Tree Farm Licence 37 Forest Landscape Plan and Forest Operations Plan

Connected Planning in an
Adaptive Management Framework

Draft Version 1.0 March 13, 2024

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Acknowledgements

The work in this document reflects two years of effective collaboration. We appreciate the depth of subject matter expertise, technical support, financial contributions and most importantly the trust and empowerment placed in us to be successful. Specifically, we'd like to acknowledge:

- 'Nam̓gis First Nation members and leadership who shared their stories and the inherent interconnectedness of 'Nam̓gis Forest Values. Thank-you for the wisdom and input provided through community engagement meetings and conversations.
- Other First Nations with Indigenous interests in relation to the pilot area. We appreciate the opportunity to keep you updated on the progress of the pilot. We recognize that many of you are also involved in collaborative planning initiatives and look forward to the next steps of sharing together.
- The Province of British Columbia through the Ministry of Forests who not only provided financial support and subject matter expertise but above all, empowered us to develop practical and transformative solutions. We look forward to continuing to work together as we shift into implementation of the pilot deliverables and first seamlessly integrated Modernized Land Use Plan, Forest Landscape Plan, and Forest Operations Plan in British Columbia.
- The communities of Woss, Port McNeill, Mount Waddington Regional District, and all who live and work in 'Nam̓gis territory and Tree Farm Licence 37. We recognize the uncertainty of the last several years and appreciate having the time to develop a durable and predictable outcome.


Photo Credit: Mike Green

- The subject matter experts who contributed their expertise and time. We especially want to acknowledge the work of Glynnis Horel (P.Eng), Allen Banner (RPBio, RPF Ret.), Del Meidinger (RPBio), John Deal (RPBio, RPF), Colin Mahony (PhD, RPF), Liza Rodrigues (RPF), and Ken Zielke (RPF).
- The Western Forest Products' Inventory and Analysis team who contributed their technical modelling and GIS expertise including over one hundred Patchworks modelling runs to test a wide range of scenarios ensuring high quality forecasts to inform our decision making.
- The Strategic Team and Advisory Committee that included members from 'Nam̓gis First Nation, Western Forest Products, and the Province of British Columbia for their leadership, input, and support.

Welcome

On behalf of ‘Nam̱gis First Nation (‘Nam̱gis), Western Forest Products Inc. (Western), and Atli Resources Limited Partnership (Atli), we are pleased to present the draft Forest Landscape Plan (FLP) and draft Forest Operations Plan (FOP) for the area of Tree Farm Licence 37 (TFL 37) within ‘Nam̱gis’ territory on northern Vancouver Island.

The *Declaration on the Rights of Indigenous Peoples Act* provided an opportunity for meaningful change in British Columbia (B.C.). We have taken this opportunity to define a new approach where we steward our forests together towards a future forest that is aligned with our collective values and our hopes for subsequent generations.

Like all relationships, our journey began with a step of trust. There was no roadmap to follow nor preconceived notions about what the outcome might be. Our work reflects the spirit of collaboration between ‘Nam̱gis, Western, Atli, the Province of British Columbia (Province), and local communities. Over the last two and a half years, a local technical team with a commitment and connection to the stewardship of ‘Nam̱gis territory, TFL 37, and success of the North Island have worked together to develop the first fully integrated FLP and FOP in British Columbia.

The TFL 37 Forest Landscape Plan Pilot Project (TFL 37 FLP Pilot) is one of four provincial pilot projects intended to inform a new framework for forestry and is the only pilot involving an area-based tree farm licence tenure. As we began documenting our outcome in the FLP, we quickly discovered it was necessary to document both the FLP and FOP concurrently. Together, these two plans provide a strong foundation for the stewardship of ‘Nam̱gis territory and TFL 37 within an adaptive management framework supported by cooperative decision making.

Forestry is important to the economic and social fabric of the North Island. This document reflects the discussions and input received from ‘Nam̱gis community members, municipal governments, forest certification advisory groups, forest workers, and the public.

On page I7, you will find a detailed user reference guide on how to use the integrated FLP and FOP. We encourage you to take the time to review the draft plans and we look forward to your feedback.

Sincerely,

Signature
‘Nam̱gis First Nation

Signature
Western Forest Products Inc.

Signature
Atli Resources Limited Partnership

Executive Summary

In 2021, the Province of British Columbia announced that as part of changes to the *Forest and Range Practices Act* it will replace Forest Stewardship Plans (FSP) with FLPs and FOPs.

The FLP is intended to establish clear outcomes for the management of forest resource values within defined areas providing a bridge between strategic land use planning and operational planning[1].

The FOP is intended to provide requirements for forest operations considering forest practices, silvicultural systems, stocking standards and the approximate location of future cutblocks and roads.

From the date of establishment, the FLP will have a 10-year term and the FOP will have a five-year term.

- The Gwa'ni Project, TFL 37 FLP, and FOP have been documented in seamless alignment. This alignment is achieved by connecting the Objectives from the Gwa'ni Project and Section 2.22 of the *Forest and Range Practices Act* (FRPA) to Goals and **Future Forest Outcomes** in the FLP which then connect to **Stewardship Strategies** in the FOP. This connected approach is made possible by making the shift from traditional top-down and sequential planning to bottom-up and connected planning. Connected planning builds on the characteristics of the local ecosystem to design ecologically appropriate **Stewardship Strategies** for each of the planning values. These strategies are then joined together inside a spatial model to create a connected future forest outcome forecast 300 years into the future. The connected future forest outcome is then documented within each legislated plan through **Objectives**, **Future Forest Outcomes**, and **Stewardship Strategies** as follows:
  - 18 **Objectives** from the Gwa'ni Project for the desired future forest condition;
  - 13 **Future Forest Outcomes** in the FLP that describe the connected future forest outcome forecast 300 years into the future; and
  - 20 **Stewardship Strategies** in the FOP that provide the requirements for forest operations aligned with each of the planning values.

This connected approach to planning enables transformative change for implementing in an adaptive management framework with cooperative decision making. Implementation in an adaptive management framework is achieved by linking 40 **Adaptive Management Indicators** to either **Future Forest Outcomes** in the FLP or **Stewardship Strategies** in the FOP. These **Adaptive Management Indicators** are then monitored by 'Nam̱gis and Western to ensure we remain on track to achieve the connected future forest outcome described by the 13 **Future Forest Outcomes**.

If monitoring indicates we are not on track to achieve the 13 **Future Forest Outcomes**, cooperative decision making will inform whether adjustments to **Stewardship Strategies** are required or whether one or more of the **Future Forest Outcomes** need to be formally amended. This approach provides the flexibility to adjust **Stewardship Strategies** and the resulting harvest pattern as needed to be consistent with achieving the 13 **Future Forest Outcomes**.

Monitoring results and a summary of any adjustments to **Stewardship Strategies** will be provided through an annual monitoring update report shared with local communities and a more comprehensive 5-year monitoring report linked to establishment of the next FLP and approval of the next FOP.

1 https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-landscape-plans


Photo Credit: Mike Green

As part of this adaptive management framework, planned harvest areas including new road construction are maintained as part of the connected future forest outcome enabling them to be updated in the FOP on a rolling one to two-year basis. This ensures there will always be a meaningful projection of future harvest areas and road construction five years into the future. These cutblocks and roads will also be reflected on the annual **Harvest Development Schedule**.

Connected planning transforms the way we manage for cumulative effects and biodiversity and ecosystem health including a forecast 300 years into the future. The connected future forest outcome is the combined impact of all forest related activities within the plan area. The connected future forest outcome also describes how biodiversity and ecosystem health is sustained through 10 relevant **Future Forest Outcomes**.

With expertise from a broad range of technical experts, spatial modelling, modern approaches to inventory, and public input, we have created a connected planning framework that ensures outcomes are achievable and economically viable. We also have the flexibility needed to adapt as we monitor our activities in real time. This new approach provides the detail and diligence required to sustain biodiversity and ecosystem health, the economic viability of the forest sector, and local communities.

A visual User Reference Guide explaining the interactive linkages between the FLP and FOP is located on page 17.

Forest Landscape Plan Pilot Project

Introduction

In August 2021, ‘Nam̱gis, Western, and the Ministry of Forests (FOR) signed the TFL 37 Forest Landscape Plan Pilot Project Charter which included three deliverables:

1. Context review which considers how an FLP could interact or replace current plans to increase the efficiency of downstream regulatory decisions;
2. Draft FLP which documents the process followed and preferred scenario selected; and
3. Recommendations for decision making between ‘Nam̱gis and Western and between ‘Nam̱gis and the Province and *Forest and Range Practices Act (FRPA)* improvements considering the entirety of the forest management process.

Once the FLP is established by the Chief Forester and the FOP is approved by the local District Manager, it will replace the current Forest Stewardship Plan (FSP) for the portion of TFL 37 within ‘Nam̱gis territory. From the date of establishment, the FLP will have a 10-year term and the FOP will have a five-year term.

First Nations With Interests in the Pilot Area

Several First Nations with interests in the pilot area also have collaborative planning processes underway. Communications have been maintained by the FLP technical team during development of the pilot and a range of discussions are ongoing considering the full extent of TFL 37 providing seamless connections with adjacent collaborative planning initiatives. First Nations with an interest in portions of the pilot area are Ka:'yu:'k't'h'/ Che:k:tles7et'h' First Nations, Kwakiutl First Nation, Mamalilikulla First Nation, Mowachaht/Muchalaht First Nation, Quatsino First Nation, Tlowitsis Nation, We Wai Kai Nation, and Wei Wai Kum First Nation.

Description of the Plan Area

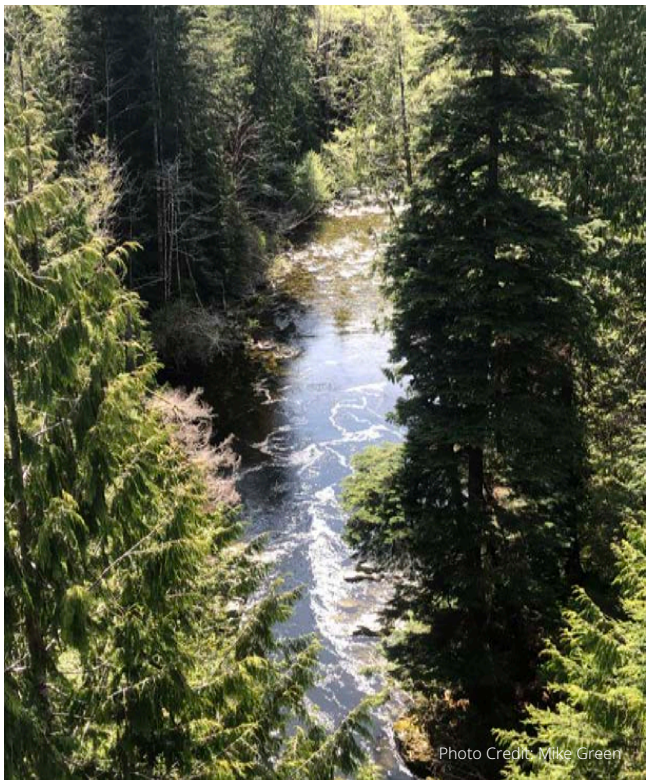
TFL 37 exists over most of the Nimpkish Valley. The northern portion of the TFL is in the Lower Nimpkish Landscape Unit and the southern portion is in the Upper Nimpkish Landscape Unit.

The name Nimpkish is an anglicized version of ‘Nam̱gis. The rich resources of the Nimpkish Valley, and especially the Nimpkish River, continue to be vital to ‘Nam̱gis and is sometimes referred to as the heart of ‘Nam̱gis territory. The Nimpkish River, known by ‘Nam̱gis as Gwa’ni, is the longest river on Vancouver Island and supports all five species of Pacific salmon.

The TFL 37 FLP currently covers the portion of TFL 37 located within ‘Nam̱gis territory. TFL 37 totals 160,000 ha, with a forested area of approximately 140,000 ha. A total of 89% of TFL 37 is in ‘Nam̱gis territory.

An important characteristic of the Nimpkish Valley are the major lakes linked together by a network of rivers. Nimpkish Lake is the valley’s largest lake, and it is located entirely within TFL 37. The main rivers include the Nimpkish, Woss, Kilpala and Davie. The area encompasses 11 of the valley’s 12 sub-basin drainages.

The Nimpkish Valley includes five forested biogeoclimatic units — CWHvm1, vm2, xm2, mm1, and MHmm1. The major tree species include western hemlock, western redcedar, amabilis fir, Douglas-fir and yellow cedar. Annual precipitation levels reach 3,000 to 5,000 mm. At lower elevations the climate is characterized by short winters with intermittent snowstorms with prolonged spring snowpacks at higher elevations. The summer period from July to September can be dry and warm. The topography of TFL 37 is dominated by the U-shaped Nimpkish Valley with a variety of mountainous feeding drainages.



Gwa'ni Project

The Gwa'ni Project covers most of the Nimpkish Valley and was formally launched in January 2021 between 'Nam̱gis and the Province under a Memorandum of Understanding for Modernized Land Use Planning. Close integration was maintained between the TFL 37 FLP Pilot and the Gwa'ni Project.

The Gwa'ni Project is a multi-year project that will result in consensus recommendations to update the Vancouver Island Land Use Plan (VILUP) including alternate management options if required. The updated VILUP will guide what can happen on the lands, rivers, lakes, watersheds, and forests of the Nimpkish valley.

At the time of preparing the draft FLP and FOP, the recommendations that will come from the Gwa'ni Project have not yet been finalized. The FLP and FOP do however, intentionally incorporate the draft objectives from the Gwa'ni Project. Linkages are maintained throughout the Gwa'ni Project, FLP, and FOP demonstrating consistency across both initiatives including the specific requirements for forest operations to ensure the desired objectives for the plan area are met.

Gwa'ni Planning Values

The Gwa'ni Project, FLP, and FOP are built on a comprehensive suite of values summarized in Figure 1 that were informed through engagement with 'Nam̱gis membership and local communities.

Engagement with 'Nam̱gis membership provided clear direction that rather than isolating nature's resources value-by-value, 'Nam̱gis' consider the elements of all values as integrated factors within the complex natural ecosystem. 'Nam̱gis Forest Values therefore encompass the duty to ensure the cultural, environmental, and spiritual vitality of the waters, lands, and resources are protected and used sustainably for future generations of people, plants, and animals.

Local values were also informed through Gwa'ni Project engagement and FLP engagement that included participation at Gwa'ni Project open houses and meetings with the Nimpkish Woodlands Advisory Committee (NWAC) and Vancouver Island North Woodlands Advisory Group (VINWAG), forest workers, and local municipal government leadership. This comprehensive suite of values includes many that are commonly recognized resource values in forest planning. A summary of engagement for the FLP and FOP is included in Appendix A.

Connected planning builds up from a foundation of values and so each value summarized below is identified with an icon that links directly to each of the relevant **Stewardship Strategies** in the FOP.

Figure 1: A summary of planning values that supported development of the Gwa'ni Project, FLP, and FOP.

Aquatic Habitat and Fish	Aquatic systems include the communities of aquatic organisms across the entire range of species along with the non-living components of the aquatic environment. All five species of salmon spend a portion of their lives within the Nimpkish River system.	
Biodiversity	Biodiversity refers to the variety of life in all its forms along with the supporting habitats and natural processes. Improving the ecological integrity of drier ecosystems was a focus given the early harvest history of the Nimpkish Valley.	
Cedar	Engagement with 'Na̲mgis members identified western redcedar and yellow cedar as a distinct planning value. This includes the use of cedar for cultural purposes in addition to commercial timber products. Bark from both species of cedar are valued within the community which is used to create a wide range of textile and artistic products. The word k'wa'xtlu translates to large western redcedar trees and logs. It is respectfully used in this document to reference both western redcedar and yellow cedar.	
Climate Resiliency and Carbon	Climate resilience is the ability to prepare for, recover from, and adapt to climate change impacts. It is recognized that maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber from the forest, generates the largest sustained carbon mitigation benefit.	
Karst	Karst landscapes develop over geological time scales, as soluble bedrock is exposed to water creating features such as fluted and pitted rocks on the surface and subsurface drainage systems below. Karst occurrences are dispersed throughout the Nimpkish Valley with denser concentrations towards the north of the TFL, including some with cultural and recreational significance.	
Water	The Nimpkish Valley has abundant, clean, and healthy water which is a priceless resource vital for all life.	
Non-timber Forest Products (NTFP)	Forests provide a range of resources which can be gathered for human use. These are often categorized as edible, medicinal, or floral products, including uses in arts and crafts. Many have been harvested by 'Na̲mgis for millennia.	
Recreation and Tourism	These are grouped together as they both reflect the human experience including outdoor activities such as camping, hiking and watersports. Opportunities for outdoor experiences contribute to community health and wellness, along with attracting visitors supporting local economies.	
Wildlife	A wide diversity of wildlife live in the Nimpkish Valley with ungulate management of particular importance. Considerations include habitats, populations, and opportunities for viewing, trapping and hunting.	
Access	Access is the ability to approach, enter and use the area. Roads are an asset for forestry activities, recreation, tourism, and cultural opportunities. Access also includes information such as maps and signage.	
Visuals	Visuals relate to the beauty of the natural landscape and scenery of the area. This is closely connected with recreation and tourism.	
Soil	Healthy, productive, and stable soils are critical to the health and productivity of forest ecosystems. Soil has an ecosystem of micro-organisms and nutrients and is an excellent filter supporting clean water.	
Minerals	Minerals are present in the plan area with active mineral exploration occurring.	
Culture	Culture can mean different things to different people and includes the space for all cultural traditions and activities in the area.	
Timber	Trees within the area are harvested on a sustained yield to produce a predictable supply of forest products with the majority manufactured into lumber on Vancouver Island.	

Old Growth Strategic Review

A key focus has been implementing the 14 recommendations of the Old Growth Strategic Review[2]. In recognition of the interconnected nature of the recommendations, the development of a connected future forest outcome has proven to be instrumental in achieving the intent of the 14 recommendations.

1. **Indigenous Involvement:** In alignment with the required conditions for change, both the FLP and FOP are jointly developed and implemented with the full participation of ‘Nam̱gis.
2. **Prioritizing Ecosystem Health and Resilience:** The prioritization of ecosystem health and resilience is described in detail in the Biodiversity and Ecosystem Health section of the FLP on page 24.
3. **Formalized Three-Zone Forest Management Framework:** In recognition of the concept of zoning, the Gwa’ni Special Management Zone is aligned with the intent of the consistent zone as practices at a forest or landscape level are reasonably consistent with the attributes of the original forest and forest landscapes. The Gwa’ni General Management Zone is aligned with the intent of the converted zone and the ‘Nam̱gis Conservation Network is aligned with the intent of the protected zone.
4. **A More Inclusive and Stabilizing Approach to Governance:** Implementation in an adaptive management framework supported by co-operative decision making provides for the stable and ongoing long-term implementation of the FLP and FOP. A connected future forest outcome forecast 300 years into the future provides the foundation needed to ensure daily decisions align with the long-term outcome.
5. **Public Information:** The 13 **Future Forest Outcomes** in the FLP combined with the annual monitoring report, five-year adaptive management monitoring report, updated harvest pattern in the FOP, and updated Forest Development Schedule provide timely and objective information about the forest and long-term trends.

[2] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/old-growth-forests/strategic-review-20200430.pdf

6. **Immediate Response to Ecosystems at Very High Risk:** The detailed design of the ‘Nam̱gis Conservation Network was well underway when the Province of B.C. released the provincial scale options for prioritizing areas of deferral. The draft ‘Nam̱gis Conservation Network was maintained while the FLP was developed.
7. **Compliance with Existing Requirements:** Compliance with existing requirements was verified as part of FLP development.
8. **Monitoring and Evaluation:** Implementation will occur in an adaptive management framework that includes **Adaptive Management Indicators** directly connected to each of the elements of biodiversity and ecosystem health.
9. **Setting and Managing Objectives and Targets:** A connected future forest outcome that combines the ecologically appropriate stewardship of all values ensures that both the spatial and temporal aspects of biodiversity and ecosystem health are sustained. Connected planning builds up respecting the principles of whole land management in a way that is locally relevant and meaningful.
10. **Update Biodiversity Targets and Guidance:** Ecologically appropriate **Stewardship Strategies** are implemented in an adaptive management framework with direct linkages to the 13 **Future Forest Outcomes** ensuring biodiversity and ecosystem health is sustained over the long-term with recognition to the complexity of changes that may occur with a changing climate. This approach is practical and meaningful as it connects the unique values of the area to the local ecological characteristics and history of the area.
11. **Inventory and Old Forest Classification:** The connected future forest outcome has been developed utilizing the very best of local data including the development of a LiDAR and Geographic Information System (GIS) based approach to ecosystem integrity that better recognizes the inherent complexity of forests and how they all contribute to sustaining biodiversity and ecosystem health in managed forests.
12. **Innovative Silviculture Systems:** In recognition of the importance of structural complexity to forest ecosystem function and biological diversity, the Retention Silvicultural system and extended rotations with the Gwa’ni Special Management Zone are used.
13. **Transition Planning at the Provincial and Local Levels:** A transparent and relevant forecast for the connected future forest outcome helps provide long-term predictability for both provincial and local levels. Connected planning provides for a more timely transition as all aspects that need to be considered to make the transition are connected and evaluated concurrently.
14. **Transition Support for Communities:** Given the dynamic nature of forests and ecosystems, it is recognized that there will always be uncertainty into the future. Given this, the 300-year forecast and adaptive management framework provide a structured approach supporting an orderly transition over the long-term. This forecast can inform the transition supports required for successful implementation.

Connected Planning

The Need for Fundamental Change

A few years ago, there was a seemingly simple request from ‘Nam̱gis to Western: “*Can you please provide a diagram of the current forest management framework on one piece of paper?*” This challenge was enlightening and proved to be both complex and impossible to fit onto one page.

First, the challenge exposed a wide array of disconnected forest plans — some voluntary and some legislated. Second, it became clear there was very little transparency. Up until that time, the focus of Western and ‘Nam̱gis communications had been reviewing plans on a block-by-block basis, often late in the planning process. As a result, discussions were difficult as individual cutblocks have little context or connection to ‘Nam̱gis values and their connectedness across the landscape. We knew that addressing this fundamental issue with the current planning framework was critical to success of the pilot.

We began our journey with no roadmap to follow or preconceived notion of what the outcome would be.

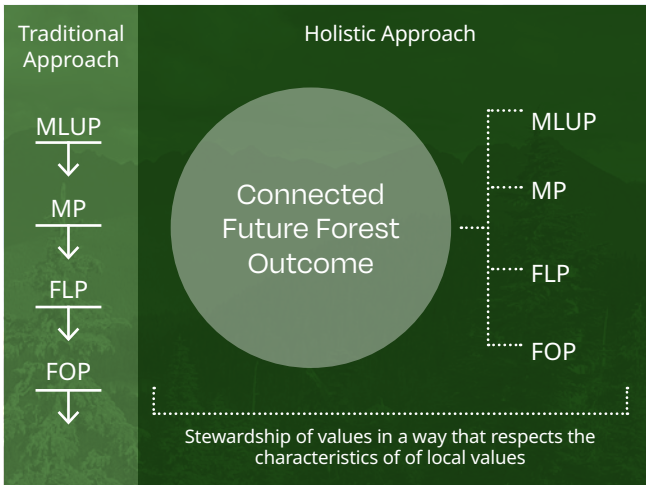
It was necessary to be open-minded and we didn't constrain our creativity or limit our ability to truly address the structural challenges of the current planning framework. We worked together respectfully, transparently, and with a focus on ‘Nam̱gis planning values and biodiversity and ecosystem health. As our work progressed, it was abundantly clear that everything is connected – providing a common foundation for exploring new ideas and concepts. In coordination with the Gwa’ni Project, we ultimately aligned on a new approach, which we have called **Connected Planning**.

Connected Planning builds on the connected stewardship of all values in a way that respects the characteristics of local ecosystems. All aspects of stewardship are then integrated in a forest planning model to develop a connected future forest outcome that provides a more holistic picture of the complete ecosystem and forest including the resulting harvest pattern forecast spatially 300 years into the future. A connected future forest outcome enables outcomes to be established that better reflect the complete ecosystem and forest including their spatial and temporal elements.

This approach is a significant change from more traditional top-down and target-focused planning that sequentially develops plans with the harvest pattern developed as the last step in the planning process while trying to achieve an often-competing set of objectives and guidelines.

Figure 2 illustrates this holistic shift to **Connected Planning** that completes all steps of planning in parallel to develop a connected future forest outcome. Once a connected future forest outcome is developed, all the information needed to document each legislated is available, allowing the plans to comprehensively meet the legislated requirements.

Figure 2: The shift to Connected Planning.



MLUP: Modernized Land Use Plan | **MP:** Management Plan (Timber Supply Review)
FLP: Forest Landscape Plan | **FOP:** Forest Operations Plan

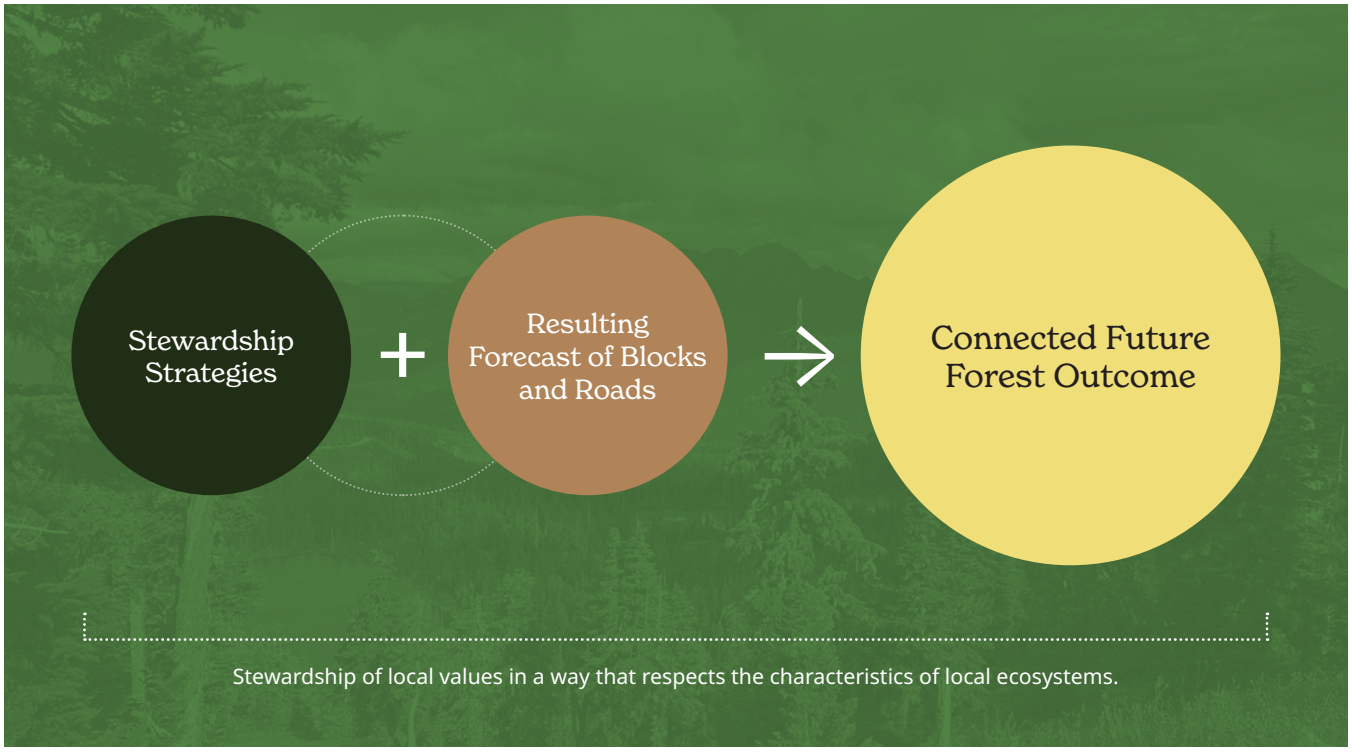
Methodology and Approach

We approached **Connected Planning** by building on a foundation of values connected to ecologically relevant **Stewardship Strategies** that respect the natural landscape and local ecological characteristics. The **Stewardship Strategies** were then connected in Patchworks™ which is a spatially explicit forest estate planning model that can translate the full suite of **Stewardship Strategies**, including the resulting forecast of cutblocks and roads, into an optimized and connected future forest outcome.

We also developed a modelling indicator dashboard linked to both the connected future forest outcome and relevant objectives for each value. This enabled us to evaluate the cumulative effect of all **Stewardship Strategies**, including the resulting spatial and temporal harvest pattern across multiple scenarios. This included evaluating how the spatial pattern of ecosystem integrity changed through time across various scenarios. This provided important insight into the many symbiotic relationships and sometimes trade-offs across many values allowing us to make informed decisions and refinements. By the time we selected and endorsed a preferred scenario, we had completed over one hundred modelling runs as we completed the necessary refinements to the **Stewardship Strategies**. The result is a thoughtful and carefully developed connected future forest outcome that respects the complexity of whole land management and maintains biodiversity and ecosystem health. Figure 3 illustrates the concept of building up to a connected future forest outcome from a foundation of values that respect the local ecological characteristics of the natural landscape.

We have come to appreciate that **Connected Planning** provides for five transformational benefits supporting improved decision making and public transparency in parallel with the innovation needed to streamline and modernize the current planning process providing the predictability needed for safe and effective forest operations.

Figure 3: Connected planning.



1. **Integrated FLP and FOP Improving Public Transparency:** A connected future forest outcome provides the legislated content requirements for both the FLP and FOP consistent with *Forest and Range Practices Act* ("FRPA") Section 2.28 and 2.36. While recognizing that **Connected Planning** could be effectively documented in one plan, the Bill 23-2021 amendments to FRPA require documentation across two separate plans. We have therefore developed an interactive FLP and FOP that avoids the duplication of information across plans while providing clear linkages between **Future Forest Outcomes**, **Stewardship Strategies**, and **Adaptive Management Indicators**.

   The FLP and FOP document the connected future forest outcome as follows:

   - FRPA Section 2.28 (1) (b) and FRPA Section 2.28 (1) (c)

     The FLP documents the outcome in relation to the five objectives referred to in FRPA Section 2.22 consistent with FRPA Section 2.2.8 (1) (b). Like putting together a jigsaw puzzle, this connects all the objectives into a single picture rather than trying to describe each of the objectives in isolation.

     The FLP also documents how each of the objectives in FRPA section 2.22 were taken into consideration in establishing the outcomes consistent with FRPA section 2.28 (1) (c). Given that the objectives in FRPA Section 2.22 are interconnected, the connected future forest outcome provides the necessary level of detail to document this requirement.

   - FRPA Section 2.36 (1) and FRPA Section 2.36 (2)

     The FOP documents the **Stewardship Strategies** which are the requirements for the forest operations area in respect to forest practices. The FOP also includes the silvicultural systems and stocking standards consistent with FRPA Section 2.36 (1) (b). Through **Connected Planning**, we verify that the pattern of cutblocks and roads are consistent with the 13 **Future Forest Outcomes** at the earliest possible point in the planning process. This fundamental shift in timing, transforms and simplifies the entirety of forest management process eliminating inconsistencies between the FLP and FOP.

2. **Adaptive Management Framework:** Adaptive management is a systematic approach of "learning by doing" to improve future management decisions. The details of how the Adaptive Management Framework functions are described in the FLP.

