

DRAFT

Ecosystem Based Management Planning and Practice in the Sunshine Coast Community Forest

Prepared by Laurie Kremsater, M.Sc., R.P.Bio., R.P.F.,

Anna Yuill, M.Sc., R.P.Bio, F.I.T, Warren Hansen R.P.F. & Sara Zieleman

Prepared for: Sunshine Coast Community Forest

April 2024

Revision Index			
Revision #	Approved by	Date (YYYY-MM-DD)	Issued Status
1		2024-01-22	
2		2024-03-28	
3		2024-04-02	

Table of Contents

1.0 INTRODUCTION 7

 1.1 EBM Definition..... 7

 1.2 Forest Management and EBM..... 7

 1.3 Ecosystem Based Management Planning Scales 8

2.0 Planning context for EBM in the SCCF 9

 2.1 No Harvesting of Old Growth 9

 2.2 Protecting Cultural Values 10

 2.3 Reducing Wildfire Risk..... 10

 2.4 Deferring Harvest in Chapman Creek Watershed 10

 2.5 Implementing EBM 10

3.0 Conservation Network 11

 3.1 General Characteristics of SCCF Forests 11

 3.2 Principles of Design 14

 3.3 SCCF Conservation Network..... 16

 3.4 Management Zones..... 22

4.0 Constraints 30

 4.1 Roads 30

 4.2 Invasive Species 32

 4.3 Riparian Forest..... 33

5.0 Wildlife Features 33

 5.1 Bear Dens..... 34

 5.2 Other Species..... 35

6.0 Adaptive Management: Monitoring and Revision..... 36

7.0 References 38

Appendix I. Supplemental information on the Conservation Network 40

Appendix II. Stand-level Practices..... 43

Importance of Retaining Structures: 43

Silvicultural systems in the SCCF:..... 44

How to retain: 45

Where to retain: 45

Appendix III. Streamside Protection and Managment Zone Strategy 46

Appendix IV. Objectives by polygon for each management zone 48

Appendix V. Wildlife Species Habitat Groups 51

 1.0 Background and Context..... 51

 2.0 High Priority Species in the Sunshine Coast Community Forest..... 51

 3.0 Species Habitat Groups 52

4.0 Results of Assigning High Priority Vertebrate Species to Species Habitat Groups 53

Appendix VI. Chapman and Sechelt Landscape Unit Plans and Sunshine Coast Community Forest Ecological Context..... 4

 Introduction 4

 Current Levels of Protection 4

 Sunshine Coast Community Forest Inventory 10

List of Figures

Figure 1: Overview and Biogeoclimatic Ecosystem Classification units (FAIB 2021) of the Sunshine Coast Community Forest (SCCF) tenure (yellow) in relation to provincial Landscape unit (black). 13

Figure 2: Preliminary ideas of a Conservation Network for the Angus/Gray/Chapman Creek tenure area for the Sunshine Coast Community Forest. 18

Figure 3: Preliminary ideas of a Conservation Network for Halfmoon Bay tenure area for the Sunshine Coast Community Forest..... 19

Figure 4: Preliminary ideas of a Conservation Network for Wilson Creek tenure area for the Sunshine Coast Community Forest. 20

Figure 5: Draft Management Zones for the Angus/Gray/Chapman Creek tenure area for the Sunshine Coast Community Forest with Wild Urban Interface (WUI) boundaries overlain in beige. 23

Figure 6: Draft Management Zones for Halfmoon Bay tenure area for the Sunshine Coast Community Forest with Wild Urban Interface (WUI) boundaries overlain in beige. 24

Figure 7: Draft Management Zones for the Wilson Creek tenure area for the Sunshine Coast Community Forest with Wild Urban Interface (WUI) boundaries overlain in beige. 25

Appendix I

Figure I-1: Overview of the proportion of old forest within overlapping Bbiogeoclimatic units (BEC) for the Sunshine Coast Community Forest (SCCF) and the proportion that is protected for the Sechelt and Chapman Landscape Unit (LU). All values were derived using the Vegetation Resource Inventory (VRI) data release from 2022. **Error! Bookmark not defined.**

Figure I-2: Overview of the Sunshine Coast Community Forest (SCCF) and Old Growth Management (OGMA) both legal and non-legal in addition to provincial parks and ecological reserves that overlap the boundary of the tenure area. **Error! Bookmark not defined.**

Figure I-3: Seral distribution within Sunshine Coast Community Forest’s Forest Management Landbase, **Error! Bookmark not defined.**

