TFL) 58, TFL 60, and Timber Supply Area (TSA) 25 on Haida Gwaii. This document also identifies where new or better information is needed for incorporation in future determinations. My determinations, for the management units on Haida Gwaii, follow from the Haida Gwaii Management Council's (HGMC's) AAC determination for the Haida Gwaii Management Area (HGMA) announced on May 1, 2020.

Description of the Haida Gwaii Management Area

Haida Gwaii is an archipelago of more than 150 islands off the north coast of BC and covers approximately one million hectares. There are two main islands: the larger Graham Island to the north, and the smaller Moresby Island to the South.

The Haida Gwaii landscape is dominated by the Coastal Western Hemlock biogeoclimatic zone and forests are composed of Western redcedar, western hemlock, sitka spruce, with some yellow-cedar and lodgepole pine. The biological diversity on Haida Gwaii is high, with a large number of plant and animal species and sub-species that are only found on the archipelago.

Approximately half of Haida Gwaii is in protected areas (480 000 hectares). After accounting for land base exclusions for surface water, non-forest, roads, Federal lands, Provincial reserves and private lands, approximately 44 percent (440 190 hectares) of the management area is Crown forest land. About 35 percent of the Crown forest land (155 493 hectares, or approximately 15.5 percent of the total management area) is considered timber harvesting land base (THLB).

Within the HGMA, there is one timber supply area (TSA 25), and two TFLs (TFL 58 and TFL 60). Licence holders in TSA 25 include: Taan Forest Limited (Taan), Husby Forest Products, A&A Trading (Haida Gwaii), Dawson Harbour Logging Co. Ltd., and BC Timber Sales. TFL 60 is held by Taan and TFL 58 is held by A&A Trading (Haida Gwaii).

The land use plans covering the HGMA include the 2007 Haida Gwaii Strategic Land Use Agreement (SLUA), which set the framework for ecosystem-based management (EBM) including establishment of 11 new protected area, and for the 2010 Haida Gwaii Land Use Objectives Order (LUOO), which established legal Ecosystem-Based Management (EBM) objectives.

Statutory framework

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

With respect to Haida Gwaii, Section 8(11) of the *Forest Act* specifies that the aggregate of the AACs determined for woodlot licences, community forest agreements, First Nations Woodland Licences, TFLs, and TSAs that overlap with the Haida Gwaii Management Area (HGMA), which is defined in Section 1 (1) of the *Haida Gwaii Reconciliation Act*, must not exceed the AAC determined by the HGMC for the HGMA.

The AAC determinations made by the chief forester for the TSA and TFLs on Haida Gwaii will reflect one minor difference from the determination made by the HGMC. The chief forester will include the contribution from forested portions of municipal areas which were excluded from the HGMC's determination.

History of the AAC

In 2000 the AAC for TSA 25 and the TFLs on Haida Gwaii totalled 1 786 000 cubic metres. During the period 2000 to 2010 this AAC varied slightly as administrative changes were made to the management units. In 2010 the AAC for TSA 25, TFL 58 and TFL 60 on Haida Gwaii totalled 1 772 616 cubic metres. In 2012 the AAC for these management units was reduced by 47 percent to 931 000 cubic metres and there was a partition limiting the total harvest of cedar to 360 000 cubic metres. Appendix 5 shows a more detailed description of the AACs for each of TSA 25, TFL 58, and TFL 60 from 2000 to 2012.

New AAC determinations

Effective October 27, 2020:

- the new AAC for TSA 25 is 398 000 cubic metres, of this amount, I specify under Section 8(5)(a) of the *Forest Act*, the volume of red- and yellow-cedar must not exceed 145 000 cubic metres;
- the new AAC for TFL 58 is 99 000 cubic metres, of this amount, I specify under Section 8(5)(a) of the *Forest Act*, the volume of red- and yellow-cedar must not exceed 10 000 cubic metres;
- the new AAC for TFL 60 is 279 000 cubic metres, of this amount, I specify under Section 8(5)(a) of the *Forest Act*, the volume of red- and yellow-cedar must not exceed 95 000 cubic metres.

These AACs will remain in effect until new AACs are determined, which must take place within 10 years of these determinations.

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 related to forest inventory, growth and yield and management practices. The factors used as inputs to timber supply analysis have differing levels of uncertainty associated with them, due in part to variation in physical, biological and social conditions.

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

In determining these AACs for TFL 58, TFL 60, and TSA 25, I have considered known limitations of the technical information provided. I am satisfied that the information provides a suitable basis for my determinations.

Guiding principles for AAC determinations

Given the large number of periodic AAC determinations required for BC's many forest management units, administrative fairness requires a reasonable degree of consistency of approach in addressing relevant factors associated with AAC determinations. In order to make my approach in these matters explicit, I have considered and adopted the following body of guiding principles, which have been developed over time by BC's chief foresters and deputy

chief foresters. However, in any specific circumstance in a determination where I consider it necessary to deviate from these principles, I will explain my reasoning in detail.

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

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

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

Information uncertainty

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

Two important ways of dealing with this uncertainty are:

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

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

It is not appropriate to speculate on timber supply impacts that may eventually result from land use designations not yet finalized by government. Where specific protected areas, conservancies, or similar areas have been designated by legislation or by order in council, these areas are deducted from the 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 that helps meet resource management objectives such as biodiversity.

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

requirement for regular AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

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

I acknowledge the perspective that alternate strategies for dealing with information uncertainty may be to delay AAC determinations or to generally reduce AACs in the interest of caution. However, given that there will always be uncertainty in information, and due to the significant impacts that AAC determinations can have on communities, I believe that no responsible AAC determination can be made solely on the basis of a precautionary response to uncertainty with respect to a single value.

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

First Nations

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

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

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

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

- (i) the information provided to First Nations to explain the timber supply review process and analysis results;
- (ii) any information brought forward through consultation or engagement processes or generated during collaboration with First Nations with respect to Treaty rights or Aboriginal Interests, including how these rights or Interests may be impacted;

- (iii) any operational plans and/or other information that describe how First Nations' Treaty rights or Aboriginal Interests are addressed through specific actions and forest practices; and,
- (iv) existing relevant agreements and policies between First Nations and the BC Government.

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

Established Aboriginal title lands (meaning declared by a court or defined under an agreement) and other areas, such as Treaty Settlement Lands or Indian Reserves, are not provincial Crown land. Consequently, the timber on these lands does not contribute to the AAC of the TSA or TFL with which they overlap. Prior to establishment of Aboriginal title, it is not appropriate for the chief forester to speculate on how potential establishment of Aboriginal title in an area, either by court declaration or by agreement, could affect timber supply, given uncertainties about the scope, nature and geographic extent of title. Until land has been established as Aboriginal title land, it remains as provincial land managed by the province, and will contribute to timber supply.

Integrated decision making and cumulative effects

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

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

Climate change

One key area of uncertainty relates to climate change. There is substantial scientific agreement that climate is changing and that the changes will affect forest ecosystems. Forest management practices will need to be adapted to the changes and can contribute to climate change mitigation by promoting carbon uptake and storage. Nevertheless, the potential rate, amount, and specific characteristics of climate change in different parts of the province are uncertain. This uncertainty means that it is not possible to confidently predict the specific, quantitative impacts on timber supply.

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

resources, or where monitoring information indicates definite trends in forest growth and other dynamics, I will consider that information in my determinations.

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

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

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply projections provided to me through the work of the Timber Supply Review (TSR) Program for TSAs and TFLs as well as work from members of the Joint Technical Working Group (JTWG) with representatives of the Council of Haida Nation (CHN) staff and the British Columbia provincial government.

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

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

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

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

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

original data package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines or plans.

Thus, in reviewing the considerations that lead to the AAC determination, it is important to remember that the AAC determination itself is not simply a calculation. Even though the timber supply analyses I am provided are integral to those considerations, the AAC determination is a synthesis of judgment and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case. Judgments that in part may be based on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, particularly in cases characterized by a large degree of unquantified uncertainty, once an AAC has been determined, no additional precision or validation would be gained by attempting a computer analysis of the combined considerations.

Timber supply analysis and the base case forecasts

The November 14, 2019 timber supply analysis report for Haida Gwaii, which contains forecasts for TSA 25, TFL 58 and TFL 60, was prepared by the JTWG. The timber supply analysis was performed using the Ministry's spatial timber supply model (STSM) which was developed using the raster-based spatially explicit landscape event simulator (SELES) modelling framework. STSM was used to project harvesting and growth over an analysis horizon of 400 years.

The STSM incorporated an economic operability model and directly modelled natural disturbance. In addition to a new forest cover inventory, there was also new ecosystem mapping available. This allowed management requirements specified in the LUOO to be explicitly modelled and tracked and provided greater confidence in the results.

Base case forecasts

The 'base case' forecast for the Haida Gwaii Management Area is an aggregate of individual forecasts for TSA 25, TFL 58, and TFL 60. Each of these forecasts was designed to represent sustainable timber harvest levels according to current practice and management requirements, including the legal requirements in the LUOO. The data set was prepared to provide a reasonable representation of current forest management practices based on evidence of actual practices, and an extrapolative approach to EBM requirements from the LUOO, using the best available information. In particular, the base case incorporates the most recent standards for field assessments of monumental cedar and other cultural features, the *Cultural Features Identification Standards v5* (CFIv5) approved by the CHN in December 2019. The base cases of the three management units are used as reference points to assess the timber supply on Haida Gwaii, including exploration of the potential impacts of uncertainties through sensitivity analyses.

The forecasts are not predictions, because many unforeseeable events will certainly occur, and practices and knowledge will change and evolve. Given this change and uncertainty, the projections may change in the future. Changes in practices and information will be incorporated into future AAC determinations. However, the forecasts developed to support this AAC determination were designed to provide a rigorous and reasonable basis for these AAC decisions.

The base case for each management unit represents only one in a number of possible forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecasts are not AAC recommendations. Their validity, as with all the other forecasts provided, depends on the validity of the data and assumptions incorporated into the computer analysis used to generate them.

Much of what follows in the considerations outlined below is an examination of the degree to which the assumptions made in generating the base case forecasts are accurate, realistic and current, and of the degree to which resulting predictions of timber supply must be adjusted to more properly reflect the current situation. These adjustments are made on the basis of informed judgment, using currently available information about forest management some of which may have changed since the original data package was assembled. Even though the timber supply analysis was integral to my considerations, the AAC determinations are syntheses of judgment and analysis in which numerous risks and uncertainties are weighed. The AAC determinations I have made reflect the outcomes of these considerations. As a result, the AACs determined may or may not coincide with the base case forecasts. Judgments that in part may be based on uncertain information are often qualitative and general in nature and, as such, are subject to an element of risk.

The base cases for each management unit area as follows:

- For TSA 25, the projected harvest level is initially 452 200 cubic metres per year, which is maintained for the first 90 years of the forecast, and then increases to 503 300 cubic metres per year until year 240. The long-term harvest level is 516 400 cubic metres per year.
- For TFL 60, the projected harvest level is initially 298 300 cubic metres per year, which is maintained for the first 60 years. The harvest then increases to 318 500 cubic metres per year until year 100. The long-term harvest level is 331 200 cubic metres per year.
- For TFL 58, the harvest projection is a flat line at 92 100 cubic metres per year.

These forecasts combine to a base case forecast for the Haida Gwaii Management Area with an initial harvest rate of 842 600 cubic metres per year for the first 60 years, followed by gradual increases to the sustainable long-term harvest level of 939 700 cubic metres per year.

The base cases were used only as a point of reference for the consideration of many factors that affect timber supply and the determination of the AACs. I reviewed all inputs to the base cases, including how the legally required environmental objectives in the LUOO were incorporated into the analysis. I also reviewed in detail the assumptions and methodology incorporated in the base cases, as well as the model output, including species distribution over time; growing stock projections by age class over time; average age, area, and volume harvested annually; and other factors as described in my considerations below. For this determination I am satisfied that the base case harvest forecasts and the sensitivity analyses have provided a suitable basis for my assessment of the timber supply for TSA 25, TFL 58, and TFL 60.

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

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

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

Table 1. *List of factors accepted as modelled in the base case and not discussed further in the rationale*

<i>Forest Act section and description</i>	Factors accepted as modelled and not discussed further in the rationale
8(8)(a)(i) the composition of the forest and its expected rate of growth on the area	<ul style="list-style-type: none"> • Ocean or large water body • Unstable terrain • Stands with low timber growing potential • Non-merchantable forest types • Forest inventory • Volume estimates for existing natural stands • Site productivity estimates
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"> • Regeneration delay and impediments to regeneration • Species composition of regeneration • Stand density
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"> • Decay, waste and breakage • Utilization standards • Operational adjustment factors
8(8)(a)(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production	<ul style="list-style-type: none"> • Cutblock adjacency • Forest planning and practices regulation (FPPR) requirement for fish habitat • Heritage conservation sites • Red- and blue-listed ecological communities
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

Forest Act Section 8 (8)

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

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

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

Land base contributing to timber harvesting

- general comments

During the previous TSR in 2012 there were several questions concerning the validity and accuracy of the forest cover inventory. This prompted the Ministry to conduct a new vegetation resources inventory (VRI) which was completed in 2016. The VRI is based on aerial photographs which were taken during the period 2011 to 2013. The Ministry then used available LiDAR and field samples to improve the accuracy of certain stand characteristics on Haida Gwaii. This procedure is known as LiDAR enhanced forest inventory (LEFI). In this analysis,

the LEFI-based features were used to estimate existing stand volumes using the Ministry's variable density yield projection (VDYP) model.

After the data package was published in November 2019, feedback from the public led to revisions in estimating the THLB. These revisions, completed in January 2020, resulted in a 5.2 percent increase in the THLB. Table 2 below lists the total areas and the revised timber harvesting land bases for the TSA and the two TFLs on Haida Gwaii. The effect of the increased THLB on timber supply will be discussed under '*alternative harvest flows*'. The current timber harvesting land base (approximately 15.5% of the total area of Haida Gwaii) is the area that is currently suitable and available for commercial forest harvesting operations.

Table 2. Total and timber harvesting land base areas for each management unit

	Total area (hectares)	Current timber harvesting land base (hectares)
TSA 25	339 063	91 091
TFL 58	23 845	12 403
TFL 60	134 526	51 999

A member of the public questioned why there was such a big difference in the amount of area removed as non-forest in the 2019 TSR as compared to the 2012 TSR. The difference is mainly because non-forest was grouped with non-productive forest in 2012. After accounting for this difference in grouping, the non-forest reductions in both TSRs are quite similar.

- area-based tenures

The *Forest Act* authorizes the chief forester to set AACs for TSAs and TFLs. AACs for woodlots, First Nations woodland licences and community forests are set by other statutory decision makers and the forest in these tenures are excluded from my decision. Since 1996, the Province has been working with the Misty Island Economic Development Society to create a community forest but no agreement has been signed to date. The Province has also been working with the Council of Haida Nation and Taan to establish a First Nations woodland licence that is yet to be finalized. In accordance with my '*Guiding principles for AAC determinations*', I will not make any adjustments for the possible creation of these tenures. If these tenures are created before my next AAC determination, the AAC Administration Regulation allow for the AACs of TSAs and TFLs to be adjusted to reflect the AAC awarded to the new tenures.

In the base case the private land portions of woodlot licences were excluded from the THLB but the public portions (Schedule B) were included. Since the AAC I determine excludes woodlot licences I will remove their volume contribution from the base case. The Schedule B lands of the woodlot licences are all in TSA 25 and it is estimated that they contributed approximately 6000 cubic metres per year to the base case. I account for the contribution from woodlot licences in my determinations as discussed in '**Reasons for Decision**'.