3. **Cumulative Effects:** Cumulative effects refer to changes in the environment caused by the combined impact of past, present, and potential future changes. The 13 **Future Forest Outcomes** in the FLP document the cumulative effect of all forest management activities including the resulting harvest pattern forecast 300 years into the future.

4. **Biodiversity and Ecosystem Health:** The multiple elements of biodiversity and ecosystem health are documented through 10 **Future Forest Outcomes** in the FLP.

5. **Forecast of Cutblocks and Roads Improving Public Transparency:** With the future harvest pattern integrated as part of the connected future forest outcome, cutblocks and roads in the FOP can be updated on a rolling basis providing the public with the best information available. The process to maintain an up-to-date forecast of cutblocks and roads is documented in the FOP.

A Joint Commitment from Design to Implementation

A critical success factor for all planning is maintaining the connection between design and implementation by those who are directly accountable for a successful outcome.

We recognize that the relationships strengthened over the last few years, provide the foundation needed for our next step of implementation together.

We also recognize it is challenging to translate the depth of our connected future forest outcome into words. We have however, made every effort to concisely and accurately document the FLP and FOP to enable the consistent implementation of both plans into the future.

We collectively recognize our stewardship and conservation responsibilities and are committed to the successful implementation of the connected future forest outcome.

Signature

Printed Name, Title and Date | ʼNa̱mgis First Nation

Signature

Printed Name, Title and Date | Western Forest Products Inc.

Signature

Printed Name, Title and Date | Atli Resources Limited Partnership

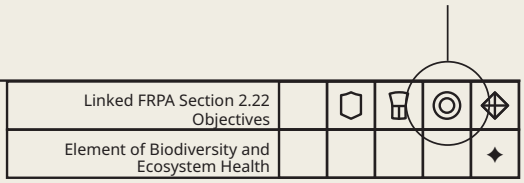
User Reference Guide

At the top of the FLP and FOP you'll see a menu which allows you to toggle between pages in the section with a click.

The underlined text indicates the current page you are on

At-a-glance visual guide highlights which objectives are met

FF 5 — ECOSYSTEM INTEGRITY



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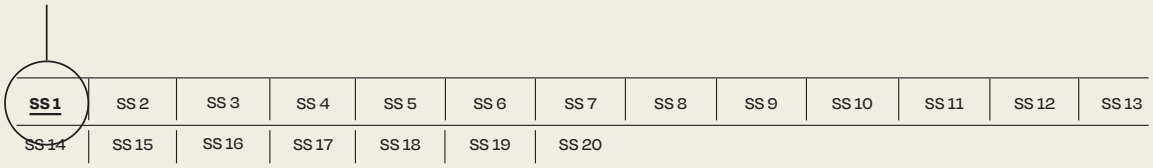


SS 1 — ‘NAMGIS CONSERVATION NETWORK INCLUDING RESERVES FOR WILDLIFE, BIODIVERSITY, AND CARBON

At-a-glance visual guide highlights which objectives are met

Tree Farm Licence 37 Forest Landscape Plan

Establishing Clear Future Forest Outcomes

March 7, 2024

Rachel Dalton, RPF

"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

March 7, 2024

Mike Davis, RPF

"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

March 7, 2024

Mike Green, BSc, RFT

"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

March 7, 2024

Stuart Glen, RPF

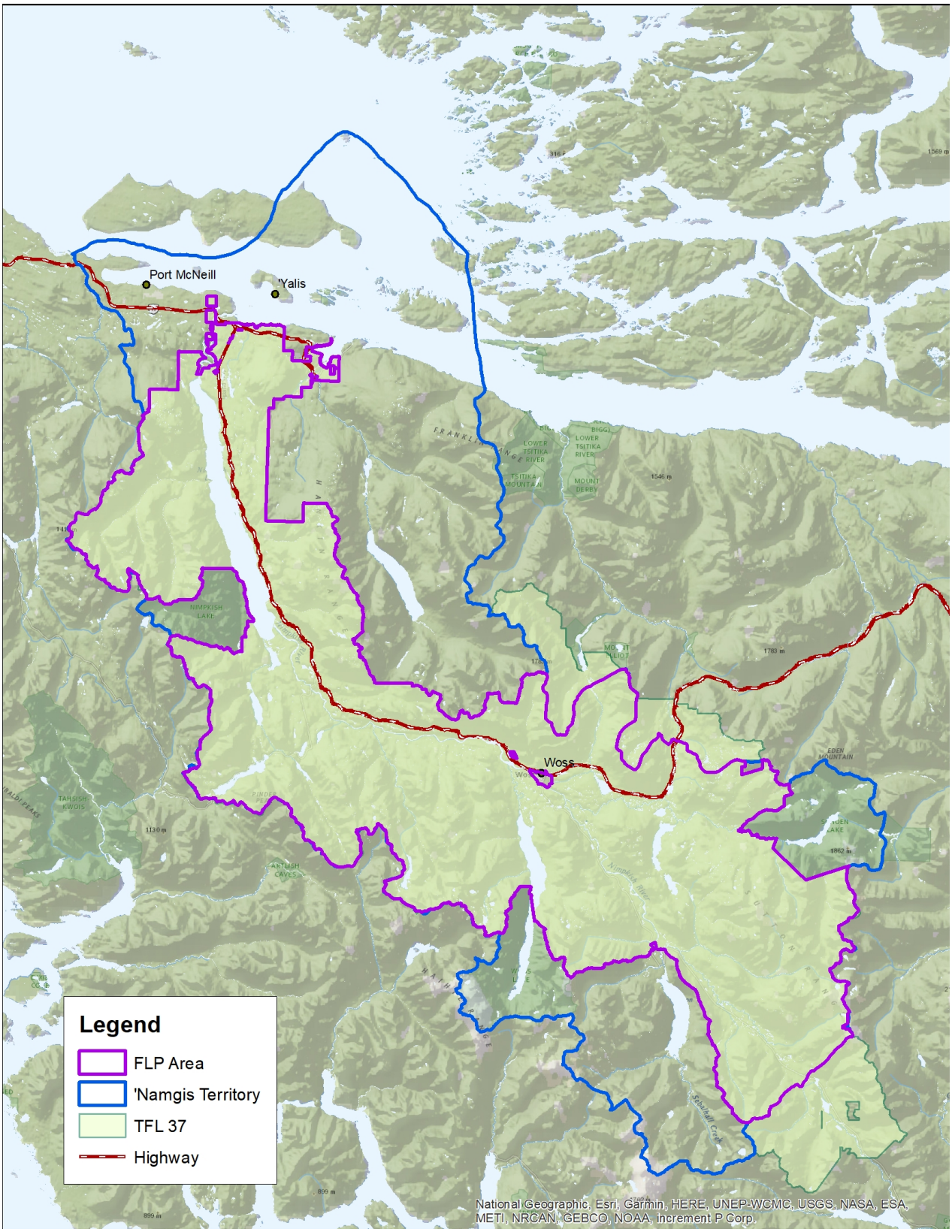
"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

March 7, 2024

Brian Svanvik, Director, ‘Namgis Natural Resource Department

Map of the Forest Landscape Plan Area

FPPR Section 2.28 (1) (A)



Implementing Connected Planning

Adaptive Management Framework

A Systematic Approach for Implementation

Adaptive management is a systematic approach of "learning by doing" to improve future management decisions. Given the inherent complexity and interconnectedness of ecosystems, values, and climate change forecasts - adaptive management recognizes that no plan is ever perfect. This requires the flexibility and freedom to learn, innovate, and adapt on an ongoing basis.

Through this framework we are embracing innovation and are implementing new forward-looking **Future Forest Outcomes** and **Stewardship Strategies** — some of which have not been done before. This approach rewards and encourages innovation and takes into account learning by doing recognizing that not every **Future Forest Outcome** or **Stewardship Strategy** may be perfectly achieved and that amendments to **Future Forest Outcomes** and adjustments to **Stewardship Strategies** may be required during the term of each plan. This approach improves public transparency as there is a clear picture of the future forest outcome providing context to the daily activities occurring in the TFL.

An adaptive management framework has five essential components which function together to enable a systems-based approach to implementation:

1. **Establishing a Reference Point for Monitoring:** The connected future forest outcome provides the necessary reference point for monitoring as it is the cumulative of all stewardship strategies and the resulting pattern of cutblocks and roads forecast 300 years into the future. This provides the detail needed to ensure that the combined impact of all stewardship decisions being made today function together to achieve the desired outcome. This enables **Stewardship Strategies** and the resulting harvest pattern to be adjusted as needed consistent with achievement of the outcome. Where it is determined that a change to any of the 13 **Future Forest Outcomes** is required, an amendment of the FLP will be prepared and submitted for approval.
2. **Linking Indicators to the Reference Point: Adaptive Management Indicators** are linked to the reference point described by the 13 **Future Forest Outcomes** in the FLP. There are a total of 40 **Adaptive Management Indicators** that function together as an overall dashboard of progress.
3. **Monitoring of Adaptive Management Indicators:** Each **Adaptive Management Indicator** has a specified frequency for monitoring. **Adaptive Management Indicators** will be monitored through a combination of field and inventory information and the results will be included in the Patchworks model which we anticipate updating approximately every two years. Figure 1 summarizes the 40 **Adaptive Management Indicators** including the monitoring frequency and linkages to either **Future Forest Outcomes** or **Stewardship Strategies**.
4. **Evaluating Indicators and Updates: Adaptive Management Indicators** linked to clear reference points will enable 'Namgis and Western to make stewardship refinements as needed to stay on track to achieve the **Future Forest Outcomes**. An annual review of monitoring outcomes will be completed to identify if any adjustments are required. This includes aligning on the updated schedule of future cutblocks and roads as part of the connected future forest outcome.
5. **Reporting the Results:** The results of monitoring and any amendments to **Future Forest Outcomes** or adjustments to **Stewardship Strategies** will be summarized in the five-year FLP report required by FRPA Section 2.31 (2). In addition to the five-year report, an annual summary report will also be

prepared providing local communities with regular implementation updates. Updates to the schedule of cutblocks and roads will be made publicly available for review and comment and will be published in the annual Forest Development Schedule consistent with FRPA Section 2.46.

Figure 1: 40 Adaptive Management Indicators.

Adaptive Management Indicator		Monitoring Frequency	Future Forest Outcome	Stewardship Strategy
AMI 1	The five-year rolling average of the total number[1] (stems/ha) of western redcedar and yellow cedar trees at the time of free growing where these species were planted. [1]as defined by the inventory label	Annual		■
AMI 2	The five-year rolling average of the change (%) in the density (stems/ha) of western redcedar and yellow cedar at the time of free growing compared to the density at planting.	Annual		■
AMI 3	The five-year rolling average of the change (%) in the density (stems/ha) of western redcedar and yellow cedar at the next harvest compared to the density at free growing.	Annual	■	
AMI 4	The total area (ha) of stand level retention with western redcedar or yellow cedar trees as recorded during block layout.	Annual		■
AMI 5	The total number (#) of bear dens and raptor nests protected.	Annual		■
AMI 6	The current and forecast ECA (%) by area of sensitivity.			■
AMI 7	The channel condition trend[1] over a ~10-year period (+/- 3 years) beginning in 2007. [1] Trend is based on observed changes from imagery and defines the level of disturbance from high to stable or consistent with the natural condition.	~10 Years	■	
AMI 8	The five-year rolling average of the number of landslides[1] per 100ha of logged steep terrain[2] in the 15-year period following harvesting that impact the defined value. [1] 500m^2 (0.05ha) or larger [2] >60% slopes based on Lidar	Annual	■	
AMI 9	The proportion (%) of riparian forest of S1, S2, and S3 streams that have functioning, and resilient riparian forest.	5 years	■	
AMI 10	The five-year rolling average width[1] (m) of retention along S5u, S4, and S6u streams associated with harvested cutblocks. [1] Average width = Riparian Management Zone (m) x % retention prescribed.	Annual		■
AMI 11	The five-year rolling average width[1] (m) of retention along W1, W2, W3, W4, W5, and W6 wetlands associated with harvested cutblocks. [1] Average width = Riparian Management Zone (m) x % retention prescribed.	Annual		■
AMI 12	The five- year rolling average width[1] (m) of retention along L1A, L1B, L2, L3, and L4 lakes associated with harvested cutblocks. [1] Average width = Riparian Management Zone (m) x % retention prescribed.	Annual		■
AMI 13	The 5-year rolling average of the estimated proportion[1] (%) of windthrow at year 1 and 5 on a random sample of S4, S5u, and S6u streams. [1] Proportion = estimated # windthrow trees/estimated total # trees.	Annual		■
AMI 14	The area (ha) by age class in the Gwa'ni Special Management Zone.	5 years	■	
AMI 15	The area (ha) by age-class in the dza̱'wa̱n 400 portion of the Gwa'ni Special Management Zone.	5 years	■	

Adaptive Management Indicator		Monitoring Frequency	Future Forest Outcome	Stewardship Strategy
AMI 16	The area (ha) by age-class in the mąłik 800 portion of the Gwa'ni Special Management Zone.	5 years	■	
AMI 17	The proportion (%) of contiguous stands < 21 years old by size category in the mąłik 800.	5 years	■	
AMI 19	Ecosystem integrity of the Gwa'ni Special Management Zone and General Management Zone.	5 years	■	
AMI 20	The five-year rolling average proportion (%) of the retention silvicultural system utilized in the Gwa'ni Special Management Zone and General Management Zone.	Annual		■
AMI 21	The five-year rolling average proportion (%) of stand level retention in the Gwa'ni Special Management Zone and General Management Zone.	Annual		■
AMI 22	The five-year rolling average of volume harvested (m^3) by conventional and helicopter harvest methods.	Annual	■	
AMI 23	The five-year rolling average of the aggregated length of road used for hauling logs (km/m^3) on an annual basis.	Annual	■	
AMI 24	The five-year rolling average proportion (%) of the total road network utilized for hauling.	Annual	■	
AMI 25	The proportion (%) of the road network that is not deactivated that is inspected annually.	Annual		■
AMI 26	A review of erosion control treatments at year one and five after harvest complete on a random sample of roads.	Annual		■
AMI 27	The area (ha) by wildlife habitat type.	5 years	■	
AMI 28	The area (ha) in each age-class by biogeoclimatic ecosystem variant.	5 years	■	
AMI 29	The proportion (%) of the Gwa'ni Special Management Zone and General Management Zone with connectivity.	5 years	■	
AMI 30	The proportion (%) of the Gwa'ni Special Management Zone and General Management Zone with forest interior conditions.	5 years	■	
AM 31	Ecosystem integrity of rare ecosystems.	5 years	■	
AMI 32	The proportion (%) of area (ha) that requires replanting.	Annual		■
AMI 33	The proportion (%) of stands with incidence of significant forest health agents at the time of free growing.	Annual		■
AMI 34	The average number of annual rainfall events over 75mm in 12 hours or 100mm in 24 hours.	Annual	■	
AMI 35	The total period (# days) of snowpack based on Mount Cain opening day and snow depth at April 1[1]. [1] Measured at Mount Cain lower station.	Annual	■	
AMI 36	The annual life cycle carbon balance (tCO2e).	Annual	■	
AMI 37	Total area (ha) of the 'Nąmgis Conservation Network.	2 years		■
AMI 38	Total area (ha) of the carbon reserve.	2 years		■
AMI 39	Total inventory (#) of k'wa'xtlu by diameter category.	Annual		■
AMI 40	Total volume (m^3) salvaged under the blanket salvage permit timbermark.	Annual		■

Cumulative Effects

The term cumulative effects refer to changes in the environment caused by the combined impact of past, present, and potential future changes. A connected future forest outcome implemented in an adaptive management framework transforms how we manage for cumulative effects because it links monitoring to the combined impact of **Stewardship Strategies**, including the resulting harvest pattern.

A connected future forest outcome addresses cumulative effects in the following four ways:

1. **Long-term Forecast:** A forecast 300 years into the future provides assurance that the combined impact of the activities we undertake today are leading to the desired outcome in the future. Through Connected Planning, we now verify at the earliest possible time in the forest planning process, that the future harvest pattern is consistent with desired outcome in the future.
2. **Connecting the Stewardship of Values Simultaneously:** This addresses the current challenge of trying to evaluate cumulative effects late in the planning process. In developing the connected future forest outcome, the results of over 100 modelling runs were evaluated against an indicator dashboard directly linked to values. This approach identified the many symbiotic relationships across many of the values including trade-offs. The 13 **Future Forest Outcomes** therefore reflect the thoughtful decisions made to balance the combined impact associated with the interconnected stewardship of all values.
3. **Cumulative Effects Monitoring:** This is currently challenging to complete effectively as it is often done on an individual value basis in a risk-based framework. The 13 **Future Forest Outcomes** now provide the missing reference point needed for integrated cumulative effects monitoring.
4. **Ecosystems and Forests are Dynamic:** Monitoring for cumulative effects requires consideration of both spatial and temporal changes. With the 13 **Future Forest Outcomes** forecast into the future, the spatial and temporal aspects of cumulative effects can now be effectively monitored.

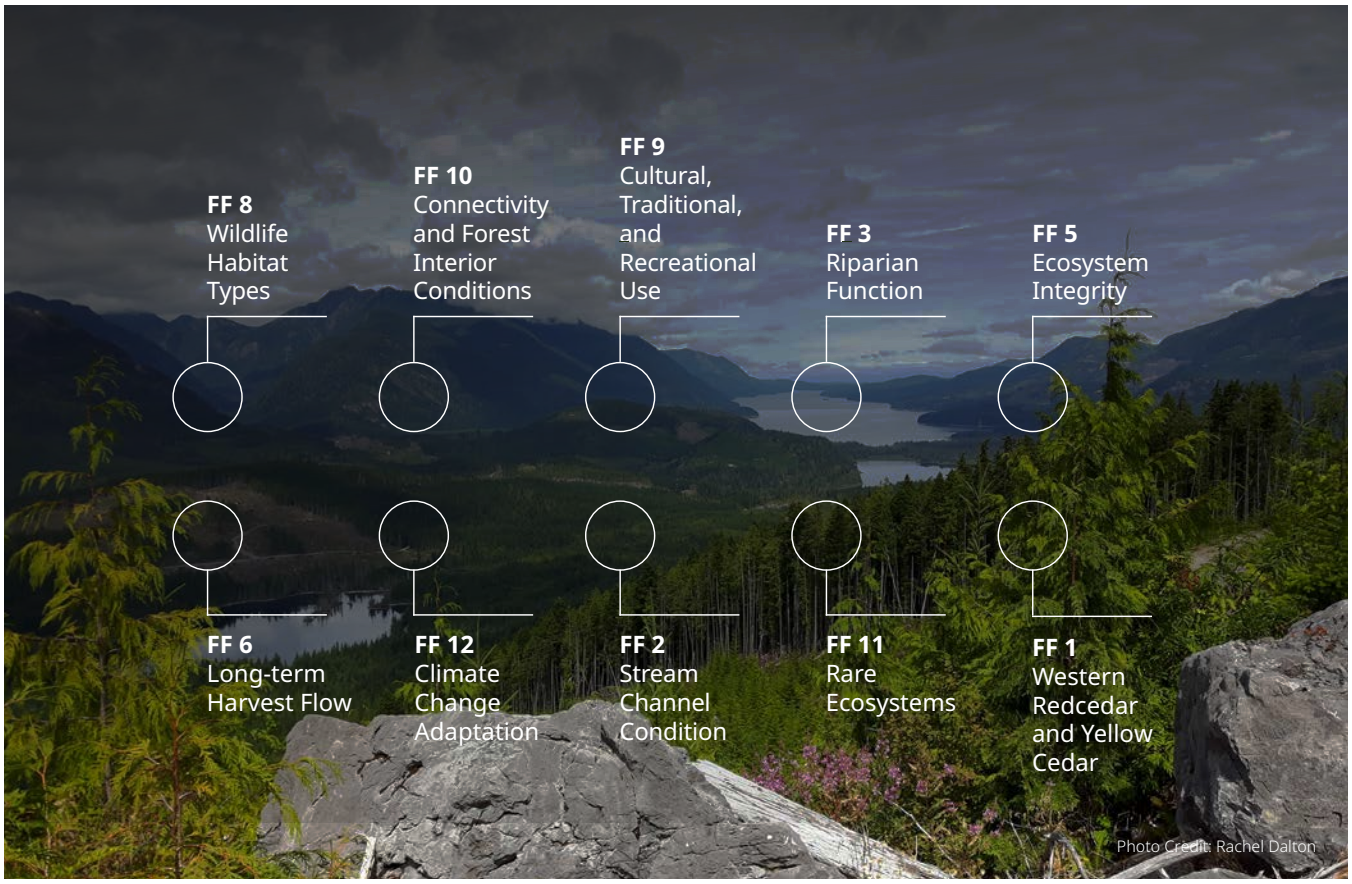
Biodiversity and Ecosystem Health

Connected Planning closely aligns with the intent of the Old Growth Strategic Review as it recognizes the complex and dynamic nature of ecosystems and builds up from a foundation of values respecting the natural landscape and characteristics of the local ecosystem to reflect what the land is telling us. This is fundamentally more meaningful than trying to build down through objectives and targets which is very difficult to do, especially considering the complexity of local ecosystems, and the spatial and temporal elements of biodiversity and ecosystem health.

Given the inherent complexity and dynamic nature of ecosystems, we recognized that there is no single element that defines biodiversity and ecosystem health. We relied on the work of Parrish et al. (2003) and Wurtzebach and Schultz (2016), who defined it as the ability of an ecological system to support and maintain a community of organisms that has species composition, diversity, and functional organization comparable to those of natural habitats within a region.

While it is difficult to predict the future, especially in a changing climate, we recognized the importance of forecasting the elements of biodiversity and

Figure 2: Future Forest Outcomes that are Elements of Biodiversity and Ecosystem Health.



ecosystem health both spatially and temporally. This proved to be critically important as it identified changes or trends that would not otherwise have been readily apparent. This helped us avoid unintended consequences and provided a clear picture of how the spatial pattern of some **Future Forest Outcomes** changed through time. For example, we were able to illustrate the improvement in ecosystem integrity along the Nimpkish River into the future. We found this especially important when communicating to ‘Nam̱gis membership and leadership the elements of biodiversity and ecosystem health that are only evident over multiple generations.

We have identified a total of 10 **Future Forest Outcomes** as elements of biodiversity and ecosystem health as visualized in Figure 2 above. Each Future Forest Outcome that is an element of biodiversity and ecosystem health is identified with this icon ✦.

Gwa'ni and FLP Objectives

FRPA Section 2.22 and 2.28 (3)

There are three sets of objectives linked to the FLP and FOP. These relate to recommendations from the Gwa'ni Project, FRPA Section 2.22, and objectives established under section 93.4 of the *Land Act*.

1. **Gwa'ni Project Recommendations:**
   At the time of preparing the FLP and FOP, the recommendations from the Gwa'ni Project have not yet been finalized. Despite this, the FLP and FOP reflect these recommendations because the technical teams for the TFL 37 FLP and the Gwa'ni Project were closely integrated and the same 'Nam̱gis technical team members and leadership provided consistency across both projects. Additionally, during some of the planning phases, a technical advisor from Western attended relevant Gwa'ni planning sessions. Recommendations from the Gwa'ni Project reflected in the FLP and FOP include:

   - **Updated Zones:** The Gwa'ni Project direction will modify and update the zoning and practices established through the VILUP Order dated December 1, 2000. The MLUP will remove the Enhanced Forestry Zone (EFZ) designation of Resource Management Zone (RMZ) 10 - Nimpkish, and it will rearrange the spatial locations and planning requirements of the Special Management Zones (SMZ). A newly designed Gwa'ni SMZ will be identified which is more directly focused on the primary and secondary rivers along the valley bottoms. The SMZ will be divided into two subzones:

     › **Dzam̱'wam̱ subzone:** This portion of the Gwa'ni SMZ follows the lower reaches of significant rivers that flow into the Nimpkish River. These watersheds are comprised of the smaller streams that reach higher up the valleys. Coho are present in many of these drainages at a greater proportion than other species inspiring the name dzam̱'wam̱ which translates to coho.

     › **Mam̱ałik subzone:** This portion of the Gwa'ni SMZ has the greatest concentration of planning values and the most productive forest sites. It contains the main stem of the Nimpkish valley's four largest, sockeye producing rivers and connected lakes which are the Nimpkish River, Woss River, Davie River, and Sebahall River inspiring the name mam̱ałik which translates to sockeye. Portions of this zone contain all five salmon species and important cultural sites and features.

   The remaining Gwa'ni Project area will be identified as a General Management Zone (GMZ).

   - **Objectives:** The Gwa'ni Project is expected to contain objectives relating to the Gwa'ni Planning Values. Where recommendations are related to forest practices, the coordination across planning tables enabled them to be addressed directly within the FLP. These include consideration for deer populations, herbicide use, opportunities relating to carbon, and monitoring. Each of these objectives are linked to the relevant **Future Forest Outcomes** in the FLP.
   - **Cultural and Cedar Strategy:** The Gwa'ni Project will require development of a cultural and cedar strategy in collaboration with 'Nam̱gis. Suitable practices will be designed to enhance the management of cedar for the purpose of 'Nam̱gis-centric outcomes that go beyond the contribution of western redcedar and yellow cedar towards timber values. The cultural and cedar strategy is supported by the relevant **Stewardship Strategies** in the FOP.

- **Conservation Network:** The Gwa'ni Project will require development of a multi-value Conservation Network in collaboration with 'Nam̱gis. This network includes the inherent capacity to sequester carbon while connecting existing legally designated areas of Old Growth Management Areas (OGMA), Wildlife Habitat Areas (WHA), Ungulate Winter Ranges (UWR), and Riparian Reserve Zones (RRZ). The Conservation Network is intended to largely be excluded from commercial timber harvest and mineral exploration and will provide landscape level retention and function across zones. The requirement for a Conservation Network is linked to **Stewardship Strategy** (SS 1).

2. **Section 2.22 Objectives:** There are five FLP objectives in FRPA Section 2.22 that need to be considered when preparing a FLP consistent with FRPA Section 2.28 (1) (c). Each of these objectives is identified by an icon to identify linkages between the objectives and the relevant **Future Forest Outcomes**:


Supporting the production and supply of timber in the forest landscape plan area


Supporting the protection and conservation of the environment


Managing the values placed on forest ecosystems by Indigenous peoples


Managing the values placed on forest ecosystems by local communities


Preventing, mitigating, and adapting to impacts caused by significant disturbances to forests and forest health, including wildfire, insects, disease and drought

3. **Section 93.4 *Land Act* Objectives:** There is one Section 93.4 *Land Act* Objective that the FLP must be consistent with as required by FRPA Section 2.28 (3) which is the Order for the Recovery of Marbled Murrelet dated November 2021. The requirement of this objective is met in the 'Nam̱gis Conservation Network.

Description of How the Objectives in Section 2.22 are Considered in the Future Forest Outcome

FRPA Section 2.28 (1) (c)

As described in this section, connections between the objectives and the relevant **Future Forest Outcomes** have been made through the five icons. This demonstrates how each of the objectives in Section 2.22 were considered when establishing the **Future Forest Outcomes**. Given that these objectives are all connected in some way, it was felt that the most logical way to describe how the objectives were considered, is in the context of the 13 **Future Forest Outcomes**.

Each **Future Forest Outcome** therefore includes a description of how each of the relevant objectives were considered in establishment of the outcome.

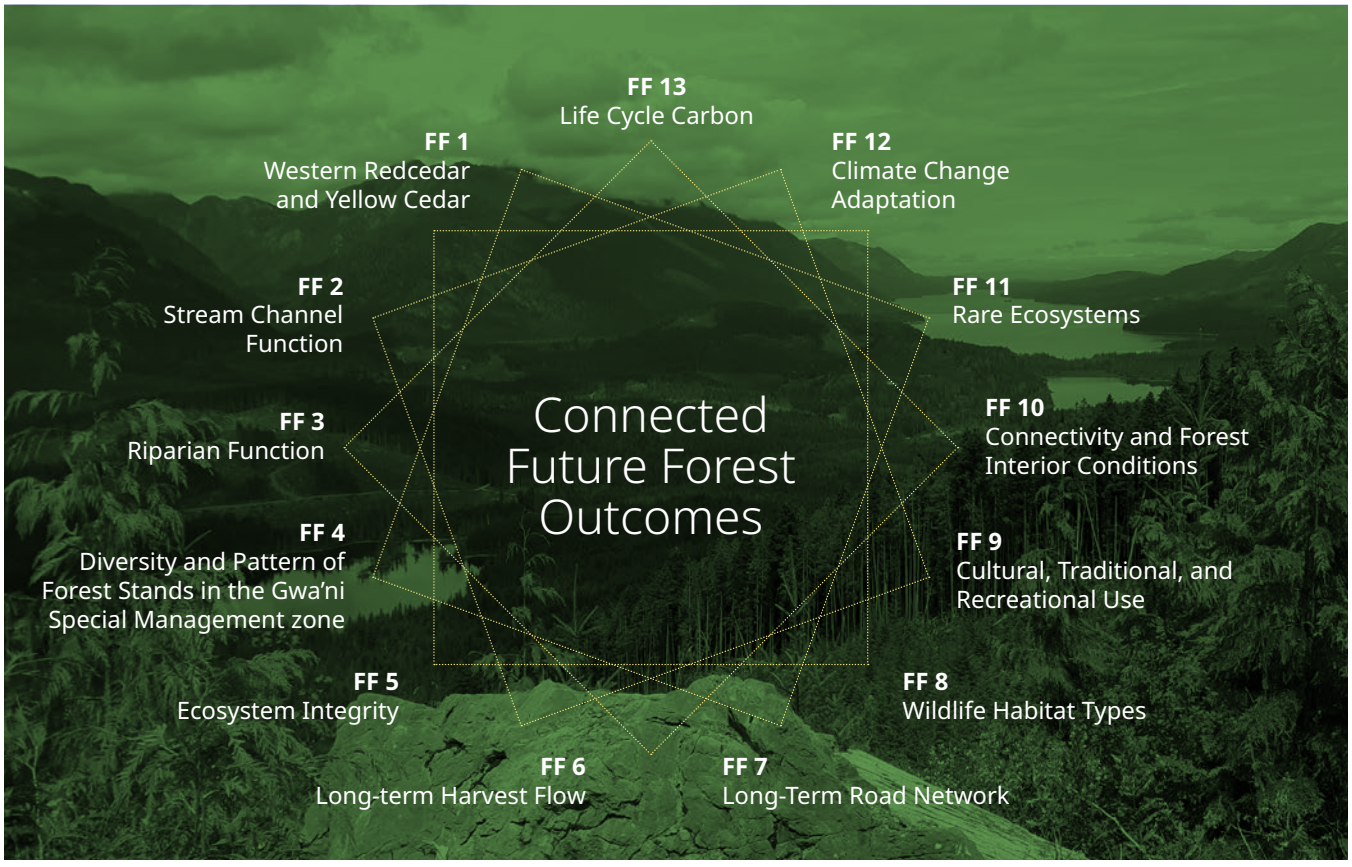
The Connected Future Forest Outcome

FRPA Section 2.2.8 (1) (b)

The goal of an FLP is to establish clear outcomes for the management of forest resource values within defined areas[3]. Achieving this goal is challenging because all forest values are connected, and forests are complex and always growing. It is simply not feasible to take an individual value and describe an outcome. This is because an outcome in relation to a value, changes with the stewardship of the other connected values. It also takes into consideration that the outcome will inevitably change as the forest grows, climate changes, and harvesting occurs.

It is therefore necessary to develop a connected future forest outcome forecast into the future. Making connections across values provides the detail needed to establish 13 clear **Future Forest Outcomes** including a forecast of how the outcome will change through time.

