HAIDA GWAII MANAGEMENT COUNCIL

Rationale for

Allowable Annual Cut (AAC)

Determination for

Haida Gwaii

April 2020

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Haida Gwaii Management Council Allowable Annual Cut Decision

The Allowable Annual Cut (AAC) for all commercial forest harvesting within the Haida Gwaii Management Area is 804,000 cubic metres for TSA 25, TFL 58 and TFL 60. This is in addition to the 7,476 cubic metre AAC for the public land portion of the four existing woodlots on Haida Gwaii – as they are also part of the Haida Gwaii Management Area. This document contains the rationale of the Haida Gwaii Management Council for this determination.

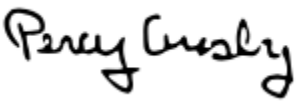
Council Members' signatures:

April 23, 2020

Brian Bawtinheimer — Date

April 23, 2020

Kung Xyaalas *Tyler Hugh Bellis* — Date



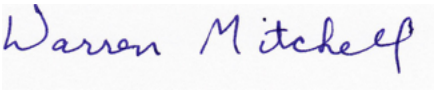
April 23, 2020

Huux *Percy Crosby* — Date

April 23, 2020

Sharon Hadway — Date

Witnessed by:



April 23, 2020

Warren Mitchell, Chair — Date

Objective of this document

This document provides an accounting of factors that we, the Haida Gwaii Management Council, have considered and the rationale we have employed in making our determination, under the authority of KaayGuu Ga gaKyah ts'as – Gin 'inaas 'laas 'waadluwaan gud tl'a gud giidaa, the Haida Stewardship Law *(*Appendix 1), and the provincial *Haida Gwaii Reconciliation Act* (Appendix 2), of the allowable annual cut (AAC) for the Haida Gwaii Management Area. This document also identifies where new or better information is needed for incorporation in future determinations.

Acknowledgement

We wish to express our sincere thanks to the Joint Technical Working Group (JTWG) for their extensive work in compiling and preparing information for consideration in this AAC determination. The JTWG is made up of technical representatives from the Council of Haida Nation (Haida) and the Province of British Columbia (BC). The JTWG was co-led by Nick Reynolds (Haida) and Christine Fletcher (BC). We also greatly appreciate the contributions of outside contractors, hired by the JTWG, whose expertise supported this Timber Supply Review.

Haida Gwaii Management Council

The HGMC consists of two members appointed by the Haida Nation, two members appointed by the Province, and a chairperson jointly appointed by both Governments. The HGMC has the authority to make joint decisions related to a specified set of strategic land and resource decisions (see Appendices 1 and 2). For more information on the HGMC, please visit our website: http://www.haidagwaiimanagementcouncil.ca/.

Prominent among the official responsibilities of the HGMC, is the determination of an allowable annual cut (AAC), to define how much timber may be commercially harvested each year from the Haida Gwaii Management Area ('Haida Gwaii') – which encompasses all of Haida Gwaii except for private land, protected areas, and areas within Indian Reserves and municipalities. The HGMC sets an AAC for Haida Gwaii, and the *Forest Act* (Appendix 3) requires that the determination of AACs for specific management units (Tree Farm Licences, Timber Supply Area, Woodlots, Community Forest Agreements, and First Nations Woodland Licences) that apply to Haida Gwaii (i.e. the management area) not exceed the overall level determined by the HGMC.

Descriptions of Haida Gwaii

Xaadaa Gwaay, Xaaydaġa Gway yaay, or Haida Gwaii ("Islands of the people") is an archipelago of more than 150 islands off the north coast of BC. The mainland north coast of BC lies 80 kilometres to the east across Hecate Strait, and the state of Alaska lies to the north across Dixon Entrance. Haida Gwaii's total landmass of just over a million hectares is situated mostly on two main islands: the larger, Kiis Gwaay (Graham Island), being to the north; and Gwaay Haanas (Moresby Island) to the south.

The 2016 population of Haida Gwaii was 4,198. The five main communities by population in 2016 are Daajiing Giids *Queen Charlotte* (852), HlGaagilda *Skidegate* (837), *Masset*

(793), Gaw Tlagee *Old Massett* (555), and Gaamadiis *Port Clements* (282); these communities account for about 80% of the overall population on Haida Gwaii. The remaining 20% of the population inhabits other areas of Haida Gwaii including the unincorporated communities of Tl.aal *Tlell*, rural Graham Island, and K'il Kun *Sandspit*.

The geography of the Islands is similar to the mainland coast of BC and the southern regions of Alaska, including mountainous terrain, deep fjords, temperate rainforests, sub-alpine forests and alpine tundra.

The rugged mountains that dominate the west side of the Islands descend abruptly into the ocean to form a steep, rocky coastline. The weather is cool and wet, with deep snow at higher elevations. Steep headwater streams and gullies drain the mountainsides, carrying water, sediment and organic materials to the alluvial fans and floodplains that line the valley bottoms.

The Skidegate Plateau occurs east of the west coast mountains and includes the most productive forest lands on the Islands. Many of the largest trees found on Haida Gwaii are located within the Skidegate Plateau. The Plateau has high levels of biodiversity with some of the best habitat for wildlife found anywhere on the Islands.

Relatively flat, lowlands are found to the northeast of the Skidegate Plateau. This area is dominated by extensive blanket bogs, shallow lakes and scrub forest, with patches of productive forest in well-drained areas.

The diverse geography and landscapes of the Islands is reflected in its biological diversity. There are many plant and animal species and sub-species that are only found on the Haida Gwaii archipelago. This is one reason why the Islands are often referred to as "the Galapagos of the North."

Coastal temperate rainforests represent only 2% of the world's forests but provide critical habitat for many unique species. BC has a sizeable percentage of the world's coastal temperate rainforests in areas like Haida Gwaii and the Great Bear Rainforest. Haida Gwaii's coastal temperate rainforests occur at lower elevations with western hemlock, western redcedar and Sitka spruce being the most dominant tree species along with lodgepole pine, western yew, and red alder. High elevation tree species include mountain hemlock and yellow cedar. At yet higher altitudes, closed forests give way to open parkland forests and alpine meadows. About 80% of Haida Gwaii is forested.

Haida Gwaii supports a wide range of wildlife including species for which land use objectives have been legally established. These are black bear, northern goshawk, northern saw-whet owl, marbled murrelet, and great blue heron.

History of the AAC

The AAC for Haida Gwaii's TSA and TFLs totaled 1,786,000 cubic metres in 2000. It varied slightly after that before dropping to 1,224,116 cubic metres in 2007. The AAC increased in 2009 to 1,772,616 cubic metres. Following the land use decision for Haida Gwaii including new protected areas and an ecosystem-based management (EBM) regime reflected in the Haida Gwaii Land Use Objectives Order, the HGMC determined the AAC in 2012 to be 929,000 cubic metres.

Information Sources Used in the AAC Determination

The information sources considered in determining the 2020 AAC for Haida Gwaii include the following:

Legislation and Policy

- Kunst'aa Guu-Kunst'aayah Reconciliation Protocol
- *Haida Gwaii Reconciliation Act*
- *Haida Gwaii Strategic Land Use Agreement*
- *Forest Act* and its regulations, principally
    - *Section 8, Allowable Annual Cut*
- *Forest and Range Practices Act* and its regulations, principally
    - *Part 2, Forest Stewardship Plans*
    - *Forest Planning and Practices Regulation;*
- *Land Act* and its regulations, principally:
    - *Haida Gwaii Land Use Objectives Order*, 2017
- *Wildlife Act*
- *Parks Act* (for defining the THLB)
- *Ecological Reserve Act* (for defining the THLB)
- *Conservancy Act* (for defining the THLB)
- *Indian Act* (under Aboriginal Affairs and Northern Development Canada, for defining the THLB),
- *Public Lands Grants Act* (under the federal Department of Defence, for defining the THLB);
- *KaayGuu Ga ga Kyah ts'as - Gin 'inaas 'laas 'waadluwaan gud tl'a gud giidaa* or Stewardship Law (Haida Nation)
- *Haida Nation Constitution*, principally section *A.8.S6* (Haida Nation)
- *Cedar Stewardship Area Management Plans* (Haida Nation)
- Haida Nation *House of Assembly Resolutions*
- *Cultural Feature Identification Standards Manual* (Haida Nation).

Timber Supply Review

- *Haida Gwaii Timber Supply Review Data Package*, 2019
- *Haida Gwaii Timber Supply Review Analysis Report*, 2019
- *Socio-Economic Analysis in support of the Haida Gwaii Timber Supply Review*, 2019
- *Haida Gwaii Timber Supply Review Public Discussion Paper*, 2019
- Public Review Comments, 2020
- *Haida Gwaii Timber Supply Review Decision Binder*, 2020
- Technical review and evaluation of factors, including public input, in Haida Gwaii that affect the AAC determination through discussion and meetings between the HGMC and the JTWG.

AAC Determination Process

Timber Supply Review

Our AAC determination was supported by a Timber Supply Review (TSR) that assesses the amount of timber available for harvesting over time. An allowable annual cut (AAC) is the maximum average level of timber harvest permitted for a forest management area, usually expressed as cubic metres of wood. The AAC represents a harvest level that aims to balance environmental, economic, social and cultural considerations.

When undertaking a timber supply review in support of an AAC determination, basic elements of timber supply need to be described such as:

- The location and types of forest including timber volumes and values (forest inventory)
- How fast forests grow over time (growth and yield)
- Where timber harvesting can occur (timber harvesting land base)
- Forest management practices based on legal requirements and other factors such as economics
- Rate or level of harvesting over time (such as even-flow annual harvest levels).

Stages in the AAC Determination Process

The stages in the AAC determination process included:

- Joint Technical Working Group (JTWG) began assembling data for the data package
- The Province's Chief Forester provided information needed to analyze timber supply
- Data package, timber supply analysis, and socio-economic analysis completed [November 2019]
- Public discussion paper was released that initiated a 60-day period for review and comment by public and licensees [November 15 to January 14, 2020]
- AAC determination meetings [February 2020]
- **HGMC rationale released** [April 2020].

The data package, timber supply review analysis, socio-economic analysis, public discussion paper and this rationale, along with the Land Use Objectives Order, are all posted on the HGMC website: http://www.haidagwaiimanagementcouncil.ca/.

We undertook a technical review and evaluation of factors, including public input, that affect the AAC determination through meetings with the JTWG held in Queen Charlotte, February 4-6, 2020, and in Vancouver, February 24-25, 2020.

The Province's Chief Forester will make separate AAC determinations under the *Forest Act* for the Timber Supply Area (TSA) and two Tree Farm Licences (TFLs) within Haida Gwaii that must not in total, when combined with Woodlot Licence AACs on public land, exceed the overall AAC determined by the HGMC for the Haida Gwaii Management Area. The determinations by the Chief Forester are required by Section 8 of the Province's *Forest Act*, under which the Chief Forester must regularly determine a new AAC for all TFLs and TSAs in BC.

Protected Areas

Our AAC determination accounts for the deletion from the commercial timber harvesting land base (THLB) of all areas in Haida Gwaii designated with protected status (Haida Heritage Sites/Conservancies) pursuant to the 2007 *Haida Gwaii Strategic Land Use Agreement*, as well as the deletion of previously existing protected areas designated under Haida law and provincial and federal statutes. While prohibiting commercial harvesting, these protected areas can provide for current and future access to cultural cedar by the Haida Nation. The AAC determination process does not include the making of strategic land use decisions, such as the establishment of protected areas.

Guiding Principles for AAC Determination

In order to make explicit the HGMC's approach in carrying out the responsibility for determining AACs for the Haida Gwaii Management Area, the HGMC developed and adopted the following guiding principles. These principles will assist in achieving desired consistency between decisions made by the HGMC in successive AAC determinations for all of Haida Gwaii, and also between the decisions made by the HGMC and those made by the BC Chief Forester and the BC Minister of Forests, Lands, Natural Resources and Rural Development in subsequent AAC determinations for the management units on Haida Gwaii.

Land use objectives

The 2017 Haida Gwaii Land Use Objectives Order sets the objectives for cultural features, aquatic habitats, biodiversity, wildlife, and forest reserves on the Haida Gwaii Management Area. The HGMC incorporates these objectives into AAC determinations by reviewing the ways in which these objectives are actually being implemented in the field and comparing the findings of this review to the inputs applied in the timber supply analysis to represent the objectives.

Biophysical, social and economic factors

In determining AACs, the HGMC considers a number of biophysical, economic, and social factors, comparing information on actual management regimes with corresponding inputs applied in the timber supply analysis. In the 2007 Haida Gwaii Strategic Land Use Agreement, the Haida Nation and the Province committed to 'achieving an initial timber harvest opportunity of no less than 800,000 cubic metres per year'; in its AAC determinations the HGMC considers this commitment as an expression of both the Province's and the Haida Nation's social and economic interests. The HGMC sought guidance from the Parties in 2017 on whether this commitment still applies, and did not receive further guidance. Nevertheless, the HGMC recognizes the importance of maintaining a balance between social, cultural, environmental and economic factors.

Harvest level sustainability

In AAC determinations the HGMC reviews, evaluates and tests the assumptions of a 'base case' harvest-level forecast that, wherever possible, is based on a 'non-declining flow', that is, a forecast that does not decline from one time period to the next, and which is consistent with expressions by the Parties of social and economic interests. Base case forecasts are used as a basis from which to assess the effects of uncertainty on timber supply.

Uncertainty

Changes in the understanding and management of forest ecosystems, and potentially in the expressions by the Haida and the Province of their social and economic interests in the forests of Haida Gwaii, mean there will always be some uncertainty in the information used in timber supply analysis. The HGMC addresses this uncertainty by:

- Reviewing all factors examined in the timber supply analysis and assessing the implications of the sensitivity of the timber supply forecast to changes in each factor;
- Recommending implementation measures as appropriate to help to reduce uncertainties for future decisions;
- Providing implementation guidance with respect to information and management aspects that have a substantial effect on timber supply and can be tangibly measured or monitored to reduce uncertainties for future determinations.

The HGMC reflects, as closely as possible, those forest management factors that are a reasonable extrapolation from current management practices. The HGMC does not incorporate factors that could affect the timber supply that cannot be substantiated by demonstrated performance or are beyond current legal requirements or policy. When considering information about which there is substantial uncertainty, the HGMC examines related analysis to understand the effects on timber supply, and where warranted uses a pre-cautionary approach pending the gathering of new information to reduce uncertainty and clarify timber supply implications.

Risk management decision-making

The HGMC's AAC determination is a choice founded in judgment, not a purely mathematical calculation. Even though the timber supply analysis uses mathematical modeling procedures and is an integral consideration in the determination process, the determination is a synthesis of judgment and analysis of all the factors in which numerous uncertainties are weighed. The AAC determined may or may not coincide with the results of the timber supply analysis, and is essentially a qualitative judgment that, although based in part on technical analysis, also addresses considerations of risk and uncertainty.

To deal with this risk, the HGMC supports frequent assessments of the timber supply and if, following the HGMC AAC decision, information regarding forest-based values or the socio-economic situation on Haida Gwaii changes substantially due to significant legislative or regulatory change, implementation of policies, procedures, guidelines or plans, or catastrophic events, the HGMC may consider making a new AAC determination earlier than 10 years after a previous determination for the Management Area.

Haida Nation consultation

The Province and the Haida Nation have legal obligations to enter into consultation as defined in case law regarding Aboriginal interests. Notwithstanding these obligations the Kunst'aa Guu – Kunst'aayah Reconciliation Protocol, the KaayGuu Ga ga Kyah ts'as – Gin 'inaas 'laas 'waadluwaan gud tl'a gud giidaa (*Stewardship Law*) and the *Haida Gwaii Reconciliation Act* have established a joint decision-making process with respect to the AAC for the Haida Gwaii Management Area. The Haida Nation and the Province of BC are agreed that this process and the delegation to the HGMC of the responsibility

for determining this AAC satisfy the requirement to consult with the Haida Nation in this decision.

Other Statutory Decisions

The AAC determined by the HGMC will guide the BC Chief Forester and the provincial Minister in their statutory decisions related to the management units on Haida Gwaii. The Chief Forester is responsible for AAC determinations for TFLs and the TSA, while the Minister or designate is responsible for AAC determinations for woodlot licences, and when they are established, Community Forest Agreements and First Nations Woodland Licences. The aggregate of the AACs determined by the Chief Forester and the Minister that apply to the Haida Gwaii Management Area must not exceed the AAC determined by the HGMC for the Haida Gwaii Management Area.

We are mindful that our AAC decision-making process should reflect, as much as possible, considerations similar to those of the BC Chief Forester, because those considerations generally encompass factors that define timber supply in an area, without prejudging the BC Chief Forester's approach or fettering that decision maker.

Base Case for Haida Gwaii

Improved information and analysis since the 2012 AAC determination

Since the last timber supply review that supported the HGMC's 2012 AAC determination, several changes have occurred to improve the Haida Gwaii timber supply analysis and the definition of the base case including use of:

- New forest inventory
- Improved site productivity estimates based on a higher number of Haida Gwaii field samples
- Improved information on growth and yield with model estimates compared against field samples
- Improved operational data to estimate the timber harvesting land base and reflect forest practices based on implementation of the land use objectives order
- Better data in general (e.g. use of LiDAR for new terrain and fluvial mapping)
- Refined estimates of natural disturbances
- Detailed operability modeling
- More sophisticated spatial model
- Large number (over 60) of sensitivity analyses.

Role of the Base Case

As part of the technical process, a computer-generated spatially explicit projection of timber supply available under assumed land use and forest management conditions was prepared to provide a 'base case' harvest projection. **This base case projection is not a recommended AAC for Haida Gwaii.** The base case is just one of several projections and sources of information we have considered in our AAC determination. Other sources include the ideas, opinions, and personal experiences of people who live on Haida Gwaii and/or who consider their interests to be affected by the determination. As part of the AAC determination process we have considered the technical data as well as social, environmental, economic and cultural considerations, including those brought forward during the public review period.

Spatial Timber Supply Modeling

The timber supply analysis for Haida Gwaii was performed using the Spatial Timber Supply Model (STSM) that was built with the Spatially Explicit Landscape Event Simulator (SELES) software. STSM allows for explicit modeling of the many factors that impact timber supply and can operate at various scales.

A concern was expressed through public input that the SELES does not account for ecological considerations. SELES-based spatial timber supply models have been used in many areas including Haida Gwaii Land Use Plan and the North Coast Land and Resource Management Plan. In discussions with the JTWG, we are confident that SELES-based STSM is adequately addressing the factors that impact timber supply, including ecological considerations, in support of this AAC determination.

Another concern was raised that measurement, sampling and modeling errors are amplified over long-term projections of timber supply. We do not expect that current data and management approaches will remain unchanged into the future. There is recognition that things will change and need updating, and that is why the *Haida Gwaii Reconciliation Act* requires that the AAC be determined at least once in every 10 years after the date of the last determination. As noted in our 'Guiding Principles', we may consider making a new AAC determination earlier than 10 years if new information is provided, or new land use decisions are made, that significantly impacts this determination.

We are confident that the SELES-based STSM that was used to support this AAC determination provides a reasonable, proven and sophisticated approach to timber supply modeling for the Haida Gwaii timber supply review.

Base Case for Haida Gwaii

The Haida Gwaii timber supply analysis uses the timber harvesting land base and forest management information such as ecosystem-based management (EBM) implementation through the Land Use Objectives Order (LUOO). The analysis includes a timber supply projection, aggregated from the projections prepared for the TFLs and the TSA, using the most up-to-date and best available information. Based on analysis principles such as having an even flow (or non-declining) harvest projection, a timber supply projection is provided that is called the 'base case'.

The initial base case harvest projection is for an annual harvest level of 842,800 cubic metres for Haida Gwaii. The base case harvest projection is expected to increase in the long run to 926,600 cubic metres after decade 10. The current base case is about 10% lower than the AAC of 929,000 cubic metres determined by the HGMC in 2012.