- municipal lands

The Kunst'aa Guu-Kunst'aayah Reconciliation Protocol excludes municipalities from the HGMC's AAC determination. Therefore, all municipal land was excluded from the THLB in this analysis. However, municipal land is Crown forest land and as such is included the chief forester's AAC determination. Three communities have formal municipal boundaries: Queen Charlotte, Port Clements and Masset. They each have official community plans which include mapped restrictions to industrial forestry operations in specific zones. The total area within municipal boundaries is 6319 hectares. The area designated for forestry is approximately 3156 hectares, of which, approximately 1055 hectares are THLB. The contribution from

municipal forest lands is expected to be from approximately 1600 to 3500 cubic metres per year to the harvest from TSA 25.

I am aware that harvesting in municipal areas is controversial and that there has not been any harvesting during the past 10 years. Until Government decides to exclude municipal lands from the TSA they are legally harvestable and contributes to the AAC I determine. Recognizing the difficulties in harvesting these areas, I have accounted for an increase to the harvest from TSA 25 of 1600 cubic metres per year under '**Reasons for Decision**'.

- economic operability

As noted above, the THLB has to be both available (legal) and suitable (commercially viable) for harvesting operations to occur. The timber supply model developed for Haida Gwaii incorporated dynamic road costs and relative stand values to approximate operational limitations related to economics. Relative stand values were derived from harvested stands in Haida Gwaii and from log market prices. The base case assumed average log market prices and sensitivity analyses were conducted using high and low market prices. Under low market prices, fewer stands were economically available and timber supply decreased by 3.4 percent. At high market prices, very few additional stands were harvestable since most of the high-cost areas were already excluded for other reasons. The base case assumption of average market prices is reasonable and I will not make any adjustments for economic operability.

About four percent of the THLB is considered high-cost access because of steep slopes and isolated timber. A sensitivity analysis indicated that excluding these areas will result in a negligible downward pressure on timber supply in TSA 25. Although these areas were included in the THLB, and no adjustment was made to the base case, I encourage continued monitoring so that they may be excluded in future TSRs if there is no activity.

- geographically isolated areas

Certain areas on Haida Gwaii are more difficult to operate because of remoteness, rugged terrain, young stands, and infrastructure investment needs. These areas are Sewell Inlet (Moresby south), Peel Inlet (Moresby north) and Louise Island in TFL 60. In the base case it was assumed that both Sewell Inlet and Peel Inlet would each require at least 333 000 cubic metres per 10-year period for operations to be economical. For Louise Island it was assumed that 250 000 cubic metres would be required over a 10-year period for economical activities. If these minimum volume requirements are removed, timber supply would increase by 3.1 percent.

Since 2015 there has been consistent forest development on Louise Island. There has also been some development in the more accessible areas of Peel Inlet. However, there has not been any harvesting in Sewell Inlet since 2007. There was public concern that Peel Inlet and Sewell Inlet operating areas are contributing to timber supply when they haven't been harvested in over 15 years. Another comment stated that isolated operating areas such as Sewell Inlet should contribute to timber supply as the development of these areas is good for the economy (e.g., more jobs). There was also a comment that a hard partition is required to address remote areas; that regulated harvest levels must be based on demonstrated performance across the landscape.

The Sewell Inlet operating area can produce a sustained yield of 68 385 cubic metres per year or 15 percent of the harvest from TSA 25, however this operating area has not seen harvesting operations since 2007. In their rationale, the HGMC considered recommending the chief forester institute a partition limiting the contribution from areas outside Sewell Inlet but ultimately recommended that I carefully consider whether a partition is warranted to reflect the contribution from the Sewell Inlet operating area.

I have considered the matter and decided not to set a partition at this time. However, I urge licensees to make every effort to re-establish operations in Sewell Inlet. Failing to show continued access to this area may result in it being removed from the THLB at my next AAC determination. Under '**Implementation**', I ask district staff to monitor harvest activities in this area should it warrant a partition with my next determination.

- roads

Roads represent a loss of productive forest area and do not contribute to timber supply. Existing roads totalling 7488 kilometres or 9100 hectares were removed from the THLB in Haida Gwaii. To estimate the area which will be occupied by future roads, 725 cutblocks harvested during the past 10 years were analyzed. It was estimated that roads accounted for 6.4 percent of cutblock area. The base case assumed that 6.4 percent of the area harvested in the future will become unproductive due to roads. Licensees commented that many roads become re-forested and therefore the reduction for future roads should be less than 6.4 percent. Staff observed that branch roads typically regenerate alder which is a minor commercial species. A sensitivity analysis which assumed no area lost to future roads showed a minor increase in long-term timber supply for TFL 58 but no changes to TFL 60 and TSA 25. Given this finding, I will not make any adjustments to the base case.

- existing and future managed stands

Stands are considered managed if they were established after 1987 when legislative changes required licensees to undertake basic silviculture. The Table Interpolation Program for Stand Yield (TIPSY) version 4.4 was used to project managed stand volumes for Haida Gwaii. Model inputs for TIPSY (species composition, age, site productivity and density) for existing managed stands were obtained from the Ministry's Reporting Silviculture Updates and Land Status Tracking System (RESULTS).

The Ministry instituted a Young Stand Monitoring (YSM) program to monitor the condition and development of stands between 15 and 50 years old. Forty-three YSM plots were established on Haida Gwaii in 2016. Volume projections from TIPSY were compared to volume measured in the YSM plots. There was no statistically significant difference between measured and modelled volumes and therefore no adjustments were made to the TIPSY volumes.

District staff informed me of plans to conduct ground sampling of young stands in accordance with the Stand Development Monitoring (SDM) procedures. I have instructed staff to ensure that ground data collected is suitable for both the YSM and the SDM programs. Under '**Implementation**', I ask staff to increase the number of YSM plots and re-measure existing plots to better track the growth of managed stands.

- genetic gains

Forest regulation requires licensees to use the best available seed when regenerating harvested areas. Genetic worth is an indication of the quality of genetically improved seed; represented as a percent volume increase expected near harvest age. The Ministry's Forest Genetics Program develops genetically improved seed (select seed) through selective breeding of seed collected from superior natural (wild) trees.

The weighted average use of select seed over the past 15 years on Haida Gwaii amounts to 71 percent of all seed with an average genetic worth of 1.8 percent. After accounting for the proportion of select seed used the average genetic worth of planted trees is about 1.3 percent. The silviculture records indicate that only about one half of the regenerated cutblocks were planted. Given the low average genetic worth and the uncertainty regarding areas planted it was decided not to include genetic gain in the TIPSY yield curves for managed stands. A sensitivity

analysis showed that there could be long-term increase in growing stock of about one percent if genetic gain was modelled in this analysis. Given this minor potential effect, I will not make any adjustments to the base case.

- minimum harvestable criteria

The timber supply model has rules that prevent the harvest of stands that are too young or do not have sufficient merchantable volume. These are known as minimum harvestable criteria. For the base case the minimum harvestable age (MHA) was set at the age when stands have attained at least 95 percent of their culmination mean annual increment (CMAI). CMAI is the age at which the average annual growth reaches its maximum. CMAI is also referred to as the optimal biological age that maximizes the long-term volume production of a stand. Due to the many other constraints modelled, setting the MHA to CMAI leads to most stands being harvested after CMAI.

The minimum harvestable volume (MHV) was set at 250 cubic metres per hectare. All natural and managed stands not projected to achieve at least 250 cubic metres per hectare before 400 years of age were excluded from the THLB. Stands that met both the age and volume criteria were eligible for harvesting.

A sensitivity analysis was conducted to test the effect of applying an economic rotation age (age where a minimum log diameter of 30 centimetres was attained). This reduced timber supply by 3.5 percent. Extending rotation ages to the greater of 150 years or CMAI, to achieve a certain grade distribution, reduced timber supply by 79 percent. Increasing the MHV to 350 cubic metres per hectare (for managed stands) reduced timber supply by one percent.

Records indicate that the age and volume criteria used in the base case are reasonable and I will not make any adjustments.

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

- silviculture systems

Clearcut with reserves is the silviculture system used on Haida Gwaii. The average cutblock size is 15 hectares. Harvesting of adjacent blocks is not allowed until trees on the cutblock are at least 1.3 metres in height and 10 percent of those trees being three metres in height.

There has been a small amount of partial harvesting on Haida Gwaii. These blocks, primarily in the TSA (Rennell Sound and Eden Lake landscape units), were harvested in the early to mid-2000s. There has been approximately 25 hectares of partial harvesting during period 2008 to 2017.

Although public comments were expressed, describing clearcutting as destructive with the desire for such harvesting practices to be stopped, I note that the FPPR allows for a maximum clearcut size of 40 hectares on the Coast and that the average size on Haida Gwaii is 15 hectares.

A review of RESULTS records confirms that more than 95 percent of the area currently under silviculture management was harvested under a clearcut harvest system and I accept the way it was modelled in the base case.

Section 8 (8) (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

- residual waste

According to the *Provincial Logging Residue and Waste Measurement Procedures Manual*, avoidable waste is all fibre that meets timber merchantability specifications that is not considered “unavoidable” due to safety or environmental concerns. Avoidable waste in excess of the waste benchmarks (unavoidable waste) is charged to the AAC and billed for stumpage.

During the period 2008 to 2017, avoidable logging waste on Haida Gwaii averaged about 96 000 cubic metres per year or about 13% of the volume harvested in the TSA and TFLs. This level of waste is lower than the average for the West Coast Region likely due to the relatively high quality of the mature to old hemlock and Sitka Spruce fibre on the islands and the long-established salvage operations on Haida Gwaii.

I note that the level of residual waste is lower than the average for the West Coast Region, but I would like to see even less waste. I urge District staff to work with licensees to find ways to reduce waste. I note that several bioenergy related projects have been proposed or are in the planning stages and under ‘**Implementation**’ I encourage these efforts.

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

- visual quality management

A Visual Landscape Inventory (VLI) was completed on Haida Gwaii in the early 2000’s, that mapped important views from communities, travel corridors and public recreation sites. Visual Quality Objectives (VQO) identified in the VLI were legally established in 2005 by a Government Actions Regulation (GAR) Order. VQO classes within views range from retention (52 297 hectares, 0-1.5 percent alteration) and partial retention (148 532 hectares, 1.6-7 percent alteration), to modification (53 244 hectares, 7.1-18 percent alteration).

A new VLI for Haida Gwaii is expected to be completed later in 2020. I look forward to the VLI being completed and licensees implementing the prescribed practices. I am satisfied that the base case appropriately accounted for the current requirements for visual quality management.

- karst management

Karst landscapes are shaped by water dissolving soluble carbonate bedrock such as limestone. This geological process, occurring over many thousands of years, results in unusual surface and subsurface features ranging from sinkholes, vertical shafts, disappearing streams and springs, to complex underground drainage systems and caves. Karst is a resource feature often related to paleontological or archaeological resources, given the high potential habitation qualities of karst caves.

Most of the karst on Haida Gwaii occurs on the Sadler geological formation with about one-third of the formation located in the Gwaii Haanas National Park Reserve and Haida Heritage Site. In 2006, the District established a GAR Order under the *Forest and Range Practices Act* (FRPA) that identifies surface or subsurface elements of a karst system as a resource feature. Section 70 of the GAR requires that persons carrying out a primary forest activity must ensure that the activity does not damage or render ineffective a resource feature.

Schedule 2 of the LUOO lists karst as a Class 2 Haida Traditional Heritage Feature. Karst is protected under Section 5(4) of the LUOO when associated with high potential habitation sites, utilized on a temporary or permanent basis for shelter or other significant cultural or ceremonial activity.

Up to 50 percent of the Sadler formation is estimated to be karst. Although karst occurs in other formations, the location and extent, are uncertain. Therefore, to fully account for karst in this analysis, 100% of the Sadler formation was excluded from the THLB. This amounted to 7179 hectares (gross area) and 2574 hectares (net after accounting for overlaps with other features).

Taan Forest Products was concerned that 100 percent removal of the Sadler formation overestimates karst features. I agree that there is uncertainty regarding the area removed from the THLB to account for karst and under ‘**Implementation**’ I urge the District to obtain better information on the occurrence of karst. Given the uncertainty and likely very small impacts to timber supply, I will not make any adjustments to the base case.

- Mosquito Lake and Slatechuck Creek watersheds

The Mosquito Lake watershed, located in the TSA on northern Moresby Island, contributes to the base case timber supply. A 2015 Haida House of Assembly resolution designated the Mosquito Lake watershed as an area of importance to be placed under the protection of the Council of Haida Nation (CHN). A sensitivity analysis showed that removal of this watershed would reduce timber supply by 19 800 cubic metres or 2.3 percent.

Slatechuck or Tllgadu is a watershed and mountain west of the Village of Queen Charlotte. Its creek, Tllgadu Gandlaay, empties into Skidegate inlet near the ancient village of Tllgadaaw Llnagaay. The high-quality argillite deposits in the watershed are quarried by the Haida Nation and are used for carving. The quarry is located within an 18-hectare Federal reserve. Recent proposals to log within the watershed were opposed by the CHN. A sensitivity analysis showed that removal of this watershed would reduce timber supply by 5450 cubic metres or 0.6 percent.

In their AAC decision the HGMC did not remove these areas from contributing to timber supply. Recognizing the uncertainty regarding the status of these areas, they recommended that both governments make a land-use decision for Mosquito Lake and Slatechuck so that they can be appropriately addressed in the next timber supply review. I concur with this recommendation and make no further adjustments to the base case.

- stand-level retention

Section 66 of the FPPR requires that areas with wildlife trees must be retained to provide wildlife habitat and assist in the conservation of stand-level biodiversity. The regulation stipulates that an average of seven percent of cutblock areas must be retained as Wildlife Tree Retention Areas (WTRAs). Data on WTRAs for the period 2012 to 2016 were collated from all licensee submissions to understand current practice. The extent of overlap between WTRAs and other retention required under the LUOO was assessed. Retention for the LUOO already exceeds the WTRA requirements for old forest but falls short of the seven percent FPPR minimum for younger forests. In the base case there was no reduction for WTRAs in old forest, but there was a seven percent reduction (42 289 hectares) in younger forest.

Input from A&A Trading suggested that stand-level retention in TFL 58 should be 2.6 percent rather than seven percent in young forests due to overlaps with adjacent retention. The company provided an analysis indicating this is a reasonable reflection of their practices and meets the FPPR requirements. A sensitivity analysis reducing stand-level retention in younger forests to

2.6 percent increased timber supply on TFL 58 by 7412 cubic metres per year or eight percent. I will account for this increase in timber supply for TFL 58 under ‘**Reasons for Decision**’.

Haida Gwaii Land Use Objectives Order

The LUOO established legal objectives for several forest-based values to support the implementation of ecosystem-based management (EBM). These objectives protect important Haida cultural values, support ecosystem integrity, and provide environmental benefits by maintaining the diversity and abundance of organisms on Haida Gwaii.

Cultural objectives

Cedar stewardship areas (CSA) are identified and reserved to provide a supply of cedar for present and future cultural use. Although the LUOO allows for the commercial harvest of up to 10 percent of these areas, licensees have not harvested in cedar stewardship areas and the base case removed 25 303 hectares of cedar stewardship areas from the THLB. Although there is no policy or requirement under the LUOO, the CHN have occasionally requested a one tree length buffer around cedar stewardship areas to protect their integrity. Buffering all identified CSAs would reduce the THLB by a further 1240 hectares or one percent. In their AAC rationale the HGMC recommended that forest practices should be monitored adjacent to CSAs so that these practices can be appropriately modelled in the next TSR. I agree with this recommendation and under ‘**Implementation**’ ask District staff to monitor practices adjacent to CSAs.

Haida traditional heritage features such as those listed in Schedule 2 of the LUOO are buffered and removed from the THLB. A 500-metre buffer is applied around Class 1 features (e.g., village, camp, burial site), and a 100-metre buffer is applied around Class 2 features (e.g., midden, bear trap, fish weir, cave, petroglyph, trail). In the base case 27 946 hectares were removed to account for Haida traditional heritage features, known culturally modified trees, and archeological sites, and I accept that they were appropriately modelled in the base case.