The following are the 13 **Future Forest Outcomes** with their linkages to Gwa'ni Objectives, Section 2.22 Objectives, Biodiversity and Ecosystem Health, and the **Stewardship Strategies** in the FOP.



[3] https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-landscape-plans

FF 1 — WESTERN REDCEDAR AND YELLOW CEDAR

Linked FRPA Section 2.22 Objectives		⬡		◎	✣
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 2 — Maintain a healthy, diverse, and resilient[1] forest that contains native species, communities, natural landscapes, and ecological functions characteristic of the Nimpkish Valley.

GO 3 — Manage for western redcedar and yellow cedar to ensure a perpetual supply exists supporting cultural and ecological health.

[1] Resilience is defined as the ability of an ecosystem to absorb external influences and remain intact (Holling 1973)

FLP Goal

The long-term presence of western redcedar and yellow cedar trees supporting cultural and ecological health.

FF 1

The abundance of western redcedar and yellow cedar increases across the range of sizes including k'wa'xtlu[1,2] and trees for bark harvest.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

Western redcedar and yellow cedar are important to ‘Nam̱gis health and culture and provide a wide variety of uses including textiles, canoes, totem poles, and masks. These uses require trees across a range of diameters.

A diverse range of tree diameters also enhances biodiversity, ecological integrity, and the overall resilience of the forest. This ensures habitat for a range of species including cavity nesting birds and those that require relatively large trees for denning such as black bears.

Diameter growth equations were developed for western redcedar and yellow cedar so the number of trees by diameter class could be forecast into the future. Figures 1 to 6 identify the estimated number of western redcedar and yellow cedar trees across a range of diameters, including including relatively large trees > 150cm in diameter. The forecasts demonstrate that a diverse range of tree sizes are maintained over the long-term. There is a separate forecast for the ‘Na̱ mgis Conservation Network given the limited harvesting expected.

The climate change implications for western redcedar and yellow cedar are discussed in FF 12.

Figure 1: 300 Year Forecast of western redcedar and yellow cedar within the ‘Nam̱gis Conservation Network

[1] K̓wa'x̱tɬu - Kwak̓wala first voices
[2] See SS 11: K'wa'xtlu Retention Criteria

FF 1 — WESTERN REDCEDAR AND YELLOW CEDAR

Linked FRPA Section 2.22 Objectives		⬡		◎	◈
Element of Biodiversity and Ecosystem Health					✦

Figure 2: 300 Year forecast of western redcedar and yellow cedar outside the ‘Nam̓gis Conservation Network

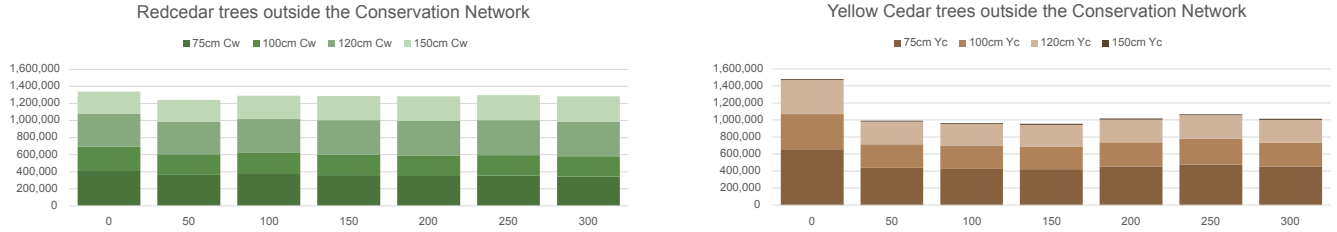


Figure 3: 300 Year forecast of k’wa’xtlu inside the ‘Nam̓gis Conservation Network

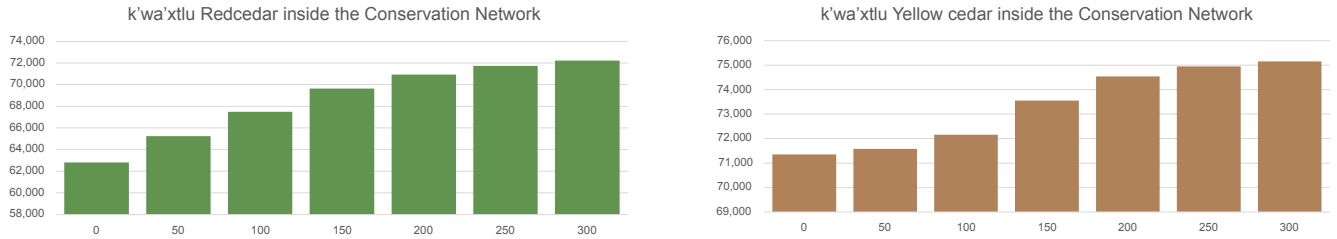


Figure 4: 300 Year forecast of k’wa’xtlu outside the ‘Nam̓gis Conservation Network

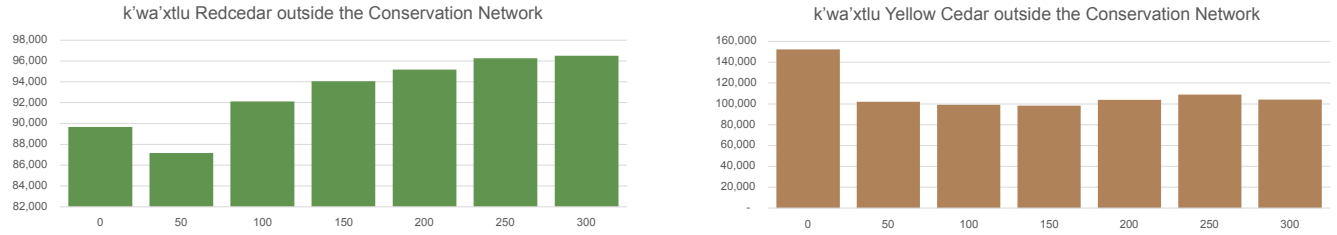


Figure 5: 300 Year forecast of western redcedar and yellow cedar < 75cm dbh inside the ‘Nam̓gis Conservation Network

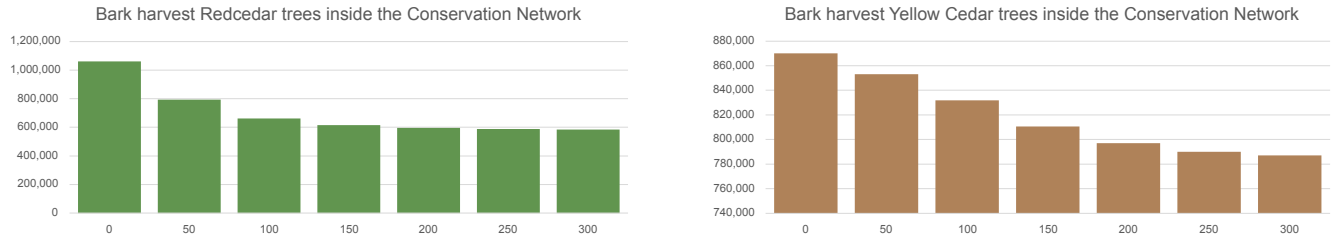
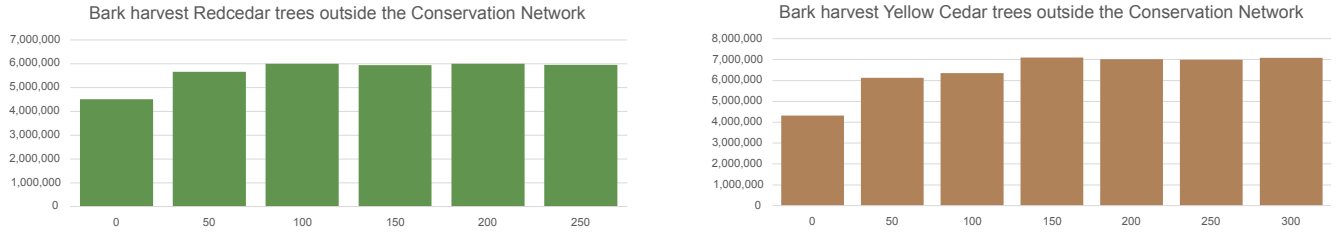


Figure 6: 300 Year forecast of western redcedar and yellow cedar < 75cm dbh outside the ‘Nam̓gis Conservation Network



FF 1 — WESTERN REDCEDAR AND YELLOW CEDAR

Linked FRPA Section 2.22 Objectives					
Element of Biodiversity and Ecosystem Health					✦

Linked Stewardship Strategies

SS 1 ‘Nam̱gis Conservation Network
SS 5 Retention of Riparian Forest – Streams
SS 6 Retention of Riparian Forest – Wetlands
SS 7 Retention of Riparian Forest – Lakes
SS 8 Variable Retention
SS 9 Harvest Criteria
SS 11 K’wa’xtlu Retention Criteria
SS 12 Reforestation
SS 14 Bark Harvest Opportunities
SS 18 Karst

Linked Adaptive Management Indicators

AMI 3 The five-year rolling average of the change (%) in the density (stems/ha) of western redcedar and yellow cedar at the next harvest compared to the density at free growing.

FF 2 — STREAM CHANNEL CONDITION

Linked FRPA Section 2.22 Objectives		⬡		◎	◈
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 1 — Maintain or improve aquatic ecosystems with a functioning and resilient riparian forest supporting healthy fish populations.

GO 4 — Manage the Gwa'ni Project area recognizing the projected changes to the local climate.

GO 7 — Maintain the hydrological function of the Nimpkish Valley as a source of abundant and clean water.

FLP Goal

Stable or improving stream channel conditions supporting healthy fish populations.

FF 2

The channel condition in mainstem reaches are stable or improving by watershed.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

Stream channels achieve a form in response to inputs of water, sediment and large wood debris. A stream channel monitoring program was initiated in 2007 to assess the conditions of the mainstem reaches of rivers in each watershed approximately every 10 years. Maintaining stream channels that are stable or consistent with natural conditions is part of promoting healthy fish populations.

Stream channel form can be influenced by climate change. By 2055 under Climate Scenario RCP4.5, total annual precipitation in the TFL is predicted to increase by 6% but precipitation falling as snow is predicted to decrease by approximately 29%.

Increases in rain storm intensity can increase storm run-off and peak flow magnitudes, delay the recovery of floodplains impacted by historic logging, change channel morphology, and increase the potential for landslides.

Fish are an important local value, and this outcome supports conservation and protection of the environment while also assisting with mitigating and adapting to impacts caused by significant disturbance from a potential increase in high intensity storms.

The current channel condition trend is summarized in Figure 1.

FF 2 — STREAM CHANNEL CONDITION

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Figure 1: The current channel condition trend in 2020 by watershed

2020 Channel Condition Trend	Watershed[1]
High Disturbance (D)	Kilpala, Kinman, Sutton
Moderate disturbance or improving, and may have sites of concern (C)	Oktwanch – Alston, Remainder Eve-Kunnum, Gold, Kaipit, Kilpala – Karmutzen, Kiyu, Kla'anch Maquilla, Noomas, Surprise Nimpkish Remainder – mid (Nimpkish Lake to Woss) Nimpkish Remainder – upper (upstream of Woss)
Minor disturbance or improving, and may have sites that are still disturbed (B)	Atluck – Wolfe, Remainder Davie – Granite, Schoen North, Remainder Kaipit – Canon, Lukwa, Maquilla – Quilla, Tlakwa Woss – Clint, Fiddle, Remainder Kokish – Tsulton, Tsitika – Elliott Upper Tsitika, West Tsitika
Stable or consistent with natural condition (A)	Atluck – Marion, Shannon, Welch Davie – club, Croman, Klaklakama, Hump, Steele, Storey, Woodengle Woss – Torback, Nimpkish Remainder – lower Theimer

[1] See Appendix A for a map of watersheds.

Linked Stewardship Strategies

- SS 1 'Nam̱gis Conservation Network
- SS 2 Carbon Reserve
- SS 3 ECA Limits in Areas of Peak Flow Sensitivity
- SS 4 Landslide Risk Tolerance for Roads and Harvesting
- SS 5 Retention of Riparian Forest – Streams
- SS 6 Retention of Riparian Forest – Wetlands
- SS 7 Retention of Riparian Forest – Lakes
- SS 8 Variable Retention
- SS 16 Erosion Control Treatments
- SS 18 Karst

Linked Adaptive Management Indicators

- AMI 7 The channel condition trend[1] over a ~10-year period (+/- 3 years) beginning in 2007.

[1] Trend is based on observed changes from imagery and defines the level of disturbance from high to stable or consistent with the natural condition

FF 3 — RIPARIAN FUNCTION

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 1 — Maintain or improve aquatic ecosystems with a functioning and resilient riparian forest supporting healthy fish populations.

GO 4 — Manage the Gwa'ni Project area recognizing the projected changes to the local climate.

GO 7 — Maintain the hydrological function of the Nimpkish Valley as a source of abundant and clean water.

FLP Goal

Functional and resilient riparian forest supporting healthy fish populations.

FF 3

Alluvial and semi-alluvial stream reaches restore riparian forest[1] adequate to maintain channel bank stability and large wood debris inputs.

How the Section 2.22 Objectives were Considered in Establishing the Outcome:

The riparian forest is the intersection between the aquatic and terrestrial portions of the ecosystem. Maintaining trees of an adequate size adjacent to alluvial stream channels resists streambank erosion and provides inputs of functional large wood debris. This is particularly important during peak flow events which occur in coastal watersheds during high intensity rainstorms and rain-on-snow events. By 2055 under Climate Scenario RCP4.5[2], total annual precipitation in the TFL is predicted to increase by 6% but precipitation falling as snow is predicted to decrease by approximately 29%. Increases in peak flow magnitudes can delay the recovery of floodplains impacted by historic logging.

Figure 1 provides a detailed forecast for channel bank stability and large wood debris inputs for a grouping of the Nimpkish River, Davie River, Woss River, and Sebahall River, and all other S1, S2, and S3 streams.

Figure 2 defines the age of riparian forest required to support channel bank stability and functional large wood debris inputs by stream class.

Fish are an important local value and this outcome supports conservation and protection of the environment while also assisting with mitigating and adapting to impacts caused by significant disturbance from a potential increase in high intensity storms.

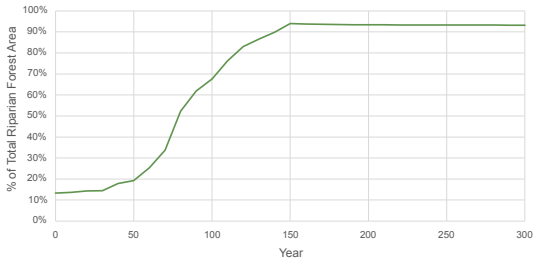
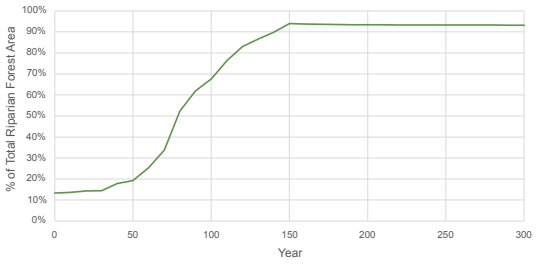
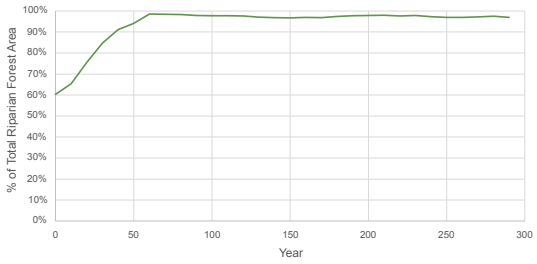
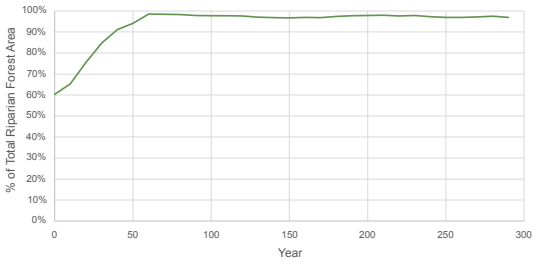
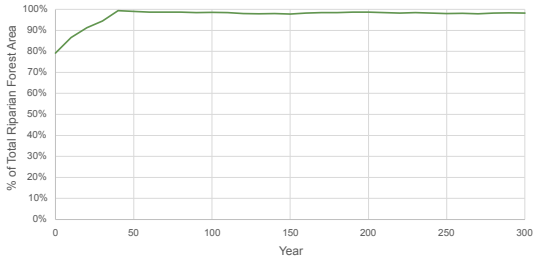
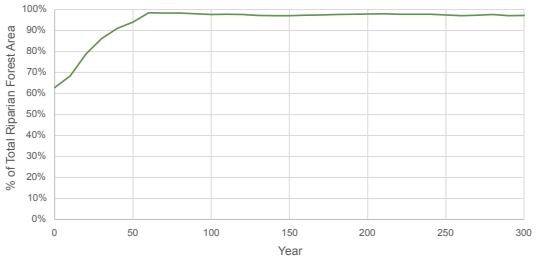
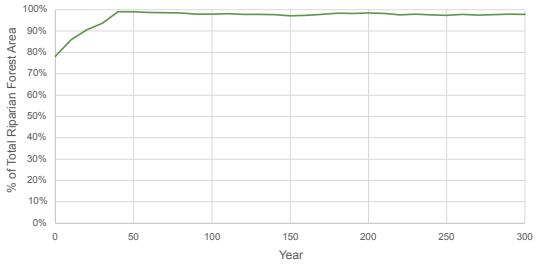
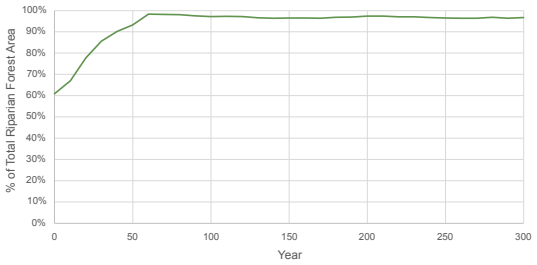
[1] Adequate riparian forest is defined by the forest age required to maintain channel bank stability or large wood debris inputs as identified in the table below. The riparian forest width used in the forecast is defined by SS 5 which we recognize is conservative as the research indicates that 80-90% of LWD comes from within 10m of the channel.

[2] https://sos.noaa.gov/catalog/datasets/climate-model-temperature-change-rcp-45-2006-2100/

FF 3 — RIPARIAN FUNCTION

Linked FRPA Section 2.22 Objectives		⬡		◎	◈
Element of Biodiversity and Ecosystem Health					✦

Figure 1: Forecast of the proportion of riparian forest area (ha) with an age adequate to maintain channel bank stability and large wood debris inputs

Streams	Channel Bank Stability	Large Wood Debris Inputs
Nimpkish Davie Woss Sebahall		
All other S1		
S2		
S3		

FF 3 — RIPARIAN FUNCTION

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Figure 2: Age of riparian forest required to support channel bank stability and funtional wod debris inputs by stream class

Stream	Channel Bank Stability		Large Wood Debris Inputs	
	Riparian Forest Width (m)	Minimum Forest Age (Years)	Log Size (Dbh)	Minimum Forest Age (Years)
Nimpkish Davie Woss Sebahall	70m or floodplain	= > 150	log >30cm[1]	150
All other S1	70m or floodplain	= > 60	log >30cm[1]	60
S2	50m or floodplain	= > 30	log >30cm	60
S3	30m or floodplain	> 15	log >30cm	60

[1] Large wood debris functions in alluvial reaches up to about 50m channel width. In large rivers like the Nimpkish floodplain reaches, large wood debris aggregates in jams which influence channel morphology and create habitat features.

Linked Stewardship Strategies

SS 1 ‘Nam̱gis Conservation Network

SS 5 Retention of Riparian Forest – Streams

Linked Adaptive Management Indicators

AMI 9 The proportion (%) of S1, S2, and S3 streams that have functioning and resilient riparian forest.

FF 4 — DIVERSITY AND PATTERN OF FOREST STANDS IN THE GWA'NI SPECIAL MANAGEMENT ZONE

Linked FRPA Section 2.22 Objectives	△	⬡	🪵	◎	✦
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 2 — Maintain a healthy, diverse and resilient[1] forest that contains native species, communities, natural landscapes, and ecological functions characteristic of the Nimpkish Valley.

1 Resilience is defined as the ability of an ecosystem to absorb external influences and remain intact (Holling 1973)

GO (Gwa'ni Special Management Zone) — Increase the proportion of mature forest within an un-even aged mosaic that is reasonably consistent with the attributes of the natural ecosystem supporting connectivity to fish habitat in the Nimpkish River and its primary tributaries.

FLP Goal

An un-even aged forest mosaic in the Gwa'ni Special Management Zone[1] that provides a diverse mix of log grades.

1 Refer to Appendix B for a map of the Gwa'ni Special Management Zone

FF 4

A diverse mix of forest ages with greater than 50% of the forest older than 120 years by 2140 growing across a range of patch sizes contributing to an un-even aged forest mosaic.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

Forest ecosystems and associated species evolve in response to climate, other biophysical attributes, and range of natural disturbances at various temporal and spatial scales[2]. Retaining long-term mature forest structures during harvesting develops future forest stands that more closely resemble conditions after natural disturbances. Variable Retention supports this outcome by maintaining structural elements of the pre-harvest stand through-out the area harvested, enhancing structural complexity including live and dead trees of varying sizes and canopy layers. This diversity of forest structures, tree ages, and patch sizes all contribute to healthy, diverse and resilient forests. This enhances connectivity across the Gwa'ni Special Management Zone to fish habitat in the Nimpkish River and its primary tributaries. The Gwa'ni Special Management Zone aligns with the definition of the Consistent Zone[3] in the Old Growth Strategic Review with forests in this area being managed to be reasonably consistent with the attributes of the original forests and forest landscapes.

Figure 1 forecasts a complex mix of forest ages across the Gwa'ni Special Management Zone with the majority of the forest forecast to become older than 250 years in the absence of natural disturbance.

Figure 2 and 3 identify the difference in age classes between the dzą'wąn 400 and mąłik 800 due to the 120 year rotation age in the mąłik 800. The mąłik 800 has a greater proportion of forest older than 100 years.

Figure 4 identifies a significant transition to smaller patches of contiguous stands < 21 years old due to the reduced cutblock sizes in the Gwa'ni Special Management Zone.

2 Beese et al. Ecological Processes (2019) 8:33
3 https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/stewardship/old-growth-forests/strategic-review-20200430.pdf

FF 4 — DIVERSITY AND PATTERN OF FOREST STANDS IN THE GWA'NI SPECIAL MANAGEMENT ZONE

Linked FRPA Section 2.22 Objectives	△	⬡	🪵	◎	✥
Element of Biodiversity and Ecosystem Health					✦

This outcome supports conservation and protection of the environment, the biodiversity, ecological integrity, and resilience of the Nimpkish Valley, while contributing to the overall harvest profile.

Figure 1: 300 Year forecast area (ha) of age-classes in the Gwa'ni Special Management Zone

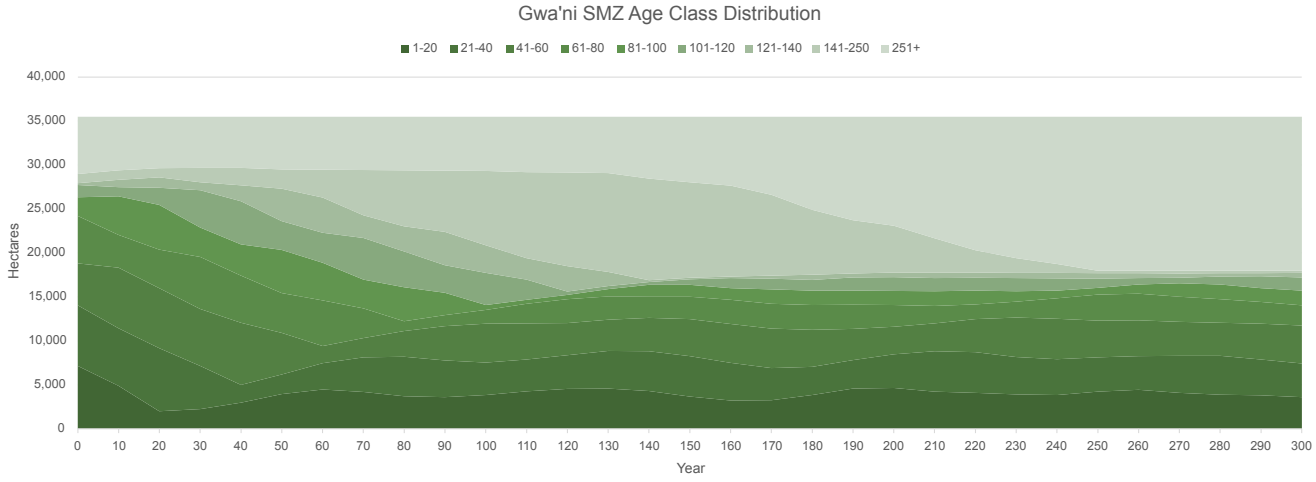
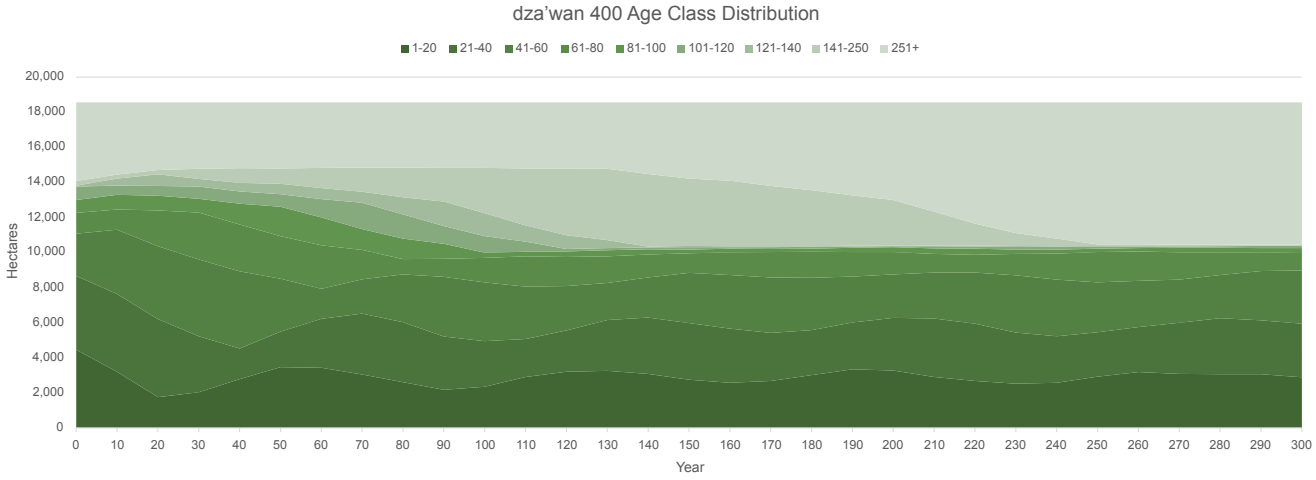


Figure 2: 300 Year forecast area (ha) of age-classes in the Gwa'ni Special Management Zone



FF 4 — DIVERSITY AND PATTERN OF FOREST STANDS IN THE GWA'NI SPECIAL MANAGEMENT ZONE

Linked FRPA Section 2.22 Objectives	△	⬡	▯	◎	✥
Element of Biodiversity and Ecosystem Health					✦

Figure 3: 300 Year forecast area (ha) of age-classes in the Gwa'ni Special Management Zone

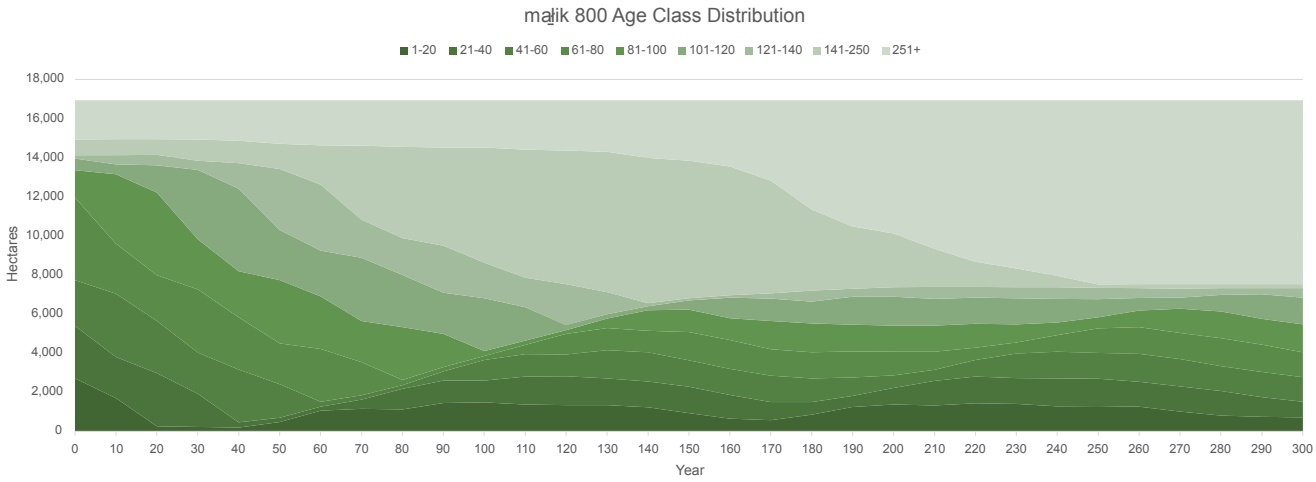


Figure 4: 300 Year forecast proportion (%) of contiguous stands < 21 years old by size category in the mąłik 800

Area of Contiguous Stands (ha)	Forecast Proportion (Years)		
	2024	2124	2324
≤ 5	4%	19%	45%
> 5 to ≤ 10	9%	16%	35%
> 10 to ≤ 15	6%	9%	14%
> 15 to ≤ 20	13%	8%	5%
≥ 20	68%	47%	2%

Linked Stewardship Strategies

- SS 1 'Nąmgis Conservation Network
- SS 8 Variable Retention
- SS 9 Harvest Criteria
- SS 10 Cutblock Size and Green-Up Criteria
- SS 11 K'wa'xtlu Retention Criteria
- SS 12 Reforestation
- SS 18 Karst
- SS 20 Wildlife Features (Bear Dens and Raptor Nests)

Linked Adaptive Management Indicators

- AMI 14 The area (ha) in each age class in the Gwa'ni Special Management Zone.
- AMI 15 The area (ha) in each age-class in the dzą'wąn 400 portion of the Gwa'ni Special Management Zone.
- AMI 16 The area (ha) in each age-class in the mąłik 800 portion of the Gwa'ni Special Management Zone.
- AMI 17 The proportion (%) of contiguous stands < 21 years old by size category in the mąłik 800.

FF 5 — ECOSYSTEM INTEGRITY

Linked FRPA Section 2.22 Objectives		⬡		◎	◈
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 2 — Maintain a healthy, diverse and resilient forest that contains native species, communities, natural landscapes, and ecological functions characteristic of the Nimpkish Valley.

GO 4 — Manage the Gwa'ni Project area recognizing the projected changes to the local climate.

FLP Goal

A diverse and resilient[1] managed forest landscape with an emphasis on the Gwa'ni Special Management Zone.