The timber supply review also provides base case harvest projections for the TSA and the two TFLs. These results are relevant for the Chief Forester's determinations for the TSA and TFLs. The initial even flow annual harvest level projection for the TSA is 452,300 cubic metres; for TFL 58 it is 91,200 cubic metres; and for TFL 60 it is 298,300 cubic metres.

About 30% of the harvesting on Haida Gwaii is currently from second growth forests. The base case projection suggests that in the next decade about 55% of harvests will be in second growth stands, and that it will be nearly 80% in 40 years. There was public input expressing concern that in 40 years there will no longer be natural stands in the THLB. We

note in response that the representation of the THLB by age class does not account for the retained older forests that are not in the THLB yet are spatially interspersed with the THLB (e.g. many of the reserves required under the LUOO that protect aquatic habitats, biodiversity, and wildlife and aquatic habitat). The THLB is not a spatially contiguous area, and over time following harvesting will be a diverse mosaic of managed and natural stands.

The base case is one of many possible harvest flows. We have also considered alternative harvest projections, and several sensitivity analyses. A sensitivity analysis (sometimes called scenarios) examines how changes in base case assumptions impact timber supply. These analyses have been helpful as we refer to several of them in support of our determination. We are satisfied that the base case, in combination with other analyses as noted and described, represent the best information available to us respecting various aspects of the current projection of the timber supply for Haida Gwaii, and that as such they are suitable for reference in our considerations in this determination.

Forest Inventory and Ecosystem Mapping

Forest Inventory

The forest inventory used for this timber supply review consisted of the most up to date:

- Vegetation Resource Inventory (VRI) completed for all of Haida Gwaii between 2011 and 2013 for natural stands for attributes such as species, age and site index; the inventory was updated to 2018 to account for growth and disturbances
- LiDAR Enhanced Forest Inventory for natural stands for attributes such as volume, basal area and heights
- Silviculture records from the Reporting Silviculture Updates and Land Status Tracking System (RESULTS) for existing managed stands.

The VRI includes two phases: Phase 1 photo-interpreted inventory; and Phase 2 mature stand ground audits that enable Phase 2 attribute adjustments to be made.

Two types of field audits were used to assess the accuracy of the inventory:

- Mature stand audit (as discussed above)
- Young Stand Monitoring.

The mature stand audit results indicated that the photo-interpreted ages matched ground samples very well; that ground-measured heights were slightly lower than the photo-interpreted inventory; and that ground-measured basal area and number of trees per hectare were substantially greater than the photo-interpreted inventory. However, due to large sampling errors, the results of the mature stand audit were not used to adjust the inventory.

LiDAR coverage was acquired for a significant portion of Haida Gwaii between 2015 and 2017 through various partners and projects. LiDAR was used to provide enhanced terrain stability and active fluvial unit mapping; and was also used to enhance the photo-interpreted forest inventory for attributes such as volume, basal area and height. LiDAR covers the majority of the timber harvesting land base (THLB) but is lacking in some areas such as northwest Graham Island.

Both the Phase 2 mature stand audit and Young Stand Monitoring measurements supported

the LIDAR Enhanced Forest Inventory (LEFI). LEFI was a foundation for the natural stand volume curves used in the base case and all sensitivity analyses undertaken.

There was public concern about the difference in cedar volumes from ground plots and that the Phase 1 photo-interpreted inventory was not accounted for in LEFI. In response, we note that although the ground plots were not used to adjust the VRI, they were used to calibrate LEFI that supported the timber supply analysis.

There was another comment that cedar volumes are underestimated in the appraisal cruise when compared to scaled timber. The JTWG undertook a LEFI volume validation analysis in part to address this issue. The analysis results do not support the conclusion that cedar volumes are underestimated in the inventory. A principle reason why LEFI-based volumes are not considered to underestimate cedar volume is because the LEFI-based volume was calculated using local taper and loss factors. We believe this is an important distinction between volumes in inventory used in this timber supply review as compared to appraisal cruise or VRI-based volume estimates.

We appreciate the level of effort made to upgrade the forest inventory since the last timber supply review including the completion of the new VRI, the use of LEFI, calibrated with the use of ground plots for natural stands, and the use of RESULTS for managed stands. Consequently, there is much better forest inventory information in support of this timber supply review and AAC determination. We are satisfied that the best available information regarding the forest inventory was used to support the base case.

Under '**Implementation**', we recommend that both governments (Haida and the Province) work with industry and other partners to fill existing gaps in LiDAR coverage on Haida Gwaii (e.g. northwest Graham Island). Under '**Implementation**', we also recommend that both governments continue to support research and inventory projects like Young Stand Monitoring that improve the forest inventory on Haida Gwaii.

Ecosystem Mapping

As part of the timber supply review, 17 ecosystem mapping projects on Haida Gwaii conducted between 1994 to 2019 were collated. The mapping was primarily Terrestrial Ecosystem Mapping (TEM) and Predictive Ecosystem Mapping (PEM) using the Biogeoclimate Ecosystem Classification (BEC), standard unit mapping to the site series level from silviculture prescriptions (RESULTS), and biophysical mapping for Gwaii Haanas.

The ecosystem mapping has multiple applications in the timber supply analysis including its use to: (i) predict site productivity using the Site Index Estimates by BEC Site Series (SIBEC) as discussed below; and (ii) support of LUOO implementation regarding the protection of blue and red-listed ecosystems, forested swamps, and the protection of rare and common ecosystems.

In the last AAC determination, the HGMC recommended ecosystem mapping be completed for all of Haida Gwaii consistent with TEM standards. Although this has not yet been achieved regarding TEM standards, great progress has been made in the completion and collation of ecosystem mapping projects for Haida Gwaii. Under '**Implementation**', we recommend that both governments continue to support research and inventory projects like updating ecosystem mapping to TEM standards as this will improve forest management on

Haida Gwaii. Meanwhile we accept the existing collated ecosystem mapping used in the timber supply review as the best available information to help inform our AAC determination.

Site Productivity, and Growth and Yield

Site Productivity

Site index (SI) is commonly used to assess site productivity for managed stands. SI is the expected average height in metres of a given stand at age 50. For example, a SI 25 stand will be 25 metres tall at 50 years of age. SIBEC is the primary source for SI for this Haida Gwaii timber supply review. Based on SIBEC plots and consistent with SIBEC standards, SIBEC estimates SI for each BEC site series, by tree species, in BC.

During the timber supply review, 685 forest mensuration plots from various sources were collated to increase the SIBEC samples for Haida Gwaii. The JTWG compiled these supplementary plots, along with SIBEC plots and additional research plot data into one dataset with 1,170 plots. This enabled an enhancement of SIBEC estimates for site index on Haida Gwaii for managed stands. The enhanced SIBEC estimates were spatially linked to the BEC site series available from existing ecosystem mapping. Harvested areas with RESULTS data used RESULTS SI estimates that for the most part use SIBEC. Any remaining gaps in SI estimates for managed stands use the Provincial Site Productivity Layer (PSPL).

Based on our discussions with the JTWG, we are satisfied that the best available site productivity estimates were used in the base case. Under '**Implementation**', we recommend that both governments continue to support research and inventory projects like SIBEC supported growth and yield plot re-measurements, and that new plots be established in poorly represented stands in order to improve information available for forest management decisions on Haida Gwaii.

Growth and Yield

Existing and Future Managed Stands

Managed stands are those established after harvesting since 1986 on Haida Gwaii. The *Table Interpolation Program for Stand Yields* (TIPSY) is a growth and yield model used in BC to estimate managed stand yields generated by *Tree and Stand Simulator* (TASS). TASS projects growth for single-species, even aged stands based on over 15,000 Permanent Sample Plot (PSP) measurements in BC. TIPSY was used for all existing and future managed stands in the timber supply review. For mixed species stands, TIPSY pro-rates species information from TASS.

Species composition (up to 5 species), site index and stand density inputs are provided to TIPSY from the RESULTS silviculture data system for existing managed stands. Future managed stands use the attributes from RESULTS averaged to site series. All stands established after 1986, but lacking RESULTS silviculture records, are regenerated on TIPSY future managed stand curves.

There was public input expressing concern that species composition in managed stands reflect what is actually planted, that TIPSY is not able to account for naturally regenerated

portions of stands, and that including model inputs such as PSPs from outside Haida Gwaii may not give us accurate information. The JTWG showed us the analysis of planting records from 933 RESULTS openings that compared planted stems to free growing stems and many records do indicate a lot of natural ingress. Even though TIPSY cannot account for a mixture of planted and natural stock, the JTWG used free-to-grow surveys to adjust for increased densities from ingress relative to initial planting records. In addition, any remaining uncertainty in this factor can be accounted for in future determinations as forests are re-inventoried.

Forty-three (43) Young Stand Monitoring plots, established in 2016, targeted stands between 15 and 50 years of age to compare, among other things, observed stand yields with those estimated from managed stand yield models. Based on the plots sampled, there was no statistically significant difference between observed and modeled managed stand yields.

Due to recognition of natural ingress, the genetic worth for managed stands was set as zero in the base case. In addition, managed stand initial densities were adjusted to ensure that stand density at free-to-grow age is close to that recorded in RESULTS free to grow surveys; this adjustment accounts for natural ingress. Species composition changes over the harvest rotation were also evaluated and considered. The results suggest that leading species composition does not change significantly over an average 18-year plot re-measurement period e.g. western redcedar leading stands remain cedar leading. That said, there remains some uncertainty regarding managed stand growth and yield with on-going research aimed to address that uncertainty, and there is very little information on the growth and yield of managed yellow cedar. Due to a lack of data, the growth of yellow cedar is modeled the same as that of western redcedar, but their growth habits are different.

For second growth stands in the THLB, the maximum average volume increment ranges from about 5 m3/ha/yr on less productive sites to about 10 m3/ha/yr on the best sites. The THLB average is about 8 m3/ha/yr.

In reviewing this factor with the JTWG, we are satisfied that the best available information was used to estimate the growth and yield of existing and future managed stands in support of the base case. Under '**Implementation**", we recommend that information on the growth and yield of managed yellow cedar stands be obtained.

Operational Adjustment Factors

TIPSY estimates for growth and yield assume full site occupancy and no losses with age. Operational Adjustment Factors (OAF) are applied to better account for actual conditions. OAF1 is designed to capture gaps in the managed forests (e.g. due to bedrock outcrops, small gaps in productive forest), with a provincial default factor of 15% of the area of a stand assumed to not be occupied by commercial trees. OAF2 increases the mortality of the managed stand with age to account for endemic biotic factors (e.g. forest health impacts); and decay, waste and breakage. The provincial default is 5% loss at 100 years. The use of both defaults lowers the growth and yields projections from TIPSY by 20% at age 100.

If local information is obtained that suggests the OAF defaults are too high or too low, then the other reduction factors could be applied. Young Stand Monitoring plots on Haida Gwaii indicate that tree-level forest health factors affected 7% of the live trees, however not all of these factors will cause mortality and thereby affect merchantable volume.

The JTWG offered a conclusion that the timber supply analysis supporting the base case applied the provincial OAF1 and OAF2 defaults as there was no conclusive evidence that local information should be used to replace this. We concur with that conclusion, and accept this factor as modeled. We also note that programs like Young Stand Monitoring can improve estimates of OAF locally. Under 'Forest Inventory' above, we recommend that both governments continue to support Young Stand Monitoring.

Regeneration Delay

Regeneration delay is the number of years from disturbance (e.g. harvesting) to the beginning of stand establishment. For all planted sites, the default used in the timber supply analysis was 1 year, which assumes stands are planted 1 year after harvesting. The analysis also assumed one-year old planting stock are used, effectively moving the regeneration delay to zero. The analysis is based on current practices. We concur the best available information was used to account for regeneration delay in the base case.

Regeneration Stock Height

Planted tree stock heights used in the timber supply analysis are the defaults used within TIPSY, for example, 22 cm for western hemlock and 27 cm for western redcedar. All stock ages are assumed to be one year old. We are satisfied that the best available information was used to account for this factor in the base case.

Regeneration Density

Regeneration density is the number of trees established within the stands expressed as stems per hectare (SPH). Stands are typically a mix of planted trees and ingress of natural regeneration. Free growing surveys measure well-spaced trees that are anticipated to become crop trees and typically occur 8 to 12 years after planting. Therefore data from free growing surveys is a more useful indicator of species composition than planted trees.

In the analysis a density adjustment factor was applied to free growing survey densities by BEC unit to estimate regeneration density at the time of planting so that this could then be factored into TIPSY.

We conclude that the best available information was used in the base case to account for regeneration density.

Genetic Worth

Genetic worth is an indication of the quality of genetically improved seed, as generally represented by a percentage volume increase expected near harvest age. The Ministry's Forest Genetics Program develops genetically improved seed ('select seed') through selective breeding programs of seed collected from superior natural (wild) trees.

The weighted average use of select seed over a 15-year period on Haida Gwaii amounts to 71% of all seed. Of that select seed, the majority has a genetic worth of 2%. When accounting for the amount of select seed used overall, and use by species, the weighted average genetic worth for all seed use for all species is about 1.3%.

The Haida Gwaii Young Stand Monitoring project found that about 50% of its randomly established plots were made up of natural stands likely from natural regeneration rather than from planted seedlings derived from select seed. The uncertainty regarding the amount of planted trees versus natural regenerated trees in young forests on Haida Gwaii reduces the likelihood that about 1.3% genetic worth occurs in managed stands.

Given this information, it was decided not to include genetic worth in the TIPSY growth curves for managed stands on Haida Gwaii in the base case.

There was public comment agreeing with not including genetic worth in the analysis. There was also public input expressing concern that genetic worth was assumed in the timber supply review – which was in fact not the case.

Public input also included concern that seedlings planted may adversely affect biodiversity as they are not grown locally on Haida Gwaii. Although there is no seed nursery on Haida Gwaii, the seed used in nurseries in BC are sourced from Haida Gwaii (Haida Gwaii parentage). We have heard concerns that yellow cedar seed is from a very limited source, which is of concern given yellow cedar declines on Haida Gwaii due to climate change.

In reviewing this factor with the JTWG, we are satisfied that genetic worth was not included in the base case.

Natural Stands

Natural stands are defined as those stands on Haida Gwaii that have no history of silvicuture and were established before 1986. The Variable Density Yield Projection version 7 (VDYP7) is the provincial growth and yield model used for updating and projecting Vegetation Resource Inventory (VRI) attributes. VDYP is based on 52,000 permanent sample plots and 9300 temporary sample plots province-wide.

VDYP7 projects stand height, diameter, basal area, stems per hectare, and volumes for various utilization levels and stand ages. Inputs are age, height, species composition, density of stems, basal area, site index, and BEC unit.

VDYP7 is also used to create natural stand yield tables for timber supply analysis. In the Haida Gwaii timber supply review, all of the natural stands have height and volume curves generated using VDYP7.

The base case natural stand height and volume curves are used for all the timber supply review modeling including the scoping of the base case and the sensitivity testing. The VDYP inputs are mostly from LEFI, except age and species composition from the new Phase 1 VRI. The analysis unit versions of these initial LEFI based VDYP curves were adjusted to synchronize with LEFI volumes and to set the utilization level to 17.5cm.

Several sets of VDYP7 yield curves were created. These include: (i) Phase 1 VRI VDYP yield curves (not used); (ii) Phase 2 (mature ground audit) attribute adjustments made to VDYP inputs to arrive at yield curves (for comparison purposes only); (iii) polygon specific LiDAR Enhanced Forest Inventory (LEFI) curves from a combination of VRI Phase 1 and LEFI inputs; (iv) LEFI based VDYP curves aggregated into 66 analysis units; (v) LEFI based VDYP curves adjusted based on LEFI estimates of net merchantable volume applied to the 66 analysis units; and (vi) the final set also includes a utilization adjustment. Ministry inventory specialists recommend using LEFI attributes to derive natural stand yield curves as it represents the best available information

The LEFI derives attributes for basal area, height, stems per hectare, diameter, and net merchantable volume and all of them except merchantable volume were used as VDYP inputs. VRI Phase 1 attributes for species composition and stand age were needed to complete the VDYP inputs. The resulting polygon specific LEFI based VDYP curves

were aggregated into 66 analysis units based on BEC zone, leading species and site index which enabled the curves to be applied throughout Haida Gwaii including areas without LiDAR coverage as part of the base case. As noted earlier under 'Forest Inventory', the timber supply review modeling did not use the VRI Phase 2 studies' attribute adjustments because better information from LiDAR/LEFI was available to take its place.

We appreciate the collaborative approach taken on Haida Gwaii among many partners to acquire LiDAR coverage, and to utilize this coverage in the timber supply analysis to support estimates of natural stand growth and yield for all of Haida Gwaii. We conclude the best available information was used to support the base case to account for natural stand growth and yield.

Timber Harvesting Land Base

The timber harvesting land base (THLB) is the area assumed to be available for commercial timber harvesting when considering protected areas, ecosystem-based management (EBM) as reflected in the Haida Gwaii Land Use Objectives Order (LUOO), current management practices, and other pertinent factors. The total area of Haida Gwaii is about 1,004,982 hectares.

Each of the factors described below represent spatial net downs (or removals) from the THLB. The THLB used for the base case accounted for net down factors leaving 147,746 hectares in the THLB – which is about 15 percent of Haida Gwaii. While the base case is a useful reference, we examined many scenarios with varying amounts of THLB, with serious consideration of scenarios ranging from a high of approximately 150,000 hectares to a low of 131,000 hectares. The total or gross area removed from the base case THLB is described for each factor - this includes overlaps with other factors. Public input is described where provided by factor.

The LUOO requires that features and reserve zones identified or retained by licensees for various values be documented and submitted as digital spatial data at the end of each calendar year to the Council of Haida Nation and the Province of BC. To improve on these LUOO annual submissions, under '**Implementation**', we recommend that both governments work with forest licensees to ensure annual submissions of LUOO digital spatial data follow consistent data management protocols.

There was public concern that the THLB in the base case needs to account for future forest reserves to ensure we are not over harvesting. The JTWG used the information about current practices, obtained in part from LUOO submissions, to not only account for existing reserves in developed areas, but also to project requirements for future reserves in undeveloped portions of the THLB.

The LUOO also enables licensees to modify default requirements provided that certain conditions are met and an intergovernmental process is completed. This involves the licensee making a risk-managed LUOO application, the results of which if prevalent may lessen the impact on timber supply relative to the default requirement. Given this, under '**Implementation**', we recommend that both governments continue to monitor risk-managed applications that are submitted and tracked at the Solutions Table and the decisions from the Council of Haida Nation and the Province of BC on those applications so that this information can support the next timber supply review.

There was public comment that the base case THLB does not account for the ability of forest companies to extract value from areas identified as non-economic. The JTWG did look at forest practices over a full market cycle (e.g. 10 years) when defining economic constraints on harvesting. No specific consideration was given to potential emergence of new technologies that might expand the range of wood that could provide market value. To do so, in our opinion, would be highly speculative. The statutory requirement that we must determine the AAC at least every 10 years allows us to factor in any new proven technologies in future timber supply reviews.

Protected Areas, Non-Forest, and Administrative Areas

Protected Areas

All protected areas on Haida Gwaii jointly recognized by the Haida Nation, federal and provincial governments were excluded from the THLB. The total area of protected areas is 478,008 hectares representing about 48 percent of Haida Gwaii. We are satisfied that this deduction from the THLB is appropriate as commercial timber harvesting is not legally permissible in protected areas. That said, timber may be harvested in the protected areas for cultural purposes.

Surface Water and Non-Forest

Terrain Resource Information Management (TRIM) maps provide base data for BC. All TRIM waterbodies, totaling 64,685 hectares, were removed from the THLB. All non-forested areas totaling 86,940 hectares, such as wetlands and alpine areas, and areas unable to grow to a height of 5 metres in 50 years, as identified in the Vegetation Resource Inventory (VRI), were also removed from the THLB.

There was a public comment questioning an increase in non-forested areas between the 2012 and current timber supply reviews. The JTWG has responded that the 2012 analysis accounted for non-forested areas across various exclusion factors (non-productive, non-forest, no typing available, no species information in the inventory). This, as well as now having a new forest inventory, means that this factor is not easily comparable between timber supply reviews. Overall the new inventory information is considered to provide a superior source of base data than what was available in 2012.