Haida traditional forest features consist of 11 types of Class 1 features and 10 types of Class 2 features as listed in Schedule 2 of the LUOO. Class 1 features require a one tree length reserve zone around them as well as a one tree length management zone around the reserve zone. For Class 2 features the LUOO specifies that the integrity of 50 percent of them be protected through stand-level retention within development areas. Known Haida traditional forest features totalling 281 hectares, identified during operational planning, were buffered and removed from the THLB. The presence of unidentified features was projected based on the frequency and distribution of known features. This resulted in 2.6 percent of additional forest area being removed from the THLB. I accept that Haida traditional forest features were adequately modelled in the base case.

Western redcedar and yellow-cedar retention is achieved by: (i) within development areas greater than 10 hectares, retaining at least 15 percent of the pre-harvest composition of western redcedar and yellow-cedar if cedar comprised more than 30 percent of the pre-harvest volume; and, (ii) within development areas less than 10 hectares, retaining at least 15 percent of the pre-harvest composition of western redcedar and yellow-cedar if cedar comprised more than 60 percent of the pre-harvest volume. Data submitted between 2012 to 2016 indicate that about 51 percent of development areas are retained to meet LUOO and other legal requirements. Since most of these retained areas are sites with higher productivity (e.g., riparian areas, monumental cedar reserves), the targets for cedar retention were met within areas retained for other purposes and no further reductions were made in the base case for cedar retention. I accept that retention for red- and yellow-cedar was appropriately modelled in the base case.

Western yew retention is achieved by protecting all western yew patches. Similarly, the LUOO specifies that individual yew trees are protected at the stand level where practicable. Known yew patches amounting to 212 hectares, identified during operational planning, were removed from the THLB. The presence of unidentified patches was projected based on the frequency and distribution of known patches. This resulted in an additional 2.3 percent of old forest (>250 years) being removed from the THLB, and I therefore accept that requirements for Western yew were adequately modelled in the base case.

Culturally modified trees (CMT) as defined in the LUOO are trees that have been modified prior to 1920 by Haida people as part of their cultural use. These trees must be protected to support the Haida Nation's present and future cultural use. Also to be protected are cultural cedar stands containing three or more CMTs, monumental cedar, or a combination thereof, where each tree is within 50 metres of another tree. The LUOO specifies that a reserve zone with a minimum width of one-half of a tree length and a management zone of one tree length must be maintained around cultural cedar stands and CMTs. The area removed for known CMTs was grouped with that removed for Haida traditional heritage features and reported above. The presence of unidentified CMTs was projected based on the frequency and distribution of known CMTs. This resulted in an additional 3.6 percent of forest removed from the THLB. I accept that the base case appropriately accounted for CMTs.

Monumental cedar is western redcedar or yellow-cedar trees greater than 100 centimetres in diameter at breast height (dbh) and have a log length of seven metres or longer above the flare with at least one face suitable for cultural use. Objective 9(3) of the LUOO protects all monumental cedar greater than 120 centimetres dbh in support of the Haida's present and future cultural use. Objective 9(5) also protects monumental cedars not located within a cultural cedar stand and that are smaller than 120 centimetres dbh but allows some harvesting under conditions specified under 9(5)(a) and 9(5)(b). Similar to CMTs, the LUOO specifies that a reserve zone with a minimum width of one-half of a tree length and a management zone of one tree length must be maintained around monumental cedar. Data submitted between 2012 to 2016 showed that 763 monumental cedar trees (70 percent of those identified) were protected and 322 trees (30 percent of those identified) were harvested. In the base case, 442 hectares were removed to account for known protected monumental cedar.

Using the new *Cultural Features Identification Standards Version 5* (CFI v.5) a procedure was developed to estimate the number of monumental cedar trees expected on the land base. Assuming an average volume per tree of 11.5 cubic metres and monumental cedar comprising five percent of cedar volume, it was estimated that there are 151,000 monumental cedar trees in forests older than 250 years in TSA 25, TFL 58 and TFL 60. If 30 percent of these trees are harvested, then it is expected that 106,000 will be protected. The base case removed a further 77 754 hectares from the THLB to account for the protection of these monumental cedar trees.

Several comments were received regarding monumental cedar. Concern was expressed that nearly half of the remaining old growth on TFL 58 would be required as buffers to protect monumental cedar. Another comment suggested that more consultation should have occurred in the development of the new standards, and that further consultation is needed prior to implementation. Concern was expressed that uncertainty regarding the new standard could lead to job losses. There was a comment about uncertainties in the implementation of the new standard, and that a socio-economic impact assessment was not done. Someone suggested that the impact of the new standard should have been assessed in a sensitivity analysis rather than be incorporated in the base case. Another concern expressed was that the timber supply analysis used the new standard prior to field implementation, and that the analysis may have underestimated ramifications of the new standard and its economic effects.

There was also support for the new standards, noting that continued harvesting of 30 percent of monumental cedar is felt to be unsustainable.

District scale data from January 2003 to March 2010 indicated that monumental cedar comprise five percent of cedar volume. Additional scale data for the period 2010 to 2019 provided by Taan after the analysis was published indicated that monumental cedar comprised seven percent of cedar volume.

A sample of 5251 data points of the location of monumental cedar was compared to the current forest inventory. It was observed that 18.5 percent of these points were within stands that were not considered 'old growth', e.g., less than 250 years old. In coastal old-growth forests, stands contain trees of various ages. It is quite common to have older, veteran trees interspersed in younger stands. A timber supply scenario (the preferred scenario of the HGMC) which assumes monumental cedar comprise seven percent of cedar volume and that 18 percent of monumental cedar trees can be found in stands younger than 250 years old will be discussed later under '*alternative harvest flows*'.

In their consideration of this factor the HGMC concluded that there may be a range of downward impacts to timber supply from the implementation of the new CFIV5 standards. The HGMC recommended that: (i) a population study of monumental cedars be developed, based on statistical principles and Haida knowledge, so that better information can be available for future AAC determination processes; (ii) operational practices that implement the new CFIV5 be monitored to assess impacts to timber supply; and, (iii) a transparent and replicable risk-managed permit application process be developed in anticipation of an increased need to alter reserve and/or management zones to accommodate timber harvesting access. I concur with these recommendations and urge District staff to implement them.

Aquatic habitat

All forests within Type I and Type II fish habitat are protected under Sections 10 and 11 of the LUOO. Type I fish habitat are low gradient (< 5 percent) fish streams along with adjacent lakes, wetlands and marine interface zones. Type II fish habitat are higher gradient (> 5 percent) fish streams along with adjacent lakes and wetlands. The LUOO requires a reserve zone of two tree lengths around Type I fish habitat and a reserve zone of one tree length around Type II habitat. There is also a management zone of one-half tree length next to the reserve zone of Type II habitat. Although the LUOO allows for the reduction or alteration of these zones under certain conditions, these provisions have not been used and the base case fully excluded the reserve and management zones from the THLB.

The HGMC recommended that annual submissions of Types I and II fish habitat data be used to: (i) build a Haida Gwaii-wide inventory of fish habitat that can assist future operational and strategic planning; and, (ii) support the next timber supply review. I concur with those recommendations.

Active fluvial units include active floodplains and fluvial fans. The LUOO stipulates a 1.5 tree length management zone around active fluvial units and allows harvesting of up to 10 percent of the zone. All forests within active fluvial units and 90 percent of the forests within the management zone, representing a total area of 36 353 hectares, were removed from the THLB. A variety of data sources were used to delineate active fluvial units including LiDAR, watershed assessments, terrain classification mapping, and riparian fish-forestry floodplain mapping. The JTWG noted that LiDAR mapping was the most accurate method for delineating active fluvial units. However, there are significant gaps in the LiDAR coverage of Haida Gwaii. The HGMC recommended that the Council of Haida Nation (CHN) staff and Province of BC, along with

industry partners, work to fill the LiDAR gaps. I fully endorse this recommendation and include an instruction to this effect under ‘**Implementation**’.

Upland stream areas are those portions of watershed sub-units that are outside of reserve and management zones for Types I and II fish habitat and are identified in Schedule 6 of the LUOO. A minimum of 70 percent of the forest in upland stream areas must be hydrologically recovered before any harvesting can occur. I am satisfied that these requirements were appropriately modelled in the base case.

Sensitive watersheds are identified in Schedule 7 of the LUOO. For sensitive watersheds greater than or equal to 500 hectares, up to five percent of the watershed area may be harvested in a five-year period. For sensitive watersheds less than 500 hectares, up to 10 percent of the watershed area may be harvested in a 10-year period. No harvesting may occur in sensitive watersheds with an equivalent clearcut area greater than or equal to 20 percent. I am satisfied that these requirements were appropriately modelled in the base case.

Biodiversity

Forested swamps are forested mineral wetlands or forested peatlands that are represented by the western redcedar-Sitka spruce/skunk cabbage ecological community. All forested swamps greater than 0.25 hectares are protected. The area adjacent to forested swamps is managed by maintaining a management zone with an average width of 1.5 tree lengths. Within the management zone, at least 70 percent of the forest must be maintained as mature or old forest. In the base case, 15 331 hectares were removed to account for forested swamps and I agree that these were appropriately modelled.

Ecological representation is achieved by retaining an amount of old forest for each common site series and each rare site series in a landscape unit greater than or equal to the targets listed in Schedule 10 of the LUOO. In the base case, 26 930 hectares were removed from the THLB to meet old forest requirements. After the base case was established three corrections/changes were made: (i) the JTWG corrected an error in the Skidegate Lake landscape unit where areas outside the THLB should have contributed to the retention targets but did not; (ii) an adjustment was made so that all three ecosystem classification deciles, rather than just the first decile, contributed to the targets; and, (iii) the model was adjusted so that old forest in the THLB are given higher priority for retention than younger forests in the non-THLB. The combination of these three changes resulted in a decrease in the THLB of 1369 hectares or 0.8 percent. This decrease in THLB is recognized under ‘*alternative harvest flows*’.

The HGMC recommended that forest licensees and both governments finalize the spatial identification of recruitment polygons for old forest in the Skidegate landscape unit. I agree with this recommendation and, because of climate change and the dynamic nature of forests, would like to see a plan whereby new areas of old forest are recruited and existing old areas are available for harvest so that the target amount of old forest is always available.

Forest reserves are forested areas reserved from harvesting to assist in meeting objectives for ecological representation and objectives for marbled murrelet nesting habitat. These reserves are identified in Schedule 8 of the LUOO. A forest reserve may be reduced by up to five percent for activities such as road construction or wind throw mitigation provided the remaining reserve is greater than five hectares. In the base case, 95 percent of each reserve was removed from the THLB and I conclude this was appropriate.

Red- and blue-listed ecological communities greater than 0.25 hectares are listed in Schedule 13 of the LUOO and are protected. The LUOO allows for up to five percent of a red-listed community and for up to 30 percent of a blue-listed community to be harvested if required for road access or to address a safety concern. It also allows for up to 30 percent of a blue-listed

community to be harvested for other purposes provided an inter-governmental process is completed. To date, no harvesting has occurred in any red- or blue-listed community. These areas were fully excluded from the THLB, and I accept that they were appropriately modelled in the base case.

Wildlife

All black bear dens are protected under the LUOO. There is a 20-metre reserve zone and one-tree length management zone around each den. In the base case all 26 known black bear dens and their associated reserve and management zones were removed from the THLB. This amounted to 62 hectares or 0.1 percent of the THLB. An exclusion factor of 0.1 percent of the THLB was also applied to undeveloped areas to account for possible unknown dens. I accept that the base case has adequately accounted for black bear dens.

Marbled murrelet nesting habitat is protected under Sections 19 and 23 of the LUOO. Section 19 states that an amount of marbled murrelet habitat greater than or equal to amount listed in schedule 9 must be maintained, and that the habitat must conform to the areas shown in schedule 11 (marbled murrelet nesting habitat map) or must be identified as Class 1 or 2 habitat by a qualified professional. As discussed earlier under Forest reserves, Section 23 of the LUOO establishes forest reserves for ecosystem representation and for marbled murrelet nesting habitat. In addition, there are two wildlife habitat areas (WHA), established before the LUOO was enacted, which protect marbled murrelet habitat. A total of 380 hectares were removed from the THLB to account for these WHAs. An analysis was conducted which showed that essentially all of the schedule 9 targets were met from areas outside the THLB and no further reductions were required. I agree with this conclusion and make no further adjustments to the base case.

Northern goshawk nesting habitat is protected by two WHAs and by Section 20 of the LUOO. A total of 4905 hectares were excluded from the THLB to meet the requirements of the WHAs. Section 20 requires that all known goshawk nesting sites be protected by establishing a 200-hectare reserve around each nest. There is also a restricted activity zone with a minimum radius of 800 metres from the nest which must be maintained to protect the nest from disturbance during breeding season. In the base case, 23 reserves (3286 hectares) were removed from the THLB to account for goshawk nesting habitat.

The 2018 provincial *Implementation Plan for the Recovery of Northern Goshawk in BC* targets 25 nesting territories for Haida Gwaii, while the federal Recovery Strategy targets 38 nesting territories. Based on the amount of suitable habitat on Haida Gwaii, it is estimated that there could be 67 nesting territories. Sensitivity analyses showed that: (i) if there were 25 nests timber supply would be reduced by 3450 cubic metres or 0.4 percent; (ii) if there were 38 nests timber supply would be reduced by 10 787 cubic metres or 1.3 percent; and, (iii) if there were 67 nests timber supply would be reduced by 15 437 cubic metres or 1.8 percent.

The base case did not remove any areas or constrain harvesting to account for goshawk foraging habitat. The 2018 provincial *Implementation Plan for the Recovery of Northern Goshawk, laingi Subspecies (Accipiter gentilis laingi) in British Columbia* acknowledges the importance of foraging habitat to continued nest occupancy but does not provide any direction, citing the need for more research. The federal Recovery Strategy suggests that 65.5 percent of each home range be maintained as suitable foraging habitat. Sensitivity analyses which included the management for 65.5 percent foraging habitat showed that: (i) with 23 nests in the base case, timber supply would be reduced by 0.5 percent; (ii) if there were 25 nests timber supply would be reduced by 1.2 percent; (iii) if there were 38 nests timber supply would be reduced by 4.83 percent; and, (iv) if there were 67 nests timber supply would be reduced by 18.2 percent. The HGMC acknowledges that measures are underway by both the Council of Haida Nation (CHN) staff and the BC government to develop strategies for the management of goshawk foraging habitat.

The JTWG noted that since 1995 an average of one new breeding northern goshawk pair is identified each year. Based on this finding, the HGMC supported the assumption that 10 new nesting areas are likely to be identified over the next 10 years and that these will need to be protected under the LUOO. Accounting for these possible new nesting areas represents a decrease of about 0.85 percent in the base case timber supply. I will account for the possibility of additional goshawk nests under ‘*alternative harvest flows*’.

Great blue heron nest sites are protected under the LUOO by maintaining a reserve of a minimum of 45 hectares with a minimum of 350 metres from the nest to the edge of the reserve. Adjacent to the reserve there is a zone of restricted activity of 150 metres during the breeding season. Two great blue heron nests were found on Haida Gwaii. The base case did not account for the removal of these 90 hectares from harvesting. Given the very small impact to timber supply, I will not make any adjustments to the base case for great blue heron nest sites.

Northern Saw-whet owl nesting habitat is protected by creating a reserve around the nest. All known nests and associated reserves totalling 730 hectares were removed from the THLB. The LUOO specifies that when a new nest is found a reserve of at least 10 hectares must be maintained around the nest. I agree with the accounting for Northern Saw-whet owl nesting habitat and I will not make any adjustments to the base case.

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

- forest carbon

The carbon stocks in a forest ecosystem are described by different carbon pools. The five terrestrial carbon pools defined by Intergovernmental Panel on Climate Change (IPCC) are aboveground biomass carbon (ABC), belowground biomass carbon (BBC), dead organic matter (DOM), forest floor litter (FFL), and soil organic carbon (SOC). The sum of the five pools is known as the total ecosystem carbon (TEC).