Figure I-4: Seral distribution of the Forested Management Landbase by BEC Unit within the Sunshine Coast Community Forest, generated using the Vegetation Resource Inventory 2022 data release. **Error! Bookmark not defined.**

Appendix II

Figure II-1: Frequency distribution of all Forest Attribute Scores (FAS) conducted to date, November 7, 2023, per tenure area. 42

List of Tables

Table 1: Current levels of protection within the DRAFT Conservation Network design (V11) for the Sunshine Coast Community Forest as a whole and each individual tenure..... 21

Appendix I

Table I-1: Seral class distribution for Old Growth Management Areas (Legal and Non-Legal) with the Sechelt and Chapman Landscape Units (LU). All values were derived from the Vegetation Resource Inventory (2022). **Error! Bookmark not defined.**

Table I-2: Total area (ha) for the Sechelt and Chapman Landscape Units (LU) per Biogeoclimatic units (BEC) in the Forest Management Landbase (FMLB) and Non-FMLB. All values were derived from the Vegetation Resource Inventory (2022)..... **Error! Bookmark not defined.**

Table I-3: Total area (ha) for the Sechelt and Chapman Landscape Units (LU) for Biogeoclimatic units (BEC) in the FMLB. All values were derived from the Vegetation Resource Inventory (2022).**Error! Bookmark not defined.**

Table I-4: Protection levels by BEC subzone and variant for the Forest Management Landbase (FMLB) in the Sunshine Coast Community Forest. All values exclude private land except total area.**Error! Bookmark not defined.**

Table I-5: Area in hectares and percent of the area for each biogeoclimatic unit for each of the age classes within Sunshine Coast Community Forest’s three different tenure locations, using the Vegetation Resource Inventory 2022 data release. **Error! Bookmark not defined.**

Appendix IV

Table IV-1: Distance of the respective reserve and management zone associated with each fish bearing stream class applicable to the SCCF, with the riparian zone to be adopted by the SCCF. In all cases, the reserve zone extends from the top of the streambank to the specified slope distance.**Error! Bookmark not defined.**

Table IV-2: Distance of the respective reserve and management zone associated with each non-fish bearing stream class applicable to the SCCF, with the riparian zone to be adopted by the SCCF. In all cases, the reserve zone extends from the top of the streambank to the specified slope distance. **Error! Bookmark not defined.**

Appendix VI

Table VI-1: Species habitat groups and associated group modifiers that can be used for Group 2 (species broad habitat types) and Group 3 (species with strong dependencies). Group 6 species could also be assigned modifiers, but these are non-forest dwelling species unlikely to be affected by Forestry. 53

Table VI-2: High priority terrestrial vertebrate species assigned to habitat groups 1 through 5 (excluding habitat generalists (group 1) and non forest habitat users (group 6) 2

Acronyms

Acronym	Definition
AAC	Annual Allowable Cut
BC	British Columbia
BEC	Biogeoclimatic Ecosystem Classification
CN	Conservation Network
CWH	Coastal Western Hemlock
CWHdm	CWH dry maritime
CWHvm	CWH very wet maritime
CWHxm1	CWH very dry maritime
DFO	Department of Fisheries and Oceans Canada
EBM	Ecosystem-based Management
FRPA	Forest and Range Practices Act
LU	Land Use
LUP	Land Use Plans
MH	Mountain Hemlock
MHm1	MH moist maritime
MoF	Ministry of Forests
NDT	Natural Disturbance Type
OGMA	Old Growth Management Area
SCCF	Sunshine Coast Community Forest
WUI	Wildland Urban Interface

1.0 INTRODUCTION

The Sunshine Coast Community Forest (SCCF) holds significance for people, encompassing cultural, spiritual, ecological, recreational, scenic, and tourism value. As well, many residents depend on the forest for their economic well-being and income from forest harvesting contributes to community initiatives. The SCCF sees ecosystem-based management (EBM) principles and practice as a way to define balanced forest management for these varied values, prioritizing ecosystem health as all the other values rely upon it. By adopting practices that sustain ecological integrity, the SCCF hopes to maintain economic benefits and human values for current and future generations. This requires collaborative planning with shíshálh, provincial, regional governments, and interested community groups.

This document:

- Provides a brief background on how EBM is being used in forest planning in British Columbia (BC),
- Outlines the intent of EBM and SCCF's approach, and
- Provides high-level objectives and guidance for SCCF operations.

Further details will be necessary to translate broad EBM objectives to operational planning. This document is intended to provide enough direction to allow informed community engagement for the SCCF.

SCCF recognizes the rights and title of shíshálh and importance of co-planning with shíshálh.