Roads

Existing and future roads represent a loss of productive forest area and were removed from the THLB. Existing roads totaling 7,488 km in length were mapped using a variety of sources including TRIM, historic licensee road data for TFL 39, road segments from the RESULTS dataset, and roads from a mapping gap analysis conducted by the Council of Haida Nation's Heritage and Natural Resource Department using high resolution imagery. Existing roads were classified as 'permanent' (322 km), 'mainline' (1,412 km), and 'branch' (5,754 km). An analysis of average non-vegetated road width was undertaken leading to a 10 metre and 20 metre buffer width for branch roads and permanent/mainline roads, respectively. All existing roads, including the buffer area, with a total area of 9,100 hectares were removed from the THLB.

A review of harvesting in second-growth forests was conducted to determine if older re-vegetated roads had contributed to harvestable volumes. The review found that road right-of-way volumes have not contributed to merchantable volumes. Additional data can be

collected before the next timber supply review to determine if older road right-of-way volumes contribute to timber supply.

An estimate of 6.4 percent for future roads in undeveloped areas of the THLB was determined by examining the proportion of roaded to unroaded area in 725 cutblock openings over the last 10 years. The timber supply analysis model harvests the existing standing timber on future roads.

There was public input that many roads become re-forested and therefore excluding the full 6.4 percent for future roads from the THLB would overstate the impact on timber supply. In response, red alder is the typical ingress species for abandoned roads, and alder represents a minor commercial species on Haida Gwaii contributing about 0.3 percent of the volume billed between 2013 and 2017. Also, road widths tend to be less productive than adjacent forest stands, and on Haida Gwaii older roads that are not needed are decommissioned and not rehabilitated. And as noted earlier, there is no evidence at this time that timber volumes on older roads have meaningfully contributed to harvest levels.

Given the concern that was raised a sensitivity analysis was undertaken to assess the impact of applying no netdowns for future roads and a separate analysis that assumed alder dominated growth and harvest on branch roads. The resulting effect on timber supply, under both scenarios, relative to initial harvest projections for the next several decades in the base case was negligible. The analysis did find that long-term timber supply would increase.

Having reviewed this factor with the JTWG, we are satisfied that the base case appropriately accounted for existing and future roads by removing these areas from the THLB. Should information be gathered in the future that shows that some harvesting occurs on older roads, then this can be accounted for in the next timber supply review.

Federal and Provincial Reserves, Private Land & Municipal Lands

Federal reserves (about 2600 hectares), provincial reserves (about 6,260 hectares), private land (about 17,300 hectares), and municipal lands (about 3,100 hectares) were removed from the THLB in the base case.

The *Haida Gwaii Reconciliation Act* excludes federal Indian Reserves, municipal lands and private lands from the Haida Gwaii Management Area – the area from which the HGMC can make an AAC determination. We conclude that it is also appropriate to exclude other federal reserves (e.g. military reserves) and provincial reserves from the THLB as was done to define the base case.

Section 8 of the *Forest Act* enables the Chief Forester to determine an AAC that includes some areas within municipal lands. The Minister's (or designate's) AAC determination for woodlots includes both public and private land. Our determination for the Haida Gwaii Management Area excludes municipal lands and includes public land portion of woodlots. These discrepancies make it confusing to determine how the Chief Forester's and Minister's determination align with our determination for Haida Gwaii. Under '**Implementation**', we therefore recommend that the discrepancies between how municipal lands and woodlots are considered in AAC determinations by the HGMC and the Province be remedied so that they are better aligned.

Land Use Objectives Order – Cultural Objectives

Cedar Stewardship Areas

Objective 3 (1) maintains cedar stewardship areas (CSAs) to provide a supply of cedar for present and future cultural use. CSAs are shown in Schedule 3 of the LUOO. Objective 3 (2) allows up to 10% of CSAs to be harvested provided that an intergovernmental process is completed and that other specified conditions are met. Since 2011, less than 10 hectares of the CSAs have met those conditions and been harvested. Given that small area, all 25,303 hectares of CSAs were removed from the THLB.

Although there is no requirement to do so under the LUOO or policy, at times the Council of Haida Nation have requested a 1.0 tree length buffer to be put around the CSAs to protect their integrity. A sensitivity analysis that assessed the impact of buffering CSAs by 1.0 tree length found the impact would decrease the THLB by 1240 hectares or 0.8%.

Currently the Council of Haida Nation and the Province of BC are in discussions about creating new CSAs near Masset. If the areas under discussion were added to the CSAs the JTWG concluded the likely impact would be less than 1% of the THLB.

Consistent with our guiding principles, which include not accounting for decisions or policies that have not yet been made, we are satisfied that the timber supply analysis appropriately accounted for CSAs in defining the base case. Should new CSAs be designated, a policy regarding buffers be approved, or a change in practice leads to increased harvesting access of CSAs via risk-managed applications, then we can account for this in the next timber supply review. We are also mindful that any uncertainty regarding future decisions in this regard will likely have a minor impact on the THLB.

Under '**Implementation**', we conclude that although there is no LUOO requirement regarding buffers around CSAs, at times the Council of Haida Nation have requested a 1.0 tree length buffer around CSAs; as a consequence we recommend that forest practices should be monitored adjacent to CSAs so that these practices can be appropriately addressed in support of the next timber supply review.

Haida Traditional Heritage Features, Culturally Modified Trees & Heritage Sites

The LUOO addresses heritage values through: (i) Section 5 objectives for Haida Traditional Heritage Features; and (ii) Section 9 objectives for Culturally Modified Trees (CMTs). The *Heritage Conservation Act* also provides protection for heritage sites that include archaeological resources within BC.

<u>Haida Traditional Heritage Features</u>

Haida Traditional Heritage Features include those listed in Schedule 2 of the LUOO with a 500-metre buffer applied around Class 1 features (e.g. village, camp, burial site), and a 100-metre buffer applied to Class 2 features (e.g. midden, bear trap, fish weir, cave, petroglyph, trail). Class 1 and 2 features under LUOO are the most sensitive and the most widely studied types of heritage features that also have protection under the *Heritage Conservation Act.*

Most timber harvesting avoids these features and identifies them as a result of a pre-harvest Archaeological Impact Assessment and/or Cultural Feature Identification Survey.

A variety of data sources were used to identify and buffer Class 1 and 2 heritage features in the timber supply analysis.

There was public input expressing concern that Haida Oral History sites such as oral history trails require a 500 metre buffer as a Traditional Heritage Feature. In response, the JTWG reported to us that oral history sites associated with the Haida place names data set (villages, camps) were identified as Class 1 features and provided a 500-metre buffer in the timber supply analysis. The Traditional Trails layer in the trail data set, however, is a strategic-level estimate of Haida traditional travel routes that should be used to inform archaeological assessments but are too coarse in scale to represent actual trail locations. Known traditional trails are Class 2 features and are provided a 100-metre buffer as per the LUOO. Sensitivity analysis indicated that if the strategic-level Traditional Trails layer were applied and provided a 100-metre, this would result in a net area of 284 hectares being removed from the THLB resulting in a 0.2% decrease in THLB.

Culturally Modified Trees

A culturally modified tree (CMT) is a tree that has been altered by Indigenous people as part of their traditional use of the forest. Examples include trees with bark removed, stumps and felled logs, trees tested for soundness, trees chopped for pitch, trees with scars from plank removal, and trees delimbed for wood. The LUOO defines a CMT to be a tree that was modified prior to 1920 by Haida people as part of their cultural use.

Objective 9 (2) in the LUOO protects all CMTs to support the Haida Nation's present and future cultural use. Section 9 (6) requires that a reserve zone with a minimum width equal to 0.5 tree length be maintained; Section 9 (8) requires that a management zone with an average width equal to 1.0 tree length be adjacent to the reserve zone in order to protect the integrity of the reserve; and Section 9 (9) requires that at least 90% of the management zone be maintained or recruited as mature or old forest.

The Council of the Haida Nation and the Province of BC have been systematically cataloguing CMT data since the 1980's. A variety of data sets were used in the timber supply analysis to identify CMTs. For known CMTs, existing retention buffers (reserve and management zones) were removed from the THLB.

For not yet identified CMTs, the area removed from the THLB was based on predicted likelihood of finding CMTs based on 2012-2016 annual submissions required under Section 9 (11) of the LUOO. This resulted in a 1.8% average reduction in the THLB per hectare of operating area.

Heritage Sites

The *Heritage Conservation Act* provides for the protection of heritage sites in BC. The Act defines a heritage site to mean, whether designated or not, land, including land covered by water, that has heritage value to BC, a community or an aboriginal people. The Act protects heritage sites that include archaeological sites.

A total of 2,132 archaeological sites were identified from the BC Heritage Branch's Registered Archaeological Sites data base updated to 2019, and all were removed from the THLB in the timber supply analysis. Many of the sites overlapped with features protected under the LUOO such as CMTs.

Conclusion

The timber supply analysis removed 27,946 hectares from the THLB to account for Haida Traditional Heritage Features, CMTs, and heritage sites. In reviewing these heritage values with the JTWG, we are satisfied these heritage values were appropriately accounted for in the base case consistent with the direction of the LUOO and the requirements of the *Heritage Conservation Act*.

Haida Traditional Forest Features

Haida Traditional Forest Features consist of 11 types of Class 1 features and 10 types of Class 2 features as per Schedule 2 of the LUOO. Section 6 (2) and (3) require a 2.0 tree length buffer (reserve and management zone) for Class 1 features. Section 6 (7) requires stand level retention to protect Class 2 features.

The amount of area not harvested to account for these features was determined from 2012-2016 annual submissions as required under Section 6 (9) of the LUOO. These areas were removed from the THLB (current in-block retention), as well as used to estimate their distribution across old and young forest to inform a netdown for predicted occurrences

The frequency and distribution of the reported features by dominant type (i.e. Devil's club for Class 1, and Hellebore and Pacific crabapple for Class 2 features) were used in the timber supply analysis to predict the area of retention required to protect those features in new forest development areas.

Based on this analysis, 0.7% and 0.1% exclusion factor (from the THLB) was applied for old (>250 years) and younger (<250 years) forests, respectively, to account for Class 1 features; and a 2.3% and 0.1% exclusion factor was applied old and younger forests, respectively, for Class 2 features.

In reviewing this factor with the JTWG, we are satisfied that the best available information was used to account for Haida Traditional Forest Features in the timber supply analysis.

Western Redcedar and Yellow Cedar Retention

Section 7 (1) of the LUOO requires that: within a development area, retain a minimum of 15% of the combined pre-harvest composition of western redcedar and yellow cedar with a minimum of one hectare where: (i) the development areas are greater than 10 hectares and the combined cedar component of pre-harvest stand composition is greater than 30%; or, (ii) the development areas are equal to or less than 10 hectares and the combined cedar component of the pre-harvest stand composition is greater than 60%.

LUOO annual submission data between 2012-2016 indicated that as much as 51% of development areas were retained to meet the LUOO and other legal requirements or operability considerations. Much of these areas in retention represent sites with higher productivity (e.g. riparian areas, monumental cedar reserves). As such it was assumed that the minimum 15% retention targets for western redcedar and yellow cedar are met within existing reserve, management zones or retention areas.

Western Yew Retention

Section 8 (1) of the LUOO protects all western yew patches in development areas through stand level retention. Section 8 (3) protects individual yew trees at the stand level where

practicable. Known or existing retention areas were accounted for based on annual submissions on western yew required under Section 8 (4) of the LUOO. Nearly all yew occurrences were found in old forests greater than 250 years of age. Future yew retention areas were estimated based on the amount of area likely needed in these older forests to protect yew. Based on annual submissions, 2.3% of old forests (>250 years) were excluded from THLB to account for future western yew retention. We are satisfied that the best available information was used to account for western yew in the timber supply analysis.

Monumental Cedar

The Haida have used and continue to utilize western redcedar and yellow cedar for traditional and cultural purposes. Some examples of traditional and cultural uses include totem poles, dug-out canoes, and longhouses. The LUOO defines monumental cedar to be visibly sound western redcedar or yellow cedar tree that is greater than 100 centimeters (cm) in diameter at breast height (dbh) and has a log length of 7 metres or longer above the flare with at least one face that is suitable for cultural use. Objective 9 (3) protects all monumental cedar greater than 120 cm in dbh to support Haida Nation's present and future cultural use.

The LUOO defines a cultural cedar stand to mean three or more CMTs, monumental cedars, or a combination thereof, where each tree is within 50 metres of another tree. Objective 9 (1) of the LUOO protects all cultural cedar trees to support the Haida Nation'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 defined in Objective 9 (3) but allows some harvesting under specified conditions under 9 (5) (a) and (b).

Similar to CMTs, Objective 9 (6) requires a 0.5 tree length reserve zone adjacent to cultural cedar stands and monumental cedar that are protected or retained, and Objective 9 (8) requires a 1.0 tree length management zone adjacent to the reserve zone in order to protect the integrity of the reserve. At least 90% of the management zone needs to be maintained or recruited as mature or old forests.

Objective 9 (11) requires an annual submission of retained or managed monumental cedars and cultural cedar stands. Based on 2012-2016 annual submission data of 1085 monumental trees, 763 (70%) were protected and 322 (30%) were harvested. For known occurrences of monumental cedar, the reserve and management zones were entirely removed from the THLB. This resulted in a total area of 442 hectares being removed from the THLB.

New *Cultural Features Identification Standards* v5 (CFIv5) were approved by the Council of Haida Nation in December 2019. The new CFIv5 standards were designed to better implement the existing LUOO requirements, not to revise the LUOO. Section 4 (1) of the LUOO specifies that field assessments for monumental cedars (and other cultural features) be completed by a person who has been certified by the Council of Haida Nation. The new Standards v5 support this certification process.

CFIv5 standards guided assessments regarding the amount of monumental trees that may be protected in the future. Correlating provincial log grades with the new standards allows for estimates in the frequency of occurrence of monumental cedar. The comparison showed that higher log grades have a higher chance of being classified as monumental

cedar. This led to sensitivity analysis that explored varying proportions that different log grades contribute to monumental cedar volumes.

Harvest Billing System and District scale data were used to quantify the frequency of occurrence of cedar log grades, as well as an estimate of the frequency of these logs being monumental cedar. The next step was to determine the expected number of monumental cedar per hectare. Higher quality cedar is generally found with higher volumes of cedar, and monumental cedar is generally found in older forests >250 years of age (age class 9). The final step in the analysis was to assign buffers to the monumental cedars that emulate the requirements under the LUOO.

In the base case, it was assumed that monumental cedars would only be found in age class 9. The base case also assumed an estimate of monumental cedar volume by scale grade (relative to total cedar volume), linking that proportion to the forest inventory, converting the volume to individual trees and then randomly distributing them across the landscape. Operational data from the implementation of the LUOO suggest that up to 70% of monumental cedars have been retained. This was therefore assumed in the base case as best representing current practice. The assumptions used in the base case to account for monumental cedars that may need to be protected in the future resulted in a total area of 77,615 hectares being removed from the THLB.

Several sensitivity analyses or scenarios were undertaken given uncertainties in accounting for the protection of future monumental cedars due to correlations with age and log grades, and retention levels. Many of these uncertainties were expressed during the public review (see Public input below), in turn supporting further review and analysis. In response to these uncertainties, the JTWG compiled additional information to explore: (i) indications that younger age classes (than age class 9 assumed in the base case) could contribute monumental cedar; (ii) the likelihood that a broader range of log grades than assumed in the base case could contribute to monumental cedar; and (iii) the timber supply implications of various levels of retention of monumental cedar from harvesting.

For example, some large cedar occurs in Age Class 8 (140 to 250 year old stands) and a few may also occur in Age Class 7 stands (121-140 years of age). Base case assumptions regarding the distribution of monumental cedars by log grade type may be under-represented, however there is greater uncertainty with lower quality log grades (e.g. I, K, L, M and U grades).

Scenario 1 examined the effect of applying the base case estimates of monumental cedar (e.g. only in age class 9 stands, 5% of the volume inventory of cedar considered monumental cedar, 70% retention levels). This resulted in a 5.1% increase in timber supply relative to the base case. The estimated number of monumental cedar protected under this scenario is 105,998 trees.

Scenario 2 widened the ages where monumental cedar can be found to include Age Class 7 and 8 (in addition to Age Class 9). This scenario resulted in 1.6% decrease in timber supply relative to the base case. The estimated number of monumental cedar protected under this scenario is 161,488 trees.

Scenario 3 also included Age Class 7 and 8, and increased distribution of monumental cedar by log grade relative to the base case and Scenario 2 (i.e. 6% of cedar volume are

monumentals). This resulted in a 3.5% decrease in timber supply relative to the base case. The estimated number of monumental cedar protected under this scenario is 193,785 trees.

Scenario 4 also included Age Class 7 and 8, and further increased the distribution of monumental cedar by log grades relative to Scenario 3 (7% of cedar volume are monumentals). This resulted in a 6.9% decrease in timber supply relative to the base case. The estimated number of monumental cedar protected under this scenario is 226,083 trees. This scenario utilizes data inputs from licensees and was recommended by the JTWG as the best estimate of the effect on timber supply from protecting monumental cedar. This estimate amounts to an approximate 19% reduction in available timber supply between CFIv4 and CFIv5.

Lastly, a Scenario 5 explored the impact of retaining all monumental cedar in Scenario 3. This resulted in a 17.3% decrease in timber supply relative to the base case. The estimated number of monumental cedar protected under this scenario is 276,836 trees.

Public input

Several comments were submitted during the public review period regarding monumental cedar. There was concern expressed that nearly half of the remaining old growth on TFL 58 would be required as buffers to protect monumental cedar. Another comment indicated that more consultation was needed in the development of the new CFIv5 standard. Concern was expressed that uncertainty regarding the new standard may have led to job lay-offs.

There was also comment about uncertainties in the implementation of the new standards, and that a socio-economic assessment regarding the impact of the new standards was not undertaken. A concern was expressed that the impact of the new standards should have been addressed as a sensitivity analysis, not as part of the base case. Another comment expressed concern 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 impacts.

There was also expressed support for the new standards, noting that continued harvesting of 30% of monumental cedar is unsustainable. There were also concerns that monumental cedar will no longer exist in the THLB of the TSA under the current timber supply review assumptions.

There was a detailed comment regarding how the timber supply analysis addressed the new standards with concern that the analysis underestimates the timber supply impacts and that their timber business may be at risk due to increased need to reserve high value old growth stands and associated impacts on profits.

JTWG feedback

Feedback from licensees and regional ministry scaling experts suggest that more monumental cedar may be found in lower grade cedar than assumed in the base case. Extending the distribution of monumental cedar to younger age classes increases the predicted number of monumental cedar trees.

Given this uncertainty, the JTWG recommends a review of operational data one-year after the AAC determination to determine whether the predicted impacts to timber supply are appropriate or whether further analysis or adjustments are warranted. And that Council of

the Haida Nation and the Province track the scaling results of monumental cedar logs that are administered through the Cultural Wood Access program.

Conclusion

We recognize that there is uncertainty about how many monumental cedars there are, and how protection of them will affect the THLB. In reviewing this factor at length with the JTWG, we conclude in our '**Reasons for Decision'** that there may be a range of potential timber supply impacts from the implementation of the new CFIv5 standards with a likely downward pressure on timber supply and there is uncertainty in all scenarios reviewed.

As noted under '**Implementation**', we recommend that: (i) a population study of monumental cedars be developed (e.g. using the most recent inventory and ground sampling) based on statistical principles and Haida knowledge so that this value can be more accurately represented for future AAC determination processes; (ii) operational practices that implement new CFIv5 standards and that protect (buffer) monumental cedars be monitored to better assess impacts on timber supply; and that (iii) in anticipation of an increased need to alter reserve or management zones to accommodate timber harvesting access, both governments support the development of a transparent and replicable risk-managed application process.

Land Use Objectives Order – Aquatic Habitats

Fish Habitat

Sections 10 and 11 of the LUOO protects all forest within Type I and Type II fish habitat. The LUOO classifies low gradient (<5%) fish streams - along with adjacent lakes, wetlands and marine interface zones – as Type I fish habitat; and higher gradient (>5%) fish streams – along with adjacent lakes and wetlands - as Type II fish habitat.