It is estimated that there are currently 110 million metric tonnes of carbon (Mt C) in the THLB. This store of carbon is projected to decline over the next 100 years by 5-9 percent (about 5-9 million Mt C). This decline is primarily due to logging and expected younger average stand ages (and hence lower volumes) in future second-growth stands than in current old-growth stands. It is estimated that there are currently 164 million Mt C in the non-THLB. This store of carbon is projected to increase over the next 100 years by about 11 percent (about 20 million Mt C). This increase is likely largely due to growth in previously logged stands that are now removed from the THLB due to the LUOO. Together, there is a projected net increase for forest carbon in the TSA and TFLs by about 11 to 15 million Mt C (4-5 percent). It is estimated that in the areas outside of the TSA and TFLs (Gwaii Haanas park and other protected areas on Haida Gwaii) there are about 236 million Mt C.

I am aware that the CHN and the Province have an atmospheric benefit sharing agreement in support of a forest carbon offset project. The offset project accounts for the various legal conservation measures adopted on Haida Gwaii, and the consequent carbon sequestration benefits that can help mitigate climate change. Neither governments have forest management objectives for forest carbon, and none were modelled in the base case, however I am encouraged by these efforts to sequester carbon and help mitigate climate change.

- unused volume (undercut)

Coast regional tenures staff indicate that unharvested volume for the 2014 to 2018 cut control period was 175 388 cubic metres for TFL 58 and 762 820 cubic metres for TFL 60. Unused

BCTS volume (within the TSA) for the period 2014 to 2019 was 319 440 cubic metres. The base case harvest forecast is predicated on the condition of the forest, (species, growing stock), at the time the data was assembled for this analysis. The standing forest was not depleted to account for the potential harvesting of any accumulated unharvested (i.e., undercut) volume. Therefore, any volume harvested, including undercut volume, above the forecast harvest level would deplete the growing stock at a greater rate than projected in the base case. The Forest Tenures Branch 2018 policy on the disposition of unused volume requires staff to inform me at AAC determination meetings of any plans to dispose of unused volume. I was informed of plans to dispose of 70 000 cubic metres and under '**Reasons for Decision**' I will account for this in my determination.

- socio-economic analysis (SEA)

The population on Haida Gwaii in 2016 (most recently data available) was 4,198, a decrease of nearly 13 percent from 2006. The resident labour force was 2,290 workers in 2016, a 19 percent decline from the 2006 total of 2,830 workers. The public sector and tourism are the major employers on Haida Gwaii. These are followed by forestry which employed 290 resident workers.

Across the province of BC, it is estimated that the current AAC for Haida Gwaii supports almost 1,600 jobs per year. This includes 908 direct employees, and 675 indirect plus induced employees. Approximately 40 percent of these jobs are forest management and logging-related, with 60 percent related to manufacturing.

The actual volume of timber harvested varies significantly from year to year with the seven-year average from 2013 to 2019 being 686 623 cubic metres. A very small amount of this volume (0.6 percent during the 2015-2017 period) is processed on Haida Gwaii. Exports account for 35 percent and the rest is processed at mills on the Lower Mainland. There is currently one small, multi-species mill operated by Haida Gwaii Forest Products (formerly Abfam Enterprises Ltd.) located in Port Clements. In 2015 the Old Massett Village Council became a joint venture partner in this operation. The mill has been inactive since 2017. There are about 10 micro mills which operate sporadically and employ from one to six persons. The customers are primarily local businesses (such as fishing lodges), organizations (such as community halls) and residents (new homes and renovations). Most forest licensees have fairly large custom cutting programs where they rent capacity/services at Lower Mainland sawmills to process mainly cedar logs harvested on Haida Gwaii.

The HGMC commissioned Crane Management Consultants Ltd. to prepare a socio-economic analysis to: a) assemble and present recent historical information and data on the Haida Gwaii forest sector; and, b) analyze the effects of certain key timber supply related matters on Haida Gwaii's current and future social and economic conditions.

Using this information, a socio-economic analysis was also completed by Economics Services Branch of the Ministry. This analysis considered harvest volume, stumpage value, and direct impacts to gross revenue, gross domestic product (GDP), household income, employment and government revenue. The analysis compared the current AAC, base case and other scenarios of interest.

The SEA indicated that all harvest scenarios will likely result in an economic loss, except for the scenario without the constraints imposed by the new monumental cedar policy.

- harvest practices

The total average volume scaled, for the TSA and two TFLs, on Haida Gwaii between 2013 and 2019 was 686 623 cubic metres (73 percent of the AAC). The TSA 25 averaged 462 516 cubic

metres (90 percent of its AAC), whereas TFL 58 averaged only 45 786 cubic metres (57 percent of its AAC), and TFL 60 averaged 184 862 cubic metres (54 percent of its AAC). As discussed previously under ‘*unused volume*’, there are plans to use about 70 000 cubic metres of this unharvested volume.

During the period 2013 to 2019, cedar harvest averaged 283 141 cubic metres (41 percent of the total harvest). In TSA 25, cedar harvest averaged 226 530 cubic metres per year. In TFL 58, cedar harvest averaged 3186 cubic metres per year and in TFL 60, cedar harvest averaged 53 880 cubic metres per year.

In the 2012 AAC determination, the deputy chief forester set expectations limiting the overall harvest of cedar to 360 000 cubic metres per year. The TSA was limited to 195 000 cubic metres, TFL 58 was limited to 32 000 cubic metres and TFL 60 was limited to 133 000 cubic metres. These expectations were later formalized in a Minister’s Order in 2017. Although the overall harvest of cedar was not exceeded, the TSA significantly exceeded its partition limit while the harvest levels for the TFLs were significantly below their partition limits for cedar.

As I will discuss further under ‘**Reasons for Decision**’, I have set partition limits to allow licensees to harvest the less desirable species (hemlock, spruce) while not over-harvesting the more desirable cedar, so that sustainability into the future of a balanced profile is maintained. Under ‘**Implementation**’ I request District staff to closely monitor harvest performance in the partitions and report violations to me so that I may take necessary corrective action.

- log export

At the domestic Vancouver log market, the prices offered for hemlock and spruce are less than the cost of harvesting and delivering logs from Haida Gwaii. The prices offered by foreign log buyers are significantly higher than the Vancouver log market. As discussed previously under ‘*socio-economic analysis*’ cedar was identified as “carrying” the commercial operability of logging on Haida Gwaii when export markets for whitewoods are weak or limited. If cedar harvest is reduced, the operability on Haida Gwaii of hemlock and spruce would be strongly dependent on continuing access to and price strength in export markets, as domestic prices for hemlock and spruce logs have not been (and are not foreseen to be) at levels that can support Haida Gwaii harvesting and transport costs. I will refer to the importance of cedar to harvesting operations on Haida Gwaii later under ‘*cedar harvest*’.

The Haida Gwaii Timber Exemption Order (2015) allowed for the export of up to 35 percent of the previous year’s total harvest, provided the species exported were not cedar or cypress. A new Exemption Order was issued in July 2019. It allows for the export of up to 40 percent of the volume of whitewood species (i.e., species other than cedar and cypress) harvested during the past 18 months. I met with the licensees on September 8, 2020, where they expressed concerns that the new order has effectively: reduced the volume of wood eligible for export, reduced the economic viability of stands containing whitewood, and limited the total volume of wood which can be harvested. The information provided by the licensees showed that the net economic margin of timber delivered to domestic markets has been significantly lower than that of export markets, therefore a reduction in export opportunities may challenge the licensee’s ability to harvest whitewood intensive areas over the term of the AAC. In order to track and monitor the economic impacts of the changes in export policy on the timber supply in Haida Gwaii, I encourage the licensees to work with district staff to monitor whitewood harvest performance and document export volume amounts.

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

- alternative harvest flows

The first alternative harvest flow described here incorporates the increased THLB previously discussed under ‘*Land base contributing to timber harvesting, general comments*’; the decreased THLB described under ‘*ecological representation*’; and the preferred scenario described under ‘*monumental cedar*’. It also incorporates additions to the THLB which result from a change to the modelling method for monumental cedar that allowed removals to contribute to stand-level retention targets. As a result of the combined effect of these changes, timber supply decreases to 803 504 cubic metres per year, which is 4.9 percent lower than the base case.

The second alternative harvest flow includes the changes described above, and as described under ‘*Wildlife, Northern goshawk nesting habitat*’, assumes that the number of goshawk nests increases from 23 to 33. Under this alternative, timber supply decreases to 779 304 cubic metres per year. The harvest level by management unit is: 409 163 cubic metres for TSA 25, 91 406 cubic metres for TFL 58 and 278 735 cubic metres for TFL 60.

- cedar harvest

In their *Rationale for AAC Determination for Haida Gwaii (2020)*, the HGMC stated that the long-term sustainability of cedar was a principal reason for initiating this timber supply review. Cedar provides the most value and is considered the economic mainstay of the forest industry on Haida Gwaii. In the base case, which included a preference for higher value stands, an average of 277 000 cubic metres per year of cedar was harvested for the first 10 years. The cedar harvest then declined to 122 000 cubic metres per year by year 40, before increasing to 176 000 cubic metres per year, 80 years from now. After year 50, most of the cedar harvested in the base case was from managed stands.

During the period 2013 to 2019, cedar harvest averaged 283 141 cubic metres or 41 percent of the total harvest. In TSA 25 cedar harvest averaged 226 530 cubic metres per year. In TFL 58 cedar harvest averaged 2731 cubic metres per year and in TFL 60 cedar harvest averaged 53 880 cubic metres per year. Given the economic importance of cedar and the desire for sustainability, several sensitivity analyses were conducted exploring different levels of cedar harvest. Table 3 below describes the some of the cedar scenarios that were explored.

Table 3. *Modelled cedar scenarios for Haida Gwaii management units*

Cedar scenario description	Total cedar harvest (m ³ /year)	TSA 25 (m ³ /year)	TFL 58 (m ³ /year)	TFL 60 (m ³ /year)
2019 Base Case	277,198	158,038	9,956	109,201
2019 Base Case Intermediate Step	247,692	143,098	9,837	94,757
2019 Base Case Long Run Average Yield	158,101	91,557	9,479	57,065
Preferred Scenario with Goshawk	182,023	95,865	8,886	77,272
Preferred Scenario with Goshawk Intermediate Step	183,176	96,358	8,199	78,619
Preferred Scenario with Goshawk Long Run Average Yield	134,912	75,577	9,076	50,259

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

- Minister's letter

The Minister of Forests, Lands, Natural Resource Operations and Rural Development has expressed the economic and social objectives of the Crown for the province, in a letter dated October 30, 2017. In it, he emphasizes the BC Government's commitment to building a strong, sustainable innovative economy and creating well-paid jobs in the province. The letter identifies Government's three objectives for the management of BC's forests and Crown lands that are relevant to AAC determinations. These are:

1. modernizing land use planning to effectively and sustainably manage BC's ecosystems, rivers, lakes, watersheds, forests and old growth forests;
2. expanding investments in reforestation; and,
3. developing strategies for the management of wildlife resources and habitat (in collaboration with relevant Natural Resource Ministries, indigenous partners, and industry).

The October 30, 2017 letter also asks that I ensure the Ministry's approved strategies for delivering its forestry objectives are integrated into the Timber Supply Review (TSR) process.

With respect to First Nations, the letter suggests I ensure AAC determinations take into consideration relevant agreements between First Nations and the Government of BC, and court decisions that define Aboriginal title and rights. In addition, it reinforces Government's commitment to move forward on reviewing policies, programs, and legislation to determine how to bring the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) into action with respect to AAC determinations. It asks that I consider traditional knowledge and other input from BC First Nation communities and organizations as they pertain to the AAC determination.

The Minister asked for consideration as to how AAC determinations can support Government's objective to focus on planning and sustainable resource management in a way that support robust forest recovery and timely and effective responses to emerging threats from factors such as insect infestations and wildfire while promoting forest health and values.

As well, the Minister asks that I ensure the TSR process incorporates the best available information on climate change and the cumulative effects of multiple activities on the land base and explores management options that align with established climate change strategies, adaptation and mitigation practices. Where the cumulative effects of timber harvesting and other land-based activities indicate a risk to natural resource values, the Minister asks that I ensure the TSR identifies those risks for consideration in land-use planning.

Finally, the minister suggested the chief forester should consider the environmental, social and economic needs of local communities as expressed by the public during TSR processes, including strategies that contribute to community economic stability, and the jobs that the forest sector creates in communities, where these are consistent with the government's broader objectives. When faced with necessary reductions in AACs, that those reductions be no larger than necessary to avoid significant longer-term impacts.

With respect to the Minister's letter, I note that the base case and alternative harvest projections, prepared for this determination, have the primary objective of maintaining a sustainable harvest and a stable, long-term growing stock.

During my consideration of the factors required under Section 8 of the *Forest Act*, I have considered both the local objectives, as provided in the Haida Gwaii Land Use Objectives Order, as well as the objectives of forest licensees. I have considered the socio-economic objectives expressed in the 2017 letter in this determination for the TSA and TFLs on Haida Gwaii, and I have reviewed input received from the public. On this basis, I am satisfied that this determination accords with the objectives of Government as expressed by the Minister.

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

- natural disturbances/non-recoverable losses

Non-recoverable losses (NRL) represent the average timber volume killed by disturbances but not salvaged. Historically this volume estimate was modelled like a timber harvesting event and subtracted from the total timber supply forecast.

Major shortcomings of this approach are that the volume loss: is based on the harvest ordering rules (e.g., oldest first); obeys forest cover requirements; occurs only on the THLB; and occurs as an average, which doesn't account for extreme events or variability. In addition, since disturbance is treated as a harvest, disturbed areas are regenerated as managed stands.

To address these shortcomings, a new approach was used in the Haida Gwaii timber supply review. In this analysis, natural disturbance was represented explicitly within the timber supply model, with the NRLs being an outcome of the analysis. The new approach employed the concept of "natural analysis units" (natural AUs) to group stands that share a similar natural disturbance regime (i.e., the combination of disturbance agents that may affect a stand).

In this timber supply review, the provincial forest health aerial overview survey was used to define which disturbance agents had the greatest impact on timber supply, their core parameters and natural analysis units. Five disturbance agents were explicitly modelled: wind throw, mass wasting (landslide), western black-headed budworm, and yellow-cedar decline. The timber supply model treated natural disturbance as a random event within each natural AU within each time period (decade in this analysis). Affected volumes did not contribute to harvest targets because salvage is not planned.

The NRL that resulted for Haida Gwaii in the base case was 41 601 cubic metres per year. For TSA 25, 23 466; TFL 58, 3422; and for TFL 60, 14 722. By comparison, in the 2012 TSR, the NRL that was deducted for Haida Gwaii was 44 913 cubic metres per year. For TSA 25, 28 744; TFL 58, 3144; and for TFL 60, 13 025.

I commend staff for developing this approach for estimating NRLs and I will not make any adjustments to the base case for this factor.

Consultation with the Haida Nation

The Crown has a duty to consult with, and accommodate if required, those First Nations for whom it has knowledge of the potential existence of Aboriginal Interests that may be impacted by a proposed decision, including strategic-level decisions such as AAC determinations. Recent court decisions have stated that decision-makers must use credible information to consider the effects of land management decision, including AAC determinations, on Aboriginal Interests. As chief forester, I must therefore consider information arising from the engagement process with First Nations, respecting Aboriginal Interests as well as treaty rights that may be affected by my AAC determination. As well, I will consider other relevant information available to government regarding Aboriginal title, rights and Interests, including information gathered during other consultation processes. For this timber supply review, the Haida Nation is the only First Nation with Aboriginal Interests on Haida Gwaii.