1.1 EBM Definition

Ecosystem-based management is an environmental management approach that recognizes the full array of interactions within an ecosystem. The intent of EBM is to implement strategies to manage human activities, ensuring the coexistence of healthy, fully-functioning ecosystems alongside human communities. The primary objective is to maintain the spatial and temporal characteristics and processes of entire ecosystems, allowing for the sustainability of native species and human social, economic, and cultural activities in perpetuity.

1.2 Forest Management and EBM

The terms 'ecosystem health' or 'ecosystem integrity' are frequently employed in EBM descriptions. Both concepts refer to functioning self-sustaining ecosystems that undergo no systematic changes due to human-induced manipulations. While not strictly scientific terms, they represent ideas that bridge the gap between scientific understanding and human values. The question of whether an ecosystem is 'healthy' or possesses 'integrity' is somewhat subjective and subject to human interpretations regardless of how well the assessment is grounded in science.

The term 'biodiversity' is a general concept, but in this context, it refers to the diversity of living things – genes, populations, and species, with sustained regenerative capacity and the ability to create more biodiversity. Maintaining biodiversity addresses public concerns of feared losses of species, site productivity and opportunities for future generations.

Sustainability depends on maintaining ecosystem productivity and functions through time. Ecosystems consist of plants and animals whose presence and abundance undergo changes over time with succession, competition, natural disturbances, and increasingly, climate change. Therefore, ecosystems are not static or immutable, and as a result, the values they support are dynamic and reflect ever changing conditions.

Approaches to EBM-based forest management reflect knowledge, understanding and values at a given point in time. Ecosystems, resources, and societal values are interconnected, and since all these elements change, management strategies must adapt to evolving conditions. However, maintaining functioning ecosystems (even if constituent parts change) and sustaining biodiversity will always remain important pillars to EBM-based forest management. Their sustenance ensures productivity of forested sites and enables long-term economic sustainability while fulfilling various aspects of human well-being.

EBM-based forest management systems are relatively new, which underscores the importance of ongoing monitoring and adapting practices. Monitoring to assess 'if ecosystems are functioning' and 'biodiversity is being maintained' will require identifying indicators, usually sensitive species, and habitats.

Ecosystems are inherently complex, and EBM-based forest management will inevitably encounter a degree of uncertainty, even more so with our changing climate. To address this uncertainty a precautionary approach is advisable. Precaution gives benefit of doubt to the resources rather than their extraction or development.

1.3 Ecosystem Based Management Planning Scales

Conservation planning within the framework of EBM involves two recognized and complementary approaches:

1. **Coarse Filter Strategies:** These strategies aim to identify and protect representative areas of different ecosystems and seral stages across their natural range. They also focus on preserving habitat for focal, umbrella, or keystone species as needed at appropriate scales. Within coarse filter strategies there are several management tools:
 - **Reserves:** reserves across the landscape are designed to ensure that key areas of natural connectivity are maintained and/or restored within regions, subregions, landscapes, and watersheds.
 - **Management zones:** zones are established to focus actions on achieving priority objectives within a given boundary.
 - **Conservation measures in the matrix of harvested stands:** in areas that have not been protected or reserved, these measures aim to maintain, and when necessary, restore biological legacies (e.g., coarse woody debris, large snags, multiple canopy layers, wildlife habitat), to sustain ecological composition, structures, and functions.
2. **Fine filter strategies:** These strategies aim to identify and protect specific elements and features (e.g., habitat for specific species and cultural heritage areas and sites) that may not be adequately protected and/or maintained by coarse filter strategies.

Coarse filter strategies are intended to encompass effective ecological conservation actions, minimizing the instance where species or values require the use of a fine filter strategy.

An EBM approach to conserving biological diversity includes all the scales, ranging from regional large protected areas to extensive landscape reserves, to maintaining patches and individual structures in forested stands. The planning process for EBM involves identifying areas for protection, designating management zones to meet broad objectives (e.g., recreation, water quality and flow, timber harvest, and others) and sustaining forest attributes in harvested stands.

While recognizing the importance of all scales in forest management, the SCCF does not manage across regions or even over substantial portions of the Chapman and Sechelt Landscape Units. Instead, the SCCF adopts a focused approach, concentrating on reserving patches and establishing connections within its tenure areas. Moreover, the SCCF emphasizes managing retention within harvested stands to preserve and retain forest structures and habitat elements for forest biota and retain more features of the previous forest in newly-harvested stands.