Type I and II fish habitat was spatially represented in the timber supply analysis by a fish habitat model that included LUOO Schedule 4 fish habitat data, TRIM lakes and wetlands, and marine interface zone mapping. As per LUOO requirements, reserve buffers 2 tree lengths wide were created for Type I fish habitat, with 95% of the buffers excluded from the THLB. For Type II fish habitat, reserve buffers 1.5 tree lengths wide were created, with 80% of the buffers excluded from the THLB.

Schedule 4 in the LUOO provides strategic-level Type I and II fish habitat maps for Haida Gwaii. The mapping combines empirical fish presence/absence data, TRIM streams, and modeled gradient breaks. The strategic fish habitat mapping may, however, over- or under-estimate actual fish bearing streams. To address this concern, more detailed field mapped stream data collected for 14,092 hectares of development areas between 2012 and 2016 was compared to the strategic level fish habitat mapping at the ecosection level for Type I and II fish habitat. The frequency/distribution of fish habitat versus non-fish habitat was statistically different between these two data sets. These findings supported the development of a landscape-scale model to more accurately represent the distribution and types of fish habitat across Haida Gwaii.

A scaling analysis compared the strategic fish habitat mapping findings by ecosection for Type I and II fish habitat to the expected proportion and amount of habitat found in the field. The results of the scaling analysis found that overall fish habitat is under-represented in the strategic fish habitat mapping across the Haida Gwaii land base by 7% overall. The

scaling analysis enabled the strategic fish habitat mapping findings to be modified by ecosection and Type I and II fish habitat to better reflect what was found in the more detailed field mapped stream data. A landscape-scale stream model was built using SELES to account for this in the timber supply analysis. An analysis of the two data sets – field based versus modified strategic fish habitat mapping – indicated they were not statistically different.

Marine interface zones into which Type I fish habitat streams flow are protected under the LUOO. This includes high value marine habitats made up of kelp beds, herring spawn areas, shallow intertidal areas, and near shore habitats used by marine invertebrates for reproduction and rearing. A variety of data sources were used to identify these marine interface zones. As per the LUOO, reserve buffers were applied to the zones in the timber supply analysis.

In total, 93,149 hectares of Type I and 58,108 hectares of Type II fish habitat were removed from the THLB.

We appreciate the scaling analysis undertaken by the JTWG in order to provide a more accurate accounting of Type I and II fish habitat in the timber supply analysis. We conclude that the best available information was used to identify and account for Type I and Type II fish habitat in the base case. Under **'Implementation'**, we recommend that annual submissions of Type I and II fish habitat data be used to: (i) build a Haida Gwaii-wide inventory of fish habitat that can then assist future operational and strategic planning; and (ii) support the next timber supply review.

Active Fluvial Units

Active fluvial units include active floodplains and fluvial fans. One of the objectives for active fluvial units in Section 12 of the LUOO is to protect all forest within active fluvial units as harvesting could cause increased channel erosion and thereby impact fish habitat. A variety of data sources were used to delineate active fluvial units including, where available, LiDAR derived floodplains and fans, watershed assessment mapping of active floodplains and fans, terrain classification mapping, and riparian fish-forestry floodplain mapping.

The LUOO stipulates a 1.5 tree length management zone from the edge of the active fluvial unit with an allowance for harvesting up to 10 percent of the zone. All forests within the active fluvial unit, and 90 percent of the forests in the management zone, representing a total area of 36,353 hectares, were therefore removed from the THLB.

The JTWG found that LiDAR derived mapping reduced uncertainty around the size and placement of active fluvial units and noted that significant gaps in LiDAR coverage exist on northwest Graham Island.

We conclude that the best available information was used to identify and account for active fluvial units in the base case. As recommended already in the 'Forest Inventory' section, under **'Implementation'** we recommend that the Haida and Provincial Governments, along with industry and other partners, work to fill existing gaps in LiDAR coverage on Haida Gwaii.

Land Use Objectives Order – Biodiversity

Forested Swamps

Forested swamps are defined under the LUOO to mean forested mineral wetland or a forested peatland that is represented by the western redcedar – Sitka spruce/skunk cabbage ecological community. One of the objectives in Section 15 of the LUOO is to protect all forested swamps greater than 0.25 hectares in size.

Ecosystem maps for Haida Gwaii were used to identify the site series associated with the forested swamps (i.e. site series CWHwh1 12 and CWHvh2 13). As per the LUOO, the entire forested swamp greater than 0.25 hectares was protected and a 1.5 tree length management zone from the forested swamp was identified with at least 70% maintained as mature or old forest. This led to a total area of 15,331 hectares being removed from the THLB.

We conclude that the best available information was used to account for forested swamps in the timber supply analysis that identified the base case.

Ecological Representation (Common and Rare Ecosystems)

Section 23 of the LUOO establishes forest reserves for ecological representation and Marbled Murrelet nesting habitat as identified in Schedule 8. As discussed later under 'Forest Reserves', 31,201 hectares were removed from the THLB to account for these forest reserves.

Section 16 of the LUOO states that: "For each common site series and each rare site series in a landscape unit, retain an amount of old forest equal to or greater than the landscape unit targets listed in Schedule 10". The 12,019 total area needed to meet those targets were removed from the THLB in the base case.

After the base case was established, three corrections or changes were made. (1) The JTWG found an error in ecosystem representation for the Skidegate Lake Landscape Unit where areas outside the THLB should have contributed to the retention targets. (2) An adjustment was also made in response to licencee feedback so that the analysis was changed to account for all 3 ecosystem classification deciles rather than only the primary decile, consistent with how targets are met operationally. (3) The model was adjusted so that old forest on the THLB are given higher priority for retention than young forests in the non-THLB.

The combination of these three adjustments resulted in a small 1,153 hectare decrease in the THLB – about 0.8%. We accept this downward pressure on timber supply relative to the base case in our '**Reasons for Decision'**. Under '**Implementation**', we recommend that forest licensees and both governments finalize the spatial identification of recruitment polygons for old forests for the Skidegate Landscape Unit as soon as possible as was also recommended by the Forest Practices Board.

Red- and Blue-Listed Ecosystems

Red-listed ecosystems are at risk of being lost (extirpated, endangered or threatened) while blue-listed ecosystems are of special concern. Schedule 13 of the LUOO provides a list of red- and blue-listed ecological communities on Haida Gwaii. The objectives for these ecological communities are provided in Section 17 of the LUOO and include the

protection of all red- and blue-listed ecosystems that are a minimum of 0.25 hectares in size.

Ecosystem maps for Haida Gwaii were used to spatially identify red- and blue-listed ecosystems in the timber supply analysis. All forests in red-listed ecosystems were retained in the analysis resulting in 13,567 hectares being removed from the THLB. All of the red-listed forested ecosystems are floodplain forest ecosystems and therefore tend to overlap with active fluvial units and fish habitat factors that have been previously addressed in this rationale.

All forests in blue-listed ecosystems were also retained in the analysis as this represents the 'default' (low risk) requirement of the LUOO. This resulted in a total area of 62,444 hectares being removed from the THLB.

Although the LUOO allows for up to 30% of blue-listed ecosystems to be harvested if required for road access or to address a safety concern, or provided an intergovernmental process is completed, this allowance has not been put into practice and therefore was not assessed in the base case.

We conclude that the best available information was used to account for red- and blue-listed ecosystems in the timber supply analysis that identified the base case.

Land Use Objectives Order – Wildlife

Black Bear Dens

Objective 18 (1) of the LUOO protects all Black Bear dens within a reserve zone, measuring at least 20 metres in width, around the den. Objective 18 (3) states that adjacent to any reserve zone, a management zone must be maintained with an average width equal to 1.0 tree length to project the integrity of the reserve zone. Objective 18 (6) states that all existing and newly discovered bear dens must be documented and annually submitted to the Council of Haida Nation and to the Province.

All 26 documented bear dens and their reserve and management zones were removed from the THLB in the timber supply analysis resulting in 62 hectares being removed from the THLB. This amounted to about 0.1% of the development area, and this 0.1% exclusion factor from the THLB was also applied to account for future documented bear dens in new development areas.

Council of Haida Nation's surveys have found about three times as many bear dens per hectare than in licensee LUOO submissions. As such there is uncertainty about the number of dens found across the land base, which may result in a larger impact on the THLB.

We are satisfied that the best available information was used to account for bear dens in the timber supply analysis. We also conclude that any uncertainty in this factor will likely have a small affect on timber supply – based on the impacts of the 26 dens that have been documented and submitted – and that the accounting for any new bear dens can be appropriately addressed in the next timber supply review.

Marbled Murrelet Nesting Habitat

Marbled Murrelets are small, north Pacific seabirds that depend on large mossy platforms in old-growth forests for nesting habitat. The Canadian population, entirely located in BC, was assigned threatened status by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1990. Marbled Murrelets are on BC's blue-list (species of concern). The Province prepared an Implementation Plan for the Recovery of Marbled Murrelet in 2018.

Section 19 of the LUOO provides objectives for Marbled Murrelet nesting habitat on Haida Gwaii which are: (1) Maintain an amount of Marbled Murrelet nesting habitat within each landscape unit equal to or greater than the target listed in Schedule 9; and (2) Marbled Murrelet habitat referred to in subsection (1) must conform to areas shown in Schedule 11 [Marbled Murrelet Nesting Habitat map] or must be identified as Class 1 or 2 Marbled Murrelet nesting habitat by a qualified professional.

Section 23 of the LUOO establishes forest reserves for Marbled Murrelet nesting habitat and ecological representation as identified in Schedule 8. As discussed later under 'Forest Reserves', 31,201 hectares were removed from the THLB to account for these forest reserves.

An analysis was completed that calculated the amount of Schedule 11 Marbled Murrelet nesting habitat located outside the THLB by landscape unit relative to the Schedule 9 targets. The analysis found that essentially all the Schedule 9 targets were met outside the THLB and therefore no further reductions to the THLB were necessary.

There was public input expressing concern that Marbled Murrelets are in serious decline on Haida Gwaii and require old growth for nesting. They felt it was unclear how the timber supply review considered habitat for these species. The aforementioned accounting for Marbled Murrelet nesting habitat is how this timber supply analysis addressed this important factor.

We conclude that the timber supply analysis appropriately accounted for Marbled Murrelet nesting habitat relative to the LUOO when defining the base case.

Northern Goshawk Habitat

Stads k'un Northern Goshawk was named by the Council of the Haida Nation as Haida Gwaii's national bird. Northern Goshawk is a red-listed subspecies that is considered threatened by COSEWIC. A peer reviewed, published article cites the Haida Gwaii goshawk as genetically distinct from other Northern Goshawks.

<u>Nesting habitat</u>

Two existing Northern Goshawk wildlife habitat areas were also removed from the THLB as discussed under 'Wildlife Habitat Areas'. In addition, existing Northern Goshawk nesting habitat is protected under Section 20 of the LUOO with approximately 200-hectare reserves over 23 known goshawk territories, some of which occur in protected areas. In total 3,661 hectares of known nesting habitats were excluded from the THLB to address this LUOO requirement.

Section 20 (2) of the LUOO requires that when a new Northern Goshawk nest is discovered that a 200-hectare reserve around the nest be established. The discovery of new nests was not assumed in the base case. However, a sensitivity analysis was

performed to explore the implications of establishing new nesting reserves. A predictive goshawk nesting territory model was used to account for 200-hectare reserves from expected goshawk territories that are not currently known.

The provincial 2018 Implementation Plan for the Recovery of Northern Goshawk in BC targets 25 nesting territories for Haida Gwaii, while the federal 2018 Recovery Strategy for the Northern Goshawk in Canada targets 38 nesting territories for Haida Gwaii. The federal recovery strategy believes that 38 breeding pairs are necessary to contribute to the minimum viable population needed to reduce the risk of extinction. Based on the amount of suitable habitat on Haida Gwaii, it is estimated that if all of that habitat were fully occupied with breeding pairs, there could be 67 nesting territories in total. Sensitivity analysis explored the timber supply impacts of each of these scenarios.

If the provincial target of 25 nests is assumed – two more than are currently protected – the timber supply impact would be 3,450 cubic meters or 0.4% decrease from the base case. If the federal target of 38 nests is assumed, the timber supply impact would be 10,787 cubic metres or 1.3% decrease from the base case. If the full occupancy scenario (i.e. 67 nests) is assumed, the timber supply impact would be 15,437 cubic metres or 1.8% decrease from the base case.

Foraging habitat

A 2015 Journal of Ecosystems & Management article entitled *Science-Based Guidelines for Management of Northern Goshawk Breeding Areas* concluded that territories with 60% suitable foraging habitat have the lowest risk of abandonment based on an analysis of data on Haida Gwaii and Vancouver Island.

The provincial 2018 Implementation Plan for the Recovery of Northern Goshawk in BC acknowledges the importance of foraging habitat but does not provide direction for foraging habitat management, citing the need for continued research. The federal 2018 Recovery Strategy for the Northern Goshawk in Canada provides targets for goshawk foraging habitat that surrounds the targeted 38 nesting territories on Haida Gwaii citing the importance of maintaining 65.5% as suitable foraging habitat within the breeding home range in Haida Gwaii.

As part of a sensitivity analysis, the timber supply analysis adopted the forage habitat suitability index based on the 2017 Nesting and Foraging Habitat Suitability Models and Territory Analysis Model to determine suitable foraging habitat. Like the nesting reserve analysis, the impacts on timber supply relative to the base case were assessed regarding the maintenance of 65.5% suitable habitat for the territories that surround 22 known breeding pairs[1], the provincial target of 25 breeding pairs, the federal target of 38 breeding pairs, and the full occupancy scenario of 67 breeding pairs.

The timber supply impact of protecting suitable foraging habitat for 22 known breeding pairs was 4,537 cubic metres or a 0.5% decrease from the base case. The impact of protecting foraging habitat for 25 breeding pairs was 9,924 cubic metres or a 1.2% decrease from the base case. The impact of protecting foraging habitat for 38 breeding pairs was 40,738 cubic metres or a 4.8% decrease from the base case. The impact of

[1] 22 known breeding pairs at the time of analysis. By the fall of 2019 a total of 23 known territories had been discovered.

protecting foraging habitat for 67 breeding pair (assuming full occupancy of suitable territories) was 153,125 cubic metres or 18.2% decrease from the base case. Scenarios were also run on reducing suitable foraging target from 65.5% to 55% and to 45% for 67 breeding pairs; this reduced timber supply impacts considerably from an 18.2% decrease to 2.6% and 2.1% decrease to the base case, respectively.

Public input

A number of public comments were provided regarding the protection of Northern Goshawk on Haida Gwaii. This included:

- That all known and potential nest sites need protection and that 65% of all known or potential territories need to be retained as old growth forests
- That the HGMC should manage for the nesting and foraging habitat for the 67 known and predicted territories
- Concern that the THLB needs to be adjusted for the reserves needed for newly found breeding pairs to ensure we are not overharvesting
- Questions whether the model had been reviewed by biologist. In response, the JTWG indicated to us that in fact this had occurred
- Concern that scientific recovery reports do not use the best available forest inventory adding to uncertainties around population estimates
- Suggestion that a full risk analysis of potential losses to biodiversity is needed before there is further clearcutting on Haida Gwaii
- Suggestion that territory prediction model should allow for a 30-40% overlap between territories which would take up less of the THLB; in response, the JTWG indicated to us that model assumptions are based on published articles or policies in conjunction with review by qualified professionals and that the suggestion of territory overlap are currently not supported.

Conclusion

In summary, the base case accounted for the 23 known Northern Goshawk nesting areas but did not account for new nesting areas that may be identified in the future. The JTWG noted to us that about one new breeding pair per year on average (since 1995) are identified on Haida Gwaii. We support the assumption, based on the previous discovery rate since 1995, that 10 new nesting sites are likely to be identified over the next 10 years before the next timber supply review, and that these nesting sites need to be protected as per the requirements of the LUOO. Accounting for 10 new nesting sites represents about a 0.85% decrease in timber supply relative to the base case, and we accept this downward pressure on timber supply in our '**Reasons for Decision'**. Under '**Implementation**', we recommend that both governments monitor the number of new goshawk nests found each year so that this can be accounted for in the next determination.

There are no legal requirements to protect Northern Goshawk foraging habitat at this time. Consistent with our 'Guiding Principles' that we not account for land use decisions that have yet to be made, the base case did not account for foraging habitat within the territories of the 23 known Northern Goshawk nesting areas or for foraging habitat for new nesting sites that might be identified in the future. We do however acknowledge that measures are underway by both the Haida Nation and the BC government to develop strategies for the management of goshawk foraging habitat. Once strategies (such as an implementation plan) for the recovery of Northern Goshawk, including the management

of foraging habitat, that applies to Haida Gwaii have been approved by all governments, then that decision can be factored into the next AAC determination.

Great Blue Heron Nesting Habitat

Section 21 (1) of the LUOO protects Great Blue Heron nest sites with a reserve zone with a minimum size of 45 hectares and with a minimum distance of 350 metres from any nest site to the edge of the reserve. Section 21 (2) specifies that adjacent to any reserve zone, there is a requirement to maintain a restricted activity zone of 150 metres measured from the outer edge of the reserve zone during the breeding season.

Two blue heron nesting areas have been discovered between 2011 to 2018 amounting to approximately 90 hectares reserved from harvesting. Given the small area affected, no area was removed from the THLB to account for heron nesting habitat in the analysis as it would not have had a consequential impact on timber supply for Haida Gwaii.

There was public comment expressing concern that Great Blue Heron are in serious decline on Haida Gwaii and require old growth for nesting, and that it was unclear how the timber supply review considered habitat for this species.

There is uncertainty around the fidelity of Great Blue Herons to nesting stands on Haida Gwaii. Known nest areas must be monitored annually and must not have had nesting activity consecutively for 3 years before a nest is considered inactive and no longer protected under the LUOO.

Under '**Implementation'**, we recommend that both governments and forest licensees convene a monitoring initiative to report on the annual breeding activities for the two known and any new Great Blue Heron nest areas in order to support a better understanding of the species requirements relative to forestry activities on Haida Gwaii. Meanwhile we are satisfied that making no reductions to the THLB was warranted in the base case given the small area of reserves that protect heron nesting habitat.

Northern Saw-whet Owl

According to the 2014 federal Recovery Strategy for the Northern Saw-whet Owl in Canada, the Saw-whet Owl subspecies found on Haida Gwaii was designated as threatened by COSEWIC in 2006 because they are a distinct subspecies endemic to Canada, have a small world population that is restricted to Haida Gwaii, and are a specialist of older forests that are declining in abundance because of threats such as forest harvesting.

Section 22 (1) of the LUOO protects all Northern Saw-whet Owl reserves shown on the map attached as Schedule 12. Objective 22 (2) states that when a Northern Saw-whet Owl nest is discovered that is not located as a reserve in Schedule 12, that a reserve zone measuring at least 10 hectares must be maintained centered on the owl nest. Objective 22 (3) addresses the requirement to retain or recruit 10 hectares of mature/old forest under 300-metre elevation in a grid approximately 1400-metres apart as core nesting habitat.

In the timber supply analysis all Schedule 12 reserves, totaling 730 hectares, were removed from the THLB. The analysis also found that most landscape units met the core nesting habitat conditions identified in objectives 22 (3). Two landscape units (Lower Yakoun and Skidegate Lake) were in deficit of meeting core nesting habitat conditions as

a consequence of past harvest history, but recruitment of habitat outside the THLB is anticipated to meet the required conditions over time. As a consequence, no further reductions to the THLB were applied for core nesting habitat.

In discussing this factor with the JTWG, we are satisfied that the timber supply analysis supporting the base case appropriately accounted for Northern Saw-whet Owl reserves in the LUOO.