1 Resilience is defined as the ability of an ecosystem to absorb external influences and remain intact (Holling 1973)

FF 5

Ecosystem integrity improves across the Nimpkish Valley with a noticeable shift from class IV and III (yellow and light green) to classes II and I (darker greens) in the Gwa'ni Special Management Zone particularly along the Nimpkish River and its primary tributaries.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

As regenerating stands develop along a successional trajectory, they develop attributes of older stands, including height, horizontal and vertical structural diversity, species composition and cover, and forest floor development.[1,2,3] Attributes such as age, stand structure, and species diversity, combined with landscape context, are all appropriate and useful for assessing ecosystem integrity. This approach builds on earlier initiatives developed primarily for assessing individual element occurrences of rare or at-risk ecological communities by NatureServe[4] and the BC Conservation Data Centre[5] which utilize the three factors of condition, size, and landscape context to develop an ecosystem integrity score for individual occurrences.

Significant progress has been made that builds on this approach to now utilize LiDAR technology[6] to assess forest structural complexity, focusing on the metric of rumple, which is a measure of canopy roughness or rugosity. The use of LiDAR is a significant step forward, as it allows us to consider the structural complexity of all stands, moving beyond simplified age-based risk approaches. Canopy roughness is an important forest attribute that correlates with other indicators of ecosystem recovery and integrity, such as understory vegetation development and habitat diversity.

A total of six attributes (mean and standard deviation of rumple, stand age, tree species diversity, polygon size, and landscape context) are used to develop an ecosystem integrity score for

1 Gerzon, M., B. Seely, and A. MacKinnon. 2011. The temporal development of old-growth structural attributes in second-growth stands: a chronosequence study in the Coastal Western Hemlock zone in British Columbia. Can. J. For. Res. 41: 1534-1546.

2 LePage, P. and A. Banner. 2014. Long-term recovery of forest structure and composition after harvesting in the coastal temperate rainforests of northern British Columbia. For. Ecol. Manage. 318: 250–260.

3 Price, K., E. Lilles, and A. Banner. 2017. Long-term recovery of epiphytic communities in the Great Bear Rainforest of Coastal British Columbia. For. Ecol. Manag. 391: 296–308.

4 Faber-Langendoen, D., W. Nichols, J. Rocchio, K. Walz, and J. Lemly. 2016. An Introduction to NatureServe's Ecological Integrity Assessment Method. NatureServe, Arlington, VA. 33 p.

5 British Columbia Ministry of Environment. 2006. Standard for mapping ecosystems at risk in British Columbia. An approach to mapping ecosystems at risk and other sensitive ecosystems. Version 1.0. B.C. Ministry of Environment.

6 McGaughey, R.J. 2022. FUSION/LDV: Software for lidar data analysis and visualization. January 2022 – FUSION Version 4.30. U.S. Department of Agriculture, Forest Service. Pacific Northwest Research Station.

FF 5 — ECOSYSTEM INTEGRITY

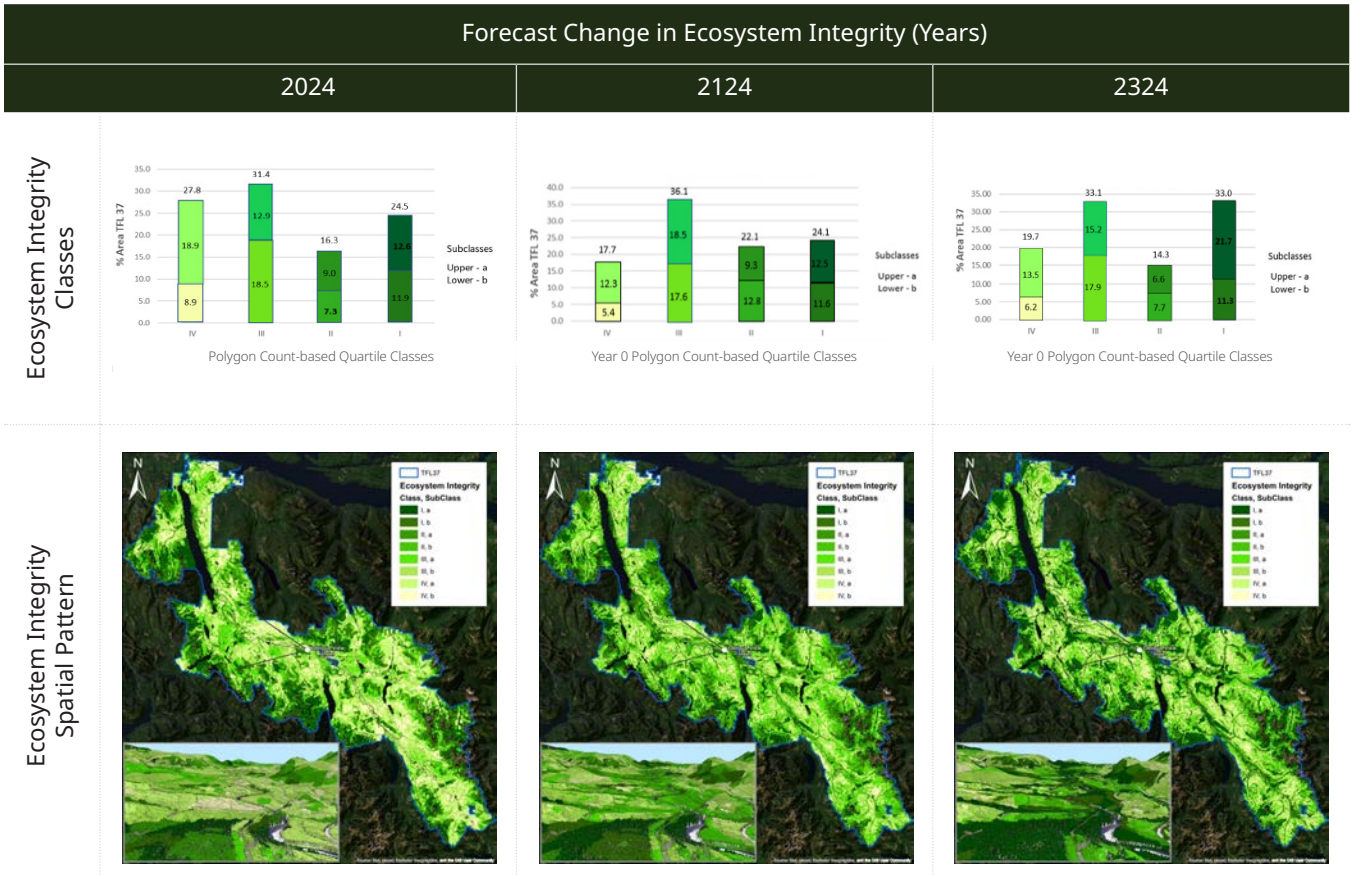
Linked FRPA Section 2.22 Objectives		⬡		◎	✥
Element of Biodiversity and Ecosystem Health					✦

each forest cover polygon. The current conditions (year 0) are assessed using recent LiDAR and forest inventory data. Future conditions are modeled based on the Patchworks™ forecast of the forest.

Figure 1 identifies the current condition of ecosystem integrity and the forecast ecosystem integrity at years 2124, and 2324. The current condition identifies that classes IV and III (yellow and light green respectively) are most prevalent at low to mid elevations and classes II and I (darker greens) at mid to higher elevations. By 2124, there is a significant decrease in the area occupied by the lowest integrity class IV with a slight decrease in class III. By 2324, the area in class I has increased further as areas matured and shifted through classes III and II. As young and mature stands further mature, they not only offset changes due to harvesting, but add additional area of older forest to class I, which by 2324, is forecast to make up 33% of the productive forest. The increase in ecosystem integrity within the Gwa'ni Special Management Zone is also evident with a noticeable shift to classes II and I (darker greens), particularly along the Nimpkish River and its primary tributaries.

This outcome supports conservation and protection of the environment, the biodiversity, ecological integrity, and resilience of the Nimpkish Valley.

Figure 1: 300 Year forecast of ecosystem integrity



FF 5 — ECOSYSTEM INTEGRITY

Linked FRPA Section 2.22 Objectives					
Element of Biodiversity and Ecosystem Health					✦

Linked Stewardship Strategies

SS 1 ‘Nąmgis Conservation Network
SS 5 Retention of Riparian Forest – Streams
SS 6 Retention of Riparian Forest – Wetlands
SS 7 Retention of Riparian Forest – Lakes
SS 8 Variable Retention
SS 9 Harvest Criteria
SS 10 Cutblock Size and Green-Up Criteria
SS 11 K’wa’xtlu Retention Criteria
SS 12 Reforestation
SS 18 Karst
SS 20 Wildlife Features (Bear Dens and Raptor Nests)

Linked Adaptive Management Indicators

AMI 19 Ecosystem integrity of the Gwa’ni Special Management Zone and General Management Zone.

FF 6 — LONG-TERM HARVEST FLOW

Linked FRPA Section 2.22 Objectives	△			◎	
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 15 — Maintain a predictable flow of commercially viable timber to sustain healthy communities, businesses, employment, and the Provincial economy.

FLP Goal

A predictable flow of commercially viable timber that is relatively stable through time.

FF 6

An average available harvest volume of 589,000 m^3 annually for the first 10 years.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

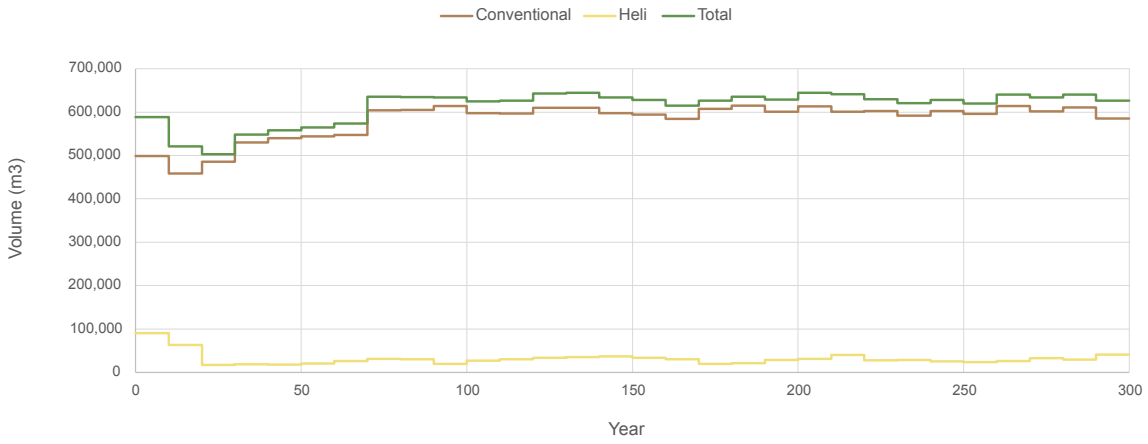
The harvest flow reflects the full complement of Stewardship Strategies and considers the amount of active road required for hauling, amount of new road construction and reconstruction required for access, seasonality of operations, and an appropriate mix of harvest methods. The selected harvest flow maintains the maximum mid-term harvest level to maintain a relatively smooth harvest flow over the 300 years.

Figure 1 forecasts the harvest flow 300 years into the future. In the first 10 years the harvest level is 589,000 m^3 year comprised of 499,000 m^3 of conventional volume and 90,000 m^3 of helicopter volume. The long-term harvest level trends up to an average of 630,000 m^3 per year.

Timber that is not harvested will continue to be included in updated forecasts on a rolling basis maintaining availability of the harvest volume for the future as part of the connected future forest outcome. The helicopter portion of the total harvest level is being tracked as a separate partition.

This outcome supports the production and supply of timber as one of the values placed on local ecosystems. Active forest management assists in preventing, mitigating and adapting to impacts caused by significant disturbances to forests and forest health, including wildfire, insects, disease and drought.

Figure 1: 300 Year forecast of available harvest volume



FF 6 — LONG-TERM HARVEST FLOW

Linked FRPA Section 2.22 Objectives	△			◎	
Element of Biodiversity and Ecosystem Health					✦

Linked Stewardship Strategies

SS 3 ECA Limits in Areas of Peak Flow Sensitivity
SS 4 Landslide Risk Tolerance for Roads and Harvesting
SS 8 Variable Retention
SS 9 Harvest Criteria
SS 10 Cutblock Size and Green-Up Criteria
SS 12 Reforestation
SS 17 Predetermined Salvage Process

Linked Adaptive Management Indicators

AMI 22 The 5 year rolling average of volume harvested (m^3) by conventional and helicopter harvest methods.

FF 7 — LONG-TERM ROAD NETWORK

Linked FRPA Section 2.22 Objectives	△				
Element of Biodiversity and Ecosystem Health					

Linked Gwa'ni Objectives

GO 8 — Maintain the conditions that support the sustainable harvest of non-timber forest products.

GO 11 — Recognize the importance of access to the features, resources, and natural beauty of the Nimpkish Valley.

GO 15 — Maintain a predictable flow of commercially viable timber to sustain healthy communities, businesses, employment, and the Provincial economy

FLP Goal

A road network that provides access for a variety of uses.

FF 7

A road network of approximately 4,500 km providing access to the long-term harvest flow and a variety of other uses.

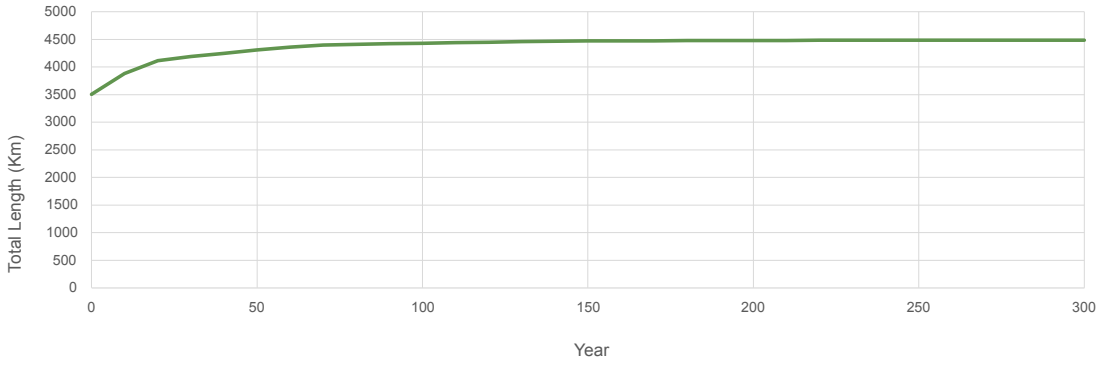
How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

TFL 37 has an extensive and valuable road network providing excellent access across the plan area supporting timber harvesting, stewardship, silviculture, and a wide range of activities including harvesting of non-timber forest products and recreation. The total length of the road network reflects the full complement of **Stewardship Strategies** aligned with the long-term harvest level. The road network is maintained with consideration to the timing of future harvesting in order to minimize environmental risk while maintaining the economic viability of on-going harvest activities. It also provides ready access for responding to natural disturbance events including wildfires, windthrow, and pest infestations which have the potential to increase with a changing climate.

The forecast of the total length (km) of the maintained road network is shown in Figure 1. The road network increases to approximately 4,500 km in 100 years where it is expected to remain relatively stable into the future.

This outcome reflects the cumulative road network required to support the production and supply of timber from the plan area aligned with the full complement of **Stewardship Strategies** that support the conservation and protection of the environment.

Figure 1: Forecast of the total length (km) of the road network



FF 7 — LONG-TERM ROAD NETWORK

Linked FRPA Section 2.22 Objectives	△				
Element of Biodiversity and Ecosystem Health					

Linked Stewardship Strategies

SS 4 Landslide Risk Tolerance for Roads and Harvesting

SS 8 Variable Retention

SS 9 Harvest Criteria

SS 10 Cutblock Size and Green-Up Criteria

Adaptive Management Indicators

AMI 23 The five-year rolling average of the aggregated length of road used for hauling logs (km/m^3) on an annual basis.

AMI 24 The five-year rolling average proportion (%) of the total road network utilized for hauling.

FF 8 — WILDLIFE HABITAT TYPES

Linked FRPA Section 2.22 Objectives		⬡		◎	✣
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 2 — Maintain a healthy, diverse and resilient[1] forest that contains native species, communities, natural landscapes, and ecological functions characteristic of the Nimpkish Valley.

GO 10 — Support healthy wildlife populations by promoting a diversity of habitats and enhancing wildlife management practices.

1 Resilience is defined as the ability of an ecosystem to absorb external influences and remain intact (Holling 1973)

FLP Goal

A diversity of forest habitat types and features to support healthy wildlife populations.

FF 8

A diversity of forest habitat types and associated features are present 300 years into the future.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

Maintaining a diversity of forest habitat types is an effective landscape level approach to assess the likelihood that stewardship practices will sustain vertebrate and non-vertebrate species based on their habitat requirements. A Species Accounting System[1] has been developed that assigns species into six groups that have similar habitat requirements:

- **Group 1** – generalists, species that inhabit many habitat types or respond positively to forest practices;
- **Group 2** – species that can be statistically assigned broad habitat types as defined within the forest cover;
- **Group 3** – species with strong dependencies on specific habitat elements (e.g. snags or understory);
- **Group 4** – species restricted to specialized and highly localized habitats;
- **Group 5** – species for which patch size and connectivity are considered important; and
- **Group 6** – is included for completeness and contains species that are not dependent on forest environments

Overall, 40 species are habitat generalists (Group 1) and are unlikely to be affected by forest practices. Group 4 includes a total of four species which require management of localized habitat at the site level. Group 3 contains 93 species which show strong dependencies on specific habitat elements such as cavity sites, downed wood, and understory vegetation. Group 2 contains 35 species which are associated with a particular habitat type which are as follows:

- Non-treed
- Recent disturbance: < 20 years old
- Conifer: 21-60 yrs old, 61-140 yrs old, > 140 yrs old
- Deciduous: < 40 yrs old, >= 40 yrs old
- Riparian forest: S1, S2, and S3 streams

Figure 1 shows the current and forecast amount of area (ha) and spatial pattern of each of the habitat types. The outcome identifies that the diversity of habitat types continues to be maintained in relatively equal proportions over the next 300 years. The most noticeable change is an increase in older riparian forest and a decrease in younger deciduous forest. The decrease in younger deciduous forest is likely due to assumptions made for the inclusion of deciduous species in regenerating stands.

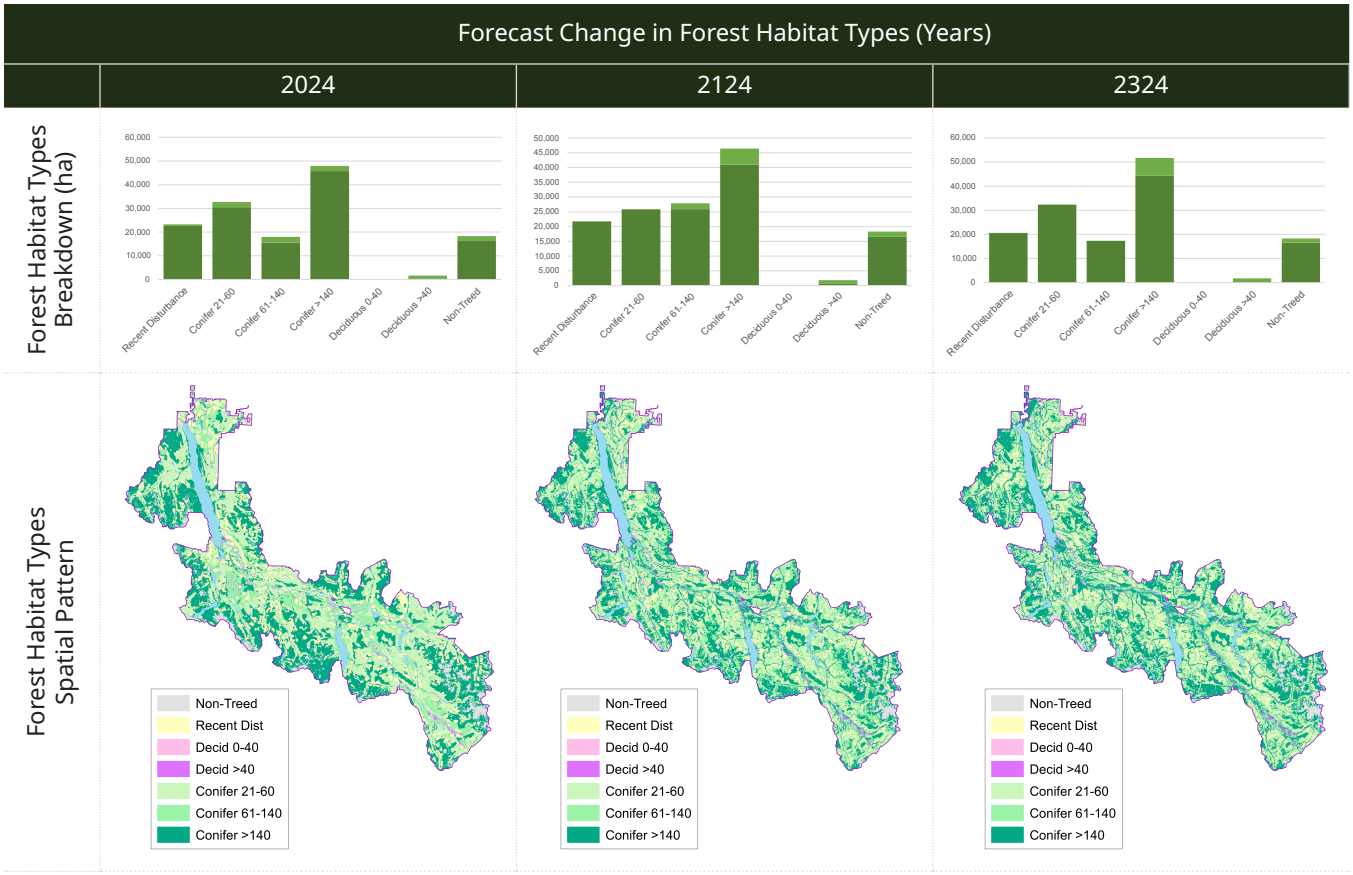
1 Species Accounting System for Western Forest Products, Laurie L. Kremsater, Fred l. Bunnell, and Pierre Vernier, Centre for Applied Conservation Research University of British Columbia, February 2012

FF 8 — WILDLIFE HABITAT TYPES

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

This outcome supports conservation and protection of the environment, the biodiversity, ecological integrity, and resilience of the Nimpkish Valley.

Figure 1: 300 Year forecast of forest habitat types



Linked Stewardship Strategies

- SS 1 'Namgis Conservation Network
- SS 4 Landslide Risk Tolerance for Roads and Harvesting
- SS 5 Retention of Riparian Forest – Streams
- SS 6 Retention of Riparian Forest – Wetlands
- SS 7 Retention of Riparian Forest – Lakes
- SS 8 Variable Retention
- SS 9 Harvest Criteria
- SS 10 Cutblock Size and Green-Up Criteria
- SS 11 K'wa'xtlu Retention Criteria
- SS 12 Reforestation
- SS 18 Karst
- SS 20 Wildlife Features (Bear Dens and Raptor Nests)

Adaptive Management Indicators

AMI 27 The area (ha) by wildlife habitat type.

FF 9 — CULTURAL, TRADITIONAL, AND RECREATIONAL USE

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 2 — Maintain a healthy, diverse and resilient forest that contains native species, communities, natural landscapes, and ecological functions characteristic of the Nimpkish Valley.

GO 4 — Manage the Gwa'ni Project area recognizing the projected changes to the local climate.

GO 8 — Maintain the conditions that support the sustainable harvest of non-timber forest products.

GO 13 — Ensure 'Nam̱gis cultural and spiritual values are conserved, managed or protected within the Gwa'ni Project area.

1 Resilience is defined as the ability of an ecosystem to absorb external influences and remain intact (Holling 1973)

FLP Goal

A diversity of seral stages across all biogeoclimatic ecosystem variants.

FF 9

A diversity of age classes are maintained across all biogeoclimatic ecosystem variants into the future.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

Ecological succession is the process by which the structure of a biological community changes over time. As ecosystems evolve they create a changing mix of species including plants and animals until a climax or relatively stable state is achieved. Maintaining a range of seral stages across all biogeclimatic ecosystem variants ensures a diverse mix of species is maintained providing for a wide variety of cultural[1], traditional[2], and recreational[3] uses.

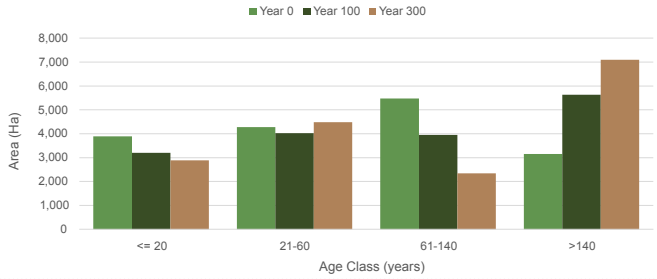
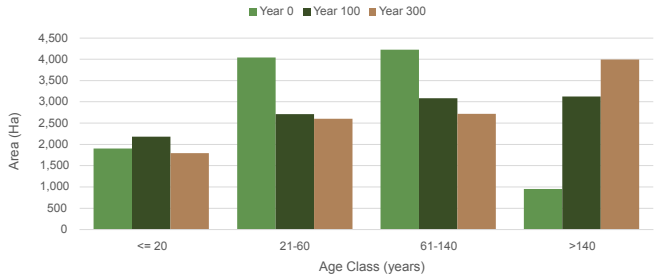
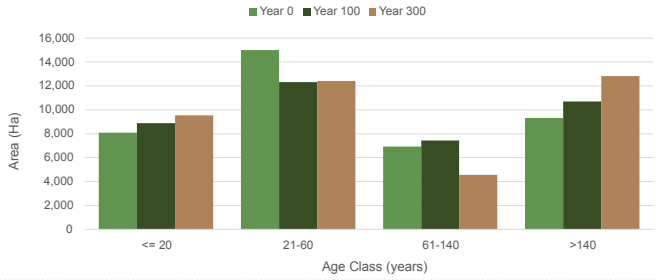
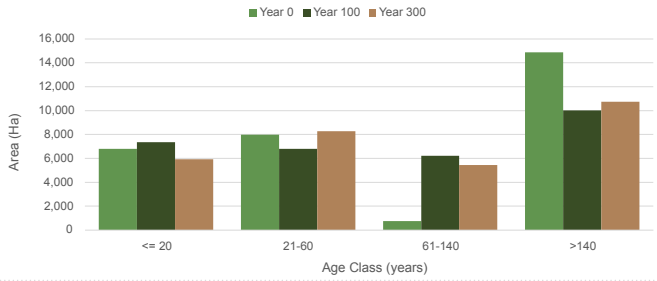
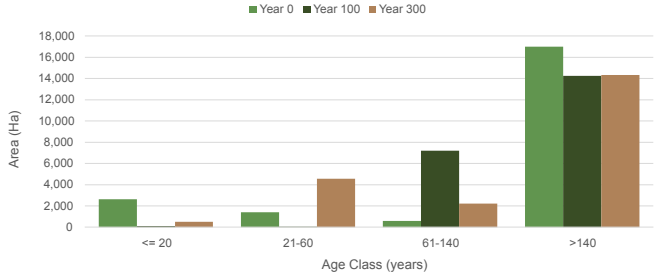
Figure 1 forecasts a diversity of seral stages with a general trend towards larger proportions of late and climax communities within each biogeoclimatic ecosystem variant over time.

1 Cultural use is the ability to go and do something
2 Traditional use is the ability to go and take something
3 Recreational use is the ability to go and enjoy something

FF 9 — CULTURAL, TRADITIONAL, AND RECREATIONAL USE

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Figure 1: 300 Year forecast of the diversity of age classes for each biogeoclimatic ecosystem variant

Biogeoclimatic Ecosystem Variant	Age by Area
CWH xm2	
CWH mm1	
CWH vm1	
CWH vm2	
MH mm1	

FF 9 — CULTURAL, TRADITIONAL, AND RECREATIONAL USE

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Linked Stewardship Strategies

SS 1 ‘Nam̱gis Conservation Network
SS 5 Retention of Riparian Forest – Streams
SS 6 Retention of Riparian Forest – Wetlands
SS 7 Retention of Riparian Forest – Lakes
SS 8 Variable Retention
SS 9 Harvest Criteria
SS 12 Reforestation
SS 13 Cultural Inventory of Plants
SS 14 Bark Harvest Opportunities
SS 18 Karst
SS 19 Visual Quality
SS 20 Wildlife Features (Bear Dens and Raptor Nests)

Adaptive Management Indicators

AMI 28 The area (ha) in each age-class by biogeoclimatic ecosystem variant.

FF 10 — CONNECTIVITY AND FOREST INTERIOR CONDITIONS

Linked FRPA Section 2.22 Objectives		⬡		◎	✣
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 2 — Maintain a healthy, diverse and resilient[1] forest that contains native species, communities, natural landscapes, and ecological functions characteristic of the Nimpkish Valley.

GO 6 — Recognize the uniqueness of the natural karst features present within the Nimpkish valley and manage for the inter-connected relationship between karst, fish and water quality at the landscape and site level.

GO 10 — Support healthy wildlife populations by promoting a diversity of habitats and enhancing wildlife management practices.

1 Resilience is defined as the ability of an ecosystem to absorb external influences and remain intact (Holling 1973)

FLP Goal

Support the movement of species across the landscape at multiple scales.

FF 10

Connectivity[1] and forest interior conditions[2] are maintained across the landscape.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

Forest connectivity supports the long-term persistence and range shifts of forest-dependent species. Connectivity also factors into a species' ability to shift to suitable climate niches as the climate changes.

The interior of a forest provides important habitat conditions for a number of species (closed canopy specialists) that are not typically found near forest edges. For example, the red-breasted nuthatch and brown creeper are area-sensitive forest birds that rely on forest interior habitat. Therefore, forest interior is a measure of quality and an indicator of landscape-level ecosystem diversity.

Figure 1 illustrates connected forest[1] between 61-140 years old and greater than 140 years old. The trend is towards increased connectivity in older forests into the future.

Figure 2 illustrates that the proportion of the forest with forest interior conditions continues to increase into the future.

This outcome supports conservation and protection of the environment, the biodiversity, ecological integrity, and resilience of the Nimpkish Valley. It also assists with adapting to potential impacts caused by significant disturbances to forests and forest health, including wildfire, insects, disease and drought.

1 Forest connectivity defined by stands in two age categories located less < 40m apart or natural features such as meadows and wetlands.
- 61-140 yrs old
- > 140 yrs old

2 Forest interior condition is defined by those areas within a old (>250) or mature forest stand (>120) >100m from an edge of a neighboring stand <30 years old due to anthropogenic activities. If the neighboring stand is >30 years old, the edge effect is assumed to be negligible.