The provincial government is committed to working collaboratively and respectfully with Indigenous leaders to establish a clear, cross-government vision of reconciliation to guide the implementation of the principles of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). As of the time of this AAC determination, there were no changes to legislation or policy modifying the statutory authority of the chief forester regarding AAC determinations. However, in agreement with the recently released Bill 41, *Declaration on the Rights of Indigenous Peoples Act*, the provincial government is committed to the preparation and implementation of an action plan, in consultation and cooperation with Indigenous peoples, that aligns the proposed *Declaration* with current legislation. This includes annual progress reporting on goals achieved in the action plan. When the Province provides clear direction through legislation, policy, and/or communications on social and economic objectives relative to UNDRIP, the chief forester will incorporate those changes in subsequent AAC decisions.

I recognize that the entire Haida Gwaii Timber Supply Review process (initiated in 2014) included representatives of the Council of Haida Nation (CHN) staff and the Province of BC working together through the Joint Technical Working Group (JTWG) to prepare the timber supply analysis for the HGMC's AAC determination and my determinations. I also note that the HGMC's determination which was arrived at through a consensus decision (under the *Kunst'aa guu – Kunst'aayah* Reconciliation Protocol), reflected both the SLUA (2007) and the LUOO (2010 with amendments in 2014 and 2017) which were also based on substantial collaborative work between the Council of Haida Nation (CHN) staff and the Province of BC.

Concurrent with the HGMC's AAC release, I had a meeting with the HGMC and members from the JTWG. During this meeting, the HGMC presented their decision in detail, including a list of their recommendations and Interests for my consideration in my determinations. In my determinations, the HGMC recommendations were reviewed for each factor by individual management unit. I believe that the explanation of my considerations of the HGMC's recommendations, the joint technical process, the role of the HGMC in a consensus-based AAC determination meet the Crown's duty to consult with the Haida Nation.

Consistency with the Haida Gwaii Management Council AAC Determination

8(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.

- consistency with Haida Gwaii Management Council determination

Section 8(11) of the *Forest Act* requires that the aggregate of the AACs for all of the various management units on Haida Gwaii, the TSA, TFLs, WLs and any future tenures, that apply to the Haida Gwaii Management Area must not exceed the total AAC determined by the HGMC. In their April 2020 AAC determination, the HGMC specified that the total AAC for TSA 25, TFL 58 and TFL 60 is 804 000 cubic metres. The AAC for Woodlot Licences (private and Crown land portions) are excluded from the 804 000 cubic metres.

The Haida Gwaii Management Area, to which the HGMC AAC determination applies under the *Haida Gwaii Reconciliation Act*, excludes municipal areas, while my determinations under the *Forest Act* include the contributions from such areas. The contributions of municipal areas to the base case harvest forecasts are an average of 1600 cubic metres per year for TSA 25 therefore I consider the limit of my AAC decision for TSA 25, TFL 58 and TFL 60 to be 805 600 cubic metres.

Reasons for Decision

In reaching my AAC determinations for TSA 25, TFL 58 and TFL 60, I have considered all of the factors required under Section 8 of the *Forest Act* and have also reasoned as follows.

I note that the base case harvest forecast showed an initial harvest level of 842 600 cubic metres per year for the first 60 years, followed by gradual increases to the sustainable long-term harvest level of 939 700 cubic metres per year.

In my considerations for the management units in Haida Gwaii, I am satisfied that the assumptions applied in the base case forecast for the majority of the factors were appropriate, as detailed in Table 1 or as described elsewhere in this rationale. However, I have identified factors which indicate that the timber supply may be either greater or less than projected in the base case. As described under '*Land base contributing to timber harvesting, general comments*', there was a 5.2 percent increase in the THLB based on revisions made following feedback from the public. Revisions were also made to the way land was removed for '*ecological representation*' which resulted in a 0.8 percent decrease in the THLB. Under '*monumental cedar*', it was noted that the base case incorporated CFIV.5 but it assumed that these trees were only found in stands older than 250 years. Subsequent data showed that monumental cedar trees were found in younger stands, and in a wider log grade distribution. In addition, a change was made to the order in which forest was removed for monumental cedar so that the forest contributed to requirements for stand-level biodiversity. There was also evidence that there could be more '*goshawk nesting habitat*' sites than modelled in the base case. These changes were all incorporated in the second-harvest forecast described under '*alternative harvest flows*' which showed an even-flow harvest of 779 304 cubic metres per year.

As discussed under '*area-based tenures*', the base case included the Crown land portions of woodlot licences. Since these tenures are not included in my decision, I will remove 6000 cubic metres per year to account for the contribution of woodlots to the base case. I will also add 1600 cubic metres to account for the contribution from municipal lands which were excluded from the base case.

Input from A&A Trading suggested that stand-level retention in TFL 58 should have been 2.6 percent rather than seven percent in young forests due to overlaps with adjacent retention. This resulted in an underestimate in timber supply of 7412 cubic metres per year attributable to TFL 58.

As discussed under '*unused volume*', I will allow for the disposition of 70 000 cubic metres of unused volume at 7000 cubic metres per year for the first decade. This volume is attributable to the AAC of the TSA.

Accounting for all adjustments to the second alternative harvest flow of 779 304 cubic metres per year, I determine a new total AAC for Haida Gwaii of 776 000 cubic metres. This AAC is distributed as follows:

- 398 000 cubic metres for TSA 25;
- 99 000 cubic metres for TFL 58; and,
- 279 000 cubic metres for TFL 60.

During the period 2013 to 2019, cedar harvest averaged 283 141 cubic metres per year. In TSA 25, cedar harvest averaged 226 530 cubic metres per year. In TFL 58 cedar harvest averaged 2731 cubic metres per year and in TFL 60 cedar harvest averaged 53 880 cubic metres per year.

The HGMC stated that the long-term sustainability of cedar was the principal reason for initiating this timber supply review. In their AAC decision, the HGMC recommended a maximum cedar harvest of 183 000 cubic metres per year. The Haida Gwaii LUOO contains provisions designed to ensure a sustainable supply of cedar. Cedar stewardship areas are intended to provide cedar for present and future cultural use. The LUOO protects all monumental cedar greater than 100 centimetres diameter at breast height. There is also a reserve zone around each monumental cedar. New and updated standards for field assessments of monumental cedar and other cultural features (CFIv.5) were introduced in December 2019. Although modelling was undertaken to quantify the timber supply impacts of CFIv.5, there is significant uncertainty in the results obtained. There is also uncertainty regarding the operational implementation of the new standards. The HGMC concluded that there may be a range of downward impacts to timber supply from the implementation of CFIv5 and made recommendations for monitoring and data collection to be used to inform future timber supply reviews.

Cedar is essential for the commercial viability of harvesting operations in Haida Gwaii. The socio-economic analysis conducted by Crane Management Consultants stated, "In a weak or limited whitewoods export log situation, cedar largely carries the commercial operability of logging in TSA 25 and TFL 60. A substantive decrease in prices or availability of cedar for harvesting would deeply challenge the financial viability of timber harvesting on Haida Gwaii due to the relatively high cost of harvesting on and transport from Haida Gwaii."

I understand the cultural importance of cedar to the Haida Nation, the need for a sustainable supply of cedar for cultural purposes and commercial operations, and the importance of cedar to the financial viability of commercial operations on Haida Gwaii. I am aware of the provisions in the LUOO for the protection of cedar and that 85 percent of the land base in Haida Gwaii is not available for harvesting. I see the need for the cedar harvest to be lowered from current level of approximately 283 000 cubic metres. I am also aware of the uncertainty in modelling and implementation of CFIv.5 and recognize the request by the HGMC to limit the cedar harvest to

183 000 cubic metres. Given these considerations, I will limit the harvest of red- and yellow-cedar from TSA 25, TFL 58 and TFL 60 to a total of 250 000 cubic metres per year.

Using the information on cedar harvests in Table 3 for the ‘2019 Base Case Intermediate Step’ scenario, I will distribute the cedar volume of 250 000 cubic metres as follows:

- 145 000 for TSA 25;
- 10 000 for TFL 58; and,
- 95 000 for TFL 60.

As mentioned previously, under ‘**Implementation**’ I request district staff to monitor and report on cedar harvest by management unit every six months, and I am prepared to reconsider the amount and distribution of this cedar partition at any time before the next AAC determination. I also fully support the HGMC’s recommendations that: (i) a population study of monumental cedars be developed, based on statistical principles and Haida knowledge, so that better information can be available for future AAC determination processes; (ii) operational practices that implement the new CFIV5 be monitored to assess impacts to timber supply.

Determination

I have considered and reviewed the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next 10 years and that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in Haida Gwaii by establishing an AAC of 776 000 cubic metres. Of this AAC, the volume of red- and yellow-cedar must not exceed 250 000 cubic metres.

Effective October 27, 2020:

- the new AAC for TSA 25 is 398 000 cubic metres, of this amount, I specify under Section 8(5)(a) of the *Forest Act*, the volume of red- and yellow-cedar must not exceed 145 000 cubic metres;
- the new AAC for TFL 58 is 99 000 cubic metres, of this amount, I specify under Section 8(5)(a) of the *Forest Act*, the volume of red- and yellow-cedar must not exceed 10 000 cubic metres;
- the new AAC for TFL 60 is 279 000 cubic metres, of this amount, I specify under Section 8(5)(a) of the *Forest Act*, the volume of red- and yellow-cedar must not exceed 95 000 cubic metres.

These AACs will remain in effect until new AACs are determined, which must take place within 10 years of these determinations.

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

Implementation

In the period following these determinations and leading to subsequent determinations, I encourage MFLNRORD staff, licensees, and members of the Council of Haida Nation (CHN) staff to undertake work noted below. I recognize that the ability to undertake this work depends on the availability of resources, including people, time and funding. This work is, however, important to help reduce uncertainties and associated risks associated with projecting timber

supply. I recognize that the HGMC outlined a comprehensive list of information and monitoring needs in its rationale. I have highlighted here what I view to be the most critical needs.

1. *Geographically isolated areas* – I expect District staff to work with licensees to monitor harvest activities in the Sewell Inlet should it warrant a partition with my next determination.
2. *Managed stand yields* – I expect Forest Analysis and Inventory Branch to conduct young stand monitoring to improve estimates for managed (post-harvest) stands.
3. *Residual waste* – I expect District staff to work with licensees to find ways to reduce waste. I note that several bioenergy related projects have been proposed or are in the planning stages and I encourage these efforts.
4. *Karst* – I expect the District to work with licensees and local experts on a landscape-level karst inventory to manage where harvesting occurs and ensure Karst features are appropriately managed.
5. *Cultural objectives, cedar stewardship areas* – I expect the District to monitor forest practices adjacent to cedar stewardship areas so these practices can be appropriately addressed in the next TSR.
6. *Monumental cedar* - I also fully support the HGMC's recommendations that:
(i) a population study of monumental cedars be developed, based on statistical principles and Haida knowledge, so that better information can be available for future AAC determination processes; (ii) operational practices that implement the new CFIV5 be monitored to assess impacts to timber supply.
7. *Aquatic habitat, active fluvial units* - I expect Haida Nation, provincial government staff, and licensees to work together to fill the gaps in LiDAR mapping used in delineating active fluvial units. I also expect an annual submission of fish habitat information to be incorporated into a comprehensive inventory of fish habitat for Haida Gwaii, to be incorporated into the next TSR.
8. *Harvest practices* – I expect District staff to closely monitor harvest performance in the partitions and report to the Director of Forest Analysis and Inventory Branch every six months.



Diane Nicholls, RPF
Chief Forester

October 27, 2020



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 7, 2020), reads as follows:

Allowable annual cut

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

(a) the Crown land in each timber supply area, excluding the Crown land in the following areas:

- (i) tree farm licence areas;
- (ii) community forest agreement areas;
- (iii) first nations woodland licence areas;
- (iv) 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 respect of an allowable annual cut determined under subsection (1), the chief forester may, at any time, specify that portions of the allowable annual cut are attributable to one or more of the following:

(a) different types of timber or terrain in different parts of Crown land within a timber supply area or tree farm licence area;

(a.1) different areas of Crown land within a timber supply area or tree farm licence area;

(b) different types of timber or terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

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

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

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

(a) each community forest agreement area in accordance with the community forest agreement for that area, and

(b) each first nations woodland licence area in accordance with the first nations woodland licence for that area.

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

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

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

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

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

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

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

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

(c) [Repealed 2003-31-2.]

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

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

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

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

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

(b) each tree farm licence area

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

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

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

Section 4 of the *Ministry of Forests and Range Act* (current to October 7, 2020) reads as follows:

Purposes and functions of Ministry

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

Appendix 3: Minister's letter of October 30, 2017



Reference: 230810

October 30, 2017

Diane Nicholls, Chief Forester and Assistant Deputy Minister
Ministry of Forests, Lands, Natural Resource Operations
and Rural Development
Victoria, British Columbia
V8W 2H1

Dear Diane

The British Columbia *Forest Act* conveys the responsibility to determine an Allowable Annual Cut (AAC) to the Chief Forester of the Province of BC for each timber supply area and tree farm licence in the province. It also specifies considerations that must be brought to bear during the course of such determinations including, among others, the economic and social objectives of the government.

This letter is intended to provide you with guidance regarding the objectives of the British Columbia (BC) government that require your consideration when determining an AAC.

Your office implements a rigorous Timber Supply Review Process to help ensure that each AAC you determine responds to a broad array of objectives and aligns with land use and management decisions established by provincial statutes and regulations. The objectives identified below are to be considered and as part of the review process to ensure that AAC determinations, and the timber harvest rates they enable, continue to support government goals.

This letter replaces two letters previously issued by the Minister of Forests and Range to the chief forester, dated July 4, 2006 and October 27, 2010. It is intended to be used in concert with direction provided by the Minister of Forests, Lands and Natural Resource Operations to the chief forester in a letter dated April 12, 2013, concerning objectives outlined in the Shared Decision Making Process pursuant to the Nanwakolas Reconciliation Protocol.

The BC government has committed to building a strong, sustainable, innovative economy and creating well paid jobs in the province. The health of the forest sector, and its ability to respond to an array of short and long term social, economic and environmental interests, is a key to delivering on this commitment. As such, Government has identified specific objectives for the management of BC's forests and Crown lands. Those relevant to AAC determinations include:

Page 1 of 3

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

Office of the Minister

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

Telephone: (250) 387-6240
Fax: (250) 387-1040
Website: www.gov.bc.ca/for

Diane Nicholls, Chief Forester and Assistant Deputy Minister

- modernizing land-use planning to effectively and sustainably manage BC's ecosystems, rivers, lakes, watersheds, forests and old growth forests
- expanding investments in reforestation; and
- collaborating to develop strategies to manage wildlife resources and habitat

Strategies for delivering on these objectives will be developed in collaboration with the Ministry of Forests, Lands, Natural Resource Operations and Rural Development, relevant Natural Resource Ministries, indigenous partners and industry. Once approved by government, I ask that you ensure such strategies are integrated into the Timber Supply Review Process to support AAC determinations.

The BC government has committed to full and lasting reconciliation with Indigenous peoples. As chief forester, your responsibility includes continuing to ensure that AAC determinations take into consideration relevant agreements between First Nations and the Government of BC, court decisions that define Aboriginal title and rights as well as moving forward on reviewing policies, programs, and legislation to determine how to bring the principles of the United Nations Declaration on the Rights of Indigenous Peoples into action for AAC determinations. You also have a responsibility to continue to carefully consider traditional knowledge and other input from BC First Nation communities and organizations in the course of AAC determinations as they pertain to the AAC determination.

The *Forest Act* requires that the chief forester consider a range of forest health issues as part of AAC determinations, including the impacts of circumstances such as infestations, devastations and salvage programs. This is particularly relevant as BC's forest sector emerges from a period of significant, compounding challenges. The infestation of the Mountain Pine Beetle that peaked in the late 2000s has largely subsided but with continuing effects to the size and composition of the forest inventory. Currently, the north area is experiencing Spruce Beetle infestations which also pose impacts. Recently, the Province has experienced record levels of wildfires that have impacted timber supply, community stability and multiple forest values.