Land Use Objectives Order – Forest Reserves

Forest Reserves for Ecological Representation and Marbled Murrelet

Section 23 (1) of the LUOO states that the forest reserves shown on a map as Schedule 8 are reserved from harvest to assist in meeting objectives for ecological representation and objectives for Marbled Murrelet nesting habitat. Section 23 (2) allows for an up to 5% reduction in the area of an individual forest reserve larger than 5 hectares in area if necessary, for example, for roads and bridges or to mitigate the impact of windthrow.

The timber supply analysis supporting the base case assumed that 95% of each forest reserve would be excluded from the THLB resulting in a total area removal of 31,201 hectares. We conclude that the timber supply analysis appropriately accounted for forest reserves when defining the base case.

Other Forest Management Objectives

Karst

Karst landscapes are largely shaped by the dissolving action of water on 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 that is often related to paleontological and/or archaeological resources given the high potential habitation qualities of karst caves.

Most of the karst on Haida Gwaii occurs within the Sadler geological formation with about one-third of the formation located within Gwaii Haanas National Park Reserve and Haida Heritage Site.

The *Government Actions Regulation* (GAR) defines resource features to include surface or subsurface elements of a karst system. Section 70 of GAR requires that persons carrying out a primary forest activity must ensure that the activity does not damage or render ineffective a resource feature. A 2006 Order under GAR identified karst resource features for Haida Gwaii.

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% of the Sadler formation is estimated to be karst. For the timber supply analysis, 100% of the Sadler formation was excluded from the THLB resulting in a total reduction of 7,179 hectares being removed from the THLB. While this may over-represent the protection of karst in the Sadler formation, the JTWG believe this is

balanced with the likely under-estimate of karst in other limestone-based geologic formations on Haida Gwaii that were not removed from the THLB.

There was public input that 100% removal of the Sadler formation from the THLB is a significant over estimate of karst features. The JTWG response to this concern noted that while there is uncertainty about how much karst will ultimately be found, the approach used in the analysis achieves a reasonable balance since other formations may include karst features. The JTWG consulted with a coast karst professional who validated the approach used in the analysis.

We conclude that the approach used by the JTWG to account for karst features in the base case was reasonable for the purposes of this timber supply analysis.

Riparian Areas for Non-Fish Bearing Streams

Riparian areas for fish-bearing streams and fish habitat were protected and accounted for in the timber supply analysis based on Type I and II fish habitat discussed above. These Section 10 and 11 LUOO requirements are more restrictive on timber supply than the *Forest Planning and Practices Regulation* (FPPR).

The FPPR also includes requirements for non-fish bearing S5 (>3 metre stream width) and S6 (<3 metre stream width) streams. The FPPR requires that 10% or more basal area of trees be retained within a 30-metre riparian management zone for S5 streams for minor tenure holders, or 'enough trees adjacent to the stream to maintain stream bank or channel stability' if it is a direct tributary to a larger fish-bearing stream or a marine interface zone.

Based on the estimated amount of non-fish bearing streams on Haida Gwaii and these FFPR requirements, the approximate net area requiring retention was 90 hectares. This is a relatively minor area and consequently it was not modeled in this timber supply review. We are satisfied, given the small area, that it was appropriate to not model this requirement in the analysis.

Lakes and Wetlands

Lakes and wetlands also require a riparian management zone (RMZ) under the FPPR. The FPPR retention requirements for these RMZs were modeled in the timber supply analysis resulting in a total area of 24,143 hectares being removed from the THLB. Much of this area was already captured by LUOO requirements for Type I and II fish habitat as previously discussed under 'Fish Habitat'. We conclude that the best available information was used to account for lakes and wetlands in the base case.

Wildlife Habitat Areas

Wildlife Habitat Areas (WHAs) are reserves designed to protect the habitat of species at risk or regionally important wildlife. WHAs were designated originally under the *Forest Practices Code,* and now under the *Forest and Range Practices Act's Government Actions Regulation.*

Four WHAs currently exist on Haida Gwaii: (i) two areas for Northern Goshawk; and two areas for Marbled Murrelet. No harvesting is permitted in Post-Fledging Areas (PFA) within the two Northern Goshawk WHAs, and no harvesting is permitted in the Marbled Murrelet WHAs. This area, totaling 623 hectares, was consequently removed from the THLB in the timber supply analysis. Furthermore, restrictions on the minimum area in

mature and old forest and a maximum limit on the area in very young and young forest within the goshawk WHAs have been accounted for as parameters in the timber supply model. Much of this area overlaps with LUOO requirements for Northern Goshawk and Marbled Murrelet that were addressed earlier in this rationale. We are satisfied that the best available information was used to account for WHAs in the timber supply analysis.

Recreation Sites and Trails

Seven recreation sites that do not occur in protected areas have been designated under the *Forest and Range Practices Act* (FRPA) or reserved under the *Land Act*. Nine other recreation sites exist that have not been designated or formally reserved. These recreation sites were provided 100-metre buffers and were excluded from the THLB.

The Haida Gwaii Strategic Land Use Agreement identified the need to protect 40 recreation trails as part of a tourism strategy with a number of those trails not occurring in protected areas. Some of the recreation trails outside of protected areas that were identified in the Agreement have been designated under FRPA while others have not. For the purposes of the timber supply analysis, all the trails that occur outside protected areas that were identified in the Agreement were provided 100-metre buffers and were excluded from the THLB.

In total 1,693 hectares of recreation sites and trails were excluded from the THLB. We are satisfied that the best available information was used to account for recreation sites and trails in the timber supply analysis.

Permanent Sample Plots

Permanent sample plots (PSPs) are field measurement plots used to collect and maintain long-term re-measurement data on forests to support growth and yield models. There are about 7,800 PSPs throughout BC, and about 419 active PSPs on Haida Gwaii. While PSPs are not formally protected from timber harvesting, the Chief Forester has requested forest licencees and natural resource decision makers to protect them from harvesting and to maintain a windfirm buffer around them

For the timber supply analysis, all active PSPs and a 100-metre buffer around them were removed from the THLB. This resulted in 1,010 hectares being deducted from the THLB to account for active PSPs on Haida Gwaii. We are satisfied that the best available information was used to account for PSPs in the timber supply analysis.

Unstable Terrain

Areas of unstable terrain are subject to or susceptible to disturbances such as landslides. Landslides are a leading abiotic natural disturbance on Haida Gwaii most often initiated by high rainfall events or earthquakes. All existing mapped landslides, totaling 1,209 hectares were removed from the THLB.

A variety of terrain stability mapping projects on Haida Gwaii were compiled in support of the timber supply analysis to identify potentially unstable Class 4 and Class 5 terrain. To further support the analysis, the amount of harvesting undertaken in Class 4 and 5 terrain over the last 10 years was assessed by management unit. For example, past practices indicate that about 46% of Class 4 terrain and 12% of Class 5 terrain had been harvested in the TSA over the past 10 years.

The result of applying this information to the analysis led to 16,816 hectares of Class 4 terrain, and 30,987 hectares of Class 5 terrain being removed from the THLB. Areas harvested since 1996 within Class 4 and 5 terrain were kept in the THLB.

Forest harvesting in Class 4 and 5 terrain may increase the risk of landslides. The JTWG overlapped existing landslides with cutblocks in Class 4 and 5 terrain and found a very small area of landslides. The area of slides relative to the total area harvested within Class 4 and 5 terrain is less than 1% suggesting that no further reductions to the THLB are needed to account for this factor.

There was public feedback that the assessment of the area harvested within Class 4 and 5 terrain should have been more than the last 10 years – that it should have gone back to 1996 when the requirements in the Forest Practices Code took effect. In response, the JTWG assessed the amount of harvesting in terrain stability classes 4 and 5 going back to 1996 and undertook a sensitivity analysis to examine the impact on timber supply – and found that using data going back to 1996 would increase base case harvest projections by about 2.6% overall on Haida Gwaii.

We reviewed this factor with the JTWG and have concluded that basing the amount of harvesting in Class 4 and 5 terrain over the last 10 years was a reasonable approach taken to support the base case. Practices can change substantially over a 20-year period, so the 10-year record seems to be reasonable basis to project future harvest performance. We therefore accept this factor as modeled in the base case.

Wildlife Tree Retention Areas

Section 66 of the *Forest Planning and Practices Regulation* (FPPR) requires that a minimum 7% of all cutblocks over a 12-month period be retained as Wildlife Tree Retention Areas (WTRAs). This requirement is intended to support the conservation of stand-level biodiversity.

Ministry guidance for forest licencees is to locate WTRAs to achieve multiple purposes. The JTWG assessed the amount of retention due to the LUOO for the years 2012 to 2016 and found that nearly 11% retention occurred in old forests, and nearly 6% occurred in younger forests. The JTWG therefore excluded nothing further from old forests, and a total of 7% from young forests – about 1% more than retained by the LUOO from the THLB in order to meet the FPPR minimum requirements.

The JTWG examined past WTRA practices on Haida Gwaii from 2012 to 2016, and found areas retained in the TSA and TFL 60 that was not attributable to either the LUOO, the FPPR requirements, or other regulated objectives. Although licencees have communicated that their longer-term plans are not to exceed the requirements, a sensitivity analysis that examined the impact of increasing the area of WTRA to match past practices found the impact to be a 10.5% downward pressure on the base case overall for Haida Gwaii.

There was feedback that the WTRA modeled in the base case for TFL 58 was too high and should be 2.6% considering overlaps with retention for other values. This comment was based on recently developed cutblocks totaling about 165 hectares where 14.2 hectares was retained with only 5.0 hectares being considered THLB – or about 3% of the total cutblock area. A sensitivity analysis explored the impact of reducing WTRAs to 2.6% for

TFL 58 and found that it would increase timber supply on the TFL by 8% - and by 0.9% overall for Haida Gwaii.

As noted early, the amount of retention in old and younger forests due to LUOO values for the years 2012 to 2016 was accounted for in consideration of WTRA retention requirements under the FPPR. The very recent data over a small area noted in TFL 58 is not as robust a data set as used in the base case where 14,000 hectares were compared. We are therefore satisfied that the base case appropriately accounted for WTRAs.

Low Productivity Stands

Some stands have such low productivity that there is insufficient volume to support timber harvesting. Calibrating these minimum harvest volume thresholds with actual harvesting is an important step to identify and exclude these stands from the THLB.

Data from 2012 to 2016 from 102 timbermarks linked to the Harvest Billing System were assessed with results showing that 95% of the timbermarks had volumes greater than 256 cubic metres per hectare.

While this is a useful reference point, actual harvested volume data does not correspond directly with inventory data. A second analysis linked the area harvested from the timbermarks to 7,295 hectares of recent spatial openings and the forest inventory. The results found that overall about 95% of the volume from all the openings had inventory estimated volumes exceeding 230 cubic metres per hectare.

As a result of these findings, all natural stands that are not projected to achieve a minimum harvest volume of at least 250 cubic metres per hectare within the analysis horizon (350 years) were removed from the THLB. Based on this, a total of 79,652 hectares of low productivity stands were removed from the THLB.

Sensitivity analysis examined the timber supply impact of not having a minimum harvest volume. This resulted in an 8.3% increase in timber supply relative to the base case.

Another sensitivity analysis assessed the timber supply impact of raising the minimum harvest volume criteria to 350 cubic metres per year as was used in previous timber supply reviews on Haida Gwaii. This resulted in a 1.0% decrease in timber supply relative to the base case.

We conclude that the best available information was used in the base case to account for low productivity stands.

Small Islands

Haida Gwaii includes over 3,670 islands, the majority of which are forested. While most of the islands are in protected areas, a number of islands are available for timber harvesting but are difficult to log. Harvesting on islands requires log handling, barge/machine loading areas, and infrastructure such as roads. As a result, small islands are typically not operationally feasible to harvest. An analysis of the last decade of timber harvesting showed that islands under 150 hectares have not been accessed for commercial harvesting. As a result, these smaller islands, with a total area of 3,123 hectares, were removed from the THLB.

We conclude that not including small islands under 150 hectares in size in the THLB, as assumed in the base case, was appropriate.

Forest Management Practices

Land Use Objectives Order – Upland Stream Areas

Section 13 (1) of the LUOO states that: "Within each watershed sub-unit shown on the map attached as Schedule 6, retain a minimum of 70% of the forest in the upland stream areas as hydrologically recovered". The LUOO defines 'hydrologically recovered' to mean "the point at which regenerated forest stands have hydrologic properties similar to the pre-harvest hydrologic properties of the stands, with hydrologic responses within the range of natural variability". Section 13 (4) enables less than 70% be retained for hydrologic recovery if, among other things, an intergovernmental process is completed, and a watershed sensitivity assessment is undertaken by a qualified professional.

For the timber supply analysis, hydrologic recovery curves were used to apply a forest cover constraint within the STSM model. The model constrains forest harvesting to ensure each upland stream's area summed hydrologic recovery does not go below the 70% default target for upland stream areas.

The analysis assumes that wetlands are hydrologically recovered. Concern has been raised that the intent of this objective was to not include non-forests (e.g. wetlands, alpine, parkland) when assessing the 70% target. There has been conflicting advice from hydrologists on whether coastal wetlands assist in regulating peak flows. There was public comment that wetlands should not contribute to hydrologic recovery as they are often saturated during high rain event that can cause flash flooding. The effect of non-forests on hydrological recovery is being studied on the central coast's Kwakshua Channel watersheds on Calvert Island.

A sensitivity analysis examined the impact of assuming that only the forested area can contribute to hydrological recovery while wetlands do not. This resulted in about a 1% decrease from the base case.

There was another public comment raising concern about the hydrological impacts of clearcutting upland forests. The JTWG noted that there are no legal objectives for harvest methods on Haida Gwaii and that the main current practice is clearcutting with reserves. Consequently, the JTWG did not examine alternative harvesting methods in the timber supply review.

In reviewing this factor with the JTWG, we conclude that the assumptions regarding meeting the 70% hydrologic recovery target for upland stream areas was appropriately modeled in the base case. If information arises from the central coast study or from other studies that indicate that wetlands do not contribute to hydrologic recovery then this can be addressed in the next timber supply review as any uncertainty in this factor has a relatively minor (1%) impact on the base case. Under '**Implementation**', we recommend that watershed level assessments be undertaken in lowland watersheds dominated by wetland complexes to mitigate uncertainty surrounding the role of coastal bogs in regulating peak flows.

Land Use Objectives Order – Sensitive Watersheds

Section 14 (1) of the LUOO states that sensitive watersheds are those shown on the map attached as Schedule 7. These watersheds are listed as sensitive due to historic logging, fisheries or water quality importance, and/or higher risk due to topography or stream

morphology. Section 14 (2) of the LUOO states that: "no harvesting may occur in sensitive watersheds with an equivalent clearcut area that is equal to or greater than 20%".

Despite Sections (1) and (2), Section 14 (3) enables the equivalent clearcut area to exceed 20% if, among other things, an intergovernmental process is completed and a watershed sensitivity assessment is undertaken by a qualified professional.

For the timber supply analysis, the default provisions were modeled; this meant that each watershed needed to be at least 80% hydrologically recovered. For the timber supply analysis, hydrologic recovery curves were used similar to upland stream areas to apply a forest cover constraint within the STSM model. Wetlands were also assumed as hydrologically recovered in sensitive watersheds. As noted above in "Upland Stream Areas", there is some uncertainty whether wetlands should contribute to hydrologic recovery, and the issue is being studied in a central coast watershed.

There was a public comment that the LUOO allowance in Section 14 (1) (b) for up to 10% of a watershed [less than 500 hectares in size] to be harvested in a 10-year period is too high. This comment is appreciated but beyond the scope of our determination; however, it can help inform possible future changes to the LUOO.

We conclude that the assumptions used in the base case have appropriately accounted for this factor, and – as noted above for Upland Stream Areas - if information arises from the central coast study or from other studies that suggests wetlands do not contribute to hydrologic recovery then this can be addressed in the next timber supply review. Under '**Implementation**', we underscore our recommendation that watershed level assessments be undertaken in lowland watersheds dominated by wetland complexes to mitigate uncertainty surrounding the role of coastal bogs in regulating peak flows as this applies to both 'Upland Stream' Areas and 'Sensitive Watersheds'.

Community Watersheds

The Honna, Jervis, Slarkedus and Tarundl watersheds that feed domestic water use for Skidegate and Queen Charlotte have been legally designated as community watersheds under the *Forest and Range Practices Act* (FRPA). FRPA's *Forest Planning and Practices Regulation* provides objectives for community watersheds where the cumulative hydrological effects from primary forest activities must not have a material adverse impact on the quantity of water, timing of water flow or human health.

The hydrological recovery of community watersheds is often gauged by calculating equivalent clearcut area (ECA). For the base case, a forest cover constraint was applied whereby at least 80% of the entire area of the watershed (forested and non-forested) needed to be hydrologically recovered, as consistent with current watershed assessment reports. All community watersheds are designated as sensitive watersheds under the LUOO. The same assumptions for required hydrologic recovery were used for both community watersheds and sensitive watershed in the timber supply analysis.

There was public comment that no forest harvesting should occur in any community watersheds. In response it should be noted that there are no existing requirements to prohibit timber harvesting altogether in community watersheds. Also that any harvesting that does take place must be consistent with the prescriptions provided in a watershed assessment.

We are satisfied that the timber supply analysis appropriately modeled existing regulatory requirements that do allow for some timber harvesting in community watersheds.

Visual Quality Management

A Visual Landscape Inventory (VLI) was completed on Haida Gwaii in the early 2000's. The VLI maps important viewscapes from communities, travel corridors, and public recreation sites. Visual Quality Objectives (VQOs) identified in the VLI were legally established in the 2005 Visual Quality Objectives Order under FRPA's *Government Actions Regulation*.

VQO classes within viewscapes (or scenic areas) typically range from retention (activities not visually evident), partial retention (activities visible, but remain subordinate), to modification (activities are visually dominant but appear natural). The provincial Visual Impact Assessment Guidebook provides a range of visible alteration for each VQO class which, for example, is 0 to 1.5% for retention and 7 to 18% for modification. The Haida Gwaii Natural Resource District established a recent policy that set expectations around the range of visible alteration in the Guidebook and a midpoint alteration per VQO class.

Areas within viewscapes that achieve Visually Effective Green-up (VEG) height are no longer considered to be visibly altered. The amount of time to achieve VEG height varies, mostly by slope, and is typically between 3 to 8 metres in height – with steeper slopes requiring taller trees to mask disturbed ground. The Ministry has published tree height guidance to meet VEG relative to hillslope gradients, and these have been considered standard practice to guide timber supply analyses including this one for Haida Gwaii.

The timber supply analysis used a plan-view (or map-view) calculating percent alteration. Perspective view is the view of someone on the ground looking horizontally across the landform. Operational approvals consider alteration amounts based on perspective view. A plan-to-perspective ratio converts the perspective percent alteration to a plan view using slope-specific ratios developed from Ministry research. This ratio was used in the timber supply analysis.

In summary, 52,297 hectares of retention with a mid-point of 0.75% alteration allowed and a weighted average minimum VEG height of 5.6 metres; 148,532 hectares of partial retention with a mid-point of 4.3% alteration allowed and a weighted average minimum VEG height of 6.4 metres; and 53,244 hectares of modification with a mid-point of 12.6% alteration allowed and a weighted average minimum VEG height of 5.4 metres were modeled in the timber supply analysis.

A public comment noted that logging along the highway and near communities negatively affects tourism. Another comment noted that the area of Skidegate Inlet should be removed from the THLB to accommodate tourism relative to visual quality.

Consistent with our 'Guiding Principles', the base case accounted for current legal requirements for visual quality management. If those requirements are formally changed, they can be accounted for in future timber supply reviews. For example, the Province is working with the Council of Haida Nation on updating the VLI which could lead to changes in required visual management practices. In the meantime, we are satisfied that the base case appropriately accounted for the current requirements for visual quality management.

Utilization Limit

Utilization limit defines the minimum diameter at breast height (dbh) that a tree must achieve to be harvested. The timber supply analysis assumed 12.5 centimeters dbh which is the minimum diameter that stumpage is applied to second growth stands in BC as outlined in the new Coast Merchantability Specification of the Provincial Logging Residue and Waste Procedures Manual.