2.0 Planning context for EBM in the SCCF

The SCCF operates under legal frameworks and internal policies. The Forest and Range Practices Act (FRPA) and associated regulations provide the basic legal framework and higher-level plans provide further legal requirements. The SCCF tenure contributes to Land Use (LU) objectives for the Sechelt and Chapman LUs and must adhere to the requirements set forth by FRPA. Following EBM will allow both those obligations to be met. However, EBM often requires forest licensees to exceed FRPA legal requirements, potentially impacting the SCCF's ability to achieve its Annual Allowable Cut (AAC)¹ that was set in absence of EBM planning. EBM principles suggest the AAC should not be an a-priori target but rather flow from the planning process that considers desired economic returns and community values within the context of maintaining ecosystem productivity and biodiversity.

Given that the SCCF operates under Ministry of Forests (MoF), is governed by a board of directors, and provides economic opportunity to the community of Sechelt, any adoption of EBM and reduction in AAC would need their support and approval. Additionally, the province has recently created "Wildland Urban Interface Zones" (WUIs), where human development interfaces with forested areas. Within these zones, the SCCF must implement forest management practices to mitigate and reduce the risk of fire, which must align with province standards.

Beyond the provincial legal framework, the SCCF has internal policies that will inform and guide its approach to EBM. These include:

- Not harvesting old growth forests.
- Collaborating with shíshálh.
- Managing for Wildfire.
- Deferring harvest in the Chapman Creek Watershed.
- Implementing EBM.

2.1 No Harvesting of Old Growth

Given the lengthy and extensive harvest history on the Sunshine Coast and operable terrain, there is little old forest remaining within the SCCF's tenure except at higher elevations in the Mountain Hemlock zone. These old-growth forests play a vital role in maintaining biodiversity, carbon storage, and social values.

¹ The initial AAC for the SCCF was set at 40,000m³. However, this was reduced to 20,000m³ in response to the deferral of harvest in the Chapman Creek watershed. As of November 3, 2023, in accordance with an agreement among the SCCF board of directors, the AAC has been reduced to 15,000m³. When EBM and planning zones are closer to being finalized, the AAC will be revisited to determine a sustainable level of timber flow.

The SCCF has an internal policy to not harvest old forests (250 years old or older). Additionally, they have an agreement with shíshálh to not harvest stands greater than 200 years old in areas of the tenure below 600 m elevation.

2.2 Protecting Cultural Values

At present, the shíshálh are in the process of developing a new Land Use Plan (LUP), which is currently unavailable for review. Until the 2025 LUP becomes available, EBM practices within the SCCF will be guided by the existing 2012 LUP² and with direct collaboration with shíshálh. The SCCF's approaches within its tenure are intended to align with the broader strategies outlined in the LUP, which extend further than SCCF tenure.

To ensure effective collaboration, the SCCF maintains regular communication with shíshálh and actively seeks input on the EBM planning approach and the CN as their capacity allows. Additionally, the SCCF is committed to assisting in enhancing shíshálh capacity. shíshálh has its own dedicated archaeologist who reviews each block, making necessary revisions, removals, or approvals to ensure the protection of cultural values that may be present.

2.3 Reducing Wildfire Risk

The risk of wildfires is increasing with climate change, as summer drought becomes more frequent and more intense. The province of BC has implemented WUIs zones within a 1 and 2 km radius of communities, requiring licensees to manage these areas to reduce wildfire risk. The SCCF has engaged professionals in the field of wildfire management to recommend best management practices. However, it's important to recognize that these approaches may sometimes be in conflict with other values, such as maintaining biodiversity. Therefore, it is crucial to carefully evaluate the risks involved as human safety is of paramount importance and may take precedence over maintaining desired stand structures for biodiversity in some areas of the tenure. It is important to note that even the most stringent wildfire risk reduction treatments will not completely prevent fires from spreading under extreme weather conditions.

2.4 Deferring Harvest in Chapman Creek Watershed

In receiving tenure from the Minister, SCCF committed in 2007 not to harvest in the Chapman Creek watershed for 25 years. In 2011, this commitment was reaffirmed which in effect, restarted the 25-year deferral. Even after that, the SCCF will harvest only to improve water flow and timing and lengthen snow time on the forest floor.

2.5 Implementing EBM

SCCF plans to implement EBM through two scales of planning:

- Creation of a CN (**Section 3** and **Appendix I**), and
- Moving to a retention system of forest harvest that retains trees to provide forest influence as blocks are harvested (see **Appendix II** for principles and the importance of stand-level retention).

² lil xemit tems swiya nelh mes stutula A Strategic Land Use Plan for the shíshálh Nation. June 2007.