In response to these challenges, it is a government objective to focus on planning and sustainable resource management in a way that supports robust forest recovery and timely and effective responses to emerging threats. Please consider how your AAC determinations can support these objectives while promoting forest health and values. In some cases AAC determinations may encourage management practices that avert another infestation in the province's forests. In certain regions, they will need to reflect the reality of a lower timber supply. Some regions will require expanded investment in reforestation and/or an increased focus on timber utilization and recovery. In the wake of extensive natural disasters, the extent of damage in certain areas may also warrant re-determining AACs earlier than scheduled.

In order to ensure that AAC determinations align with government objectives to modernize land-use planning and sustainably manage B.C.'s ecosystems, rivers, lakes, watersheds, forests and old growth forests, the Timber Supply Review process should incorporate the best available information on climate change and the cumulative effects of multiple activities on the land base. Management options that align with established climate change strategies, adaptation and mitigation practices should be explored. Where the cumulative effects of timber harvesting and other land based activities indicate a risk to natural resource values, the process should identify those risks for consideration in land-use planning.

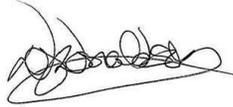
AAC Rationale for TFL 58, TFL 60 & TSA 25, October 2020

Diane Nicholls, Chief Forester and Assistant Deputy Minister

This government recognises that the forest sector is of critical importance to BC. The needs of rural communities and forest based industries are evolving in response to a number of the factors mentioned above. To support BC's forest-dependent communities, I ask that your AAC determinations consider the environmental, social and economic needs of local communities as expressed by the public during Timber Supply Review processes, including strategies that contribute to community economic stability, and the jobs that the forest sector creates in communities, where these are consistent with the government's broader objectives. I also ask that when faced with necessary reductions in AAC's, that those reductions be no larger than necessary to avoid significant longer term impacts.

Thank you Diane, for your continued service and considerable efforts in these regards.

Sincerely,

A handwritten signature in black ink, appearing to read 'Doug Donaldson', with a stylized flourish at the end.

Doug Donaldson
Minister

Appendix 4: *Haida Gwaii Reconciliation Act*, Sections 3 and 5

Sections 3 and 5 of the *Haida Gwaii Reconciliation Act* read as follows.

Haida Gwaii Management Council

- 3** (1) The Haida Gwaii Management Council is established by the joint operation of a resolution of the Haida Nation and this Act.
- (2) The council consists of
- (a) 2 members appointed by resolution of the Haida Nation after consultation with British Columbia,
 - (b) 2 members appointed by the Lieutenant Governor in Council after consultation with the Haida Nation, and
 - (c) a chair appointed both by resolution of the Haida Nation and by the Lieutenant Governor in Council.
- (3) A decision of the council must be made by consensus of the members referred to in subsection (2) (a) and (b), but failing consensus, by majority vote of those members.
- (4) In the event of a tie vote under subsection (3), the chair must cast the deciding vote.
- (5) A decision of the council must be published in the Gazette.

Allowable annual cut

- 5** (1) In this section, "**allowable annual cut**" and "**chief forester**" have the same meanings as in section 1 (1) of the *Forest Act*.
- (2) The council must determine the allowable annual cut for the management area at least once in every 10 years after the date of the last determination.
- (3) For the purposes of subsection (2), on request of the council, the chief forester must provide to the council all information that the chief forester would consider under section 8 (1) of the *Forest Act* if the chief forester were making the determination under subsection (2) of this section, including, without limitation, information respecting the matters, as they relate to the management area, set out in section 8 (8) of the *Forest Act*.
- (4) Promptly after making a determination under subsection (2), the council must
- (a) give written notice of the determination to the chief forester, and
 - (b) publish the determination on a publicly accessible website.

Appendix 5: History of the AAC

The complex history of the AACs for the various land bases (management units) now comprising the two TFLs and the TSA on Haida Gwaii is provided in abbreviated form in the following table.

Table A-4. History of the AAC for Haida Gwaii (excluding woodlot licences)

Year	TSA 25	TFL 25 'Blk 6'	TFL 47 'Moresby Blk', now TFL 58	TFL 39 'Blk 6', now TFL 60	TSA & TFLs Total
2000	361 000 m³ (due to Part 13 reduction of 114 000 m ³ , Dec 1999)	115 000 m³ (from 1998 incorporation of ex-TFL 24)	100 000 m³ (from Dec 1996 determination)	1 210 000 m³ (from 1996 determination – not an official partition)	1 786 000 m³
2001				1 150 000 m³ (contribution in Nov 2001 determination – not an official partition)	1 726 000 m³
2002					1 726 000 m³
2003	No change, but 114 000 m ³ Part 13 reduction replaced		100 000 m³ (re-determined in Aug 2003)		1 726 000 m³
2004				1 082 616 m³ (Oct 2004, due to private land removal – not an official partition)	1 658 616 m³
2005					1 658 616 m³
2006	245 000 m³ (Part 13 reduction of 116 000 m ³)	106 500 m³ (Part 13 reduction of 8500 m ³ Oct 2006)	83 000 m³ (Part 13 reduction of 17 000 m ³ Oct 2006; TFL 58 formed Dec '06)	789 616 m³ (Part 13 reduction of 293 000 m ³ Oct 2006)	1 224 116 m³
2007					1 224 116 m³
2008		106 500 m³ (base level and Part 13 reduction re-affirmed in Feb 2008 determination)			1 224 116 m³
2009	475 000 m³ (Part 13 reductions end Dec 31, 2009)	115 000 m³ (Part 13 reductions end Dec 31, 2009)	100 000 m³ (Part 13 reductions end Dec 31, 2009)	1 082 616 m³ (Part 13 reductions end Dec 31, 2009)	1 772 616 m³
2010	869 748 m³ (115 000 m ³ added from TFL 25; 279 748 m ³ added from TFL 60, Dec 2010)	Block added to TSA	100 000 m³	802 868 m³ (Dec 2010; Jan 2010, TFL 39 Blk 6 deleted, TFL 60 formed)	1 772 616 m³
2012	512 000 m³ (195 000 m ³ for cedar)		79 000 m³ (32 000 m ³ for cedar)	340 000 m³ (133 000 m ³ for cedar)	931 000 m³ (360 000 m ³ for cedar)

Appendix 6: Information sources used in the AAC determination

The information sources considered in determining this AAC include but are not limited to, the following:

Licensee Plans

- Angus, S. (2001). Tree Farm Licence No. 47 Block 18 Moresby Block. Timber supply Analysis Information Package. Delta, B.C. J.S. Jones Sandspit Ltd.;
- Brash, B., & West, J. (2012). Tree Farm Licence 60 Management Plan #1. Skidegate, B.C. Taan Forest Products Ltd.;
- Byng, D. (2003). Western Forest Products, Tree Farm Licence 25, Management Plan #10. Timber Supply Analysis Information Package. Vancouver, B.C. Western Forest Products;
- Kofoed, P. (1999). TFL 39, Management Plan#8. Timber Supply Analysis Information Package. Nanaimo, B.C. MacMillan Bloedel.

Timber Supply Review Documents

- B.C. Ministry of Forests. (2000). Queen Charlotte Timber Supply Area Analysis Report. Victoria, B.C. B.C. Ministry of Forests;
- MFLNRORD. (2017). Timber Supply Review Backgrounder. Victoria, BC. Forest Analysis and Inventory Branch, Ministry of Forests, Lands and Natural Resource Operations and Rural Development;
- Pederson, L. (1996). Rationale for allowable annual cut (AAC) determination for Tree Farm Licence 47. Victoria, B.C. Ministry of Forests;
- Sutherland, J. (2012). Rationale for Allowable Annual Cut (AAC) Determinations for Tree Farm Licence 58, Tree Farm Licence 60, and Timber Supply Area 25. Victoria, B.C. Chief Forester's Office, Ministry of Forests, Lands and Natural Resource Operations.

Land Use

- Banner, A. P. (2014). A field guide to ecosystem classification and identification for Haida Gwaii. Victoria, BC. Land Management Handbook 68, Ministry of Forest, Lands and Natural Resource Operations;
- Banner, A., MacKenzie, W., J. Pojar, A. MacKinnon, Saunders, S., & H. Klassen. (2014). A field guide to ecosystem classification and identification for Haida Gwaii. Victoria, B.C. Prov. B.C. Land Manag.Handb. 68;
- Banner, A., W. MacKenzie, J. P., MacKinnon, A., Saunders, S., & H. Klassen. (2014). A field guide to ecosystem classification and identification for Haida Gwaii. Victoria, B.C. B.C. Land Management Handbook 68. Prov. B.C.;
- B.C. Ministry of Forests. (2001). Watershed assessment procedure guidebook. 2nd ed., Version;
- Brayshaw, D. (2016). Revised Community Watershed Assessment: Honna Community Watershed- Honna River. Abbotsford, B.C. Report for Taan Forest Products by Statlu Environmental Consulting;
- Floyd, W. (2011). The Sensitivity of Coastal Watersheds to Climate Change. BC Forest Professional, p. 12-13;
- Milne, M. (2002). Watershed Assessment for the Awun River. Vernon, B.C. M.J Milne & Associates Ltd, D.G.V. Engineering Services Ltd., report for Weyerhaeuser Company Limited;

- Milne, M. (2003). Watershed Assessment for Haans Creek. Vernon, B.C. M.J Milne & Associates Ltd, D.G.V. Engineering Services Ltd., report for Weyerhaeuser Company Limited;
- Milne, M. (2004). Watershed Assessment for Datlaman Creek. Vernon, B.C. M.J Milne & Associates Ltd, D.G.V. Engineering Services Ltd., report for Weyerhaeuser Company Limited;
- Cortex Consultants and Gowland Technologies. (2004). Haida Gwaii/Queen Charlotte Islands Land Use Plan Base Case Analysis Timber Supply Modeling Assumptions. Victoria, B.C. Cortex Consultants and Gowland Technologies;
- Fall, A. (2015). Central-North Coast and South-Central Coast (Great Bear Rainforest) Land-Use Order Review Analysis. Comparing timber supply and carbon offset potential with land use orders with proposed JSP scenario. V 4.1. Gowland Technologies Ltd.;
- Holt, R. (2005). Environmental Conditions Report for the Haida Gwaii/Queen Charlotte Islands Land Use Plan. Nelson, B.C. Veridian Ecological Consulting Ltd. report for Process Technical Team (PTT) for the Haida Gwaii Land Use Plan;
- Inselberg, A. (2006). TEM HG-QCI Gap Analysis Sept 2006. Victoria, B.C. Alex Inselberg report for the Haida Gwaii Strategic Land Use Plan Joint Technical Team;
- MFLNRO. (2011). Land Use Operational Policy: Reserves, Withdrawals, Notations and Prohibitions. Victoria, B.C. Ministry of Forests, Lands and Natural Resource Operations;
- PMT. (2006). Haida Gwaii/Queen Charlotte Islands Land Use Plan Recommendations Report and Addenda. Queen Charlotte, B.C. Process Technical Team for the Haida Gwaii/Queen Charlotte Islands Land Use Planning Process. Report for the South Moresby Forest Replacement Account;
- MFLNRORD. (2018). Silviculture Surveys Procedures Manual. Regen Delay, Stocking and Free Growing Surveys plus Alternative Survey Methodologies. Victoria, B.C. Ministry of Forests, Lands and Natural Resource Operations and Rural Development.
- Resource Practices Branch. (2018). Silviculture Surveys Procedures Manual: Regen delay, stocking and Free Growing Surveys Plus Alternative Survey Methodologies. Victoria, B.C. Resource Practices Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

Forest Practices and other Documents

- 2.1. Victoria, B.C. Forest Practices Branch. Forest Practices Code of British Columbia Guidebook. Ministry of Forests;
- Forest Practices Board. (2019). Forestry Activities in the Skidegate Landscape Unit on Haida Gwaii. Complaint Investigation #18023. Victoria, B.C. Forest Practices Board;
- Forest Practices Branch. (1998). Provincial Seedling Stock Type Selection and Ordering Guidelines. Victoria, B.C. B.C. Ministry of Forests;
- Forest Practices Branch. (2006). Wildlife Tree Retention: Management Guidance. Victoria, B.C. Forest Practices Branch, Ministry of Forest and Range;
- MoF. (1995). Biodiversity Guidebook. *Forest Practices Code of British Columbia Act*. Victoria, B.C. Ministry of Forests;
- MoF. (1999). Forest Practices Code Guidebook: Mapping and Assessing Terrain Stability Guidebook. Second edition. Victoria, B.C. Ministry of Forests;
- Burleigh, J., Ebata, T., White, K., Rusch, D., & Kope, H. (2014). Field Guide to Forest Damage in British Columbia. Victoria, B.C: Joint publication ISSN 0843-4719. Province of British Columbia.

- Abbott, G., & Chapman, M. (2018). Addressing the new normal: 21st Century disaster management in British Columbia. Victoria, B.C. BC Legislature;
- Assessment of Forest Karst Resources of Haida Gwaii: A Strategic Overview. Project SFM08-2008, March 2009;
- B.C. Ministry of Forests and Range. (2009). SIBEC: Sampling and Data Standards. Victoria, B.C. MFR Research Branch;
- B.C. Ministry of Forests, Lands, Natural Resource Operations & Rural Development. February 2018. Implementation Plan for the Recovery of Northern Goshawk, laingi Subspecies (*Accipiter gentilis laingi*) in British Columbia;
- Banner, A., LePage, P., J. Moran, & Groot, A. D. (2005). The HyP3 Project: Pattern, process and productivity in hypermaritime forests of coastal British Columbia. A synthesis of 7 year results. Victoria, B.C. Research Branch, B.C. Ministry of Forests. Special Report 10;
- Barnes, A. (2016). 2015 Economic State of the B.C. Forest Sector. Victoria, BC. Competitiveness and Innovation Branch; Ministry of Forest, Lands and Natural Resource Operations;
- BC MELP. (1997). Policies and Specifications for TRIMII (1:20 000) and (1:10 000) Revision Data Capture Version 2.0. Victoria, B.C. Ministry of Environment, Lands and Parks;
- Bergeron, C., & Lavasseur, Y. (2018, 08 31). Compilations et statistiques; Direction des inventaires forestiers, Ministère des Forêts, de la Faune et des Parcs. (N.Reynolds, Interviewer);
- British Columbia. Ministries of Forests and Environment. 1999. Forest Practices Code of British Columbia. Mapping and assessing terrain stability guidebook. Second edition. <https://www.for.gov.bc.ca/ftp/hfp/external!/publish/FPC%20archive/old%20web%20site%20contents/fpc/fpcguide/terrain/zipped/terrain.pdf>
- Broadhead, J. (2008). The Riparian Fish Forest of Haida Gwaii. A Portrait of Freshwater Fish Distribution and Riparian Forest Habitats. Village of Queen Charlotte, B.C. Gowgaia Institute;
- Brown, S. (1968). Geology of the Queen Charlotte Islands, British Columbia. Bulletin No. 54. Victoria, B.C. British Columbia Department of Mines and Petroleum Resources;
- Canadian Forest Service. (2005). The State of Canada's Forests Annual Report 2005. Ottawa, ON. Natural Resources Canada, Canadian Forest Service;
- Chatwin, S., Howes, D., Schwab, J., & Swanston, D. (1994). A Guide for Management of Landslide-Prone Terrain in the Pacific Northwest. Second Edition. Victoria, B.C. Research Program, Ministry of Forests;
- Christensen, T., & Stafford, J. (2002). Archaeological Overview Assessment Haida Gwaii, North of Gwaii Haanas. Pender Island, B.C. Report for the Haida Tribal Society/Council of the Haida Nation, Ministry of Forests, Renewal Investment Corporation, J.S. Jones Ltd., Weyerhaeuser Ltd, Husby Forest Products Ltd., Western Forest Products Ltd., and the Archaeology and Forests Branch of B;
- Church, M., & Eaton, B. (2001). Hydrological Effects of Forest Harvest in the Pacific Northwest. Vancouver, B.C. Technical Report #3. Department of Geography. University of British Columbia;
- Church, M., & Eaton, B. (2001). Hydrological Effects of Forest Harvest in the Pacific Northwest. Riparian Decision Tool Technical Report 3. Vancouver, B.C. Department of Geography, University of British Columbia;
- CIT. (2004). Hydroriparian Planning Guide. Victoria, B.C. Coast Information Team;