FF 10 — CONNECTIVITY AND FOREST INTERIOR CONDITIONS

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Figure 1: 300 Year forecast of the spatial pattern of landscape connectivity

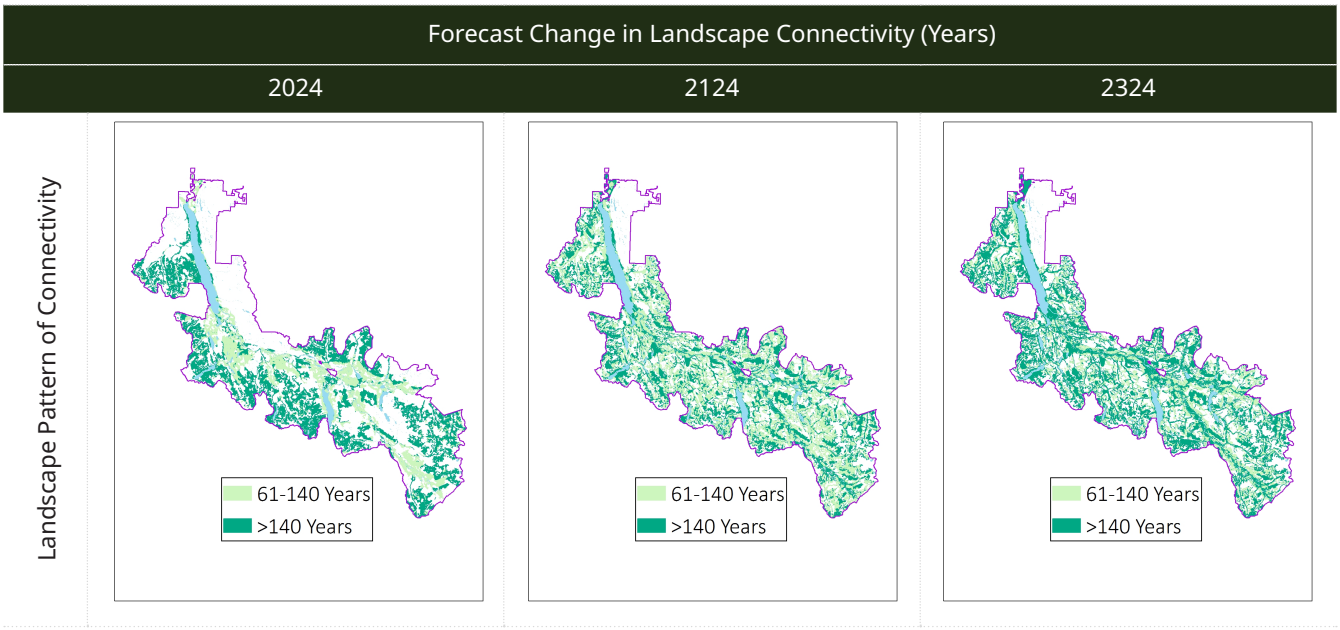
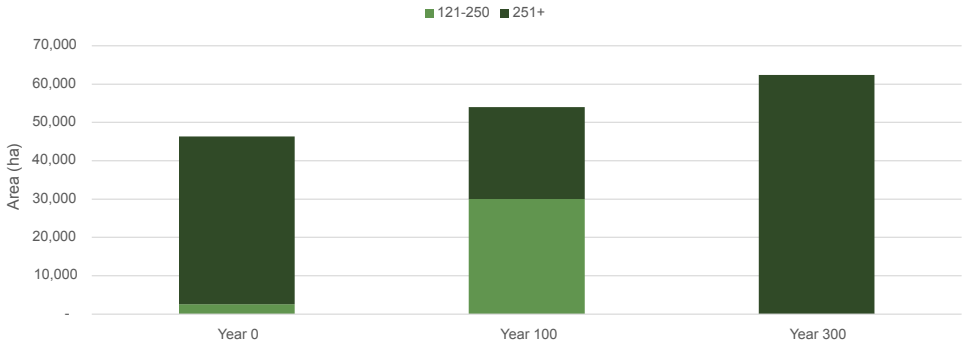


Figure 2: 300 Year forecast of the area (ha) with forest interior conditions by age category



Linked Stewardship Strategies

SS 5 Retention of Riparian Forest – Streams
SS 6 Retention of Riparian Forest – Wetlands
SS 7 Retention of Riparian Forest – Lakes
SS 8 Variable Retention
SS 9 Harvest Criteria
SS 10 Cutblock Size and Green-Up Criteria

Adaptive Management Indicators

AMI 29 The proportion (%) of the Gwa'ni Special Management Zone and General Management Zone with connectivity.
AMI 30 The proportion (%) of the Gwa'ni Special Management Zone and General Management Zone with forest interior conditions.

FF 11 — RARE ECOSYSTEMS

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 2 — Maintain a healthy, diverse and resilient forest that contains native species, communities, natural landscapes, and ecological functions characteristic of the Nimpkish Valley.

1 Resilience is defined as the ability of an ecosystem to absorb external influences and remain intact (Holling 1973)

FLP Goal

Maintain or improve the integrity of rare ecosystems.

FF 11

The integrity of rare ecosystems improves into the future.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

We have defined rare ecosystems as those that are provincially red-listed and blue-listed as determined by the BC Conservation Data Center as well as those that are uncommon or less than 2% across all of Western's tenures. All ecosystems contribute to healthy, diverse, and resilient forests that contain native species and communities characteristic of the Nimpkish Valley. In recognition that ecosystems are dynamic, ecosystem integrity provides a very helpful way to forecast the change in ecosystems into the future.

Figure 1 identifies the change in ecosystem integrity for the rare ecosystems within the CWHxm2[1], CWHmm1[2], CWHvm1[3], and CWHvm2[4] forecast 300 years into the future. Both the CWHxm2 and CWHmm1 have a significant shift in classes from IV and III (lower integrity) to classes II and I (higher integrity). The CWHvm1 and CWHvm2 also shift to a more balanced distribution across all integrity classes. The potential for these ecosystems to be considered as rare is a function of their late seral stage. Some of these ecosystems may no longer considered rare as ecosystem integrity increases into the future. Figure 2 illustrates the current distribution only across seral stages.

This outcome supports conservation and protection of the environment, the biodiversity, ecological integrity, and resilience of the Nimpkish Valley.

1 CWHxm2 / 01, 02, 03, 05, 06, 07, 08, 09, 11, 12
2 CWHmm1 / 01, 02, 03, 05, 06, 07, 09, 12
3 CWHvm1 / 03, 04, 06, 07, 09, 10, 11, 14
4 CWHvm2 / 03, 04, 06, 07

FF 11 — RARE ECOSYSTEMS

Linked FRPA Section 2.22 Objectives		⬡		◎	◈
Element of Biodiversity and Ecosystem Health					✦

Figure 1: 300 Year forecast of ecosystem integrity of rare ecosystems

FF 11 — RARE ECOSYSTEMS

Linked FRPA Section 2.22 Objectives		⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Linked Stewardship Strategies

SS 1 ‘Nąmgis Conservation Network
SS 5 Retention of Riparian Forest – Streams
SS 6 Retention of Riparian Forest – Wetlands
SS 7 Retention of Riparian Forest – Lakes
SS 8 Variable Retention
SS 9 Harvest Criteria
SS 10 Cutblock Size and Green-Up Criteria
SS 11 K’wa’xtlu Retention Criteria
SS 12 Reforestation
SS 18 Karst
SS 20 Wildlife Features (Bear Dens and Raptor Nests)

Adaptive Management Indicators

AMI 31 Ecosystem integrity of rare ecosystems.

FF 12 — CLIMATE CHANGE ADAPTATION

Linked FRPA Section 2.22 Objectives	△	⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Linked Gwa'ni Objectives

GO 4 — Manage the Gwa'ni project area recognizing the projected changes to the local climate.

FLP Goal

Adapt to the potential for increased forest health impacts resulting from a potential change in climate.

FF 12

A forecast increase of drier ecosystems and a decrease of montane ecosystems that could result in increased natural disturbance and forest health impacts.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

Climate changes were assessed using a web tool developed for the Gwa'ni project by the BC Ministry of Forests (https://bcgov-env.shinyapps.io/ccsummary-Nimpkish/). The model ensemble of forecasted climate change in Figure 1 indicates a trend towards warmer summers with less precipitation. By 2030, summers are projected to be 1.8°C (1.3-2.3°C) warmer and 10% (0-22%) drier than the 1961-1990 average. Winters are anticipated to be warmer and wetter.

These changes in temperature, precipitation, and other climate variables can be interpreted using biogeoclimatic zones as climate analogs (Figure 1). A climate analog is a historical climate type of one location that is similar to the future climate of another location. Climate analogs are a useful technique for interpreting how changes in climate variables could impact ecosystems, but caution is required in interpreting the analogs. The actual future climates will likely be a hybrid of the characteristics of the analog climate combined with enduring features (such as valleys with cold air drainage) of the local historical climate.

The projected climates are equivalent to the displacement of the historical climates of the higher elevation Mountain Hemlock (MH) zone with climates more characteristic of the lower elevation Coastal Western Hemlock (CWH) zone. This displacement is already well underway and by 2030 the MH zone is projected to by 90% occupied by CWH-like climates. Over this same time-period, climates of close to 30% of the Nimpkish Valley will be similar to analogs from either Washington or Oregon State as the valley bottoms are forecast to become warmer and drier.

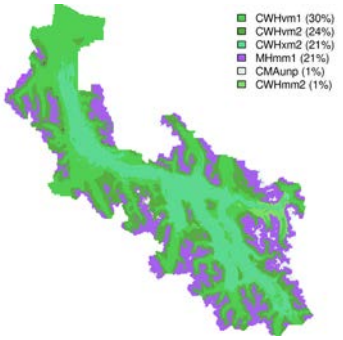
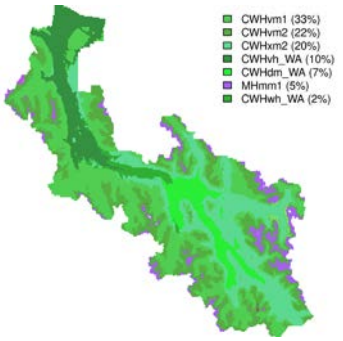
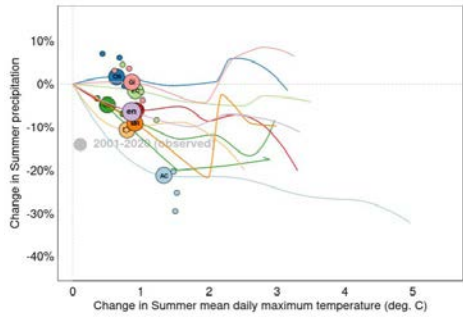
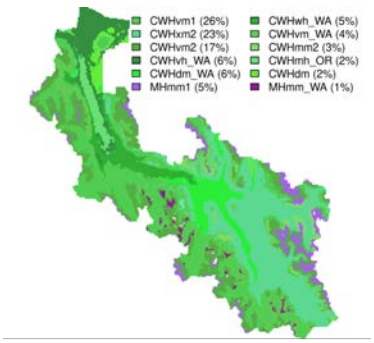
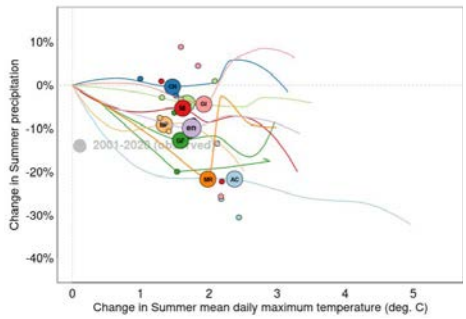
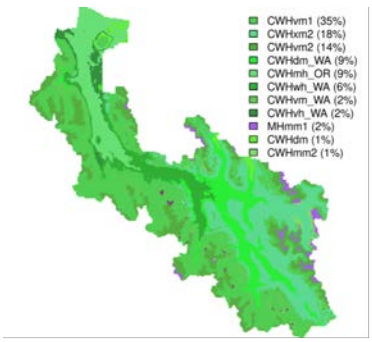
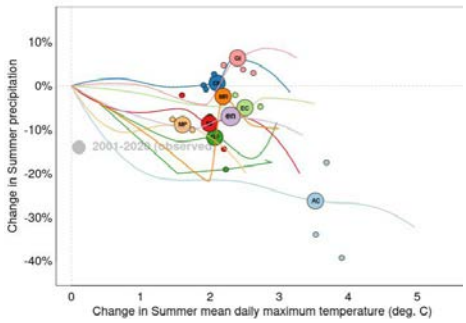
Over this same time period the suitability range for western redcedar and yellow cedar is also forecast to change as identified in Figure 2, but suitability for both species is projected to remain into the future. As the range of yellow cedar decreases, the range of western redcedar increases. The persistence of the climatic suitability for western redcedar in these projections doesn't rule out challenges for this species: the climate analog approach used for these species suitability projections doesn't account for likely changes in climate extremes and the potential for changes in insect and pathogen dynamics.

This outcome provides the ability to proactively adapt to a changing climate in order to maintain healthy ecosystems that provide a wide variety of local ecosystem services. Active forest management assists in preventing, mitigating and adapting to impacts caused by significant disturbances to forests and forest health, including wildfire, insects, disease and drought.

FF 12 — CLIMATE CHANGE ADAPTATION

Linked FRPA Section 2.22 Objectives	△	⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

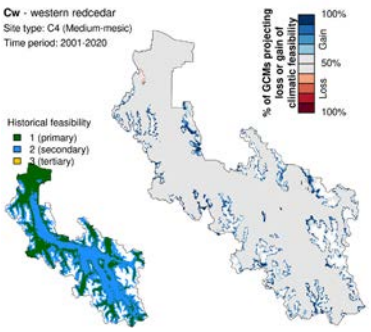
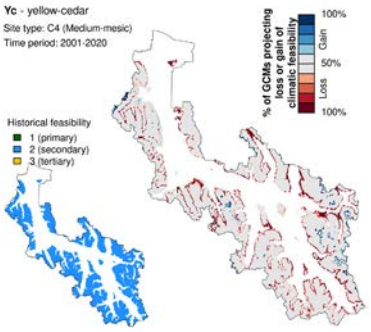
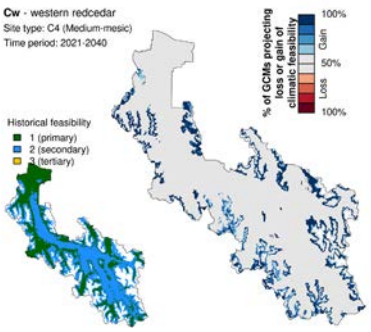
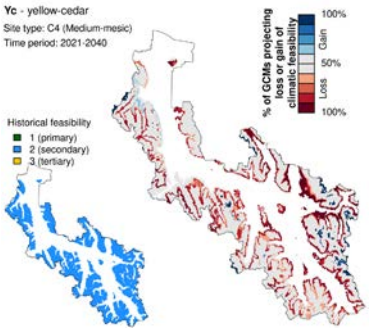
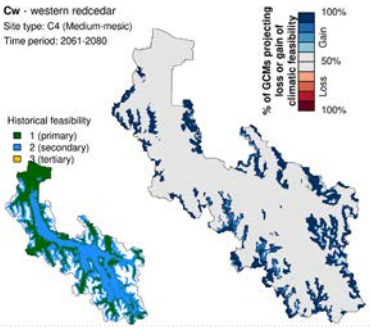
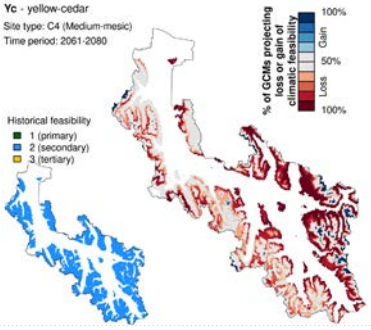
Figure 1: Forecast change in biogeoclimatic zones and summer temperature and precipitation

	Model Ensemble of Forecast Biogeoclimatic Analogs for Changing Climate Conditions	Model Ensemble of Forecast Change in Summer Temperature and Precipitation
Baseline 1961-1990 climate		NOT APPLICABLE
Observed 2001-2020 climate		
Ensemble Mean 2021-2040 climate		
Ensemble Mean 2041-2060 Climate		

FF 12 — CLIMATE CHANGE ADAPTATION

Linked FRPA Section 2.22 Objectives	△	⬡		◎	⯁
Element of Biodiversity and Ecosystem Health					✦

Figure 2: Model ensemble feasibility loss/gain forecast for western redcedar and yellow cedar

	Model Ensemble Feasibility Loss/Gain Forecast for Western Redcedar	Model Ensemble Feasibility Loss/Gain Forecast for Yellow cedar
Observed 2001-2020 climate		
Ensemble Mean 2021-2040 climate		
Ensemble Mean 2041-2060 climate		

Linked Stewardship Strategies

SS 1 ʻNa̱mgis Conservation Network
SS 8 Variable Retention
SS 9 Harvest Criteria
SS 11 K'wa'xtlu Retention Criteria
SS 12 Reforestation
SS 17 Predetermined Salvage Process

Adaptive Management Indicators

AMI 32 The proportion (%) of area (ha) that requires replanting.
AMI 33 The proportion (%) of stands with incidence of significant forest health agents at the time of free growing.
AMI 34 The average number of rainfall events over 75mm in 12 hours or 100mm in 24 hours.
AMI 35 The total period (# days) of snowpack based on Mount Cain opening day and snow depth at April 1[1].

[1] Measured at Mount Cain ridge station.

FF 13 — LIFE CYCLE CARBON

Linked FRPA Section 2.22 Objectives	△				⌖
Element of Biodiversity and Ecosystem Health					NO

Linked Gwa'ni Objectives

GO 5 — Recognize carbon as an opportunity for future offset projects.

FLP Goal

Maintain a negative full life cycle carbon balance.

FF 13

A negative full life cycle carbon balance with more carbon being removed more from the atmosphere than is emitted.

How the FRPA Section 2.22 Objectives were Considered in Establishing the Outcome:

Forest products have a vital role to play in helping Canada to meet its greenhouse gas reduction goals. The Intergovernmental Panel on Climate Change (IPCC) has concluded that "in the long term, a sustainable forest management strategy, aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fiber, or energy from the forest, will generate the largest sustained mitigation benefit[1]".

Life cycle carbon accounting[2] has been completed for the connected future forest outcome and Figure 1 identifies a negative full life cycle carbon balance with more carbon being removed from the atmosphere than emitted over the next 100 years. We are evaluating a carbon offset project for the 'Namgis Conservation Network where we have additionality as described in Section 6.2 of the DRAFT FCOP II protocol[3].

This outcome supports the production and supply of timber in the forest landscape plan area and maintaining a negative life cycle carbon balance will assist with mitigating the effects of carbon emissions that contribute to climate change.

1 The United Nations Intergovernmental Panel on Climate Change Special Report on Climate Change and Land Ch 4, 4.8.5, page 66.

2 This is based on the proportion of the area and harvest volume within TFL 37 and prorated values of the emissions (forest ecosystem, scope 1,2, and 3) from Western's overall life cycle carbon balance. The connected future forest outcome was used as the input into the Harvested Wood Products calculator to estimate carbon stored in harvested wood products and end of life treatment methods.

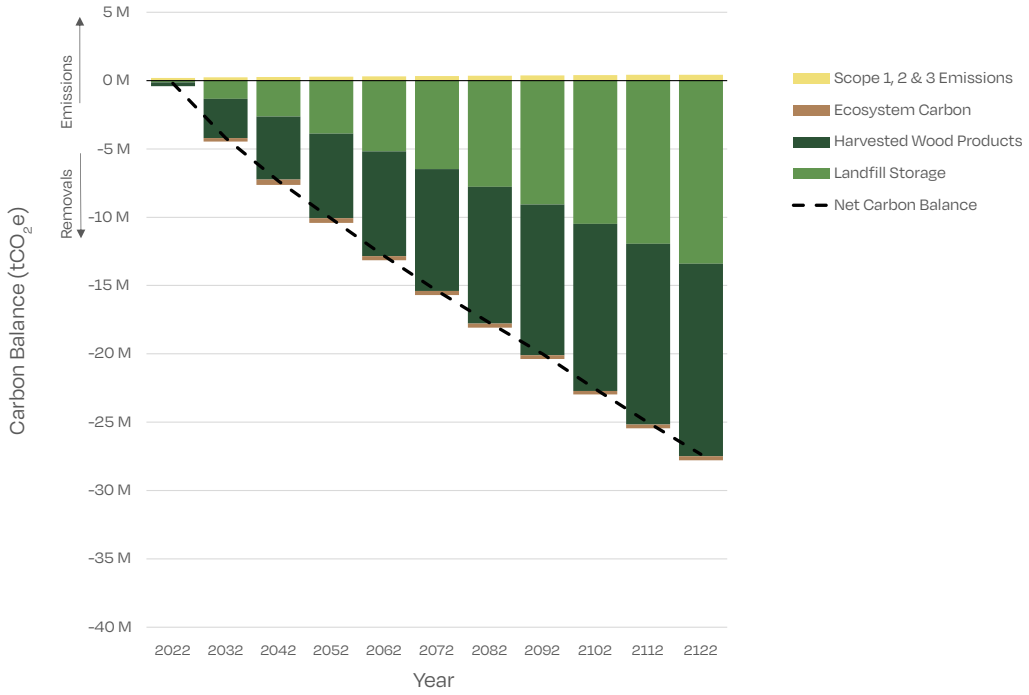
https://www.westernforest.com/wp-content/uploads/2022/05/Carbon-Accounting-Report-2022.pdf

3 https://www2.gov.bc.ca/assets/gov/environment/climate-change/offsets/offsets-portfolio/fcop_20_draft_2023.pdf

FF 13 — LIFE CYCLE CARBON

Linked FRPA Section 2.22 Objectives	△				⌖
Element of Biodiversity and Ecosystem Health					NO

Figure 1: 100 Year forecast of the life cycle carbon balance



Linked Stewardship Strategies

SS 1 ʻNa̱mgis Conservation Network
SS 2 Carbon Reserve
SS 9 Harvest Criteria
SS 10 Cutblock Size and Green-Up Criteria
SS 11 K'wa'xtlu Retention Criteria
SS 12 Reforestation
SS 17 Predetermined Salvage Process

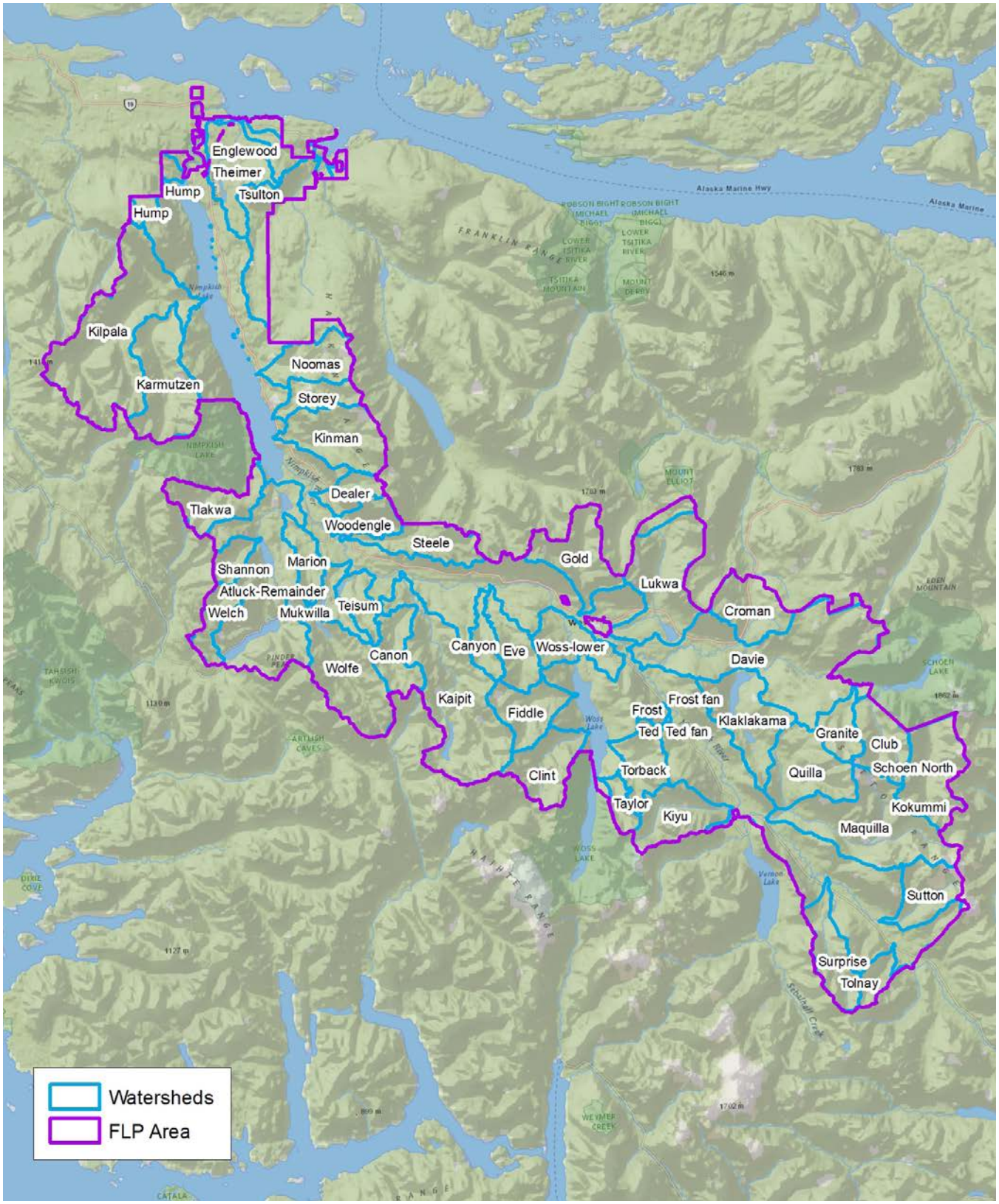
Adaptive Management Indicators

AMI 36 The annual life cycle carbon balance (tCO_2e).

Appendix A

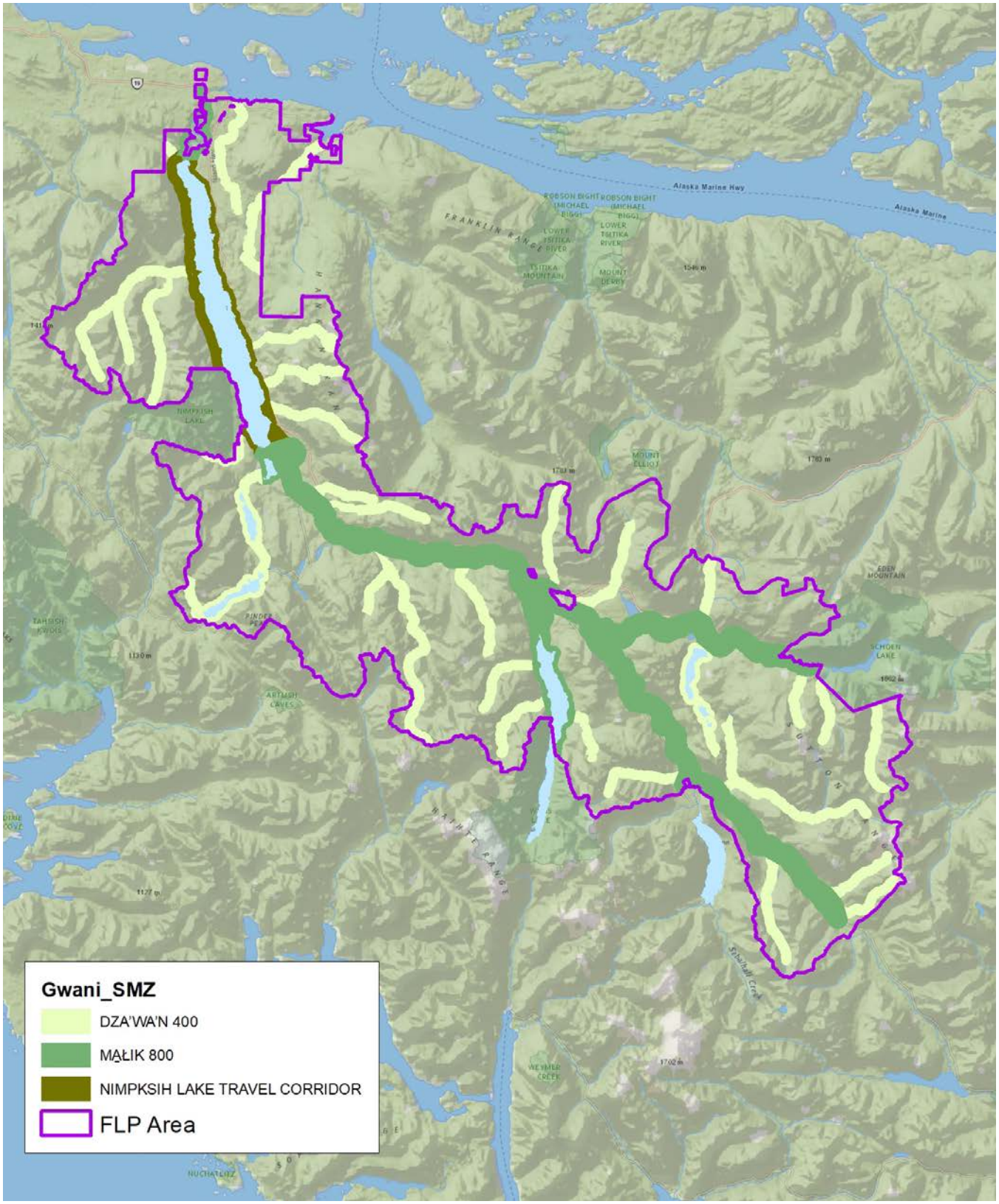
Reference Map

Map of Watersheds



Reference Map

Gwa’ni Special Management Zone



Methodology

Developing the Connected Future Forest Outcome

Modeling Criteria / to come...

Methodology

Developing the Connected Future Forest Outcome

Selecting the Preferred Scenario / to come...

Engagement

/ to come...