We accept that appropriate utilization limits were applied in the base case. Under '**Implementation**' we recommend that utilization limits on Haida Gwaii be reviewed in light of the new waste policy and utilization standards introduced as part of the Coast Forest Revitalization in 2019.

Minimum Harvestable Age

For timber supply analysis, estimates are made of the age at which stands reach a harvestable condition. In the base case, minimum harvest age (MHA) is based on the requirement stands must have reached at least 95% of their volume at culmination. Culmination age is related to mean annual increment (MAI), which is the average volume growth of a stand at any given age in cubic metres per hectare per year. Culmination mean annual increment (CMAI) is the age at which the MAI is at the maximum. Harvesting at CMAI age would produce the maximum long-term timber supply, but setting MHA to CMAI age forces the model to harvest stands after CMAI. Setting MHA to the age at which 95% of CMAI volume is achieved as was done in this timber supply review, allows the model some flexibility to harvest close to culmination age. The base case also required a minimum harvest volume (MHV) of at least 250 cubic metres per hectare of merchantable volume. Nearly all the natural stands on the THLB are beyond culmination age and have more than 250 m3/ha. Most managed stands have more than 250 m3/ha when they reach 95% of culmination volume.

There is some uncertainty regarding how MHA should be modeled. There were several sensitivity analyses that examined uncertainty in this factor. For example, one sensitivity analysis set the economic harvest rotation based on a 30-centimetre minimum stand diameter where the minimum age was lowered for those analysis units that met the minimum diameter before CMAI, otherwise the minimum harvest age was kept at 95% of CMAI (as per base case). This resulted in a 3.5% (29,837 cubic metre) decrease in timber supply.

Another sensitivity analysis examined the timber supply impact of extending the rotation age to better represent natural forest age distributions on Haida Gwaii, and to increase log quality, increase carbon sequestration, and improve habitat conditions for late seral dependent wildlife. In this scenario, all existing and future managed stands had a minimum harvest age set to 150 years or maintained CMAI age if it was over 150 years. A reason for exploring this scenario is that most stands 150 years of age or older have log grade characteristics similar to old forests. This resulted in a 79% (667,837 cubic metre) decrease in timber supply.

There have been some public comments about retaining all old growth forests (>250 years) on Haida Gwaii. Restricting harvest of old growth forests would be a land use decision and is out of scope of an AAC determination, however a sensitivity analysis examined a scenario where only forests less than 250 years of age were harvested in the THLB. This

resulted in 20.4% decrease in timber supply relative to the base case.

Public comments on this factor included:

- Concern that the quality/value of second growth versus old growth have not been accounted for
- Suggestion that the rotation age be 150 years
- Concern that spruce stands are being harvested at too young an age possibly in order to meet the ratio of cedar to whitewood
- Suggestion that harvest decisions should be based on stand value not age, and that some second growth should grow for 200 years or more to allow for high value
- Suggestion that the average age of harvested second growth in the last 10 years (e.g. 60 years) should inform minimum harvest ages
- Concern that the timber supply review should not model old growth clearcutting
- Concern that there is not enough emphasis on long term planning to increase the availability of high quality timber over time that is needed to support manufacturing and economic stability on Haida Gwaii
- Comment that extending the rotation age to a minimum of 150 years should be given greater importance to support high quality timber
- Comment that the rotation periods need to be managed to maintain the value of forests.

We appreciate the public comments that were provided on this factor. We understand that our role is to consider actual practices as best we can in our determination. We do not have the authority to dictate what the minimum harvestable ages or rotation age should be. Similarly, there have been comments that have expressed opposition to clearcutting old forests on Haida Gwaii. Alternative harvesting systems have been used in the past (e.g. selective harvesting using helicopters), but they have not been widely used in over a decade. Consequently, the base case modeled the current silviculture system being used on Haida Gwaii which is clearcutting with reserves.

Although we recognize uncertainty in this factor, we accept that the best available information was used to address minimum harvestable age in the base case. Under '**Implementation**', we recommend that both governments continue to monitor the harvesting of second growth so that appropriate minimum harvest criteria (such as size and age) can be developed to support the next timber supply review.

Socio-Economic Considerations

As noted earlier under 'AAC Determination Process', a socio-economic analysis report for Haida Gwaii was prepared and made publicly available in support of this timber supply review including public review and comment. Key aspects of the socio-economic analysis report are summarized here.

The population on Haida Gwaii was 4,198 in 2016, nearly a 13% decrease from the 2006 total of 4,812, and a 28% decrease from the 1996 total of 5,316. The resident labour force on Haida Gwaii totaled 2,290 workers in 2016, a 19% decline from the 2006 total of 2,830. Forestry is one of the main sectors on Haida Gwaii employing 290 workers in 2016, nearly a 11% decline from the 2006 total of 325.

It is estimated that 100,000 cubic metre change in actual harvest levels could result in a gain or loss of about 33.5 direct forestry jobs on Haida Gwaii, and 41 direct forestry jobs across BC. When accounting for direct, indirect and induced employment from the forest sector on Haida Gwaii, a 100,000 cubic metre change in actual harvest levels could result in a gain or loss of about 48 jobs on Haida Gwaii, and 82 jobs across BC. The socio-economic analysis found fewer jobs were created per cubic metre harvested than the provincial average. This is likely due, as discussed below, to the limited timber processing facilities on Haida Gwaii and export of logs from Haida Gwaii.

Actual timber harvest levels vary significantly from year to year with the 6-year average from 2012 to 2017 being about 787,000 cubic metres per year – about 15% below the current AAC of 929,000 cubic metres determined in 2012, and less than the 842,800 harvest forecast in the base case.

Most forest licensees on Haida Gwaii have fairly large custom cutting programs in which they rent capacity/services at Lower Mainland sawmills for processing logs they harvest on Haida Gwaii (mainly cedar logs).

There is currently only one small, multi-species mill on Haida Gwaii operated by Haida Gwaii Forest Products (formerly Abfam Enterprises Ltd) and 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.

Micro mills have been a longstanding feature of Haida Gwaii wood processing activity. The customers are primarily local businesses (such as fishing lodges), organizations (such as community halls) and residents (new homes and renovations).

The Haida Gwaii Timber Exemption Order allows for a proportion of timber harvested on Haida Gwaii, other than western redcedar and yellow cedar, to be considered surplus to requirements of timber processing facilities in BC, and subject to reduced fees in lieu of manufacture. The volume of timber considered surplus and available for export is capped at 35% of a tenure holder's total harvest volume.

As discussed further under 'Cedar Harvest Levels', the socio-economic analysis concluded that cedar provides a consistently higher return on investment and under most market conditions its inclusion in the harvest profile translates into economic viability.

Public input

There were a variety of public comments on socio-economic considerations including the following summary:

- That the AAC should be further decreased to the minimum level that is enough to ensure the financial sustainability for committed companies
- Future AAC reductions be subject to demonstration that such reductions will address a specific goal
- The new Cultural Features Identification Standard v5 (CFIv5) will impact the livelihood of the community in direct job loss but also trades people and suppliers
- Consider making logging approvals being contingent to secondary manufacturing on Haida Gwaii

- Logging pays for roads and road maintenance of many forestry roads that are used by commercial, government and non-commercial user groups; lowering the AAC might put that in jeopardy
- Forestry supports a broad range of local economic, service and infrastructure with some services helping support health/safety of the communities
- Any legislation that impacts the forest industry has a huge effect on the community
- A conservation economy might lead to increased employment (e.g. educational tourism, etc. vs logging)
- Sandspit struggles to keep basic services and infrastructure available and every single job matters; it is difficult to recruit skilled labour back to Haida Gwaii
- The socio-economic analysis is the best seen related to Haida Gwaii covering a full range of topic areas
- Maximize support for local holding of tenures and local and Haida employment in the forest sector
- The question on Haida Gwaii should be what volume of timber does a local economy need to support a healthy, sustainable local economy and how can an AAC determination assist to confront the challenges identified in the socio-economic report
- There is considerable funding available to help restore species at risk habitats and offset job losses in the forest industry from habitat conservation
- Harvest of forests on Haida Gwaii should be tied to value added industries on Haida Gwaii and BC and incentives to limit raw log exports
- Instead of basing the AAC on theoretical growth rotation and trying to maximize harvest based on that, consider matching the AAC to local employment needs
- Cutting of trees should only support local companies that supply local mills
- Concern that the quality/value of second growth vs old growth forest have not been accounted for
- With carbon's value increasing to $50 per tonne in 2021, the emission of 20 million tonnes amounts to a value of $100 million over the next decade. This compares to $50 million in wages (based on 285 PYE at $50,000/year) from logging
- Per cubic meter earnings from logging pale in comparison to earnings from carving canoes and poles from monumental cedar
- CFIv5 standards would reduce 40 planned blocks for one operator to 15 with significant corresponding revenue losses to the Haida Gwaii economy
- Concern that long term planning is needed to increase the availability of high quality timber over time needed to support increased local manufacturing and economic stability on Haida Gwaii
- Concern about no discussion on the subsidized nature of industry enabling transport of raw logs off Haida Gwaii
- The jobs from southwest BC supported by Haida Gwaii fibre should be the local economic target.
- The population of Port Clements has seriously declined in almost direct proportion to the availability of timber sales with the TSA

- A constant supply of about 200,000 cubic metres per year is needed to support several small contractors whose operations produce high value from the resource.

Conclusion

We discussed this important factor, including the considerable public input, at length amongst ourselves and with the JTWG. We discussed concerns about forest sector viability and that Haida Gwaii is a very high cost operating area; and the importance of forestry to the rural economy of Haida Gwaii and the contribution of forestry activity from Haida Gwaii to the coast as a whole including the milling facilities in the lower mainland.

We also discussed impacts from forest sector employment due to possible increases and decreases in the AAC. Employment multipliers from the socio-economic assessment suggest that a 100,000 cubic metre decrease in actual harvesting on Haida Gwaii could decrease direct, indirect and induced forest-sector related employment by 48 jobs on Haida Gwaii, and 82 jobs across BC. Between 2012 and 2017, since the last AAC was determined, actual harvest levels averaged 787,000 cubic metres per year. There are many factors that can affect forest sector employment including market conditions, exchange rates, tariffs, etc.; one factor also is the AAC. For example, if the AAC is set below actual harvest levels there could be impacts on current jobs.

There are a range of possible initial harvest levels that will not put future timber supply at risk based on the information provided in the timber supply analysis (e.g. see 'Alternative Harvest Flows' below). Within that range, if the AAC is set low to account for environmental and cultural values, then this could impact socio-economic values. If the AAC is set high to account for socio-economic values, then this may impact environmental and cultural values. We recognize that a risk management approach needs to be taken to appropriately balance all values.

Due to the desire to avoid unnecessary socio-economic impact and to the extent possible provide time for necessary adjustments to the new AAC, we examined the flexibility in the base case harvest projection in the short term and considered whether there may be potential for innovation and flexibility to reduce timber supply impacts in the implementation of the LUOO, in particular the new CFIv5 standards). In our '**Reasons for Decision'**, we have factored socio-economic considerations into our AAC determination using an approach that considers and balances risk.

Public Review and Comment

In February 2018 the HGMC published *Forest Views* that included an article on the timber supply review being undertaken in support of determining the AAC on Haida Gwaii. In Fall 2018 the HGMC's *Forest Views* provided more information on the timber supply review process including the technical work being undertaken, and the importance of public review and comment that initiates with the release of the Public Discussion Paper. Copies of *Forest Views* were widely circulated in Haida Gwaii and posted on the HGMC's website.

Several JTWG meetings (face to face or via conference call) were held with the major licencees on Haida Gwaii as well as BC Timber Sales between 2016 to 2019 to discuss the timber supply review. There were also phone calls with individual licencees. The

JTWG encouraged licensees to provide written comments regarding issues discussed and many of those comments led to changes in the data package and modeling approaches used in the timber supply analysis.

Between November 15th, 2019 and January 14th, 2020, we expressed interest in receiving public comments regarding the timber supply review. We posted the Public Discussion Paper on our publicly accessible website. Other timber supply review documents such as the data package, timber supply analysis report, and socio-economic assessment were also posted on our website.

We also e-mailed notification letters about public comment with a link to our website to access the Public Discussion Paper and other timber supply review documents on November 15th, 2019 to the councils of the Village of Masset, the Village of Queen Charlotte, the Village of Port Clements; Moresby Island Management Committee; the band councils of Old Massett and Skidegate; as well as the Skeena Queen Charlotte Regional Directors for 'Area D' and 'Area E' for rural Graham Island and Moresby Island, respectively.

The Public Discussion Paper summarizes the context and process by which an AAC determination will be made by us for Haida Gwaii, and subsequently by the Chief Forester for the TSA and two TFLs. The paper describes the forest objectives, including the LUOO, and forest characteristics and practices used to define the THLB. The paper describes some of the main issues that have been raised where sensitivity analysis was undertaken. The paper stated that the public review period includes not only an opportunity for comment on our overall AAC determination for Haida Gwaii, but also that comments are welcome on the Chief Forester's subsequent AAC determinations for the TSA and the two TFLs.

We received 47 written public comments. Original copies of the comments were provided to us with summaries provided in the binder that supported our AAC determination meetings.

There were some general comments received on the opportunity for public review and comment on the timber supply review process. This included: concern that the public review period did not include public meetings; suggestions that all public documents be summarized to make information more accessible; request that AAC determinations be undertaken every 3 years to account for changing THLB; interest that articles within the UN Declaration of the Rights of Indigenous Peoples (UNDRIP) should be applied to the AAC decision; concern that there was no posting or public promotion of the timber supply review period for Sandspit residents; and comment that the analysis and supporting documents are detailed and well presented.

We appreciate the public comments received during the public review period, and we have reviewed and considered these comments in our determination process. We will examine the public review process and assess how it may be improved in support of the next timber supply review. A change in the required AAC determination cycle (e.g. to 3 years) is beyond the scope of the HGMC as this would require changes in laws, and provision of staff resources. With respect to comments on UNDRIP, the approved Strategic Land Use Agreement that led to more designated protected areas and ecosystem-based management (EBM) for Haida Gwaii that has been implemented by the

LUOO, and the joint decision processes pursuant to the reconciliation protocol move some distance to incorporating UNDRIP. This includes the requirement that the AAC determined for all of Haida Gwaii be done by the HGMC.

We conclude that the opportunities provided for public review and comment were adequate in support of the timber supply review and this AAC determination. We address public comments regarding specific factors throughout this rationale.

Other Considerations

Natural Disturbances

Natural disturbances to the forest include biotic (insects and diseases) and abiotic (windthrow, landslides, and fire) that may cause stand-replacing events. The timber supply review tries to assess how much of an effect natural disturbances will have on timber supply.

Two key sources of information were used to evaluate natural disturbances on Haida Gwaii: the forest health annual Aerial Overview Surveys (AOS), and a change monitoring satellite image analysis.

Annual AOS data spanning 2006 to 2017, that covers nearly the entire province including Haida Gwaii, captures large stand level disturbances, however small stand replacing events are difficult to capture. Two of the most common stand replacing disturbances on Haida Gwaii are wind and landslides. Both events can range from being large (around 200 hectares) to very small (less than one hectare). It is the cumulative nature of these smaller events that the AOS data tends to not capture. As a result, a change detection analysis using satellite imagery was undertaken where wind and landslide events were mapped and compared from 2011 and from 2017 to determine the rate of change.

Windthrow is a natural disturbance that uproots trees or causes stem breakage. Change detection analysis mapped all recent windthrow occurrences down to 0.25 hectares in size with 1,992 hectares being mapped – 1,400 from the 2011 imagery and an additional 592 hectares from the 2017 imagery. Applying this to the THLB amounted to an annual disturbance rate of 70 hectares.

A similar analysis was undertaken to account for landslides with 787 hectares mapped in 2011 and an additional 394 hectares mapped in 2017. Applying this to the THLB amounted to an annual disturbance rate of 26 hectares.

The natural disturbance agent that affects the most hectares of forests on Haida Gwaii is the western black-headed budworm. The timing of outbreaks is typically 12-16 year frequency on the coast. The last outbreak occurred from 2009 to 2011 with 97,497 hectares of stands affected by 2010.

Budworm outbreaks mainly affect second growth stands with an estimated mortality rate, based on a 2010 study, of 3.6%. This mortality estimate was used in the timber supply analysis along with the timing between outbreaks of 12 years; this translates into an annual average mortality rate of 59 hectares within the THLB.

The decline of yellow cedar on the coast and on Haida Gwaii is primarily attributed to environmental stress caused by climate change. The mechanisms of decline have been

extensively researched in southeast Alaska, and appear to be freezing injury caused by delayed winter hibernation due to warming climates. Alaska recorded 236,600 hectares of affected stands in 2015, and up to 95,000 hectares of affected stands were estimated for BC's northcoast in a 2014 study.

Climate models suggest the decline will expand for several decades but ultimately not affect the entire population. Observations of decline on Haida Gwaii have so far been restricted to old forests. In southeast Alaska, the decline seems to affect young forests as well, with about 18% of yellow cedar between 40 and 60 years of age showing symptoms of decline.

Since 2006, approximately 2,270 hectares of yellow cedar decline have been mapped from annual AOS, amounting to an annual disturbance of 40 hectares within the THLB.

In sum, about 195 hectares of annual disturbance was assumed in the THLB to account for wind (70 hectares), landslides (26 hectares), black-headed budworm (59 hectares), and yellow cedar decline (40 hectares). No salvage harvesting of these disturbances was assumed in the base case.

Public comments included concerns about the impacts of climate change on forests, hydrology, wildlife and wildfire; and interest to protect all yellow cedar by removing it from the AAC due to its cultural importance.

We reviewed this factor with the JTWG and we conclude that the best available information was used to account for natural disturbances in the base case.

Climate Change

Climate change is widely affecting forests in Canada ranging from changes in the frequency and intensity of natural disturbances, rates of growth and carbon sequestration, and shifts in species composition.

Adaptation

To help address these concerns, BC has developed forest-related climate change adaptation strategies such as a Climate-Based Seed Transfer (CBST) and Climate Change Informed Species Selection (CCISS) to promote healthy, resilient and productive forests and ecosystems. In the case of CBST this is done by matching seedlings/seedlots to future (projected) planting site climates. CCISS recognizes that shifts in our Biogeoclimatic Ecosystem Classification (BEC) units are projected to occur and takes a 'least regrets' approach to species selection options based on a wide array of climate change projections. The long term BEC shift on Haida Gwaii between 2019 and 2080 is expected to be from the CWHwh1 to the CWHvm1, and from CWHvh3 to CWHvh1.

On Haida Gwaii, climate trends have demonstrated a moderate increase in temperature (2.5%) and precipitation (2.25%) over the last 70 years. As trends continue, potential changes to natural disturbance types are uncertain particularly the biotic effects from insects and diseases. Abiotic natural disturbances may include increased: peak flows and flooding, windthrow, landslides, drought and fire – as well as a continued decline in yellow cedar forests on Haida Gwaii.

The growth and yield implications of climate change are uncertain on Haida Gwaii due to the interplay of underlying soil productivity with projected climate changes, and from the impacts of stand-level disturbance agents.

Mitigation

Activities such as reforestation, fertilization and tree improvement can increase carbon sequestration in forests, while reducing slash pile burning decreases emissions and improves air quality. Recognizing this potential, the BC's Forest Carbon Initiative and the Canada's Low Carbon Economy Leadership Fund are collectively investing $290 million in carbon sequestration projects across much of BC from 2017/18 to 2021/22. There may be opportunities to tap into that funding for Haida Gwaii. And federal/provincial funding for forest carbon could get extended.

The Council of Haida Nation and the Province of BC 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 subsequent carbon sequestration benefits that can help mitigate climate change. The benefits amount to an estimate of around 12 million tonnes of CO2 sequestered and available as offsets between 2011 and 2035.

Neither governments have forest management objectives for forest carbon, and none were assumed in the base case or modeled via a sensitivity analysis. The Haida Nation and the Province intend to undertake a Carbon Budget Model analysis after the AAC determination in order to adjust sequestration estimates, validate and verify Haida Gwaii forest carbon to the Provincial Forest Carbon Offset Protocol.