- Clark, C., & Jamieson, G. (2006). Identification of Ecologically and Biologically Significant Areas in the Pacific North Coast Integrated Management Area: Phase I. Nanaimo, B.C. Department of Fisheries and Oceans;
- Cloverpoint. (2016). FLNR Provincial Site Productivity Layer v.5.0. Victoria, B.C. Cloverpoint report for the Ministry of Forest, Lands and Natural Resource Operations;
- D.Meidinger. (2003). Protocol for accuracy assessment of ecosystem maps. Victoria: Research Branch, Ministry of Forests;
- Wilson. (2018, 09 11). Manager, Renewable Resource Inventory Section, Forest Planning and Stewardship Branch, Ministry of Energy and Resource Development. (N. Reynolds, Interviewer);
- Daly, C., Gibson, W., Taylor, G., Johnson, G., & Pasteris, P. (2002.). A knowledge-based approach to the statistical mapping of climate. *Climate Research*, 22:99-113;
- Daust, D., L. Kremsater, C. Apps, K. Brunt, A. Burger, F. Doyle, K. Dunsworth, L. Dupuis, P. Friele, G. MacHutchon, T. Mahon, E. McClaren, V. Michelfelder, B. Pollard, D. Seip, J.D. Steventon, L. Waterhouse. 2010. Focal Species Risk Thresholds for BC's North and Central Coast. Report to the Joint Coastal Land and Resource Forum Technical Liaison Committee. Integrated Land Management Bureau, Nanaimo, B.C.
- Focal species risk thresholds for B.C.'s North and Central Coast. Nanaimo, B.C. Integrated Land Management Bureau. Report to the Joint Coastal Land and Resource Forum Technical Liaison Committee;
- Dawson, G. (1878). Report on the Queen Charlotte Islands. Victoria, B.C. Geological Survey of Canada;
- De Jong, R. (2017). Young Stand Monitoring in Haida Gwaii: Plot Establishment Report. Victoria, B.C. Ministry of Forests, Lands and Natural Resource Operations: Forest Analysis and Inventory Branch;
- De Jong, R. (2017b). Haida Gwaii TSA Young Stand Monitoring Program. Victoria, B.C. Forest Analysis and Inventory Branch. Ministry of Forests, Lands and Natural Resource Operations and Rural Development;
- Desrochers, A., & Orchard, M. (1991). Stratigraphic revisions and carbonate sedimentology of the Kunga Group (Upper Triassic-Lower Jurassic), Queen Charlotte Islands, British Columbia. In G. Woodsworth, Evolution and Hydrocarbon Potential of the Queen Charlotte Basin (pp. 163-172). Ottawa, ON. Geological Survey of Canada, Paper 90-10;
- Di Lucca, M. (1999). TASS/SYLVER/TIPSY: systems for predicting the impact of silvicultural practices on yield, lumber value, economic return and other benefits. Stand Density Management Conference: Using the Planning Tools (pp. 7-16). Edmonton, AB: Colin Bamsey (Ed.);
- DNR. (2017). 2017 Annual Report. Seattle, WA: Washington Department of Natural Resources;
- EBA Engineering Consultants. (2002). Small-scale predictive ecosystem mapping for the central coast, Queen Charlotte Islands and north coast LRMP areas. Vancouver, B.C. EGA Engineering Consultants, Ltd. report for the B.C. Ministry of Sustainable Resource Management;
- EBA Engineering Consultants Ltd. (2002). Small-scale predictive ecosystem mapping for the central coast, queen charlotte islands and north coast LRMP areas. Nanaimo, B.C. EBA Engineering Consultants Ltd. report for the BC Ministry of Sustainable Resource Management;
- Ecora. (2015). Haida Gwaii TSA Economic Operability Assessment. Kelowna, BC. Ecora Resource Group Ltd.;

- FAIB. (2007). Standard glossary of terms. Revised. Victoria, B.C. Forest Analysis and Inventory Branch, B.C., Ministry of Forests and Range;
- FAIB. (2007). Variable Density Yield Prediction model 7 (VDYP7) Information Note #1. Victoria, B.C. Forest Analysis and Inventory Branch, B.C. Ministry of Forests and Range;
- FAIB. (2018). Inventory Program Budget and Staffing. Victoria, BC. Forest Analysis and Inventory Branch; Ministry of Forests, Lands and Natural Resource Operations and Rural Development;
- FAIB. (2018). Strategic 10-Year Plan for Permanent Sample Plots (PSPs). Victoria, B.C. Forest Analysis and Inventory Branch, Ministry of Forests, Lands and Natural Resource Operations;
- Fall, A. (2018). Haida Gwaii Timber Supply Analysis Memo 3: Modelling Operational Road Costs and Dynamic Stand Values. Lasquiti, B.C. Gowlland Technologies Ltd. Report for the TSR Technical Working Group;
- Fall, A., & D., C. (2006). Coastal Detailed Strategic Planning Decision-Support. Report 1 DSP Spatial Analysis Framework. Victoria, B.C. Gowlland Technologies Ltd.; Integrated Land Management Bureau;
- Flewelling, J. (2001). Decay Prediction Working Notes: New Decay Equations specific for Queen Charlotte Islands. Victoria, B.C. Ministry of Forests;
- Floyd, W. (2012). Snowmelt Energy Flux Recovery During Rain-on Snow in Regenerating Forests. Vancouver, B.C. Faculty of Graduate Studies, The University of British Columbia;
- Floyd, W. (2012). Snowmelt Energy Flux Recovery During Rain-on-Snow in Regenerating Forests. Vancouver, B.C. University of British Columbia;
- Gelhorn, L. (2018, 08 28). Forest Inventory Specialist. (N. Reynolds, Interviewer) Geraldson, A., Askelson, K., Kikelski, E., Doyle, F., Harrower, W., Winder, K., & Irwin, D.;
- (2019). Population genomic analyses reveal a highly differentiated and endangered genetic cluster of northern goshawks (*Accipiter gentilis laingi*) in Haida Gwaii. *Evolutionary Applications*, 1-16;
- Gimbarzevsky, P. (1988). A regional study of mass wasting in the Queen Charlotte Islands, B.C. Victoria, B.C. British Columbia Ministry of Forests, Land Management Report 29;
- GoA. (2013). Forestry Economic Impact Report 2012. Edmonton, AB. Ministry of Agriculture and Forestry;
- GoNB. (2015-2016). Natural Resources Annual Report. Fredericton, NB. Province of New Brunswick;
- GoS. (2018). Saskatchewan Forestry Sector. Regina, SK. Ministry of Energy and Resources, Forestry Development Branch;
- Government of Canada. (2017). Recover Strategy for the Northern Goshawk *laingi* subspecies (*Accipiter gentillis laingi*) in Canada. Ottawa, ON: Species at Risk Act Recovery Strategy Series. Parks Canada Agency, Government of Canada;
- Graham, L. (2017). Young-growth yellow-cedar: improving our database and monitoring decline. Yellow cedar decline conference. Juneau, AK: University of Alaska Southeast;
- Green, R. K. (1994). A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region. Victoria, B.C. Research Program, Ministry of Forests;
- Green, R., & K. Klinka. (1994). A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region. Victoria, B.C. Ministry of Forests;

- Green, R., & Klinka, K. (1994). A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region. Victoria, B.C. Ministry of Forests Research Program;
- Griffiths, P., & Ramsey, C. (2009). Assessment of Forest Karst Resources of Haida Gwaii: A Strategic Overview. Queen Charlotte, B.C. South Moresby Forest Replacement Account, project SFM08-2008;
- Hardy, K. (2005). Remeasurement of 2nd growth permanent sample plots on Moresby Island. Project Report SFM08-04. Nanaimo, B.C.: South Moresby Forest Replacement Account.
- Hardy, K. (2006). Remeasurement of 2nd growth permanent sample plots on Moresby Island. Project Report SFM15-05. Nanaimo, B.C. South Moresby Forest Replacement Account;
- Hardy, K. (2007). Queen Charlotte Islands stump-site index study. Nanaimo, B.C. Ministry of Forests and Range: Coast Forest Region;
- Hogan, D., & Schwab, J. (1991). Stream channel response to landslides in the Queen Charlotte Islands, B.C: changes affecting pink and chum salmon habitat. 15th northeast Pacific pink and chum workshop, Feb 27-Mar 1, 1991 (pp. 222-23). Vancouver, B.C. White and Gutherie (editors);
- Hogan, D., Tschaplinski, P., & Chatwin, S. (1998). Carnation Creek and Queen Charlotte Islands Fish/Forestry Workshop: Applying 20 years of coast research to management solutions. Victoria, B.C. B.C. Min For, Res. Br. Land Management Handbook 41;
- Holland. (1976). Landforms of British Columbia: a physiographic outline. Victoria, B.C. Government of British Columbia;
- Holt, R. (2003). Environmental Conditions Report for the Haida Gwaii/Queen Charlotte Islands Land Use Plan. Nelson, B.C. Veridien Ecological Consulting Ltd.;
- Horel, G. (2017). Floodplain delineation project for Timber Supply Analysis. Salt Spring Island, B.C. G.M. Horel Engineering Ltd.;
- Howes, D. (1987). A Terrain Evaluation method for Predicting Terrain Susceptible to Post- Logging Landslide Activity. Victoria, B.C. Ministry of Environment and Parks Technical Report 28. Ministry of Environment and Parks, Recreational Fisheries Branch;
- Hudson, R., & Horel, G. (2007). An operational method of assessing hydrologic recovery for Vancouver Island and south coastal BC. Nanaimo, B.C. Forest Research Branch Technical Report 032. B.C. Ministry of Forests and Range;
- International Panel on Climate Change. (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: IPCC;
- Jagielko, L. M. (2012). Scaling and multivariate analysis of medium to large landslide events: Haida Gwaii, British Columbia. *Nat Hazards*, 60: 321-344;
- Johnston, M., Webber, S., O'Neill, G., T. Williamson, & Hirsch., K. (2009). Climate Change Impacts and Adaptations Strategies for the Forest Sector in Canada. 2nd Climate Change Technology Conference (pp. 1-13). Hamilton, ON: Canadian Forest Service;
- Kielke, K., Bancroft, B., Byrne, K., & Mitchell, S. (2010). BCTS Windthrow Manual: A compendium of information and tools for understanding, predicting and managing windthrow on the BC Coast. Chilliwack, BC. British Columbia Timber Sales;
- Koot, H. (1991). Spruce Aphid. Forestry Canada, Forest Insect and Disease Survey. Ottawa, ON. Forest Pest Leaflet No. 16, Canadian Forest Service;
- Kozak, A. (1997). Taper equations derived from the Queen Charlotte Islands Volume and Data. Victoria, B.C. Report to the Ministry of Forests.
- Krapek, J., Buma, B., D'amore, D., & Hennon, P. (2017). Despite available habitat at leading north-eastern range edge, yellow-cedar migration is punctuated with past pulse

- during little ice age. Yellow cedar decline conference. Juneau, AK: University of Southeast Alaska;
- Kurucz, J. (1978). Preliminary, polymorphic site index curves for western redcedar-Thuja plicata- in coastal British Columbia. Vancouver, B.C. MacMillan Bloedel Limited;
 - L. Daniels, C. V. (2016). Is climate causing yellow-cedar decline on Haida Gwaii? Vancouver, BC. Faculty of Forestry, University of British Columbia;
 - Lertzman, K., Sutherland, G., Inselberg, A., & Saunders, S. (1996). Canopy gaps and the landscape mosaic in a coastal temperate rain forest. *Ecology*, 77 (4): 1254-1270;
 - Luckert, M., Haley, D., & Hoberg, G. (2011). Policies for Sustainably Managing Canada's Forests. Vancouver, BC. UBC Press;
 - Macatee, G. (2003a). Order- Wildlife Habitat Area #6-002. Victoria, B.C. Ministry of Water, Land and Air Protection;
 - Macatee, G. (2003b). Order- Wildlife Habitat Area #6-041. Victoria, B.C. Ministry of Water, Land and Air Protection;
 - Macatee, G. (2003c). Order- Wildlife Habitat Area #6-046. Victoria, B.C. Ministry of Water, Land and Air Protection;
 - MacDonald, K. (2004). Final Report on Wood Supply in New Brunswick. Fredericton, NB: Select Committee on Wood Supply; Report for the Legislative Assembly of New Brunswick;
 - Maclauchlan, L., & Burleigh, J. (2011). Assessment of Western Blackheaded Budworm in second growth hemlock on Haida Gwaii. Queen Charlotte, BC. Unpublished report for the Ministry of Forests, Lands and Natural Resource Operations;
 - Madrone Environmental Services Ltd. (2017). Strategic Plan for Haida Gwaii Seamless Terrestrial Ecosystem Mapping. Vancouver, B.C. Madrone Environmental Services Ltd. report for Ministry of Forests, Lands and Natural Resource Operations, Ministry of the Environment and, the Council of the Haida Nation;
 - Mah, S., & G. Nigh. (2015). SIBEC First and Second-generation Approximation Estimates: backgrounder. Victoria, B.C. Ministry of Forests, Lands and Natural Resource Operations;
 - Mahon, T., McClaren, E., & Doyle, F. (2015). Northern Goshawk (*Accipiter gentilis laingi*) Habitat Models for Coastal British Columbia. Nanaimo, B.C. BC Ministry of Forests, Lands and Natural Resource Operations. Report for the Habitat Recovery Implementation Group of the Coastal Northern Goshawk Recovery Team;
 - McClaren, E., Mahon, T., F. Doyle, & W. Harrower. (2015). Science-Based Guidelines for Managing Northern Goshawk Breeding Areas in Coastal British Columbia. *Journal of Ecosystems and Management*, 15(2):1-91;
 - Means, J., Campbell, M., & Johnson, G. (1988). Preliminary height-growth and site-index curves for mountain hemlock. *FIR Report* 10 (10): 8-9;
 - Meidinger, D. (2003). Ecosystem Mapping Accuracy and Timber Supply Applications. Victoria, B.C. Research Branch, Ministry of Forests;
 - MFFP. (2017). Forest harvesting not a cause of deforestation in Quebec. Quebec, QB. Ministère des Forêts de la Faune et des Parcs;
 - MFLNRO. (2013). Site Index Estimates By Site Series: Report by Region (2013 Approximations). Victoria, B.C. Ministry of Forests, Lands and Natural Resource Operations, Resource Practices Branch;
 - MFLNRORD. (2011). Scaling Manual. Victoria, B.C. Timber Pricing Branch, Amendment no.3 (2018). Ministry of Forests, Lands, Natural Resource Operations and Rural Development;