Tree Farm Licence 37 Forest Operations Plan

Requirements for Forest Operations and a Rolling Forecast of the Resulting Future Harvest Pattern

March 7, 2024

Rachel Dalton, RPF

"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

March 7, 2024

Mike Davis, RPF

"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

March 7, 2024

Mike Green, BSc, RFT

"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

March 7, 2024

Stuart Glen, RPF

"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

March 7, 2024

Phil Howe, RPF

"I certify that the work described herein fulfills the standards expected of a registrant of Forest Professionals British Columbia and that I did personally supervise the work"

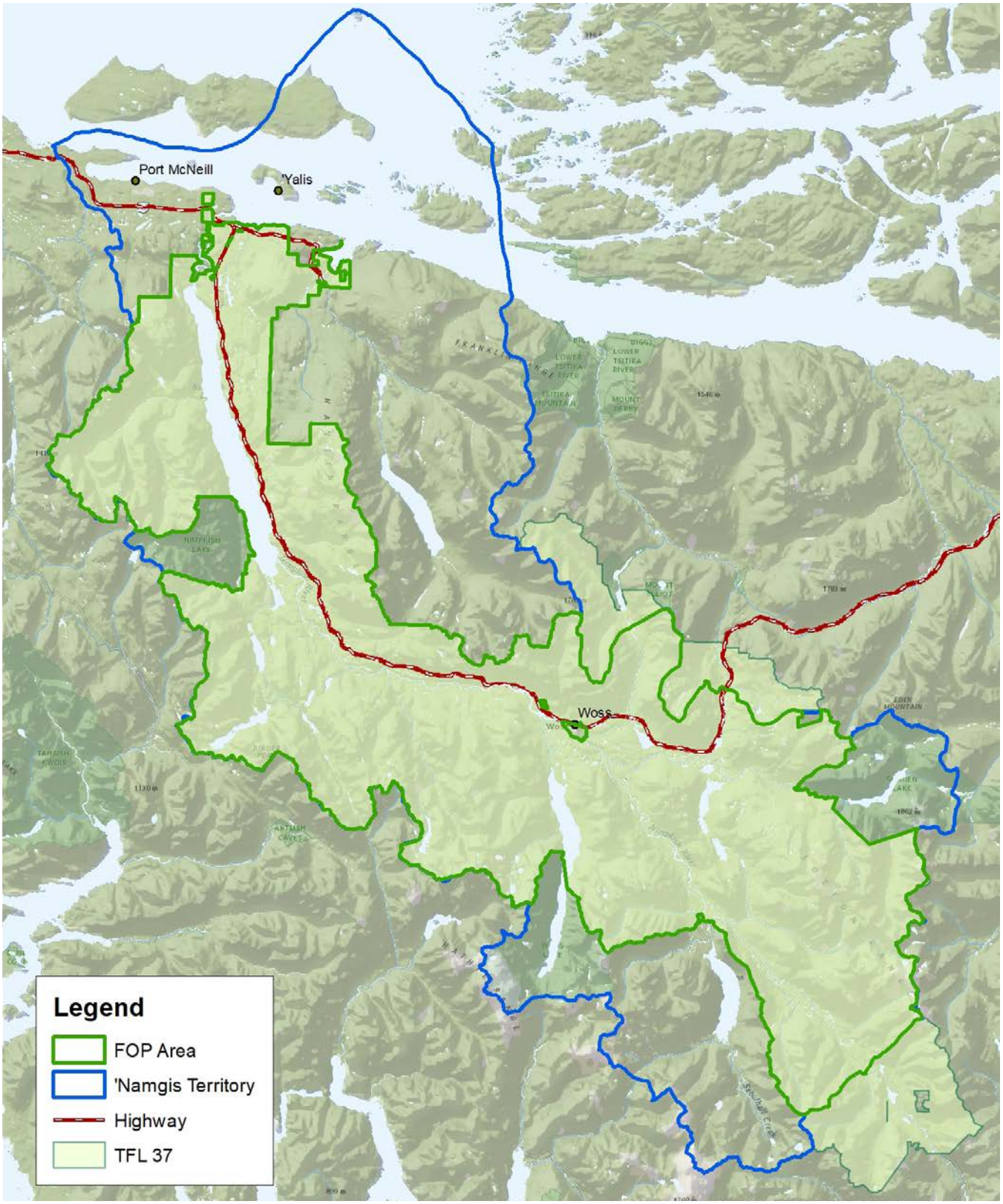
March 7, 2024

Brian Svanvik, Director, 'Namgis Natural Resource Department

Map Of The Forest Operations Plan Area

FRPA Section 2.36 (1) (A)

Figure 1: TFL 37 Forest Operations Plan Area.



Requirements for Forest Operations in Respect of Forest Practices and Silvicultural Systems

FRPA Section 2.36 (1) (B)

Two types of requirements for forest operations in respect of forest practices and silvicultural systems have been identified consistent with FRPA Section 2.36 (1) (b).

1. **Stewardship Strategies: Connected Planning** builds on a foundation of values to identify **Stewardship Strategies** that respect the natural landscape and local ecological characteristics. A total of 20 **Stewardship Strategies** have been developed and integrated as part of the connected future forest outcome.
2. **Practice Requirements:** Practice Requirements from Division 4 of the FRPA are linked to each of the relevant **Stewardship Strategies**.

The FOP is designed to function in the context of implementation in an **Adaptive Management Framework**. The suite of **Stewardship Strategies** identified below are robust, innovative, and detailed. Learnings from the **Adaptive Management Indicators** linked to the 13 **Future Forest Outcomes** and 20 **Stewardship Strategies** will help inform whether adjustments to the **Stewardship Strategies** are required during the term of the plan with the goal of staying on track to achieve the connected future forest outcome.

SS 1 — ‘NAMGIS CONSERVATION NETWORK INCLUDING RESERVES FOR WILDLIFE, BIODIVERSITY, AND CARBON

Linked Gwa’ni Planning Values 

Linked Gwa’ni Conservation Network Objective

Develop and manage a spatialized, multiple value, conservation network with emphasis on riparian function, climate resiliency, and carbon.

Linked FLP Outcomes

FF 1 Western Redcedar and Yellow Cedar
FF 2 Stream Channel Condition
FF 3 Riparian Function
FF 5 Ecosystem Integrity
FF 8 Wildlife Habitat
FF 9 Cultural, Traditional, and Recreational Use
FF 10 Connectivity and Forest Interior Conditions
FF 11 Rare Ecosystems
FF 12 Climate Change Adaptation
FF 13 Life Cycle Carbon

Stewardship Strategy

1. Joint ‘Namgis and Western design and maintenance of the ‘Namgis Conservation Network[1] with a focus on riparian connectivity integrating legally established reserves[2] and the following biophysical elements associated with the Gwa’ni Planning Values:
   - Nimpkish River and primary valley bottom tributaries (S1, S2, and S3)
   - Floodplains
   - Fans (salmon spawning)
   - Lakes (salmon spawning)
   - Fish stream complexes
   - Steep terrain
   - Archaeological sites/features
   - Cultural sites
   - Western redcedar and yellow cedar
   - Rare ecosystems – high quality element occurrences of red and blue listed ecosystems.
   - Old forest
   - Big Trees
   - Forest interior conditions
   - Bear dens
   - Bird nests
   - Marbled murrelet suitable habitat
   - Amphibian breeding ponds (wetlands)
   - Goshawk foraging habitat
   - Deer habitat
   - Elk habitat
   - Refugia
   - Karst
   - Recreation sites
2. Forest harvesting[5] within the ‘Namgis Conservation Network can be completed for road crossings, worker safety, and forest stewardship[3] consistent with the cooperative decision making agreement[3] and the requirements of any legally established reserves[2] and carbon reserve[4].

Adaptive Management Monitoring

AMI 37 Total area (ha) of the ‘Namgis Conservation Network.

[1] Appendix B identifies the ‘Namgis Conservation Network including the location of all legally established reserves and the carbon reserve.
[2] Legally established reserves (UWRs, WHAs and OGMAs) located within the ‘Namgis Conservation Network are for wildlife habitat and biodiversity. Many of these reserves were reviewed and updated as part of designing the ‘Namgis Conservation Network to reflect new inventory information and updated marbled murrelet suitable habitat targets in OGMAs and WHAs. These reserves have been submitted for government review. Once finalized, the reserves may be established through a GAR Order for Wildlife Habitat Areas, an amendment under the Land Act for Old Growth Management Areas, or as established through other measures. Future adjustments or amendments must be completed as specifically defined in each of the legal orders.
[3] ‘Namgis and Western Forest Products Co-operative Decision Making Agreement
[4] Details for the Carbon Reserves are identified in SS 2.
[5] The ‘Namgis Conservation Network was designed recognizing that road crossings would be required to maintain access.

SS 2 — CARBON RESERVE

Linked Gwa'ni Planning Values 

Linked FLP Outcomes

FF 13 Life Cycle Carbon

Stewardship Strategy

1. A spatially defined carbon reserve[1] in the 'Nąmgis Conservation Network providing the opportunity for developing a TFL 37 carbon project under the BC Greenhouse Gas Offset Protocol Forest Carbon (FCOP 2.0 Draft[2])

Adaptive Management Monitoring

AMI 38 Total area (ha) of the carbon reserve.

[1] Appendix B identifies the carbon reserve.
[2] FCOP is established provincially under Section 10 of the Greenhouse Gas Industrial Reporting and Control Act ("GGIRCA", or the Act). It creates legal requirements that Project Proponents, Validation Bodies and Verification Bodies (i.e., third-party auditors) must follow to obtain [carbon] offset units under GGIRC

SS 3 — ECA LIMITS IN AREAS OF PEAK FLOW SENSITIVITY

Linked Gwa'ni Planning Values

Linked FLP Outcomes

FF 2 Stream Channel Condition
FF 3 Riparian Function
FF 12 Climate Change Adaptation

Stewardship Strategy

1. Maintain an ECA[1] of less than 25% averaged over 5 years in the spatially delineated watershed areas of sensitivity as defined in Figure 1.

Figure 1: Spatially delineated watershed areas of sensitivity by groupings of watersheds and management focus

Watershed Grouping	Area of Sensitivity[2]	Management Focus
Kaipit Kilpala Lukwa	Kaipit (4,150 ha)Kilpala (6,030 ha) Kilpala-Karmutzen (2,805 ha) Lukwa (2,250 ha)	Watersheds with significant fisheries values
Davie	Davie (6,170 ha)	Candidate Fisheries Sensitive Watershed
Kaipit Kiyu Maquilla Sutton	Kaipit – Canon (1,415 ha) Kiyu (1,585 ha) Maquilla (3,745 ha) Maquilla – Quilla (1,060 ha) Sutton (1,305 ha)	High sediment-generating watersheds
Kla'anch Surprise	Kla'anch (1,335 ha) Surprise (1,150 ha)	Watersheds for review of management focus
Pink	Pink (500 ha)	Watershed with special fisheries significance

Adaptive Management Monitoring

AMI 6 The current and forecast ECA (%) by area of sensitivity.

[1] Appendix B contains the ECA methodology.
[2] Appendix B identifies the watershed areas of sensitivity.

SS 4 — LANDSLIDE RISK TOLERANCE FOR ROADS AND HARVESTING

Linked Gwa'ni Planning Values

Linked FLP Outcomes

FF 2 Stream Channel Condition
FF 3 Riparian Function
FF 12 Climate Change Adaptation

Stewardship Strategy

1. Design cutblocks and roads to the risk tolerance[12] for landslides for each of the planning features in Figure 1 for the associated watersheds[11] unless using a single stem harvest system that retains > 70% of the basal area evenly dispersed.

Figure 1: Landslide risk tolerance by watershed group and planning feature

Planning Feature: All Fish Habitat

Watershed Grouping	Landslide Risk Tolerance
Kaipit Kilpala Kilpala-Karmutzen Lukwa	Low-Moderate

Potential for Landslide Occurrence[10]	Sediment Delivery Potential to All fish habitat[10]				
	High[1]	Mod-High[2]	Moderate[3]	Low-Mod[4]	Low[5]
High[6]					■
Moderate[7]				■	■
Low[8]	■	■	■	■	■
Very Low[9]	■	■	■	■	■

Planning Feature : Sockeye Spawning Fans

Watershed Grouping	Landslide Risk Tolerance
Noomas, Storey, Tlakwa, Woss-Fiddle, Woss-Torback, Kinman, Woss-Clint	Low-Moderate

Potential for Landslide Occurrence[10]	Sediment Delivery Potential to Sockeye Spawning Fans[10]				
	High[1]	Mod-High[2]	Moderate[3]	Low-Mod[4]	Low[5]
High[6]					■
Moderate[7]				■	■
Low[8]	■	■	■	■	■
Very Low[9]	■	■	■	■	■

SS 4 — LANDSLIDE RISK TOLERANCE FOR ROADS AND HARVESTING

Linked Gwa'ni Planning Values

Planning Feature: Confluence of the Nimpkish or Oktwanch Rivers with any of the following rivers: Kaipit-Canon, Oktwanch-Alston, Gold

Watershed Grouping	Landslide Risk Tolerance
Kaipit-Canon Oktwanch-Alston Gold	Low

Potential for Landslide Occurrence[10]	Sediment Delivery Potential to River Confluence[10]				
	High[1]	Mod-High[2]	Moderate[3]	Low-Mod[4]	Low[5]
High[6]					
Moderate[7]					■
Low[8]			■	■	■
Very Low[9]	■	■	■	■	■

Planning Feature: Moderate or high sensitivity fish habitat1 in all remaining watersheds

Watershed Grouping	Landslide Risk Tolerance
Noomas, Storey, Tlakwa, Woss-Fiddle, Woss-Torback, Kinman, Sutton, Woss-Clint, Oktwanch-Alston, Oktwanch – Remainder, Eve-Kunnum, Gold,Kiyu, Kla'anch, Maquilla, Noomas, Surprise, Nimpkish Remainder – mid (Nimpkish Lake to Woss), Nimpkish Remainder – upper (upstream of Woss), Atluck – Woolfe, Atluck – Remainder, Davie – Granite, Davie - Schoen North, Davie – Remainder, Kaipit – Canon, Maquilla – Quilla, Tlakwa, Woss – Clint, Woss – Fiddle, Woss – Remainder, Kokish – Tsulton. Tsitika – Elliott, Upper Tsitika, West Tsitika, Atluck – Marion, Atluck – Shannon, Atluck – Welch, Davie – Club, Davie – Croman, Davie – Klaklakama, Hump, Steele. Storey, Woodengle, Woss – Torback, Nimkish – Lower, Theimer	Standard

Potential for Landslide Occurrence[10]	Sediment Delivery Potential to Moderate or High Sensitivity Fish Habitat[10]				
	High[1]	Mod-High[2]	Moderate[3]	Low-Mod[4]	Low[5]
High[6]				■	■
Moderate[7]			■	■	■
Low[8]	■	■	■	■	■
Very Low[9]	■	■	■	■	■

SS 4 — LANDSLIDE RISK TOLERANCE FOR ROADS AND HARVESTING

Linked Gwa'ni Planning Values

Practice Requirements

1. Forest Planning and Practices Regulation Section 37

2. Forest Planning and Practices Regulation Section 38

Adaptive Management Monitoring

AMI 8 The five-year rolling average of the number of landslides[1] per 100ha of logged steep terrain[2] in the 15-year period following harvesting that impact the defined value.

1 Landslide would directly enter a fish stream
2 Some landslide debris may enter a fish stream at the time of the event. High potential to transport to fish stream within the first season peak flows.
3 Most landslide debris at the time of the event would deposit at breaks in gradient or slope breaks. Fine sediment may reach a fish stream. Coarse sediment would transport to fish streams over time via normal fluvial processes.
4 Some suspended sediment or small wood debris may reach a fish stream. Coarse sediment would typically be stored in low gradient reaches, on fans, or on gentle slopes.
5 Landslide debris is unlikely to reach fish stream.
6 Greater than or equal to 5 landslides per 100 ha of harvested steep terrain.
7 3 to < 5 landslides per 100 ha of harvested steep terrain.
8 1 to < 3 landslides per 100 ha of harvested steep terrain.
9 < 1 landslides per 100 ha of harvested steep terrain.
10 As predicted by a Qualified Registered Professional.
11 Appendix B identifies the watersheds.
12 https://www.egbc.ca/getmedia/8742bd3b-14d0-47e2-b64d-9ee81c53a81f/EGBC-ABCFP-Watershed-Assessment-V1-0.pdf.aspx

1 Landslide would directly enter a fish stream.
2 Some landslide debris may enter a fish stream at time of the event. High potential to transport to fish stream within first season peak flows.
3 Most landslide debris at time of the event would deposit at breaks in gradient or slope breaks. Fine sediment may reach a fish stream. Coarse sediment would transport to fish stream over time via normal fluvial processes.
4 Some suspended sediment or small wood debris may reach a fish stream. Coarse sediment would typically be stored in low gradient reaches, on fans, or on gentle slopes.
5 Landslide debris is unlikely to reach fish stream.
6 ≥ 5 landslides per 100 ha of harvested steep terrain.
7 3 to < 5 landslides per 100 ha of harvested steep terrain.
8 1 to < 3 landslides per 100 ha of harvested steep terrain.
9 < 1 landslides per 100 ha of harvested steep terrain.
10 As predicted by a Qualified Registered Professional.
11 Appendix B identifies the watersheds.

SS 5 — RETENTION OF RIPARIAN FOREST – STREAMS

Linked Gwa'ni Planning Values

Linked FLP Outcomes

FF 2 Stream Channel Condition
FF 3 Riparian Function
FF 5 Ecosystem Integrity
FF 8 Wildlife Habitat Types
FF 9 Cultural, Traditional, and Recreational Use
FF 10 Connectivity and Forest Interior Conditions
FF 11 Rare Ecosystems

Stewardship Strategy

1. Retain riparian forest where streams that are located outside the 'Namgis Conservation Network as identified in Figure 1.

Practice Requirements

1. FPPR Section 47 (1) (2) (3) (4) (5) (6) (7) (8)
2. FPPR Section 50 (1) (2) (3)
3. FPPR Section 51 (1) (2) (3)
4. FPPR Section 52 (2)
5. FPPR Section 54
6. FPPR Section 55 (1) (2)
7. FPPR Section 56 (1) (2) (3)
8. FPPR Section 57
9. FPPR Section 59
10. FPPR Section 60 (1)

Adaptive Management Monitoring

AMI 10 The 5-year rolling average width[1] (m) of retention along S5u, S4, and S6u streams, wetlands, and lakes associated with harvested cutblocks.

AMI 13 The 5-year rolling average of the estimated proportion[2] (%) of windthrow (%) at year 1 and 5 on a random sample of S4, S5u, and S6u streams.

[1] Average width = Riparian Management Zone (m) x % retention prescribed.
[2] Proportion = estimated # windthrow trees/estimated total # trees.

SS 5 — RETENTION OF RIPARIAN FOREST – STREAMS

Linked Gwa'ni Planning Values 

Figure 1: Riparian forest retention requirements by stream class

Stream Class	Classification			Management Strategy			
	Min width (m)	Max width (m)	Classifying Features	RMA[1] (m)	RRZ[1] (m)	RMZ[1] (m)	RMZ Management Criteria
S1	> 20	—	Fish Present	70	50	20	Retain 100%
S2	≥ 5	≤ 20		50	30	20	Retain ≥ 50% of the first 10m informed by site level geomorphic and aquatic factors[4]
S3	≥ 1.5	< 5		40	30	10	Management zone informed by site level geomorphic and aquatic factors[4]
S4	—	< 1.5		30	0	30	Retain ≥ 65% of the first 15m informed by site level geomorphic and aquatic factors[4]
S5	> 3	—	> 500m Upstream of Fish	30	0	30	Retain ≥ 75% of the first 15m informed by site level geomorphic and aquatic factors[4]
S5u	> 3	—	≤ 500m Upstream of Fish	30	0	30	Retain ≥ 100% of the first 15m informed by site level geomorphic and aquatic factors[4]
S6	—	≤ 3	> 30 m Upstream of Fish or > 50 m Upstream of Fish if width ≥ 2m	20	0	20	Prioritize high stumping and fall and yard away considering the relative significance of each stream.[2]
S6u	—	≤ 3	≤ 50m Upstream of Fish	20	0	20	Retain ≥ 50% of the first 10m based on site level geomorphic and aquatic factors[4].
FSZ	—	—	Fish Present	0	0	0	Fall and yard away. Retain shrubs and high stump within the first 5m[2]. Include as a biological anchor for Variable Retention.

1 See Forest Planning and Practices Regulation Section1 (1). As measured by slope distance.

2 Where streams are too closely spaced across a hillslope such that it is not operationally feasible for measures to be applied to each stream, then streams selected for management measures should be prioritized according to stream significance with respect to safety, channel size, channel type, flow duration and distance to fish habitat.

3 Where stand conditions, falling methods, soils, and terrain permits.

4 Geomorphic and aquatic factors include channel type, fish habitat, terrace edges, escarpments, brush sites, wet soils, bluffs, channel shading, and windthrow.

SS 6 — RETENTION OF RIPARIAN FOREST – WETLANDS

Linked Gwa'ni Planning Values

Linked FLP Outcomes

FF 2 Stream Channel Condition
FF 3 Riparian Function
FF 5 Ecosystem Integrity
FF 8 Wildlife Habitat
FF 9 Cultural, Traditional, and Recreational Use
FF 10 Connectivity and Forest Interior Conditions
FF 11 Rare Ecosystems

Stewardship Strategy

1. Retain riparian forest for wetlands that are located outside the 'Nąmgis Conservation Network as identified in Figure 1.

Figure 1: Riparian forest retention requirements by wetland class

Wetland Class	Classification			Management Strategy			
	Min area (ha)	Max area (ha)	Classifying Features	RMA[1] (m)	RRZ[1] (m)	RMZ[1] (m)	RMZ Management Criteria
W1	≥ 5	—	—	50	10	40	—
W2	≥ 1	≤ 5	When located in CWH xm or mm	30	10	20	—
W3	≥ 1	≤ 5	—	30	0	30	Retain ≥ 65% of the first 15m informed by site level geomorphic and aquatic factors.[3]
W4	≥ 0.5	< 1	When located in CWH xm or mm	30	0	30	
W5	—	—	Wetland complex[2]	50	10	40	—
W6	≥ 0.25	< 1	—	20	0	20	Include as a biological anchor for Variable Retention.

[1] See Forest Planning and Practices Regulation Section1 (1). As measured by slope distance.
[2] A wetland complex is met when:
- 2 W1 wetlands are ≤ 100 m apart; or
- a W1 and ≥ 1 W2, W3, or W4 wetland are ≤ 80 m apart; or
- ≥ 2 W2, W3, or W4 wetlands are ≤ 60m apart; and
- Combined size of the wetlands; excluding upland areas is ≥ 5ha

[3] Geomorphic and aquatic factors include channel type, fish habitat, terrace edges, escarpments, brush sites, wet soils, bluffs, channel shading, and windthrow.

Practice Requirements

1. FPPR Section 48 (1) (2) (3) (4) (5) (6) (7)
2. FPPR Section 50 (1) (2) (3)
3. FPPR 51 (1) (2) (3)
4. FPPR Section 57

Adaptive Management Monitoring

AMI 11 The 5-year rolling average width[1] (m) of retention along W1, W2, W3, W4, W5, and W6 wetlands associated with harvested cutblocks.

[1] Average width = Riparian Management Zone (m) x % retention prescribed.

SS 7 — RETENTION OF RIPARIAN FOREST – LAKES

Linked Gwa'ni Planning Values

Linked FLP Outcomes

FF 2 Stream Channel Condition
FF 3 Riparian Function
FF 5 Ecosystem Integrity
FF 8 Wildlife Habitat
FF 9 Cultural, Traditional, and Recreational Use
FF 10 Connectivity and Forest Interior Conditions
FF 11 Rare Ecosystems

Stewardship Strategy

1. Retain riparian forest for lakes that are located outside the 'Nąmgis Conservation Network as identified in Figure 1.

Figure 1: Riparian forest retention requirements by lake class

Lake Class	Classification			Management Strategy			
	Min area (ha)	Max area (ha)	Classifying Features	RMA[1] (m)	RRZ[1] (m)	RMZ[1] (m)	RMZ Management Criteria
L1A	> 1000	—	—	0	0	0	—
L1B	> 5	< 1000	—	10	10	0	—
L2	≥ 1	≤ 5	When located in CWH xm or mm	30	10	20	—
L3	≥ 1	≤ 5	—	30	0	30	—
L4	≥ 0.5	< 1	When located in CWH xm or mm	30	0	30	Include as a biological anchor for Variable Retention

[1] See Forest Planning and Practices Regulation Section1 (1). As measured by slope distance.

Practice Requirements

1. FPPR Section 49 (1) (2) (3) (4) (5)
2. FPPR Section 50 (1) (2) (3)
3. FPPR Section 51 (1) (2) (3)
4. FPPR Section 57

Adaptive Management Monitoring

AMI 12 The 5- year rolling average width[1] (m) of retention along L1A, L1B, L2, L3, and L4 lakes associated with harvested blocks.

[1] Average width = Riparian Management Zone (m) x % retention prescribed.

SS 8 — VARIABLE RETENTION

Linked Gwa'ni Planning Values

Linked FLP Outcomes

- FF 1 Western Redcedar and Yellow Cedar — Supporting ʻNa̱mgis Health and Culture
- FF 2 Stream Channel Condition
- FF 3 Riparian Function
- FF 4 Diversity and Pattern of Forest Stands in the Gwa'ni Special Management zone
- FF 5 Ecosystem Integrity
- FF 8 Wildlife Habitat
- FF 9 Cultural, Traditional, and Recreational Use
- FF 10 Connectivity and Forest Interior Conditions
- FF 12 Climate Change Adaptation

Stewardship Strategy

1. Meet or exceed the five-year rolling average[1] by Forest Stewardship Zone[13] for Retention Silvicultural System[2] cutblocks specified in Figure 1.
2. Use biological anchors in retention patches when available: Big Trees, k'wa'xtlu[6], veteran trees, rare and culturally significant species[7], dens[8], nest trees, forested swamps[9], riparian including wetlands[10] and breeding ponds[11], clusters of snags, rock bluffs, karst features[12], clumps of understory cedar.
3. The amount of stand level retention in Figure 1 and Wildlife Tree Retention criteria in Figure 2 recognize that retention can be located within the 'Namgis Conservation Network.
4. Record the type of biological anchor located within the retention patch.
5. Identify the Wildlife Tree Retention Areas (WTRA) for at least one rotation.

Figure 1: Stand level retention criteria by Forest Stewardship Zone[5]

Forest Stewardship Zone		
	SMZ	GMZ
Proportion of retention Silvicultural System[3] (%)	100%	Windy 40%
		Basic 60%
		Dry 70%
Amount of stand level retention[4] (%)	25%	Windy 20%
		Basic 20%
		Dry 25%

SS 8 — VARIABLE RETENTION

Linked Gwa'ni Planning Values

Figure 2: Wildlife Tree Retention criteria by landscape unit and biogeoclimatic variant

Landscape Unit	Biogeoclimatic Variant	Percent Wildlife Tree Retention Area (%)
Lower Nimpkish	CWHxm	11%
	CWHvm	9%
	MHmm	7%
Upper Nimpkish	CWHxm	13%
	CWHmm	14%
	CWHvm	9%
	MH mm	7%

Practice Requirements

1. FPPR Section 67
2. FPPR Section 68

Adaptive Management Monitoring

AMI 4 The total area (ha) of stand level retention with western redcedar or yellow cedar trees as recorded during layout.

AMI 20 The 5-year rolling average proportion (%) of the retention silvicultural system utilized in the Gwa'ni Special Management Zone and General Management Zone.

AMI 21 The 5-year rolling average proportion (%) of stand level retention in the Gwa'ni Special Management Zone and General Management Zone.

[1] Variances will monitored consistent with the cooperative decision making agreement.
[2] Silvicultural system designed to:
- Retain individual trees or groups of trees to maintain structural diversity over the area of the cutblock for at least one rotation.
- Leave more than half of the harvest area within one tree height from the base of a tree or group of trees, whether or not the group of trees is inside the cutblock (>50% forest influence).

[3] Proportion of retention silvicultural system is based on total Harvest Area (ha)
[4] Stand-level Retention Percentage = Total Retention (ha)/Harvest Area (ha) * 100%
[5] If a portion of harvest area for the cutblock is inside the Gwa'ni SMZ then follow the SMZ criteria
[6] Refer to SS 12 - k'wa'xtlu Retention Criteria
[7] White pine, pacific yew, crab apple, black cottonwood, cascara, devils club
[8] Refer to SS 20 – Wildlife Features (Bear Dens and Raptor Nests)
[9] CWH xm 12, CWH mm1 12, CWH vm1 14.
[10] Refer to SS 5, SS 6, and SS 7 – Retention of Riparian Forest
[11] Breeding ponds are determined by the presence of egg masses or tadpoles
[12] Refer to SS 19 – Karst Features
[13] Appendix B identifies the Forest Stewardship Zones

SS 9 — HARVEST CRITERIA

Linked Gwa'ni Planning Values

Linked FLP Outcomes

- FF 1 Western Redcedar and Yellow Cedar
- FF 4 Diversity and Pattern of Forest Stands in the Gwa'ni Special Management zone
- FF 5 Ecosystem Integrity
- FF 6 Long-Term Harvest Flow
- FF 7 Long-Term Road Network
- FF 8 Wildlife Habitat
- FF 9 Cultural, Traditional, and Recreational Use
- FF 10 Connectivity and Forest Interior Conditions
- FF 11 Rare Ecosystems
- FF 12 Climate Change Adaptation
- FF 13 Life Cycle Carbon

Stewardship Strategy

1. Harvest cutblocks older than the age specified in Figure 1 at the time of falling.

Figure 1: Minimum harvest criteria for the Gwa'ni Special Management Zone

	Portion of Gwa'ni Special Management Zone
	mạ̱ɬik 800
Minimum Harvest Criteria[1] (years)	120[2]

[1] Except for deciduous leading stands and where a stand < 120 years age is determined to be appropriate for operational and ecological feasibility consistent with the cooperative decision making agreement.[3]
[2] As defined by the forest age data in the connected future forest outcome.
[3] 'Nạ̱mgis and Western Forest Products Co-operative Decision Making Agreement

Adaptive Management Monitoring

AMI 18 The average age of cutblocks harvested in the mạ̱ɬik 800.

SS 10 — CUTBLOCK SIZE AND GREEN-UP CRITERIA

Linked Gwa'ni Planning Values

Linked FLP Outcomes

FF 4 Diversity and Pattern of Forest Stands in the Gwa'ni Special Management zone
FF 5 Ecosystem Integrity
FF 6 Long-Term Harvest Flow
FF 7 Long-Term Road Network
FF 10 Connectivity and Forest Interior Conditions

Stewardship Strategy

1. Harvest cutblocks as specified in Figure 1 and Appendix Map E for the Gwa'ni Special Management Zone (Nimpkish Lake Travel Corridor, mąłik 800, and dzą'wąn 400) and General Management Zone.

Figure 1: Cutblock size and green-up criteria for the Gwa'ni Special Managment Zone

	Gwa'ni Special Management Zone			
	Nimpkish Lake Travel Corridor[1]	mąłik 800[2]	dzą'wąn 400[3]	GMZ
Maximum Net Area to Reforest (NAR)[4, 5] (ha)	10		25	40
Minimum Height[6] (m)	6	3	3	3

1 Nimpkish Lake Travel Corridor:
- If ≥ 1 ha of the NAR for a cutblock is inside the Nimpkish Lake Travel Corridor then follow the Nimpkish Visual Area criteria for cutblock size.
- If < 1 ha of the NAR for a cutblock in an adjacent zone extends into the Nimpkish Lake Travel Corridor , then follow the criteria for that zone, except in the GMZ the NAR must be ≤ 25ha.

2 Mąłik 800:
- If ≥ 3 ha of the NAR for the cutblock is inside the mąłik 800 then follow the mąłik 800 criteria for cutblock size.
- If < 3 ha of the NAR for a cutblock in an adjacent zone extends into the mąłik 800 them follow the criteria for the adjacent zone, except in the GMZ the NAR must be ≤ 25ha.

3 Dzą'wąn 400:
- If ≥ 6 ha of the harvest area for the cutblock is inside the dzą'wąn 400 then follow the dzą'wąn 400 criteria.

4 Net Area to Reforest (NAR).

5 Utilize the Retention Silvicultural System for any cutblocks partially contained in the SMZ.

6 Green-up is achieved when at least 75% of the net area to be reforested of the existing cutblock is stocked with an average minimum height of the of the tallest 10% of the trees. [This replaces FPPR Section 65 (3)]

Practice Requirements

1. FPPR Section 64 (1) (2) (3) (4)
2. FPPR Section 65 (1) (2) (3-see superscript 6 above) (4)

SS 11 — K'WA'XTLU RETENTION CRITERIA

Linked Gwa'ni Planning Values

Linked FLP Outcomes

- FF 1 Western Redcedar and Yellow Cedar
- FF 4 Diversity and Pattern of Forest Stands in the Gwa'ni Special Management zone
- FF 5 Ecosystem Integrity
- FF 9 Cultural, Traditional, and Recreational Use
- FF 11 Rare Ecosystems
- FF 12 Climate Change Adaptation

Stewardship Strategy

1. Retain k'wa'xtlu as identified in Figure1.
2. Tag each tree identified and record the specified attributes attached to a unique tree number.