Public input

There were public comments on climate change. One comment cited a study that concluded that high carbon density Pacific Northwest forests '…serves the greatest public good by maximizing co-benefits such as biological carbon sequestration and unparalled ecosystem services…". They note that Haida Gwaii's forest ecosystems have some of the highest per hectare tonnes of stored CO2 in the Province. They estimated the amount of emissions that would be created if base case projections were harvested.

There were comments about climate change impacts on yellow cedar declines, and on increases to windthrow events where incentives should be considered to encourage salvage harvesting and reforestation.

Regarding mitigation, there was a comment that the area behind (north) of Queen Charlotte/Skidegate should not be part of the THLB in order to generate carbon offsets and conserve the area. The JTWG response was that including the area in the THLB is consistent with the official community plans. Consistent with our 'Guiding Principles', if new land use or management objectives, such as for forest carbon management, are developed, then this can be assessed in future determinations.

Conclusion

We recognize that climate change may impact future forests on Haida Gwaii, and that at this time there is uncertainty regarding the severity of those impacts and how well adaptation strategies can help mitigate those impacts. We are pleased that there is recognition of this important factor in the timber supply review and are satisfied that at

this time no further adjustments can be made, other than those noted above under 'Natural Disturbances' that were accounted for in the base case. As more information becomes available on climate change implications for productivity and natural disturbances, and results from implementing adaptation and mitigation strategies, this can be included in future timber supply reviews. Also, if governments adopt forest carbon objectives in the future, this can then inform subsequent AAC determinations.

Alternative Harvest Flows

The base case follows a non-declining flow, or even flow, principle. Sensitivity analyses were undertaken to assess the impact of allowing short-term harvest levels to increase such that the steps to reach mid-term harvest levels do not decrease more than 10% per decade.

One sensitivity analysis under those conditions maximized initial annual harvests levels during the first decade to 925,000 cubic metres. The initial harvest level drops 10% in the second decade, and slightly below (by 1%) even flow harvest levels by decade 3 before eventually attaining long-term base case harvest levels by decade 9.

Another sensitivity analysis under those conditions provides an initial annual harvest level of 875,000 cubic metres for the first decade before dropping in decade 3 to base case even flow harvest levels, and then reaching long-term base case harvest levels by decade 7.

There was public feedback that the AAC should be further decreased to the minimum level to ensure financial sustainability for committed companies, with emphasis on fostering ecological sustainability and a healthy local value-added forest product industry on Haida Gwaii. Another comment said to err on the side of caution and make harvest levels less not more until the forest industry changes on Haida Gwaii are resolved, and until more value-added business is developed.

The JTWG noted that either sensitivity analysis maximized initial harvest flows by a relatively small amount (3-9% increase) relative to the base case and only within the first decade until harvests must be reduced to near base case levels.

We conclude that non-declining (even flow) harvest levels provided in the base case represent the best starting point for our determination.

Harvest Preference

The timber supply model employed harvest preference criteria based on relative highest value, as opposed to relative highest volume. This was a refinement that more accurately reflects current practice as stands with higher volumes of cedar are typically targeted first for harvesting (as also discussed under 'Cedar Harvest Levels').

Economic Operability

The 'operable area' in which licensees are able to harvest economically is subject to uncertainty. In some cases, harvesting has taken place in areas previously assumed to be inoperable, and some areas assumed operable have proved to be too expensive to harvest. If the assumed economically operable area is over-estimated, then the modeled timber supply would not be sustainable.

For the base case, the timber supply review incorporated an economic operability

assessment through a relative cost and marginal value model. The model incorporates costing surrogates (roads) and value surrogates (dynamic stand values) that approximate operational limitations. The relative stand values were derived from: (a) harvested stands in Haida Gwaii; and (b) log market prices. The base case assumed average log market prices when defining economic operability. Sensitivity analyses explored using high (strong) and low (weak) markets between 2008 to 2017 to assess impacts on operability and timber supply. These resulted in an approximate 0.1% increase and 3.4% decrease in timber supply relative to the base case when using high and low markets, respectively.

Sensitivity analysis also examined the impact of removing the road operability constraint; this resulted in a 4.4% increase in timber supply relative to the base case.

Another sensitivity analysis identified and excluded high access cost areas in the THLB to determine how much these areas were assumed to contribute to timber supply. Based on this analysis, their contribution to timber supply was negligible, which confirmed that the timber supply model reasonably accounted for areas that have a limited chance of contributing to timber supply due to operability constraints.

In reviewing this factor with the JTWG, we are satisfied that the base case appropriately modeled the above noted aspects of economic operability. Other operability considerations discussed under 'Small Islands' and below under 'Isolated Operating Areas' were also addressed in the timber supply review.

Isolated Operating Areas

Certain operating areas on Haida Gwaii are considered very remote and difficult to operate in as a result of terrain, needs for infrastructure investments, and presence of young stands due to past harvesting. Three of these areas have been identified: Sewell Inlet (Moresby south) and Peel Inlet (Moresby north) in the TSA, and Louise Island in TFL 60. These three areas were included in the base case in the timber supply analysis. Since 2015, there has been consistent forest development on Louise Island, and Peel Inlet has seen moderate development in its most accessible areas. The Sewell Inlet operating area has not seen harvesting operations since 2007. The Sewell Inlet operating area is therefore considered the most vulnerable to not having forest operations occurring.

Care must be taken not to allow areas that are only operable under specific conditions to unduly support the AAC, as this may lead to over estimating sustainable harvest levels. The base case attempted to model the operational difficulties of these isolated operating areas so that their contributions to timber supply are reasonably accounted for. This was undertaken by implementing both an operational road cost model and an initial merchantable volume threshold for harvest entry into these areas. Additional caution was also applied to this concern by: (i) evaluating outcomes if the Sewell Inlet operating area is excluded from the THLB; and (ii) evaluating outcomes if a geographic partition is implemented.

The JTWG undertook a series of analyses evaluating the delay of harvest entry in the Sewell Inlet operating area from 10, 20, 30, 40 and 50 years. The analyses suggests that: (a) if harvesting resumes in the Sewell Inlet operating area within the next 30 years the increased harvest in the rest of the TSA does not reduce sustainable timber supply; and (b) if timber harvesting there is delayed for another 40 or 50 years, the sustainable harvest of the TSA would decrease 11% relative to the base case with a 6% decrease for Haida Gwaii overall. The sustained yield of the Sewell Inlet operating area was evaluated with the

area's annual contribution to timber supply being 68,385 cubic meters when modeled as a sustained yield unit. If harvesting in the Sewell Inlet operating area never resumes, the sustainable harvest of the TSA would decrease 15% relative to the base case with a 8% decrease for Haida Gwaii overall.

There was public input expressing 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 are 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.

We note that some development has occurred in the past in the three isolated operating areas with more recent activity in Peel Inlet and Louise Island suggesting that they should contribute to timber supply.

We considered recommending a partition of the TSA area outside the Sewell Inlet operating area to the Chief Forester. If there is a partition that addresses the Sewell Inlet operating area and reduces the rest of the TSA's AAC contribution by about 68,385 cubic metres, that would be a 15% reduction to the rest of the TSA's sustainable harvest level (relative to the base case) and a 8% reduction for Haida Gwaii overall. Any harvesting in the Sewell Inlet operating area would help to offset that reduction.

Alternatively, we could wait until the next timber supply review to determine if a partition should be recommended. Although harvesting in the Sewell Inlet operating area has additional challenges due to its remoteness, the analysis shows no long-term consequences on timber supply in the TSA unless the area is avoided for another 30 years. There will be more information available to support the next AAC determination regarding Sewell Inlet operating area's ability to contribute to timber supply. For example, the level of planning and investment taking place to support timber harvesting in the Sewell Inlet operating area will be apparent.

Our considerations in the Sewell Inlet operating area includes recognition: (i) of the operating challenges in the area, including the lack of recent harvest operations (13 years since harvesting last occurred); (ii) of the importance of not overharvesting other areas in the TSA; (iii) that if harvesting resumes within the next 30 years the increased harvest in the rest of the TSA does not reduce sustainable timber supply; (iv) recognition that immediately treating the Sewell Inlet operating area as a separate timber supply block does not constrain the TSA; and (v) that other constraints on harvesting in the TSA (such as management of monumental cedars and cedar harvest levels) may lead to licensees moving into the area in the near term.

In conclusion, under '**Reasons for Decision**' and under 'I**mplementation**', we recognize that the Chief Forester may wish to further review the operability limitations in the Sewell Inlet operating area, and given our aforementioned considerations, we recommend that the Chief Forester carefully consider whether a partition is warranted to reflect the Sewell Inlet operating area's contribution to timber supply in the TSA.

Mosquito Lake and Slatechuck

The Mosquito Lake watershed, located within the TSA on northern Moresby Island, was assumed to contribute 1845 hectares to the THLB in the base case. A 2015 Haida House of Assembly resolution designated Mosquito Lake watershed as an area of importance to be placed under the protection of the Council of the Haida Nation. A sensitivity analysis that examined the removal of the watershed from the THLB concluded there would be a 19,800 cubic metre or 2.3% decrease in timber supply relative to the base case.

Slatechuck or Tllgaduu is a watershed and mountain east of the Village of Queen Charlotte whose creek, Tllgaduu Gandlaay, empties into Skidegate Inlet, to the ancient village of Tllgadaaw Llnagaay. The watershed contributes 203 hectares to the THLB in the base case. The argillite deposits found in the watershed are a sacred quarry that the Haida Nation has traditionally used to access high quality argillite for carving. The quarry is protected by an 18-hectare federal reserve. Recent proposals for timber harvesting within the watershed outside the quarry reserve have been met with opposition by the Council of the Haida Nation. A sensitivity analysis that assessed the implications of removing the watershed from the THLB found that there would be a 5450 cubic metre or 0.6% decrease in timber supply relative to the base case.

Consistent with our 'Guiding Principles', we account for existing land use decisions but are not prepared to account for land use decisions that have not yet been made. That said, we understand there is uncertainty regarding future land use status of Mosquito Lake and Slatechuck watersheds regarding their availability to support timber harvesting. Under '**Implementation**', we therefore recommend that both governments make a land use decision for Mosquito Lake and Slatechuck watersheds so that they can be appropriately addressed in the next timber supply review.

Cedar Harvest Levels

The long-term sustainability of cedar was a principle reason why we initiated this timber supply review. Aside from the high cultural value of cedar, the sustainability of western redcedar and yellow cedar in the THLB is a concern as the presence of cedar generally improves the economic viability of timber harvesting. Consequently, stands with higher volumes of cedar are typically targeted first for harvesting.

The socio-economic analysis undertaken for Haida Gwaii in support of this timber supply review stated that cedar carries the commercial operability of harvesting on Haida Gwaii when export markets for whitewoods are weak or limited. A substantial decrease in the prices for cedar logs and/or the available supply for commercial harvesting would deeply challenge the financial viability of timber harvesting on Haida Gwaii due to the relatively high cost of timber harvesting on, and transport of logs from, Haida Gwaii. However, a large downward shift in cedar prices is not likely because of the strong market presence and demand for cedar products in the US and the already limited global supply of western redcedar and yellow cedar timber.

The socio-economic analysis further states that if cedar timber supply were to be reduced on Haida Gwaii, for instance for the purpose of managing the supply of cedar over time, then the operability on Haida Gwaii of hemlock and spruce would be strongly dependent on continuing access to, and price strength in, export markets. This is a result of domestic

prices for hemlock and spruce logs not being (and are not foreseen to be) at levels that can support Haida Gwaii timber harvesting and transport costs.

There are interactions between cedar timber supply and LUOO requirements such as the protection of monumental cedar where the protection of more cedar decreases the commercial cedar supply.

There is no commercial timber harvesting of cedar in the non-THLB that represents about 85% of Haida Gwaii. Cedar may be harvested in the non-THLB such as protected areas for cultural purposes. For the 15% of Haida Gwaii in the THLB, cedar provides the most valuable timber and is considered the economic mainstay of the forest industry on Haida Gwaii. Past harvesting focused on cedar in excess of its proportion in the inventory, leading to a more limited supply of high value old cedar today. If harvesting continues to focus on stands with high value old cedar, remaining old growth stands will have lower value thereby being less valuable to harvest in the future.

In the 2012 AAC determinations for the TSA and TFLs, the Deputy Chief Forester provided non-legally binding expectations that the harvest of cedar should not exceed specific annual limits: 195,000 cubic metres for TSA 25; 32,000 cubic metres for TFL 58; and 133,000 cubic metres for TFL 60 – with the total contribution limit being 360,000 cubic metres. In 2017, the Chief Forester added a partition under the *Forest Act* for the TSA since cedar harvest in the TSA exceeded the direction in the 2012 determination. In 2018, the Minister signed an Order that brought that partition into effect for replaceable licences in the TSA.

The base case includes a preference for harvesting high value stands as this reflects past practice; this results in 277,000 cubic metres per year of cedar being harvested initially before declining to 122,000 cubic metres per year at decade 4, then increasing to about 176,000 cubic metres per year by decade 8.

A sensitivity analysis explored an approximate even flow of cedar harvest. The average annual even flow cedar harvest was 146,371 cubic metres; constraining the cedar harvest in this way resulted in a reduction in base case harvest projections for all species by 9.5%.

A sensitivity analysis examined an intermediate flow for cedar – where the contribution from cedar in the first decade is halfway between the current limit of 360,000 cubic metres and the even flow level – about 250,000 cubic metres – with cedar harvests being limited to the long run average thereafter. This analysis reduced projected base case harvest levels for all species by about 2%.

Another sensitivity explored an intermediate flow for cedar but used an adjusted THLB to account for factors that we accepted that differ from the base case. These factors include: (i) the 0.8% decrease in timber supply to account for 'Ecological Representation'; (ii) the 0.85% decrease to account for additional Northern Goshawk nests; and (iii) downward pressure on timber supply due to 'Monumental Cedars' as reflected in Scenario 4 described under that factor. The sensitivity analysis, using this adjusted THLB, could not find 250,000 cubic metres of cedar to harvest; the maximum cedar harvest that could be achieved in the first 10 years was 183,000 cubic metres. The total initial annual harvest under this sensitivity, using the adjusted THLB, was approximately 780,000 cubic metres.

Public input included:

- Concern that logging second growth whitewood blocks can only economically occur if there is continued access to harvesting cedar.
- Concern that cedar harvest has been excessive, and that a hard partition is required.
- Concern that there is no hard partition to prevent cedar overharvesting.
- Recognition that cedar is the driver of our forest industry on Haida Gwaii, and that the harvest of cedar should be regulated to stabilize employment and encourage seeking higher values from whitewood; with support for the base case calculation with adequate provision for sustained cedar harvest.

We support an intermediate flow approach to cedar harvesting as it enables a gradual adjustment to even flow cedar harvest levels. We conclude that the intermediate flow levels using the adjusted THLB – where no more than 183,000 cubic metres per year could be achieved in the first 10 years – is the most realistic estimate.

The HGMC does not have explicit authority to specify that portions of the AAC are attributable to different types of timber. The Chief Forester does have that explicit authority under the *Forest Act.* Under '**Implementation**', we therefore recommend that the Chief Forester adopt the intermediate flow for cedar, and as also noted in our '**Reasons for Decision'**, that limits cedar harvesting for the next 10 years to 183,000 cubic metres per year for Haida Gwaii.

Community Forest

The Province has been in negotiations with the communities of Haida Gwaii towards the establishment of a Community Forest Agreement (CFA) from portions of the TSA. The Minister has apportioned 80,000 cubic metres of the TSA's AAC for the proposed Community Forest. The Council of the Haida Nation continues to support the establishment of an area-based Community Forest. In 2017, the Province made a formal offer of Community Forest tenure over a specified area. The offer also included a legal partnership with BC Timber Sales through a reduced volume condition that would be applied to the licence. While the offer has not been accepted, a sensitivity analysis was undertaken to assess the timber supply implications if that 2017 offer proceeded and the area was deleted from the TSA.

The proposed CFA area would sustain a harvest of 48,325 cubic metres per year and result in a 1.6% decrease in overall timber supply on Haida Gwaii. Overall this would amount to a 13% reduction to the volume of the TSA (as the volume would be shifted into the CFA). The Chief Forester has the authority to consider an administrative reduction to the AAC in the TSA to account for establishment of the CFA in the future.

First Nations Woodland Licence

In 2011, the Council of the Haida Nation acquired TFL 60, which is managed by Taan Forest Products. There is also a formal invitation from the Province for to establish a First Nations Woodland Licence (FNWL) tenure over the area currently within the TSA managed under Forest Licence to Cut (A87661). The Province, Council of the Haida Nation, and Taan Forest Products have been negotiating the creation of an expanded First Nations Woodland Licence that would effectively merge TFL 60 and the original area of the FNWL invitation, currently managed under the Forest Licence to Cut. Taan Forest

Products manages both tenures as if they were one already (e.g. in the submission of one Forest Stewardship Plan).

A sensitivity analysis was therefore undertaken to assess the timber supply implications of merging TFL 60 and the area identified for the FNWL into one management unit. The timber supply implications potentially affect both the proposed expanded First Nations Woodland Licence and the reduced TSA, and therefore the Haida Gwaii AAC overall in terms of meeting even flow annual harvest levels for each management unit.

Taan Forest Products is currently working on an application for the FNWL, including the development of a draft Management Plan. The proposed FNWL area, as presented in the draft Management Plan, would sustain a harvest of 153,367 cubic metres per year. This would amount to a 44% reduction to the volume of the TSA compared to the base case (as the volume would be shifted into the FNWL). When adding the volume of the FNWL and the TSA together under this scenario, this would amount to 0.8% decrease in overall timber supply (e.g. a large unit being split into small supply blocks).

We appreciate the analysis undertaken by the JTWG as this can help inform any decisions on the establishment of the FNWL.

Reasons for Decision

The timber supply review that supported our AAC determination included a data package, timber supply review analysis, socio-economic analysis, and public discussion paper, along with the Land Use Objectives Order (LUOO). These are all posted on the HGMC website: http://www.haidagwaiimanagementcouncil.ca/.

We also benefited from the considerable and thoughtful public input that we were seeking when releasing the public discussion paper. We address public comments where applicable as they relate to the various factors that we have considered in this rationale document.

In reaching our AAC determination for the Haida Gwaii Management Area, we have considered all of the factors noted in this AAC rationale document and have reasoned as follows.

The base case projected harvest levels show that, for the TSA and two TFLs combined, an initial harvest level of 842,800 cubic metres per year can be maintained for the first 80 years and then increase to about 925,000 cubic metres per year after that. In the base case, TSA 25 contributes about 55% of the initial harvest level, TFL 58 contributes about 8% of initial harvest level, and TFL 60 contributes about 37% of the initial harvest level.

In addition to the TSA and two TFLs, the Haida Gwaii Management Area also includes the public land portion of the existing four woodlots. The current AAC for the public land portion of these woodlots is 7,476 cubic metres.

We are satisfied that the analysis inputs and approaches applied in the base case forecast, for the majority of factors applicable to the Haida Gwaii Management Area, were appropriate as described in our considerations as previously discussed in this rationale. However, we have identified some factors, which, considered separately, indicate that the timber supply may be greater or less than that projected in the base case. Some of these

factors can be quantified and their impact on the base case projected harvest levels estimated with a degree of reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be quantified at this time.

Factors for which considerations not reflected in the base case indicate that timber supply may be overestimated in the base case and that can be quantified are:

- *Ecological Representation*: Section 16 of the LUOO states that: "For each common site series and each rare site series in a landscape unit, retain an amount of old forest equal to or greater than the landscape unit targets listed in Schedule 10". The areas needed to meet those targets were removed from the THLB in the base case. After the base case was established, three corrections or changes were made. (1) The JTWG found an error in ecosystem representation for the Skidegate Lake Landscape Unit where areas outside the THLB should have contributed to the retention targets. (2) An adjustment was also made in response to licencee feedback so that the analysis was changed to account for all 3 ecosystem classification deciles rather than only the primary decile, consistent with how targets are met operationally. (3) The model was adjusted so that old forest on the THLB are given higher priority for retention than young forests in the non-THLB. The combination of these three adjustments resulted in a small 1153 hectare decrease in the THLB – about 0.8%. We accept this downward pressure on timber supply relative to the base case.