- MFLNRORD. (2018). Implementation plan for Northern Goshawk, laingi subspecies in British Columbia. Victoria, B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development.
https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/species-ecosystems-at-risk/recovery-planning/implementation_plan_for_the_recovery_of_northern_goshawk.pdf;
- MFML. (2010). 2010 Summary of Forest Health Conditions in British Columbia. Victoria, BC. Forest Practices and Investment Branch; Ministry of Forests, Mines and Lands;
- Milne, M.J. (2007). Hydrologic Assessment of the Upper Deena Basin and Proposed Blocks Fork014,15,20,21 and DEEN17. Vernon, B.C. M.J. Milne and Associates Ltd.;
- Ministry of Environment. (2008). Recovery strategy for the Northern Goshawk, laingi subspecies (*Accipiter gentilis laingi*) in British Columbia. Victoria, B.C. Northern Goshawk *Accipiter gentilis laingi* Recovery Team. Prepared for the B.C. Ministry of Environment;
- Ministry of Forests, Lands and Natural Resource Operations and Rural Development. (2013). Forest Inventory Strategic Plan. Victoria, BC. MFLNRO;
- Mitchell, T., & Jones, P. (2005). An improved method of constructing a database of monthly climate observations and associated high-resolution grids. *International Journal of Climatology*, 25: 693-712;
- MNRF. (2016). State of Ontario's Natural Resources Forests 2016. Toronto, ON. Ontario Ministry of Natural Resources and Forests;
- MNRF. (2018, 09 03). Area Available for Harvest. Retrieved from Ministry of Natural Resources and Forestry: <https://www.ontario.ca/page/area-available-harvest>;
- MoF. (1998). Procedures for Factoring Visual Resources into Timber Supply Analyses. Victoria, B.C. Ministry of Forests;
- MoF. (2001). Visual Impact Assessment Guidebook. 2nd ed. Victoria, B.C. Forest Practices Branch, Ministry of Forests;
- MoF. (2003). Bulletin- Modelling Visuals in TSR III. Victoria, B.C. Ministry of Forests. MSRM. (2002). Vegetation Resources Inventory Photo Interpretation Procedures. Victoria, B.C. Ministry of Sustainable Resource Management Terrestrial Information Branch's Vegetation Resources Inventory Committee;
- Munt, L. (2005). Visual Quality Objectives Order for the Queen Charlotte Islands Forest District. Queen Charlotte, B.C. Queen Charlotte Islands Forest District, Ministry of Forests and Range;
- Munt, L. (2006). Order to Identify Karst Resource Features for the Queen Charlotte Islands Forest District. Queen Charlotte, B.C. Ministry of Forests and Range;
- Munt, L. (2013). Haida Gwaii Natural Resource District Manager Policy: Management of Visual Quality Objectives. Queen Charlotte, B.C. Haida Gwaii Natural Resource District, Ministry of Forest, Lands and Natural Resource Operations;
- Nealis, V., & Turnquist, R. (2010). Impact and recovery of western hemlock following disturbances by forestry and insect defoliation. *Forest Ecology and Management*, 260(5): 699-706;
- Nicholls, D. (2018). Consultation on Ministry Permanent Sample Plots. March 14, 2018 Memorandum file 280-30. Victoria, B.C. Assistant Deputy Minister, Chief Forester, Ministry of Forests, Lands, Natural Resource Operations and Rural Development;
- Nigh, G. (1997). A Sitka spruce height-age model with improved extrapolation properties. *The Forestry Chronicle*, Vol 73 (3) p. 363-369;
- Nigh, G. (1998). Revised growth intercept models for coastal western hemlock, Sitka spruce, and interior spruce. Victoria, B.C. Research Branch, B.C. Ministry of Forests;

- Nigh, G. (1999). Revised growth intercept models for coastal western hemlock, Sitka spruce, and interior spruce. Victoria, B.C. Research Branch, B.C. Ministry of Forests;
- Nigh, G. (2012). A biophysical model for estimating site index for the major commercial tree species in British Columbia. Victoria, B.C. Province of British Columbia;
- Nigh, G. (2016). Revised site index models for western redcedar for coastal British Columbia. Victoria, B.C. Province of B.C.;
- Nigh, G., & Courtin, P. (1998). Height models for red alder (*Alnus rubra*) in British Columbia. *New Forestry*, 16:59-70;
- Nigh, G., & De Jong, R. (2015). Validating the site productivity layer for British Columbia with equivalence testing. Victoria, B.C. Province of British Columbia;
- NRCAN. (2005). West coast research on insect that eats young conifers. *Information Forestry*, 6-7;
- NRCAN. (2018, 08 25). Statistical Data Overview. Retrieved from Natural Resources Canada: <http://cfs.nrcan.gc.ca/statsprofile>;
- Nussbaum, A. (1998). Site index adjustments for old-growth stands based on paired plots. Victoria, B.C. Research Branch, B.C. Ministry of Forests;
- P. Hennon, M. C. (2016). A Climate Adaptation Strategy for Conservation and Management of Yellow-Cedar in Alaska. Juneau, AK: Pacific Northwest Research Station, General Technical Report PNW-GTR-917, US Forest Service;
- Parks Canada Agency. (2018). Recovery Strategy for the Northern Goshawk *Accipiter gentilis laingi* subspecies (*Accipiter gentilis laingi*) in Canada (Proposed). Ottawa: Species at Risk Act Recovery Strategy Series. Parks Canada Agency;
- Penner, M. (2018). Haida Gwaii Documentation of Vegetation Resources Inventory Analysis- Volume Audit (Mature). Huntsville, ON: Report prepared for the Ministry of Forests, Lands and Natural Resource;
- R. Hember, K. Werner, & M. Girardin. (2019). Tree Ring Reconstructions of Stemwood Biomass Indicate Increases in the Growth Rate of Black Spruce Trees Across Boreal Forests of Canada. *Journal of Geophysical Research: Biogeosciences*, 1-21;
- Ran, S. (2011). Final Report for the terrestrial ecosystem mapping database adjustment on the Queen Charlotte Island Timber Supply Area. Kelowna, B.C.: Ecora Resource Group Ltd. report for the TSR Joint Technical Working Group;
- Remington, D. (1993). Coastal Wetlands Habitat Assessment and Classification for Northwestern British Columbia. Vancouver, B.C. Pacific Estuary Conservation Program;
- Resource Practices Branch. (2016). *Silviculture Survey Procedures Manual- Regen Delay, Stocking and Free Growing Surveys- plus Alternative Survey Methodologies*. Victoria, B.C. BC Ministry of Forests, Lands and Natural Resource Operations and Rural Development;
- Resource Practices Branch. (2017, 10 6). RESULTS - Forest Cover Silviculture. Retrieved 10 6, 2017, from Geo BC Data Catalogue: <https://catalogue.data.gov.bc.ca/dataset/results-forest-cover-silviculture>;
- Reynolds, N. (2016). Hlgiid-Western yew-*Taxus brevifolia*. Effectiveness Monitoring Report. Old Massett, B.C. Ecosystem Based Management Technical Series 1. Heritage and Natural Resource Department. Council of the Haida Nation;
- Reynolds, N. (2016). Preliminary investigations into lodgepole pine (*Pinus contorta*) and yellow cedar (*Chamaecyparis nootkatensis*) decline in Gwaii Haanas. Skidegate, BC. Research permit #GWA-2015-19359 report to Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site;

- Reynolds, N., & de Montigny, L. (2015). A 20-year analysis of incremental silviculture in mixed western hemlock-Sitka spruce stands in the Coastal Western Hemlock Biogeoclimatic zone. *B.C. Exten. Note 114, (114): 1-9*;
- RIC. (2002). *The B.C. Land Cover Classification Scheme*. Victoria, B.C. Resource Inventory Committee, Ministry of Sustainable Resource Management;
- RISC. (2000). *The B.C. Ministry of Forests adaptation of the Canadian Forest Service's FHN Report 97-1 "Overview Aerial Survey Standards for British Columbia and the Yukon"*. Victoria, B.C. Resource Inventory Standards Committee. Report by B.C. Ministry of Forests; Canadian Forest Service;
- Robere-McGugan, G. (2018, 08 27). A/Science Coordinator, Forest Management Unit, Ministry of Natural Resources and Forestry. (N.Reynolds, Interviewer);
- Rollerson, T., Peters, C., & Beese, W. (2009). *Variable Retention Windthrow Monitoring Project*. Campbell River, BC. Forest Investment Account, report by Western Forest Products Ltd.;
- Rood, K. M. (1990). *Site characteristics and land sliding in forested clearcut terrain, Queen Charlotte Islands, B.C.* Victoria, B.C. Land Management Report 64, Province of British Columbia;
- Sandvoss, M. (2014). *Project completion report: Phase 1- Vegetation Resources Inventory (VRI) Photo Interpretation and Digital map Production of Haida Gwaii 2011-2013*. Vancouver, B.C. Timberline Forest Inventory Consultants report to the Ministry of Forests, Lands and Natural Resource Operations, the Council of the Haida Nation and Parks Canada;
- Shepard, R., & Gray, T. (2001). *Comparative rates of density change in declining populations of the blackheaded budworm Acleris gloverana among different sites on Vancouver island*. *Environmental Entomology*, 30: 883-891;
- Sonsthagen, S., McClaren, E., F. Doyle, K. Titus, G. Sage, R. Wilson, S. Talbot. (2012);
- *Identification of metapopulation dynamics among Northern Goshawks of the Alexander Archipelago, Alaska, and Coastal British Columbia*. *Conservation Genetics.*, Published online: DOI: 10.1007/s10592-012-0352-;
- SPWR003(v2). (2018). *Seed Planning and Registry System Genetic Gain: Genetic worth of Seedlings Requested by Species and SPZ. 2003-2017 DQC*. Victoria, B.C. Retrieved by L. McAuley, Ministry of Forests, Lands and Natural Resource Operations and Rural Development;
- Stone, M., Phelps, S., & Samson, R. (2002). *Selection of conversion factors for stumpage price comparisons*. Ottawa, ON: Industry, Economics and Programs Branch; Canadian Forest Service; Natural Resources Canada;
- Taan Forest Ltd & Limited Partnership. (2018). *Forest Stewardship Plan 2018 to 2023*. Skidegate, B.C. Taan Forest Ltd. and Limited Partnership;
- Thompson, D., & Pederson, L. (2001). *Order- Wildlife Habitat Area #6-001*. Victoria, B.C. Ministry of Water, Land and Air Protection; Ministry of Forests;
- Thrower, J. (1994). *Revised height-age curves for lodgepole pine and interior spruce in British Columbia*. Victoria, B.C. Research Branch, B.C. Ministry of Forests;
- Timber Pricing Branch. (2018). *Amendment no. 28- Provincial Logging Residue and Waste Procedures Manual*. Victoria, B.C. Timber Pricing Branch, Ministry of Forests, Lands, Natural Resource Operations and Rural Development;
- Timberline Natural Resource Group. (2008). *Terrestrial Ecosystem Mapping (TEM) within the Queen Charlotte Timber Supply Area. Final Accuracy Assessment*. Vancouver, B.C. Timberline Natural Resource Group report prepared for Husby Forest Products Ltd.;

- Timberline Natural Resource Group Ltd. (2010). Site Index Adjustment of the Haida Gwaii Timber Supply Area. Vancouver, B.C. Timberline Natural Resources Group prepared for Ministry of Forests and Range;
- Timberline Natural Resource Group Ltd. (2010). Site Index Adjustment of the Haida Gwaii Timber Supply Area. Victoria, B.C. Timberline Natural Resource Group Ltd. report prepared for the Ministry of Forests and Range, Forest Analysis and Inventory Branch;
- Tripp, T., & Temmel, N. (2017). Strategic Plan for Haida Gwaii Seamless Terrestrial Ecosystem Mapping. Vancouver, B.C. Madrone Environmental Services Ltd. report for Ministry of Forests, Lands and Natural Resource Operations and Ministry of Environment Ecosystem Information Section;
- Tripp, T., J. McEwen, H. Williams, & R. Adams. (2017). Haida Gwaii Terrestrial Ecosystem Inventory and mapping 2016/17: Cumshewa Inlet-Moresby Island East and Louise Island North. Vancouver, B.C. Madrone Environmental Services Ltd. report for the Ministry of Environment;
- TSR Joint Technical Working Group (2012). Haida Gwaii Timber Supply Review Data Package 2012. Old Masset, B.C. Joint Technical Working Group report prepared for the Haida Gwaii Management Council;
- USDA. (2015). Forest Health Conditions in Alaska- 2014. Fairbanks, AK: United States Department of Agriculture;
- Village of Masset. (2017). Village of Masset Integrated Official Community Plan: Bylaw 628;
- Masset 2040- Charting our Future. Village of Masset, B.C. Village of Masset;
- Village of Port Clements. (2012). Official Community Plan. Port Clements, B.C. Village of Port Clements;
- Village of Queen Charlotte. (2011). Schedule "A" to Official Community Plan Bylaw No. 50- 2011. Village of Queen Charlotte, B.C. Village of Queen Charlotte;
- Wang, T., Hamann, A., Spittlehouse, D., & Carroll, C. (2016). Locally Downscaled and Spatially Customizable Climate Data for Historical and Future Periods for North America. PLoS ONE, 11(6): e0156720;
- Watts, S., & Tolland, L. (2005). Forestry handbook for British Columbia, 5th ed. Vancouver, B.C. University of British Columbia.
- Weiland, I. (2018). Bonanza creek reconnaissance terrain stability mapping. Smithers, B.C. Weiland Terrain Sciences;
- Westfall, J. E. (2014). Summary of forest health conditions in British Columbia. BC Pest Management report 15. Victoria, B.C. British Columbia Ministry of Forests, Range and Natural Resource Operations;
- Wiley, K. (1978). Site index tables for Western hemlock in the Pacific Northwest. Weyerhaeuser Co.;
- Wilson, B. (2018, 08 24). Senior Resource Analyst, Forest Management Branch, Agriculture and Forestry. (N. Reynolds, Interviewer);
- Windbourne, J. (2011). Haida Marine Traditional Knowledge Study Volume 3: Focal species summary. Victoria, B.C. Haida Fisheries Program. Haida Marine Traditional Knowledge Study Participants, J. Windbourne and the Haida Oceans Technical Team report for the Council of the Haida Nation;
- Woods, M., Pitt, D., Penner, M., Lim, K., Nesbitt, D., & Etheridge, D. T. (2011). Operational implementation of LiDAR inventory in Boreal Ontario. The Forestry Chronicle, 87(4) 512-528;
- Woodsworth, G. (1991). Evolution and Hydrocarbon Potential of the Queen Charlotte Basin, British Columbia. Ottawa, ON: Geologic Survey of Canada, paper 90-10;

- Yuan, X., & Wang, J. (2017). LiDAR Enhanced Forest Inventory (LEFI) Haida Gwaii Summary Report 2016/2017. Victoria, B.C. Forest Analysis and Inventory Branch. Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

First Nations

- CHN & BC. (2007). Haida Gwaii Strategic Land Use Agreement. Skidegate, B.C. The Council of the Haida Nation and the Province of British Columbia;
- CHN. (2016). Cultural Feature Identifications Standards Manual; version 4. Old Masset, B.C. Council of the Haida Nation;
- CHN; Province of BC. (2009). Kunst'aa Guu- Kunst'aayah Reconciliation Protocol. Skidegate, B.C. Council of the Haida Nation; Province of B.C.;
- HGMC. (2012). Rationale for Allowable Annual Cut (AAC) Determination for Haida Gwaii. Old Masset, B.C. Haida Gwaii Management Council;
- HGMC. (2016). Haida Gwaii Management Council Timber Supply Review Technical Working Group Terms of Reference. Old Masset, B.C. Haida Gwaii Management Council;
- HGMC. (2019). Background and Intent document for the Haida Gwaii Land Use Objectives Order. Old Masset, B.C. Haida Gwaii Management Council;
- Old Masset, B.C. Joint Technical Team for the Haida Gwaii Management Council;
- JTT. (2009). Sensitive Watersheds Technical Report AQ 01. Old Masset, B.C. Joint Technical Team, Detailed Strategic Planning for the Haida Gwaii Land Use Agreement;
- JTT. (2011). Background and Intent Document for the Haida Gwaii Land Use Objectives Order;
- JTWG. (2012). Haida Gwaii Timber Supply Review Data Package 2012. Old Masset & Victoria, B.C. Joint Technical Working Group, report for the Haida Gwaii Management Council;
- Fall, A. (2017). Haida Gwaii Timber Supply Analysis: Memo 2: Analysis of Type I and II Fish Habitat for TSR. Lasquiti Island, B.C. Gowlland Technologies Ltd., report for the Haida Gwaii Management Council.