Figure 1: K'wa'xtlu[1] retention criteria for wilkw and dixw

K'wa'xtlu[1]	Criteria		
	Diameter (cm)	Quality	Retention[1] (%[3])
wilkw (western redcedar)	≥ 300	—	100[2]
	150 - 299	Minimum 6m sections, round, sound, straight, surface relatively clear of knots on at least 3 sides	90[2]
	120 - 149		50
	100 - 119		33
dixw (yellow cedar)	≥ 210	—	100[2]
	150 - 209	Minimum 6m sections, round, sound, straight, surface relatively clear of knots on at least 3 sides	90[2]
	120 - 149		50
	100 - 119		33

[1] Integrate trees not being utilized for cultural purposes at the time of harvest into stand level retention within patches or as single trees considering cutblock design factors such as safety, windthrow, distribution of trees to be retained, yarding, and access.
[2] Includes site level flexibility for operational and safety considerations consistent with the cooperative decision-making agreement[4]
[3] Percentage is based on trees identified in and/or around the cutblock or road right of way (full scope of the area being assessed for harvesting including riparian areas etc.)
[4] 'Nam̱gis and Western Forest Products Co-operative Decision Making Agreement.

Adaptive Management Monitoring

AMI 39 Total inventory (#) of k'wa'xtlu by diameter category.

SS 12 — REFORESTATION

Linked Gwa'ni Planning Values 

Linked FLP Outcomes

- FF 1 Western Redcedar and Yellow Cedar
- FF 4 Diversity and Pattern of Forest Stands in the Gwa'ni Special Management zone
- FF 5 Ecosystem Integrity
- FF 6 Long-Term Harvest Flow
- FF 8 Wildlife Habitat
- FF 9 Cultural, Traditional, and Recreational Use
- FF 11 Rare Ecosystems
- FF 12 Climate Change Adaptation
- FF 13 Life Cycle Carbon

Stewardship Strategy

1. Where western redcedar and yellow cedar will become the long-term species prescribe planting as follows and manage consistent with the stocking standard in Appendix B:
   - 1,000 stems/ha including planted, well-spaced naturals, and non-productive sites.
   - 1,200 stems/ha where >85% of the planting unit is Cw or Yc.
2. On high elk use sites maintain forage through natural stand succession by prescribing planting as follows and manage consistent with the stocking standard in Appendix B :
   - 1,200 stems/ha of conifers including planted, well-spaced naturals, and non-productive sites.
3. Where alder will become the long-term species prescribe planting as follows and manage consistent with the stocking standard in Appendix B with the goal of maintaining a future average annual harvest of 10,000m3 per year.
   - 1400-1600 stems/ha of hardwoods and manage consistent with the hardwood stocking standard in Appendix B .
4. Where it is unlikely that the free growing stocking standard will be achieved with manual brushing treatments, options for utilizing herbicides or to accept the resulting natural stand will be made consistent with the cooperative decision making agreement.[1]

[1] 'Nąmgis and Western Forest Products Co-operative Decision Making Agreement.

Practice Requirements

1. FPPR Section 35 (1) (3) (4) (5) (6) (7)
2. FPPR Section 36 (1) (2) (3) (4)
3. FPPR Section 43 (1) (2) (3) (4) (5) (6) (7) (8)
4. FPPR Section 44 (1) (2) (3) (4)
5. FPPR Section 46.11 (1) (2)
6. FPPR Section 46.2 (1) (2) (3) (4) (5)

Adaptive Management Monitoring

AMI 1 The five-year rolling average of the total number (stems/ha) of western redcedar and yellow cedar trees (inventory label) at the time of free growing where these species were planted.

AMI 2 The five-year rolling average of the change (%) in the density (stems/ha) of western redcedar and yellow cedar at the time of free growing compared to the density at planting.

SS 13 — CULTURAL INVENTORY OF PLANTS

Linked Gwa'ni Planning Values 

Linked FLP Outcomes

FF 9 Cultural, Traditional, and Recreational Use

Stewardship Strategy

1. Maintain an inventory of plants of cultural interest[1] in collaboration with 'Nąmgis Natural Resource Department.
2. Produce a 1:50,000 georeferenced **Plant Harvest Opportunities Map** in collaboration with the 'Nąmgis Natural Resource Department dependent on the needs at the time.

[1] List will be maintained with 'Nąmgis.

SS 14 — BARK HARVEST OPPORTUNITIES

Linked Gwa'ni Planning Values 

Linked FLP Outcomes

FF 1 Western Redcedar and Yellow Cedar
FF 7 Long-Term Road Network
FF 9 Cultural, Traditional, and Recreational Use

Stewardship Strategy

1. Annually produce a 1:50,000 georeferenced **Bark Harvest Opportunities Map** of potential western redcedar and yellow cedar bark harvest areas that are feasible to access within the 'Nam̱gis Conservation Network.
2. Identify bark harvest opportunities in future cutblocks as follows:
   - Identify cutblocks in the Harvest Development Schedule that are suitable for western redcedar and yellow cedar bark harvest consistent with the cooperative decision making agreement[1].
   - Create a 1:5,000 georeferenced Bark Harvest Opportunities Map for each cutblock with bark harvest opportunities once block layout is complete consistent with the cooperative decision making agreement[1].

[1] 'Nam̱gis and Western Forest Products Co-operative Decision Making Agreement

SS 15 — INVASIVE PLANTS

Linked Gwa'ni Planning Values 

Linked FLP Outcomes

FF 2 Stream Channel Condition
FF 9 Cultural, Traditional, and Recreational Use
FF 11 Rare Ecosystems
FF 12 Climate Change Adaptation

Stewardship Strategy

1. Report instances of priority invasive species[1] into Western's spatial database and through Report-a-Weed or similar technology to the Invasive Alien Plant Program.
2. Provide annual training to staff and contractors on the identification of priority invasive species[1] with the following direction:
   - Where present — clean equipment before moving to the next worksite.
   - Where present — do not brush or mow.
3. Revegetate disturbed areas where priority invasive species[1] are present.
4. Maintain a plan for controlling Knotweed along the Nimpkish River in coordination with 'Namgis, Western, and the Provincial Invasive Species Specialist.

[1] Priority Invasive species are grouped into five categories:
- Prevent: Yellow Star Thistle
- Provincial EDRR: Perennial Pepperweed
- Provincial Containment: Giant Hogweed, Rush Skeletonweed
- Regional Containment/Control: Blueweed, Common Tansy, Field Scabious, Hoary Alyssum, Hoary Cress, Knotweeds (Japanese, Giant, Bohemian, Himalayan), Leafy Spurge, Marsh Plume Thistle, Orange Hawkweed, Puncture Vine, Scotch Broom, Spotted Knapweed, Teasel, Yellow Flag Iris
- Management: Gorse, Purple Loosestrife, Scentless Chamomile, Scotch Thistle, Sulphur Cinquefoil, Tansy Ragwort

SS 16 — EROSION CONTROL TREATMENTS

Linked Gwa'ni Planning Values 

Linked FLP Outcomes

FF 2	Stream Channel Condition	FF 7	Long-Term Road Network
FF 6	Long-Term Harvest Flow	FF 12	Climate Change Adaptation

Stewardship Strategy

1. Classify roads planned for construction into one of the following three categories with consideration to the inactive period:[1]
   - seasonal water management
   - suspended use
   - permanent deactivation
2. Apply erosion control treatments with consideration to the following:
   - category of road
   - stream crossings and proximity to fish
   - road prism factors such as cut slope, grade, and parent material
   - field observations such as evidence of erosion
   - licensed water intakes
3. Complete road inspections on roads that are not permanently deactivated with consideration to the following:
   - category of road
   - stream crosses and proximity to fish
   - road prism factors such as cut slope, grade, and parent material
   - field observations such as evidence of erosion
   - licensed water intakes

[1] Inactive period is the length of time in years until the road is expected to be needed again for a timber harvesting purpose.

Practice Requirements

1. FPPR Section 39 (1) (2)
2. FPPR Section 40
3. FPPR Section 82 (1) (2) (3) (4)
4. FPPR Section 83

Adaptive Management Monitoring

AMI 25 The proportion (%) of the road network that is not deactivated that is inspected annually.

AMI 26 A review of erosion control treatments at year 1 and 5 after harvest complete on a random sample of roads.

SS 17 — PREDETERMINED SALVAGE PROCESS

Linked Gwa'ni Planning Values  

Linked FLP Outcomes

FF 6 Long-Term Harvest Flow
FF 7 Long-Term Road Network
FF 12 Climate Change Adaptation
FF 13 Life Cycle Carbon

Stewardship Strategy

1. To mitigate, prevent, and adapt to impacts caused by significant disturbances to forests and forest health patches of damaged trees[1] can be salvaged without a site plan and under a blanket salvage permit up to 1.0ha or 1,000m³ where no new road construction is required.
2. Prior to salvage, contact 'Namgis for a review of the stand type and archaeological information.
3. Complete planting where appropriate to achieve stocking.

[1] Damaged trees include green windthrow, fire, pest, and trees required to be felled for safety.

Adaptive Management Monitoring

AMI 40 Total volume (m³) salvaged under the blanket salvage permit timber mark.

SS 18 — KARST

Linked Gwa'ni Planning Values 

Linked FLP Outcomes

FF 3 Riparian Function
FF 5 Ecosystem Integrity
FF 8 Wildlife Habitat
FF 9 Cultural, Traditional, and Recreational Use
FF 11 Rare Ecosystems

Stewardship Strategy

1. Establish management areas with practices around karst caves, karst features, and areas with high or very high karst vulnerability by incorporating management strategies, control measures, and recommendations from the Karst Field Assessment.

SS 19 — VISUAL QUALITY

Linked Gwa'ni Planning Values  

Linked FLP Outcomes

FF 9 Cultural, Traditional, and Recreational Use

Stewardship Strategy

1. Meet the applicable Category of Visually Altered Forest Landscape[1] for landforms with a visual quality objective polygon[2] when developing new cutblocks and roads.
2. If it is not practicable to meet the Category of Visually Altered Forest Landscape, evaluate consistent with the cooperative decision making agreement[3].

[1] As defined in FPPR s.1.1
[2] Appendix B identifies the Visual Quality Polygons.
[3] 'Nąmgis and Western Forest Products Co-operative Decision Making Agreement

Practice Requirements

1. Forest Planning and Practices Regulation Section 79
2. Forest Planning and Practices Regulation Section 81
3. Forest Planning and Practices Regulation Section 81

SS 20 — WILDLIFE FEATURES (BEAR DENS AND RAPTOR NESTS)

Linked Gwa'ni Planning Values 

Linked FLP Outcomes

FF 8 Wildlife Habitat

FF 9 Cultural, Traditional, and Recreational Use

Stewardship Strategy

1. Retain basal,[1] root-bole, or log bear dens[3] within a contiguous forest area, retention patch ≥ 0.3ha within 150m from a mature[4] or old forested edge, or retention patch ≥ 1ha if a mature/old forested edge is not available within 150m.
2. Retain all arboreal[2] dens within a contiguous forest area, a retention patch ≥ 0.5 ha within 150m from a mature/old forested edge, or a retention patch ≥ 1ha if a mature/old forested edge is not available within 150m.
3. Retain all eagle nests within a contiguous forest area or retention patch ≥ 0.75ha that is ≥ 30m from a harvested edge.
4. Where these strategies are not feasible they will be managed consistent with the cooperative decision making agreement.[5]

[1] Basal den - den with an entrance at the base of the tree.
[2] Arboreal den – den with an above ground entrance, the base of which is ≥ 1.3m.
[3] Den – cavity that can provide shelter for bears during the winter months that meets the following general parameters:
- Tree DBH: ≥ 100cm
- Entrance dimensions: ≥ 25 cm wide x ≥ 30cm tall
- Chamber is dry
- Chamber height : ≤60cm unless evidence of activity is present
- Chamber width: ≤60cm unless evidence of activity is present

[4] Mature forest – trees ≥ 120 years old based on WFP forest cover
[5] 'Namgis and Western Forest Products Co-operative Decision Making Agreement

Adaptive Management Monitoring

AMI 5 The total number (#) of bear dens and raptor nests protected.

Requirements for Forest Operations in Respect of Stocking Standards

FRPA Section 2.36 (1) (B)

Situation or Circumstances that Determine whether Free Growing is Assessed on a Cutblock Basis (FPPR s.44(1) or Across Cutblocks (FPPR ss.45(1) and (2)) (FPPR s.16(1)

Section 44 (1) applies in all situations or circumstances under the FOP where a free growing stand is required to be established under FRPA s. 29.

Stocking and Related Standards for Stands to which Free Growing Obligations Apply

There may be relatively uniform conditions or mosaics (ecosystem complexes), transitional ecosystem sites, and varying site conditions within an area. The area will be stratified into standards units (SU) of similar characteristics for the purposes of stocking standards to the extent the delineation and mapping of site series into separate SU is practicable to meet stratification principles. The two options for assignment of standards to the SU are:

- The assessment area will be classified at the entire SU based on the applicable standard from Appendix B, and the dominant site series in the SU will be used to assign the stocking standard for species, Target Stocking Standards (TSS), Minimum Stocking Standards (MSS), Minimum Horizontal Inter-Tree Distance (MITD), and free growing heights; or
- The Assessment Area (AA) will be classified at each plot based on the applicable standard from Appendix B, and the dominant site series in each plot will be used to assign the stocking standard for species, TSS, MSS, MITD, and free growing heights for the AA, and used to summarize the SU.

Species

Species selection to determine compliance with section 44(1) of the FPPR will be based on the ecosystem classification and be evaluated at the AA level. Species which are ecologically suitable and commercially valuable for each site series are listed in Appendix B.

Stocking (Even-aged Stocking Standards)

- TSS listed in Appendix B will used to assess the achievement of an acceptable stocking level on an AA.
- MSS listed in Appendix B will be used to assess the achievement of an acceptable stocking level on an AA.
- MITD listed in Appendix B will be used to ensure that stocking distribution is taken into account when assessing stocking levels in the AA.

Regeneration Date

Regeneration date is 6 years.

Free Growing Date

Free growing date is 20 years.

Minimum Free Growing Height

Minimum free growing heights listed in Appendix B will be used to demonstrate that the trees are adapted to the site, and are growing well and can reasonably be expected to continue to do so. Minimum free growing height will be assigned at the AA level based on the AA's ecosystem classification based on the dominant site series of the AA.

Hardwood Management (Table x.1)

For Hardwood Management:

- at least 80% of the total stocking will be alder, and
- The TSS is 1500 stems per hectare and the MSS is 1000 stems per hectare, except 20% of an SU may have an MSS of 800 stems per hectare.

Elk Habitat Management

For Elk Habitat Management:

- Red alder will be considered non-deleterious at the time of free growing on mesic and sub mesic sites, and
- Red alder will be considered a crop tree on rich mesic and richer than mesic sites, and
- The TSS is 1200 stems per hectare and the MSS is 250 stems per hectare.

Intermediate Cutting (FPPR Section 16 (1) and Section 44 (1)

Where commercial thinning, removal of individual trees, a similar type of intermediate cutting or harvesting of special forest products (FPPR 44(3)(h-i)) occurs, stocking within each harvest unit will be maintained above 40 m²/ha for a period of at least 12 months after harvest completion. Intermediate cutting rules apply to conifer management only. Openings greater than 0.25 ha will be managed using even-aged stocking standards. Where intermediate cutting is applied, the residual stand will consist of ecologically suitable species that will be viable for future harvest opportunities. Stocking standard ID's will be created via the RESULTS[1] system and additional site series will be added to the standard, as required, using the approved variation mechanism.

1 https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/silviculture/silviculture-reporting-results

High Retention Harvesting – SEDRSS (FPPR Section 16 (1) and Section 44 (1)

SEDRSS (Single Entry Dispersed Retention Stocking Standard) standards may be applied where basal area retention following harvest is between 5 and 40 m²/ha. The objective for high retention harvesting will be documented in the Cutblock Site Plan, consistent with Table 1. The Single Entry Dispersed Retention Stocking Standard Framework Implementation Guide (Coastal), 2014, provides guidance for high retention harvesting (as revised by CRIT from time to time). See Table 2 for the stocking standard to be approved with this FLP.

Table 1: High Retention Management Decision (SEDRSS)

Situations or Circumstances	Standard
Type of Silviculture System	Partial Cutting with Regeneration Obligation — Use SEDRSS (Single Entry Dispersed Retention Stocking Standard). The silviculture system is Retention.
Stocking standards applicable	SEDRSS outlines stocking standard criteria based on basal area retained and site index. Additional biogeoclimatic subzones and site series may be added through approved variations. Survey methodology will be consistent with the SEDRSS Implementation Guide (Feb. 14, 2014). SEDRSS includes: stratification, overstory, understory, survey methodology, and stocking decision (Option 2 will be used in FDU 1). Results reporting will be as outlined in the Implementation Guide.
Species to be retained	As per the Implementation Guide (2014). Conifer species only.
Maximum Basal Area % Reduction (Quantity)	SEDRSS are to be applied where the residual basal area (RBA) within a selected harvest area is 5 – 40 m²/ha, and per the stratification guidelines in the Implementation Guide.
Maximum Opening size (Distribution)	Consistent with the Implementation Guide. Openings larger than 0.25 ha will be stratified and even-aged stocking standards will be applied.
Characteristics of Retained Trees or Remaining Stand	Leave tree form, health, and vigour will conform to the SEDRSS Damage Criteria in the Implementation Guide.
Scope	FDU 1 — Non-timber values and objectives are the primary management focus (visuals, recreation, terrain stability, riparian and cultural). The specific value will be indicated in the Cutblock Site Plan.
Scale	0–1% of the harvest volume during the lifetime of this FLP.

Rolling Forecast of Future Cutblocks and Roads

FRPA Section 2.36 (2)

A connected future forest outcome improves public transparency when sharing forecast cutblocks and roads. The public now has a clearer picture of the connected future forest outcome through the 13 **Future Forest Outcomes** in the FLP which includes the cumulative impact of the **Stewardship Strategies** in the FOP and the resulting harvest pattern.

An Adaptive Management Framework enables the forecast of future cutblocks and roads to be efficiently updated on an ongoing basis with the latest and most detailed block and road information available.

Updates can include both new cutblocks and refinements to to existing cutblocks because maintaining the connections between the forecast of cutblocks and roads and the 13 **Future Forest Outcomes** eliminates the potential for inconsistency as referenced in FRPA Section 2.37 (1) in relation FRPA Section 2.28 (2) (a) or (b).

As described in SS 8 – Variable Retention, stand level retention can be located over top of the ‘Na̱mgis Conservation Network.

The approximate location of cutblocks on the FOP map will therefore be shown within the ‘Na̱mgis Conservation Network.

As described in SS 1 – ‘Na̱mgis Conservation Network, roads will be identified within the ‘Na̱mgis Conservation Network when required for access.

Our goal is to maintain an updated rolling forecast of cutblocks and roads for the term of the FOP updated approximately every one to two years. This rolling forecast will be kept up to date as part of maintaining the Patchworks model that informs the connected future forest oucome.

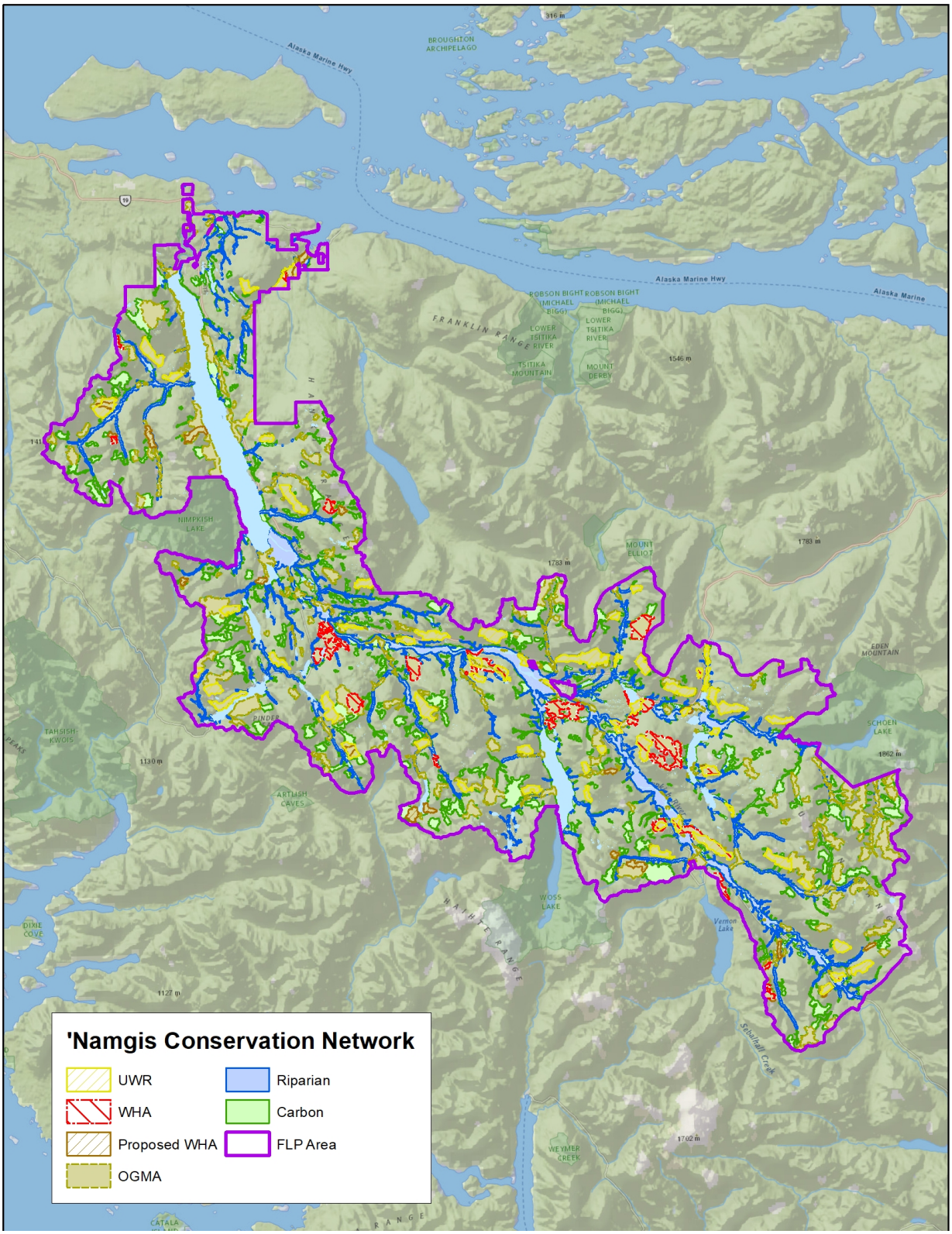
Relevant comments from the public in relation to the cutblocks or roads will be considered and implemented into the block design as appropriate.


Photo Credit: Rachel Dalton

Appendix B

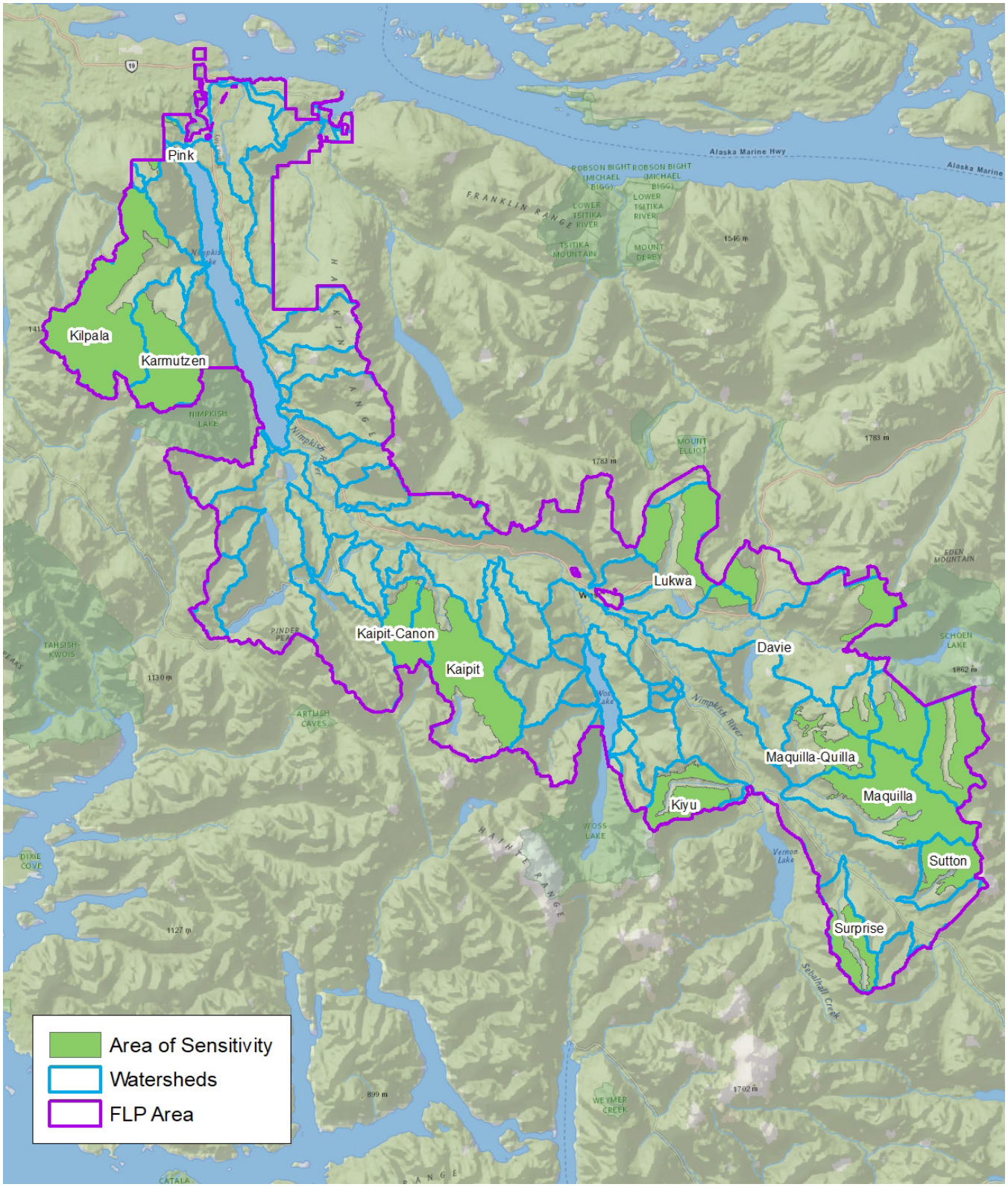
Reference Map

Map A: ‘Nam̱gis Conservation Network including Reserves for Wildlife, Biodiversity, and Carbon