- *Northern Goshawk*: Northern Goshawk nesting habitat is protected by the LUOO with approximately 200-hectare reserves for nesting sites outside of established protected areas. Currently there are 23 known goshawk territories reflected in the base case. Section 20 of the LUOO requires that when a new Northern Goshawk nest is discovered that a 200-hectare reserve around the nest be established. The discovery of new nests was not assumed in the base case. The JTWG noted to us that about one new breeding pair per year on average (since 1995) are identified on Haida Gwaii. We support the assumption, based on the previous discovery rate since 1995, that 10 new nesting sites are likely to be identified over the next 10 years before the next timber supply review, and that these sites need to be protected as per the requirements of the LUOO. Accounting for 10 new nesting sites represents about a 0.85% decrease in timber supply relative to the base case.

  There are no legal requirements to protect Northern Goshawk foraging habitat at this time. Consistent with our 'Guiding Principles' that we not account for land use decisions that have yet to be made, the base case did not account for foraging habitat within the territories of the 23 known Northern Goshawk nesting areas or for foraging habitat for new nesting sites that might be identified in the future. Once a decision has been made on appropriate forest practices in foraging habitat (e.g. via an implementation plan for the recovery of Northern Goshawk) that applies to Haida Gwaii has been approved by all governments, then that decision can be factored into the next AAC determination.

From reviewing the overestimates in base case timber supply that can be quantified that are listed above, we conclude about a small 1.6% decrease in base case projected harvest levels.

In addition to factors that indicate timber supply may be overestimated that can be quantified, there are also factors that result in uncertainty or risk that may exert an upward or downward pressure on timber supply. These include:

- *Monumental Cedars*: There is no commercial timber harvesting of cedar in the non-THLB that represents about 85% of Haida Gwaii. Cedar from across Haida Gwaii, including the protected areas, are used by the Haida for their socio-cultural purposes. The LUOO defines a monumental cedar to be a visibly sound western redcedar or yellow cedar tree that is greater than 100 centimeters (cm) in diameter at breast height (dbh) and has a log length of 7 metres or longer above the flare with at least one face that is suitable for cultural use. Objective 9 (3) protects all monumental cedar greater than 120 cm in dbh to support Haida Nation's present and future cultural use.

  New Cultural Features Identification Standards v. 5 (CFIv5) were approved by the Council of Haida Nation and came into effect in January 2020. The new standards were designed to better implement existing LUOO requirements. The base case modeled an initial estimate of the THLB impacts of the new CFIv5 standards by assuming that monumental cedars will most likely be found in >250 year old stands (age class 9), in higher log grades, and that – based on past practices – 70% would be protected and 30% would be harvested.

  Feedback from licensees and regional ministry scaling experts suggest that more monumental cedar, following the new CFIv5 standards, may be found in lower grade cedar than assumed in the base case. The JTWG did additional analysis, with input from licensees, and also found that monumental cedar may be found in younger age classes (age class 7 and 8) and in lower grades. Based on this information, the JTWG prepared additional scenarios that are discussed in 'Monumental Cedar' factor within this rationale document. The JTWG felt that Scenario 4 captured the new CFIv5 standards better than the base case. Scenario 4 used the new CFIv5 standards, assumed monumental cedar could also be found in younger age classes and lower quality log grades than assumed in the base case. The impacts of Scenario 4 indicate a 6.9% decrease in timber supply relative to the base case.

  We recognize that there is uncertainty about how many monumental cedars there are, and how protection of them will affect the THLB. In reviewing this factor with the JTWG, we conclude that there may be a range of potential timber supply impacts from the implementation of the new CFIv5 standards with a likely downward pressure on timber supply and there is uncertainty in all scenarios reviewed.

  As noted under '**Implementation**' below, we recommend that: (i) a population study of monumental cedars be developed (e.g. using the most recent inventory and ground sampling) based on statistical principles and Haida knowledge so that this value can be more accurately represented for future AAC determination processes; (ii) operational practices that implement new CFIv5 standards and that protect (buffer) monumental cedars be monitored to better assess impacts on timber supply, and that (iii) in anticipation of an increased need to alter reserve or management zones to accommodate timber harvesting access, both governments

support the development of a transparent and replicable risk-managed application process.

- *Socio-Economic Considerations:* We discussed this important factor, including the considerable public input, at length amongst ourselves and with the JTWG. We discussed concerns about forest sector viability and that Haida Gwaii is a very high cost operating area; and the importance of forestry in the rural economy of Haida Gwaii and the contribution of forestry activity from Haida Gwaii to the coast as a whole including the milling facilities in the lower mainland.

  We also discussed impacts from forest sector employment due to possible increases and decreases in the AAC. Forest sector employment is an important part of overall employment on Haida Gwaii and in BC. Employment multipliers from the socio-economic assessment suggest that a 100,000 cubic metre decrease in actual harvesting on Haida Gwaii could decrease direct, indirect and induced forest-sector related employment by 48 jobs on Haida Gwaii, and 82 jobs across BC. Between 2002 and 2017, since the last AAC was determined, actual harvest levels averaged 787,000 cubic metres per year. There are many factors that can affect forest sector employment including market conditions, exchange rates, tariffs, etc.; one factor also is the AAC. For example, if the AAC is set below actual harvest levels there could be impacts on current jobs.

  There are a range of possible initial harvest levels that will not put future timber supply at risk based on the information provided in the timber supply analysis, for example, regarding alternative harvest flows. Within that range, if the AAC is set low to account for environmental and cultural values, then this could impact socio-economic values. If the AAC is set high to account for socio-economic values, then this may impact environmental and cultural values. We recognize that a risk management approach needs to be taken to appropriately balance all values.

  Due to the desire to avoid unnecessary socio-economic impacts and to the extent possible provide time for necessary adjustments to the new AAC, we examined the flexibility in the base case harvest projection in the short term and considered whether there may be potential for innovation and flexibility to reduce timber supply impacts in the implementation of the LUOO, in particular the new CFIv.5 standards. We have factored socio-economic considerations into our AAC determination using an approach that considers and balances risk.

- *Cedar Harvest Levels:* As noted above under Monumental Cedar, there is no commercial timber harvesting of cedar in the non-THLB that represents about 85% of Haida Gwaii. Cedar from across Haida Gwaii, including the protected areas, are used by the Haida for their socio-cultural purposes. For the 15% of Haida Gwaii in the THLB, cedar provides the most valuable timber and is considered the economic mainstay of the forest industry on Haida Gwaii. Past harvesting has focused on cedar in excess of its contribution in the inventory, leading now to a more limited supply of high value old cedar. If harvesting continues to focus on stands with high value old cedar, this will result in remaining old growth stands having a lower cedar content and being less valuable to harvest in the future.

In the 2012 AAC determinations for the TSA and TFLs, the Deputy Chief Forester provided non-legally binding expectations that the harvest of cedar should not exceed specific limts: 195,000 cubic metres for TSA 25, 32,000 cubic metres for TFL 58, and 133,000 cubic metres for TFL 60 – with the total contribution limit being 360,000 cubic metres. In 2017, the Chief Forester added a partition under the *Forest Act* for the TSA since cedar harvest in the TSA exceeded the direction in the 2012 determination. In 2018, the Minister signed an Order that brought that partition into effect for replaceable licences in the TSA.

The base case assumes the highest value stands are harvested first; this results in 277,000 cubic metres of cedar being harvested initially before declining significantly to 122,000 cubic metres at decade 4, then increasing to about 176,000 cubic metres by decade 8.

A sensitivity analysis explored an approximate even flow of cedar harvest. The average annual even flow cedar harvest was 146,371 cubic metres; constraining cedar harvest in this way resulted in a reduction in base case harvest projections for all species by 9.5%.

A sensitivity analysis examined an intermediate flow for cedar – where the contribution from cedar in the first decade is halfway between the current limit of 360,000 cubic metres and the even flow level – about 250,000 cubic metres – with cedar harvests being limited to the long run average thereafter. This analysis reduced projected base case harvest levels for all species by about 2%.

Another sensitivity explored an intermediate flow for cedar but used an adjusted THLB to account for factors that we accepted that differ from the base case. These factors include: (i) the 0.8% decrease in timber supply to account for 'Ecological Representation'; (ii) the 0.85% decrease to account for additional Northern Goshawk nests; and (iii) downward pressure on timber supply due to 'Monumental Cedars' as reflected in Scenario 4 described under that factor. The sensitivity analysis, using this adjusted THLB, could not find 250,000 cubic metres of cedar to harvest; the maximum cedar harvest that could be achieved in the first 10 years was 183,000 cubic metres

We support an intermediate flow approach to cedar harvesting as it enables a gradual adjustment to even flow cedar harvest levels. We conclude that the intermediate flow levels using the adjusted THLB – where no more than 183,000 cubic metres per year could be achieved in the first 10 years – is the most realistic estimate.

The HGMC does not have explicit authority to specify that portions of the AAC are attributable to different types of timber. The Chief Forester does have that explicit authority under the *Forest Act.* We therefore recommend to the Chief Forester that the level of cedar harvest we feel is appropriate and that supports our AAC determination (i.e. 183,000 cubic metre intermediate flow for cedar) be implemented in the Chief Forester's determinations for the TSA and the two TFLs. We have underscored that recommendation under '**Implementation**.'

- *Isolated Operating Area – Sewell:* The Sewell operating area, located in the TSA, is considered very remote and difficult to operate in as a result of terrain, needs for infrastructure investments, and young stands due to past harvest history. There has been little to no area harvested in the Sewell operating area since 2007. The base case includes the Sewell operating area in the THLB. The inclusion of areas in the AAC that may not be operable, or only operable under specific conditions, may lead to over-harvesting of other areas in the THLB that are more easily accessible.

  We considered recommending a partition of the TSA area outside the Sewell Inlet operating area to the Chief Forester. If there is a partition that addresses the Sewell Inlet operating area and reduces the rest of the TSA's AAC contribution by about 68,385 cubic metres, that would be a 15% reduction to the rest of the TSA's sustainable harvest level (relative to the base case) and a 8% reduction for Haida Gwaii overall. Any harvesting in the Sewell Inlet operating area would help to offset that reduction.

  Alternatively, we could wait until the next timber supply review to determine if a partition should be recommended. Although harvesting in the Sewell Inlet operating area has additional challenges due to its remoteness, the analysis shows no long-term consequences on timber supply in the TSA unless the area is avoided for another 30 years. There will be more information available to support the next AAC determination regarding Sewell Inlet operating area's ability to contribute to timber supply. For example, the level of planning and investment taking place to support timber harvesting in the Sewell Inlet operating area will be apparent.

  Our considerations in the Sewell Inlet operating area includes recognition: (i) of the operating challenges in the area, including the lack of recent harvest operations (13 years since harvesting last occurred); (ii) of the importance of not overharvesting other areas in the TSA; (iii) that if harvesting resumes within the next 30 years the increased harvest in the rest of the TSA does not reduce sustainable timber supply; (iv) recognition that immediately treating the Sewell Inlet operating area as a separate timber supply block constrains the TSA; and (v) that other constraints on harvesting in the TSA (such as management of monumental cedars and cedar harvest levels) may lead to licensees moving into the area in the near term.

  In conclusion, under **'Implementation'**, we recognize that the Chief Forester may wish to further review the operability limitations in the Sewell Inlet operating area, and given our aforementioned considerations, we recommend that the Chief Forester carefully consider whether a partition is warranted to reflect the Sewell Inlet operating area's contribution to timber supply in the TSA.

Determination

We have considered and reviewed all the factors documented above, including the risks and uncertainties of the information provided. It is our determination that a timber harvest level that accommodates objectives for all forest resources, including ecosystem-based management (EBM) as specified in the LUOO, during the next 10 years and that

reflects current management practices and considers socio-economic information particularly as it relates to economic viability of operations on Haida Gwaii and forest sector employment, can best be achieved by establishing an AAC for the TSA and two TFLs at 804,000 cubic metres.

The public land portions of the four existing woodlots on Haida Gwaii are also part of the Haida Gwaii Management Area. These areas currently support a cumulative AAC of 7,476 cubic metres. These AACs are separate from and additional to the AAC attributable to the area covered by the TSA and TFLs.

This determination is below the base case given potential downward pressures from operational practices associated with implementing the new CFIv5 standards for monumental cedar, accounting for new Northern Goshawk nests, and adjustments made to better account for ecological representation.

It is acknowledged that the determination is above the recent actual harvest levels so that it should not, in and of itself, impact current forest jobs on Haida Gwaii or elsewhere in BC. However, we also recognize that actual harvests in recent years have been affected by markets and local events, and that the determined AAC will affect future opportunities. Socio-economic considerations were important in determining the AAC and needed to be weighed together with environmental and cultural values. Due to these socio-economic considerations and the uncertainties associated with the number and management of monumental cedars, the determination is somewhat above the timber supply projection that incorporates the most recent data used to estimate the overall number of monumental cedar (i.e. Scenario 4).

As part of the determination, we also recommend to the Chief Forester, when making the AAC determination for TSA 25, TFL 58 and TFL 60, to limit the harvest of cedar for the first decade overall to about 183,000 cubic metre on Haida Gwaii. This is reflective of the ‘intermediate flow’ which may mitigate the socio-economic impacts of reducing cedar harvests over the next decade relative the ‘even flow’ of cedar option.

This determination will remain in effect until a new AAC is determined, which must take place within 10 years of this determination. If additional significant new information is made available to us, or major changes occur in the management objectives and practices upon which we have predicated this decision, then we are prepared to revisit this determination sooner than the 10 years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, we expect Ministry and Haida Nation staff, and licensees (where appropriate) to undertake or support the tasks and studies noted below, the particular benefits of which are described in appropriate factors of this rationale document.

We recognize that the ability of all parties to undertake or support these projects is dependent on provincial and Haida priorities and available resources, including funding. However, these projects are important to help reduce the risk and uncertainty associated with key factors that affect timber supply on Haida Gwaii or to address other important issues.

We recommend that:

- *LiDAR Coverage*: both governments (Haida and the Province) work with industry and other partners to fill existing gaps in LiDAR coverage on Haida Gwaii (e.g. northwest Graham Island) as this will improve, among other things, the forest inventory and mapping of active fluvial units
- *Young Stand Monitoring*: both governments continue to support research and inventory projects like Young Stand Monitoring that improve the forest inventory on Haida Gwaii
- *Ecosystem Mapping*: both governments continue to support research and inventory projects like updating ecosystem mapping to TEM standards as this will improve forest management on Haida Gwaii
- *Site Productivity*: both governments continue to support research and inventory projects like SIBEC supported growth and yield plot re-measurements, and that new plots be established in poorly represented stands in order to improve information available for forest management decisions on Haida Gwaii
- *Managed Stand Growth and Yield*: information on the growth and yield of managed yellow cedar stands be obtained
- *LUOO Annual Submissions*: both governments work with forest licensees to ensure annual submissions of LUOO digital spatial data follow consistent data management protocols
- *Risk-managed LUOO applications:* both governments continue to monitor risk-managed applications that are submitted and tracked at the Solutions Table and the decisions from the Council of Haida Nation and the Province of BC on those applications so that this information can support the next timber supply review
- *Municipal Lands and Woodlots*: the discrepancy between how municipal lands and woodlots are considered in AAC determinations by the HGMC and the Province be remedied so that that they are better aligned relative to what is the Haida Gwaii Management Area
- *Cedar Stewardship Areas:* although there is no LUOO requirement regarding a buffer around Cedar Stewardship Areas (CSAs), at times the Council of Haida Nation have requested a 1.0 tree length buffer around CSAs; as a consequence forest practices should be monitored adjacent to CSAs so that these practices can be appropriately addressed in support of the next timber supply review
- *Monumental Cedar:* (i) a population study of monumental cedars be developed (e.g. using the most recent inventory and ground sampling) based on statistical principles and Haida knowledge so that this value can be more accurately represented for future AAC determination processes; (ii) operational practices that implement new CFIv5 standards and that protect (buffer) monumental cedars be monitored to better assess impacts on timber supply, and that (iii) in anticipation of an increased need to alter reserve or management zones to accommodate timber harvesting access, both governments support the development of a transparent and replicable risk-managed application process
- *Type I and Type II Fish Habitat*: annual submissions of Type I and II fish habitat data be used to: (i) build a Haida Gwaii-wide inventory of fish habitat that can

then assist future operational and strategic planning; and (ii) support the next timber supply review

- *Ecological Representation – Skidegate Landscape Unit:* forest licensees and both governments finalize the spatial identification of recruitment polygons for old forests for the Skidegate Landscape Unit as soon as possible as was also recommended by the Forest Practices Board
- *Northern Goshawk:* both governments monitor the number of new goshawk nests found each year so that this can be accounted for in the next determination
- *Blue Heron:* both governments and forest licensees convene a monitoring initiative to report on the annual breeding activities for the two known and any new Blue Heron nest areas in order to support a better understanding of the species requirements relative to forestry activities on Haida Gwaii
- *Upland Stream Areas and Sensitive Watersheds*: watershed level assessments be undertaken in lowland watersheds dominated by wetland complexes to mitigate uncertainty surrounding the role of coastal bogs in regulating peak flows
- *Utilization Limits*: utilization limits on Haida Gwaii be reviewed in light of the new waste policy and utilization standards introduced as part of the Coast Forest Revitalization in 2019
- *Minimum Harvestable Age:* both governments continue to monitor the harvesting of second growth so that appropriate minimum harvest criteria (such as size and age) can be developed to support the next timber supply review
- *Isolated Operating Area -Sewell:* the Chief Forester carefully consider whether a partition is warranted to reflect the Sewell Inlet operating area's contribution to timber supply in the TSA as noted in our '**Reasons for Decision'**.
- *Mosquito Lake and Slatechuck:* both governments make a land use decision for Mosquito Lake and Slatechuck watersheds so that they can be appropriately addressed in the next timber supply review.
- *Cedar Harvest Levels:* the Chief Forester adopt the intermediate flow for cedar, as noted in our '**Reasons for Decision'**, that limits cedar harvesting for the next 10 years to 183,000 cubic metres per year for Haida Gwaii.

Appendix 1: Haida Stewardship Law, Section 5

Section 5 of KaayGuu Ga gaKyah ts 'as- Gin 'inaas 'Iaas 'waadluwaan gud tl 'a gud giidaa, the Haida Stewardship Law, Old Masset, October 8, 2010, reads as follows.

5. **Haida Gwaii Management Council**

a. With this Stewardship Law, the Haida Nation through the Council of the Haida Nation and the Government of British Columbia, through the Kunst'aa Guu-Kunst'aayah Reconciliation Protocol, creates the Haida Gwaii Management Council. The Haida Nation delegates to the Haida Gwaii Management Council the authority to perform the functions set-out in section 5(b). The Haida Nation retains the authority to reassign all of the functions of the Haida Gwaii Management Council if the Haida Gwaii Management Council is unable to perform those functions.

b. **Mandate**: The Council of the Haida Nation and the Government of British Columbia shall set out the Terms of Reference the Haida Gwaii Management Council shall follow in exercising its responsibilities and functions. The Haida Gwaii Management Council
shall perform the following functions

i. implement and amend the Strategic Land Use Agreement;
ii. establish, implement and amend Land Use Objectives for forest practices;
iii. determine and approve the Allowable Annual Cut;
iv. approve management plans for protected areas;
v. develop policies and standards for identifying and conserving heritage sites;
vi. develop a comprehensive forestry management strategy that maintains ecological integrity and supports a sustainable Haida Gwaii economy;
vii. monitor and review the effectiveness of the Solutions Tables;
viii. identify policy issues for consideration by the Council of Haida Nation;
ix. monitor and evaluate the efficiency of its decisions at the operational level; and
x. other functions the Haida Nation and the Government of British Columbia delegate to it.

Appendix 2: Haida Gwaii Reconciliation Act, Section 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 3: Forest Act, Section 8 (11)

Section 8(11) of the *Forest Act* reads:

(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.