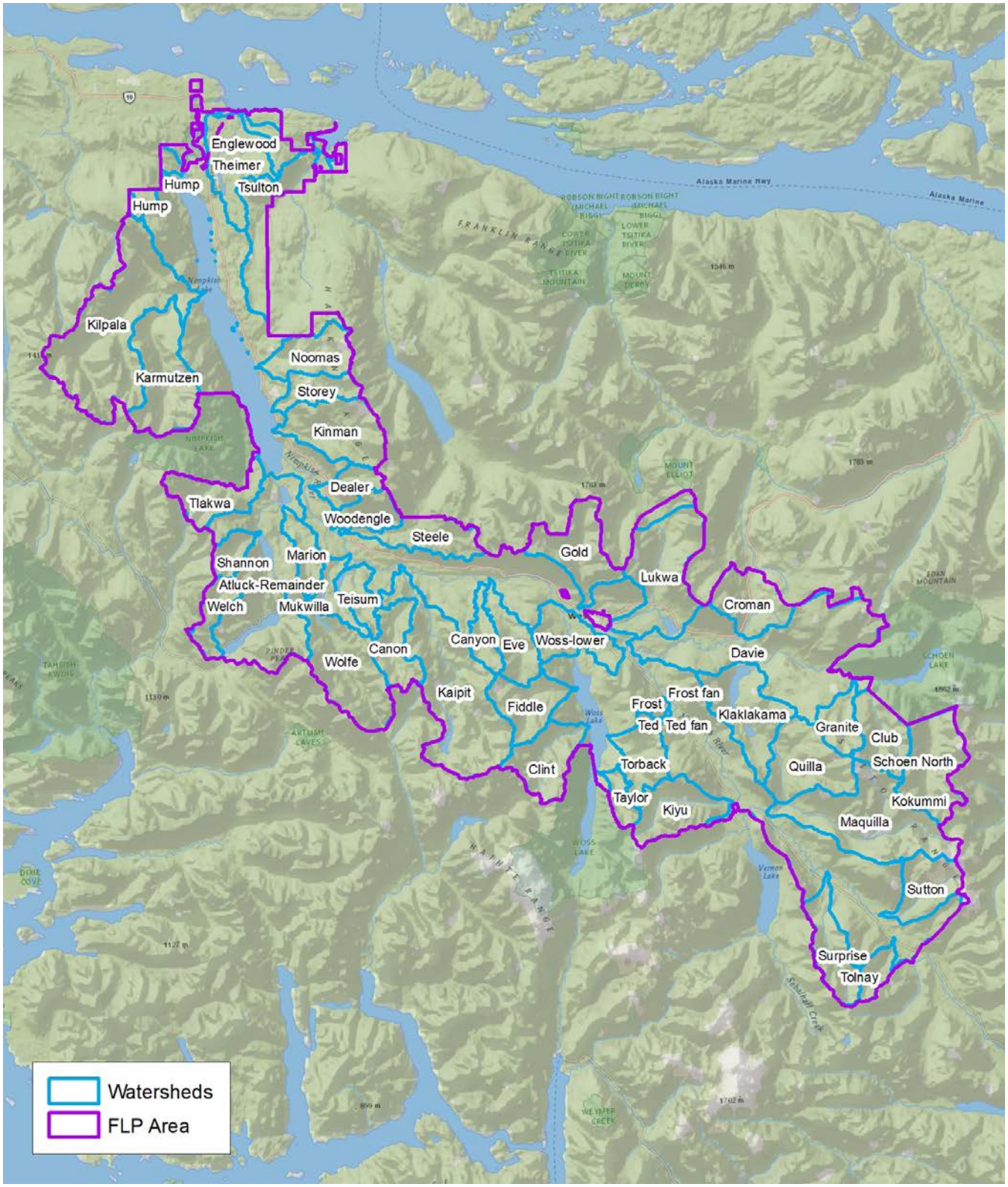
Reference Map

Map B: Watershed Areas of Sensitivity



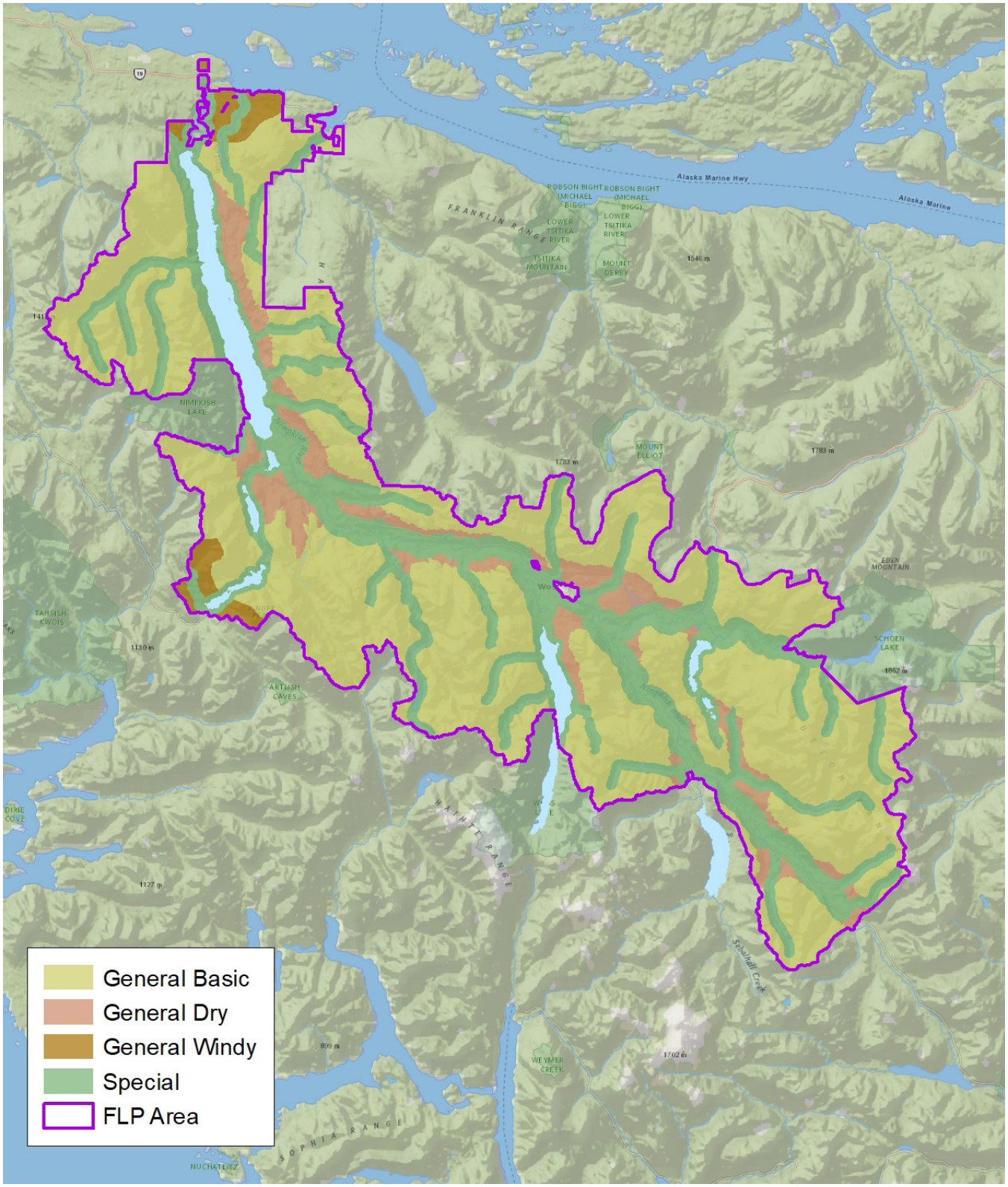
Reference Map

Map C: Watersheds



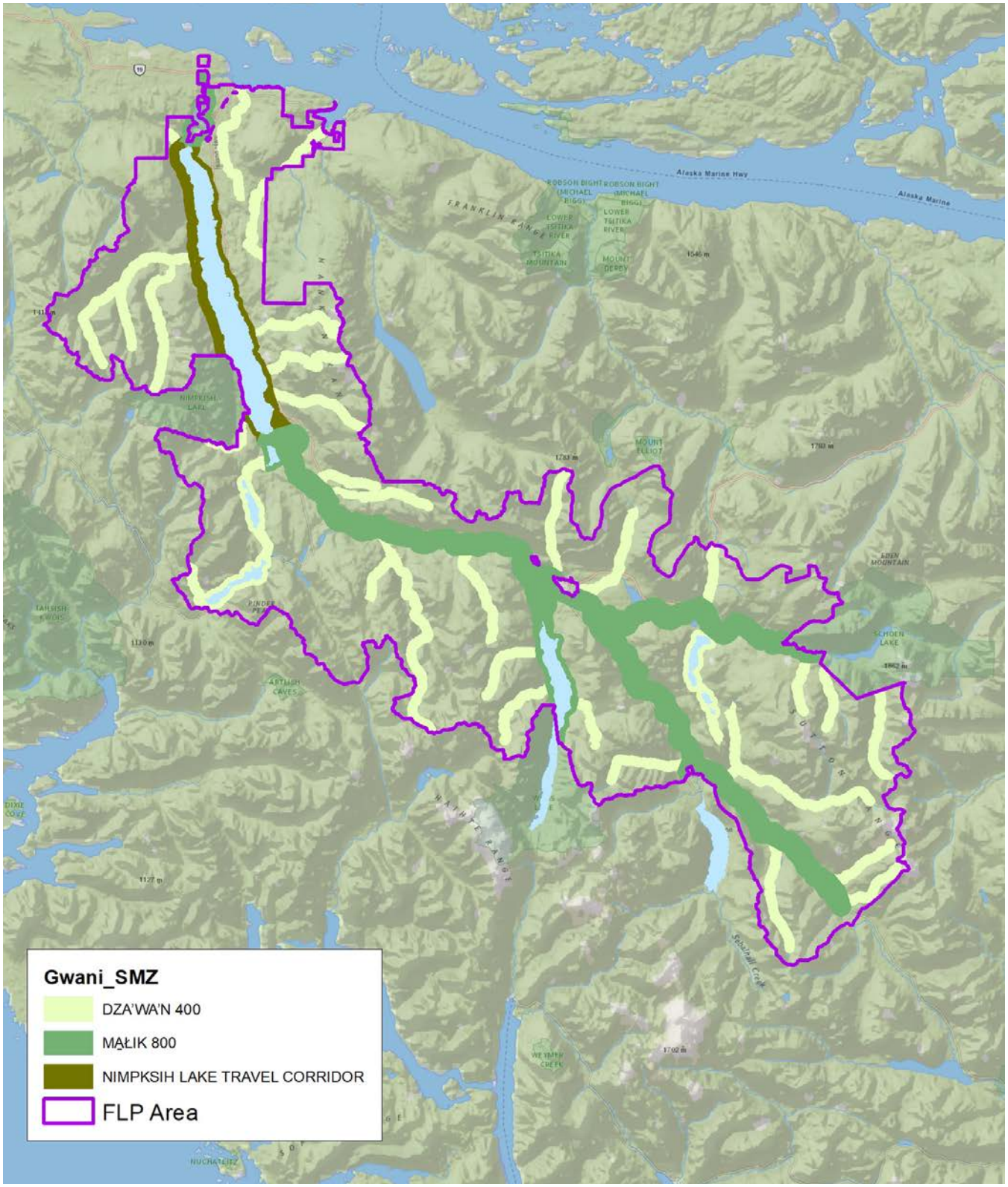
Reference Map

Map D: Forest Stewardship Zones



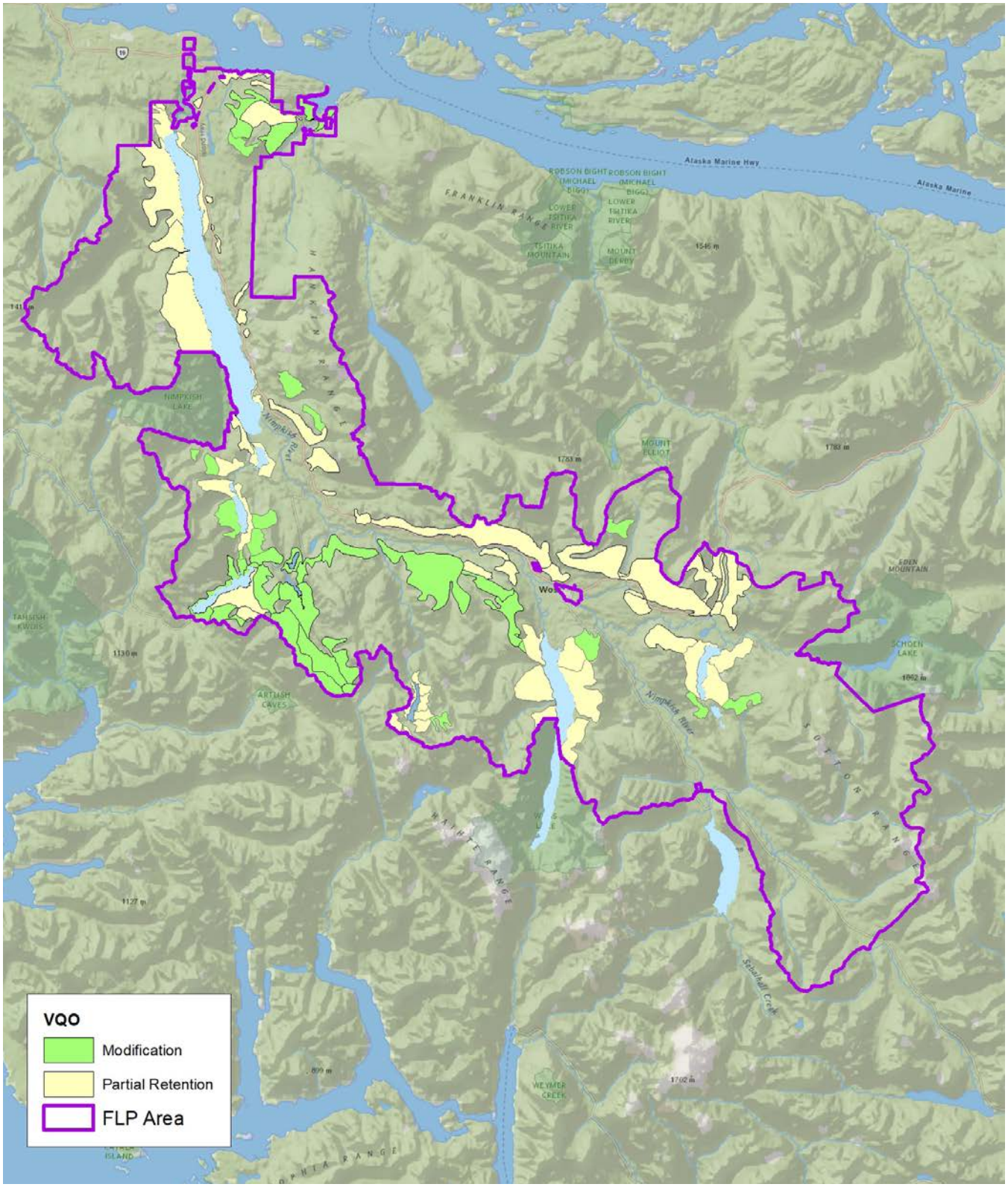
Reference Map

Map E: Gwa'ni Special Management Zone including the Nimpkish Lake Travel Corridor, Mąłik 800, and Dzą'wąn 400



Reference Map

Map F: Visual Quality Polygons



Stocking Standards

Table 1: Species Selection and Stocking Standards

BEC	Site Series	TSS	MSS	Species Selection	Minimum Free Growing Heights
CWHmm1	01	1000	500	Ba[1,6], Bp, Cw, Fd, Hw2, Pw, Ss, Yc	Ba-0.7, Bp-2.5, Cw-1.5, Fd-3.0, Hw-2.0, Pw-2.5, Ss-3.0, Yc-1.5
	02	800	400	Cw, Fd, Pl, Pw, Yc	Cw-1.0, Fd-2.0, Pl-1.2, Pw-2.5, Yc-1.0
	03	800	400	Cw, Fd, Hw2, Pl, Pw, Yc	Cw-1.0, Fd-2.0, Hw-1.7, Pl-1.2, Pw-2.5, Yc-2.0
	04	1000	500	Cw, Fd, Hw, Pw, Yc	Cw-1.0, Fd-2.0, Hw-1.7, Pw-2.5, Yc-1.0
	05	1000	500	Ba[1], Bg, Bp, Cw, Fd, Hw, Pw, Ss, Yc	Ba-0.7, Bg-3.0, Bp-2.5, Cw-1.5, Fd-3.0, Hw-2.0, Pw-2.5, Ss-3.0, Yc-1.5
	06	1000	500	Ba[1], Cw, Fd[4], Hw, Pw, Ss, Yc	Ba-0.7, Cw-1.5, Fd-3.0, Hw-2.0, Pw-2.5, Ss-3.0, Yc-1.5
	07	1000	500	Ba[1], Bg, Cw, Fd, Hw, Pw, Ss, Yc	Ba-1.0, Bg-3.5, Cw-2.0, Fd-4.0, Hw-2.5, Pw-2.5, Ss-4.0, Yc-2.0
	08	1000	500	Ba[1], Bg, Cw, Fd, Ss, Yc	Ba-1.0, Bg-3.5, Cw-2.0, Fd-4.0, Ss-4.0, Yc-2.0
	09	1000	500	Ba[1], Bg, Cw, Hw, Ss, Yc	Ba-1.0, Bg-3.5, Cw-2.0, Hw-2.5, Ss-4.0, Yc-2.0
	11	400	200	Cw, Hw, Pl, Yc	Cw-1.0, Hw-1.7, Pl-1.2, Yc-p1.0
	12	800	400	Cw, Hw[9], Pl, Ss, Yc	Cw-1.0, Hw-1.7, Pl-1.2, Ss-2.0, Yc-1.0
CWHmm2	01	1000	500	Ba[1], Bp[3], Cw, Fd[5], Hm[6], Hw, Pw[9], Yc	Ba-0.7, Bp-1.5, Cw-1.0, Fd-2.2, Hm-1.0, Hw-1.2, Pw-2.5, Yc-1.0
	02	800	400	Cw, Fd, Hm, Hw, Pl, Pw, Yc	Cw-0.7, Fd-1.5, Hm-0.7, Hw-1.0, Pl-1.2, Pw-2.5, Yc-0.7
	03	800	400	Cw, Fd, Hm[6], Hw, Pl, Pw, Yc	Cw-0.7, Fd-1.5, Hm-0.7, Hw-1.0, Pl-1.2, Pw-2.5, Yc-0.7
	04	1000	500	Cw, Fd, Hm[6], Hw, Pl, Pw, Yc	Cw-0.7, Fd-1.5, Hm-0.7, Hw-1.0, Pl-1.2, Pw-2.5, Yc-0.7
	05	1000	500	Ba[1], Bp[5], Cw, Fd[5], Hm[6], Hw, Pw, Yc	Ba-0.7, Bp-1.0, Cw-1.0, Fd-2.2, Hm-1.2, Hw-1.2, Pw-2.5, Yc-1.0
	06	1000	500	Ba[1], Cw, Fd[5], Hm[6], Hw, Pw, Yc	Ba-0.7, Cw-1.0, Fd-2.2, Hm-1.2, Hw-1.2, Pw-2.5, Yc-1.0
	07	1000	500	Ba[1], Cw, Fd, Hm[6], Hw, Pw, Yc	Ba-0.7, Cw-0.7, Fd-1.5, Hm-0.7, Hw-1.0, Pw-2.5, Yc-0.7
	08	1000	500	Ba[1], Cw, Fd[5], Hm[6], Hw, Yc	Ba-1.0, Cw-1.2, Fd-3.0, Hm-1.2, Hw-1.7, Yc-1.2
	09	800	400	Cw, Hm, Hw, Pl, Pw, Yc	Cw-0.7, Hm-0.7, Hw-1.0, Pl-1.2, Pw-2.5, Yc-0.7
	10	800	400	Cw, Hm[6], Hw, Pl, Pw, Yc	Cw-0.7, Hm-0.7, Hw-1.0, Pl-1.2, Pw-2.5, Yc-0.7
CWHvm1	01	1000	500	Ba[1], Bp, Cw, Fd[5], Hw, Pw, Ss[4], Yc[6]	Ba-1.7, Bp-2.5, Cw-1.5, Fd-3.0, Hw-3.0, Pw-2.5, Ss-3.0, Yc-1.5
	02	800	400	Cw, Fd, Hw, Pl, Yc	Cw-1.0, Fd-2.0, Hw-2.0, Pl-1.2, Yc-1.0
	03	800	400	Ba[1,2,] Cw, Fd[5], Hw, Pl, Pw, Ycv	Ba-1.2, Cw-1.0, Fd-2.0, Hw-2.0, Pl-1.2, Pw-2.5, Yc-1.0
	04	1000	500	Ba[1,2,] Bp, Cw, Fd[5], Hw, Pw, Ss[4], Ycv	Ba-1.7, Bp-2.5, Cw-1.5, Fd-3.0, Hw-3.0, Pw-2.5, Ss-3.0, Yc-1.5
	05	1000	500	Ba[1,2,] Bp, Cw, Fd[5], Hw, Pw, Ss[4], Yc[6]	Ba-1.7, Bp-2.5, Cw-1.5, Fd-3.0, Hw-3.0, Pw-2.5, Ss-3.0, Yc-1.5
	06	1000	500	Ba[1], Cw, Fd[5], Hw, Pw, Ss[4], Yc[6]	Ba-1.7, Cw-1.5, Fd-3.0, Hw-3.0, Pw-2.5, Ss-3.0, Yc-1.5
	07	1000	500	Ba[1], Cw, Fd[5], Hw, Pw, Ss[4], Yc[6]	Ba-2.2, Cw-2.0, Fd-4.0, Hw-4.0, Pw-2.5, Ss-4.0, Yc-2.0
	08	1000	500	Ba[1], Cw, Fd, Hw, Ss[4], Yc[6]	Ba-2.2, Cw-2.0, Fd-4.0, Hw-4.0, Ss-4.0, Yc-2.0
	09	1000	500	Ba[1], Cw, Fd, Hw, Ss[4], Yc[6]	Ba-2.2, Cw-2.0, Fd-4.0, Hw-4.0, Ss-4.0, Yc-2.0
	10	1000	500	Ba[1], Cw, Hw, Ss[4]	Ba-2.2, Cw-2.0, Hw-4.0, Ss-4.0
	12	1000	500	Cw, Hw, Pl, Yc	Cw-1.0, Hw-2.0, Pl-1.2, Yc-1.0
	13	400	200	Cw, Fd, Hw, Pl, Pw, Yc[6]	Cw-1.0, Fd-2.0, Hw-2.0, Pl-1.2, Pw-2.5, Yc-1.0
	14	800	400	Ba, Cw, Fd, Hw, Pl, Pw, Ss, Yc[6]	Ba-1.7, Cw-1.5, Fd-3.0, Hw-3.0, Pl-2.0, Pw-2.5, Ss-3.0, Yc-1.5

Table 1: Species Selection and Stocking Standards

BEC	Site Series	TSS	MSS	Species Selection	Minimum Free Growing Heights
CWHvm2	01	1000	500	Ba, Bp[3], Cw, Fd, Hm[6], Hw, Pw, Ss, Yc	Ba-1.7, Bp-2.0, Cw-1.5, Fd-2., Hm-1.0, Hw-2.5, Pw-2.5, Ss-3.0, Yc-1.5
	02	800	400	Cw, Fd, Hm[6], Hw, Pl, Yc	Cw-1.0, Fd-1.5, Hm-0.7, Hw-1.7, Pl-1.2, Yc-1.0
	03	800	400	Ba[6], Cw, Fd, Hm[6], Hw, Pw, Yc	Ba-1.5, Cw-1.0, Fd-1.5, Hm-1.7, Hw-1.7, Pw-2.5, Yc-1.0
	04	1000	500	Ba, Bp, Cw, Fd, Hm[6], Hw, Pw, Yc	Ba-1.5, Bp-1.5, Cw-1.0, Fd-1.5, Hm-1.7, Hw-1.7, Pw-2.5, Yc-1.0
	05	1000	500	Ba, Bp[3], Cw, Fd[5], Hm, Hw, Ss, Yc	Ba-1.7, Bp-1.7, Cw-1.5, Fd-2.2, Hm-1.0, Hw-2.5, Ss-4.0, Yc-1.5
	06	1000	500	Ba, Cw, Fd[5], Hm[6], Hw, Yc	Ba-1.7, Cw-1.5, Fd-2.2, Hm-1.0, Hw-2.5, Yc-1.5
	07	1000	500	Ba, Cw, Fd[5], Hm[6], Hw, Ss, Yc	Ba-2.2, Cw-2.0, Fd-3.0, Hm-1.0, Hw-3.5, Ss-4.0, Yc-2.0
	08	1000	500	Ba, Cw, Fd5, Hm[6], Hw, Yc	Ba-2.2, Cw-2.0, Fd-3.0, Hm-1.0, Hw-3.5, Yc-2.0
	09	800	400	Ba, Cw, Fd, Hm, Hw, Pl, Yc	Ba-1.5, Cw-1.0, Fd-1.5, Hm-0.7, Hw-1.7, Pl-1.2, Yc-1.0
	10	400	200	Hm, Hw, Pl, Yc	Hm-0.7, Hw-1.7, Pl-1.2, Yc-1.0
	11	800	400	Ba, Cw, Fd, Hm, Hw, Ss, Yc	Ba-1.5, Cw-1.0, Fd-1.5, Hm-0.7, Hw-1.7, Ss-2.0, Yc-1.0
CWHxm	01	1000	500	Cw, Fd, Hw, Pw, Ss	Cw-1.5, Fd-3.0, Hw-2.0, Pw-2.5, Ss-3.0
	02	400	200	Fd, Pl, Pw	Fd-2.0, Pl-1.2, Pw-2.5
	03	800	400	Cw, Fd, Hw, Pl, Pw	Cw-1.0, Fd-2.0, Hw-1.2, Pl-1.2, Pw-2.5
	04	1000	500	Cw, Fd, Hw4, Pw	Cw-1.5, Fd-3.0, Hw-2.0, Pw-2.5
	05	1000	500	Bg[1], Cw, Fd, Hw, Pw, Ss[7]	Bg-3.5, Cw-2.0, Fd-4.0, Hw-1.7, Pw-2.5, Ss-4.0
	06	1000	500	Bg, Cw, Fd, Hw	Bg-3.0, Cw-1.5, Fd-3.0, Hw-2.0
	07	1000	500	Bg[1], Cw, Fd, Hw, Ss[9]	Bg-3.5, Cw-2.0, Fd-4.0, Hw-1.7, Ss-4.0
	08	1000	500	Bg, Cw, Fd[5], Ss	Bg-3.5, Cw-2.0, Fd-4.0, Ss-4.0
	09	1000	500	Bg, Cw, Ss	Bg-3.5, Cw-2.0, Ss-4.0
	11	400	200	Cw, Pl	Cw-1.0, Pl-1.2
	12	800	400	Cw, Hw, Pw, Ss	Cw-1.0, Hw-1.5, Pw-2.5, Ss-1.5
	13	1000	500	Bg, Cw, Fd, Ss[9]	Bg-3.5, Cw-2.0, Fd-4.0, Ss-4.0
	14	1000	500	Bg, Cw, Ss[9]	Bg-3.5, Cw-2.0, Ss-4.0
	15	800	400	Cw	Cw-2.0
MHmm1	01	1000	500	Ba, Bp[3], Hm, Hw, Yc	Ba-0.6, Bp-1.2, Hm-1.0, Hw-1.0, Yc-1.0
	02	800	400	Ba, Hm, Hw[5], Yc	Ba-0.6, Hm-0.7, Hw-1.0, Yc-0.7
	03	800	400	Ba, Bp[3], Hm, Hw, Yc	Ba-0.6, Bp-1.2, Hm-1.0, Hw-1.0, Yc-1.0
	04	1000	500	Ba, Bp[3], Hm, Hw, Yc	Ba-0.6, Bp-1.2, Hm-1.0, Hw-1.0, Yc-1.0
	05	1000	500	Ba, Bp[3], Hm, Hw, Yc	Ba-0.6, Bp-1.2, Hm-1.0, Hw-1.0, Yc-1.0
	06	800	400	Ba, Hm, Hw[5], Yc	Ba-0.6, Hm-0.7, Hw-1.0, Yc-0.7
	07	1000	500	Ba, Hm, Hw[5], Yc	Ba-0.6, Hm-0.7, Hw-1.0, Yc-0.7
	08	800	400	Ba, Hm, Hw[5], Yc	Ba-0.6, Hm-0.7, Hw-1.0, Yc-0.7
	09	800	400	Ba, Hm, Hw[5], Yc	Ba-0.6, Hm-0.7, Hw-1.0, Yc-0.7

Table 2: Species Selection and Stocking Targets (Hardwood Management)

BEC	Site Series	TSS	MSS	Species Selection	Minimum Free Growing Heights
CWHmm1, CWHvm1, CWHxm	01, 06	1500	1000	BDr[4]	Dr-4.0
	05, 07, 08, 09	1500	1000	Dr, Mb	Dr-4.0, Mb-4.0

Table 3: Species Selection and Stocking Targets (Elk Habitat)

BEC	Site Series	TSS	MSS	Species Selection	Minimum Free Growing Heights
CWHmm1	01	1200	250	Ba1,6, Bp, Cw, Fd, Hw2, Pw, Ss, Yc	Ba-0.7, Bp-2.5, Cw-1.5, Fd-3.0, Hw-2.0, Pw-2.5, Ss-3.0, Yc-1.5
	05	1200	250	Ba1, Bg, Bp, Cw, Dr, Fd, Hw, Pw, Ss, Yc	Ba-0.7, Bg-3.0, Bp-2.5, Cw-1.5, Dr-4.0, Fd-3.0, Hw-2.0, Pw-2.5, Ss-3.0, Yc-1.5
	07	1200	250	Ba1, Bg, Cw, Dr, Fd, Hw, Pw, Ss, Yc	Ba-1.0, Bg-3.5, Cw-2.0, Dr-4.0, Fd-4.0, Hw-2.5, Pw-2.5, Ss-4.0, Yc-2.0
	08	1200	250	Ba1, Bg, Cw, Dr, Fd, Ss, Yc	Ba-1.0, Bg-3.5, Cw-2.0, Dr-4.0, Fd-4.0, Ss-4.0, Yc-2.0
CWHvm1	01	1200	250	Ba1, Bp, Cw, Fd5, Hw, Pw, Ss4, Yc6	Ba-1.7, Bp-2.5, Cw-1.5, Fd-3.0, Hw-3.0, Pw-2.5, Ss-3.0, Yc-1.5
	05	1200	250	Ba1,2, Bp, Cw, Dr, Fd5, Hw, Pw, Ss, Yc6	Ba-1.7, Bp-2.5, Cw-1.5, Dr-4.0, Fd-3.0, Hw-3.0, Pw-2.5, Ss-3.0, Yc-1.5
	07	1200	250	Ba1, Cw, Fd5, Dr, Hw, Pw, Ss, Yc6	Ba-2.2, Cw-2.0, Dr-4.0, Fd-4.0, Hw-4.0, Pw-2.5, Ss-4.0, Yc-2.0
	08	1200	250	Ba1, Cw, Fd, Dr, Hw, Ss, Yc6	Ba-2.2, Cw-2.0, Dr-4.0, Fd-4.0, Hw-4.0, Ss-4.0, Yc-2.0
CWHxm	01	1200	250	Cw, Fd, Hw, Pw, Ss	Cw-1.5, Fd-3.0, Hw-2.0, Pw-2.5, Ss-3.0
	05	1200	250	Bg1, Cw, Fd, Dr, Hw, Pw, Ss7	Bg-3.5, Cw-2.0, Dr-4.0, Fd-4.0, Hw-1.7, Pw-2.5, Ss-4.0
	07	1200	250	Bg1, Cw, Dr, Fd, Hw, Ss	Bg-3.5, Cw-2.0, Dr-4.0, Fd-4.0, Hw-1.7, Ss-4.0
	08	1200	250	Bg, Cw, Dr, Fd5, Ss	Bg-3.5, Cw-2.0, Dr-4.0, Fd-4.0, Ss-4.0

Notes for Table 1, Table 2, and Table 3

1. Ba - Risk of balsam woolly adelgid. Ba or Bg will be counted last in a survey for the silviculture layer.
2. Hw - Suitable on cool aspects.
3. Bp - Suitable on warm aspects, nutrient medium to very rich soils.
4. Dr, Ss- Suitable on nutrient medium sites.
5. Fd, Bp - Suitable at lower elevations or warm aspects.
6. Ba, Yc, Hm - Suitable at upper elevations or cool aspects.
7. Ss - Suitable on fresh sites.
8. Elevated microsites only.
9. Pw, Ss - Viable option where ungulate browse is a factor.

General Species Notes

Bp Initial regeneration of Bp (noble fir) is restricted to nutrient medium sites or better. Northerly aspects are to be avoided. Initial regeneration of Bp will not comprise more than a 20% component, to mitigate risk.

Pw Use seed which has been selected to be resistant to Cronartium ribicola. Use major gene resistant stock when available, especially below 1000 m elevation. Pw will be planted at not more than 200 trees per ha, evenly distributed. Use caution regarding the use of Pw for browse resistance, since ungulates may select other crop trees, increasing the reliance on Pw for stocking.

Pl Refers to Plc. The use of Pl to meet the MSS is limited to 20%.

Ss If Ss is from seed sources selected for high resistance to Pissodes strobi, the use of Ss to meet the MSS is unlimited in areas of moderate and high risk of spruce weevil damage; otherwise, the use of natural Ss to meet the MSS is limited to 20% in moderate-high spruce weevil risk areas.

Bg Restricted to Upper Nimpkish area of the CWH mm, not acceptable in other CWH mm areas. The natural distribution of grand fir extends into the Upper Nimpkish according to The Distribution and Synopsis of Ecological and Silvical Characteristics of Tree Species of British Columbia's Forest (2000). The Upper Nimpkish was classified as CWHxm until 2000. The area was reclassified as CWHmm1 by R.N. Green in 2000. MoF map dated April 2003 still shows the area as CWHxm. Grand fir is required for fill-planting where shade tolerance is required due to brush and where Cw cannot be used due to elk and deer browsing.

Hm Where this species is encountered outside of the MHmm1, Hm is a viable crop tree in areas transitional to the montane zone or in cold air drainages.

Table 4: Minimum Horizontal Inter-Tree Distance

MITD will be assigned at the AA level as defined below

MITD (m)	Site Series
1.0	"b" (lithic/fragmental) phases.
1.5	(i) < 20 metres from road centreline; (ii) immediately adjacent to any: (A) stream – riparian area; (B) natural non-productive area; (C) unplantable slash; or (iii) on any: (A) talus site, landslide or avalanche track (B) hygric or wetter site; (C) very harsh site where protected microsites are critical; (D) area where stump avoidance is necessary on a root rot site; (E) area extensively utilized for elk, deer or other wildlife habitat or browse (heavy elk use areas) for survival and to utilize slash; or (F) microsites that are preferable given the tree species or damaging agents, to those sites existing at regular 2.0 meters spacing. (iv) in SUs that are being managed for a target stocking of 1500 stems per hectare.
2.0	All other sites.

Table 5: Minimum Horizontal Inter-Tree Distance

		Regeneration Guide									Free Growing Guide	
		Species	Site Occupancy					Regen Delay (max yrs)	MITD			
BGCU	Layer		All BA combinations are applicable to survey plots								Species	Height (m)
			Only used during plots	One of these 4 BA combinations are applicable to final SU REGEN / FG SEDRSS obligations				Only used during plots				
CWH vh1/01	Residual Layer (L1) (≥12.5dbh) (BA m2 / ha)	Cw, Hw, Yc, Pl	0-8 m2 /ha	9-15 m2 /ha	16-22 m2 /ha	23-28 m2 /ha	29-39 m2 / ha	≥ 40 m2 /ha	3	N/A	N/A	
	Regen Layer (L2-L4) (WS / ha. TSS – Target MSS - Minimum)	Cw, Hw, Yc, Pl	900 TSS 500 MSS	800 TSS 400 MSS	700 TSS 300 MSS	500 TSS 200 MSS	400 TSS 100 MSS	0 0	3	L1 Drip line or 2.0 m (L2-L4)	Cw, Pl, Yc, Hw	1.5 2.0

Additional site series will be added as required. This standard is only applicable for SI_{50} 8-30.