The purpose of a CN at the tenure scale is to safeguard representative ecosystems and cultural values by designing areas that will not be harvested. The CN is meant to be complemented by management actions in areas that will be harvested. The intent of stand-level retention within harvested stands is to provide elements of older forests in regenerating stands to increase the functionality of those stands for a diverse range of species, complementing the CN to fulfill EBM objectives for the preservation of biological diversity (Baker and Reed 2011, Baker et al. 2017; Beese et al 2019; Franklin et al. 1997; Gustafsson et al. 2012). To achieve this, the SCCF plans to implement a variable retention approach to stand-level retention in harvested areas, using a mix of the retention silvicultural system, and other silvicultural systems (such as group retention or shelterwoods) with long-term retention.

EBM will be practiced throughout the tenure, with different emphasizes in different management zones (see **Section 3.3**).

3.0 Conservation Network

A CN is a system designed to protect areas that are managed to maintain or restore ecological integrity and connectivity. It serves as a valuable tool to conserve and promote biodiversity and ecosystem services. A CN in SCCF's tenure will be based on the best available information and will need refining as better information is collected or made available.

A basic understanding of SCCF's tenure is required before the CN can be coherently discussed.

3.1 General Characteristics of SCCF Forests

The SCCF is divided into three distinct operating areas: Halfmoon Bay, Wilson Creek and Angus/Gray/Chapman Creek. The smaller, southern areas - Halfmoon Bay and Wilson Creek – feature undulating hummocky terrain with a few cliff bands and bluffs. Their elevations range from 55 m - 585 m, spanning only one Biogeoclimatic (BEC) zone, the Coastal Western Hemlock (CWH).

In contrast, the Angus/Wilson/Chapman Creek area is larger and located further north, with elevations ranging from 25 to 1465 m. This area encompasses the Mountain Hemlock (MH) and alpine areas, characterized by complex mountainous terrain with deep gullies, rocky cliffs, and rock outcrops.

The CWH zone is named thus because its climax forests are dominated by western hemlock (*Tsuga heterophylla*) with western redcedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*) as minor components. The MH zone is dominated, in its climax condition, by mountain hemlock (*Tsuga mertensiana*) with some balsam fir (*Abies amabilis*). Within the SCCF there are four variants of the CWH, the CWH very dry maritime (xm1), the CWH dry maritime (dm), the CWH very wet maritime (vm), the CWH very wet montane (vm2). As their name suggests, the forests of the CWHxm1 and dm are drier and more prone to fire, often having Douglas-fir as a dominant species for many areas. The CWHvm1 and vm2 are wetter and usually dominated by western hemlock and redcedar. Within the MH there is only one variant, the moist maritime (mm).

There are several major creeks within the SCCF: Angus, Burnett, Chapman, Gray, Hudson, Wakefield, Wilson, and East Wilson, and that convey water through the tenure and support a host of aquatic life. The forested riparian areas adjacent to the streams help maintain the features, functions, and conditions of a stream by playing a key role in the regulation of microclimates, water quality, preventing bank erosion, promoting slope stability, supporting a married of terrestrial food webs, and providing habitat for a wide

range of aquatic, amphibious, and terrestrial organisms. In addition to the major creeks there are a variety of streams orders that provide baseflows to the larger systems and have functioning riparian areas that play a key role in maintaining healthy streams and riparian areas. In addition to the presence of streams and creeks there are a few small pocket wetlands scattered throughout the tenure. There are two lakes, Crowston and Phare (Wormy), located in the Halfmoon Bay tenure area that support fish populations, are designated critical habitat for western painted turtles and provide recreational opportunities to the community.

Natural Disturbance Types (NDTs) for BC are identified by the Biodiversity Guidebook³. NDTs are used to describe broad zones of forest conditions in BC. They range from areas that are very wet and rarely disturbed (NDT 1) to areas of frequent fire such as the Okanagan Valley (NDT 4). Each NDT has been described and the characteristics of the NDT used to establish the age threshold for old growth (because the age and characteristics of old growth and old forests vary greatly between Natural Disturbance Types). The SCCF lies within NDT 2, which is dominated by infrequent large fires that replace stands, with forests reaching ages greater than 250 years. Fires can burn hot to cool in this NDT and usually leave patches of green patches and individual lives trees; standing snags are usually prevalent. Soils may be burned if fires become hot. Other important natural disturbances in the SCCF include windthrow, insects and disease that create small openings and gaps in forests.

As well as experiencing the typical natural disturbances, lower elevation areas with productive and gentle terrain, have, to a large degree, been disturbed by past harvesting, land clearing and development. The upland areas tend to be rockier with shallower soils, with lower slopes having deeper soils and higher productive growing sites. Very little old forest remains at lower elevations.

Appendix VI contains more details on levels of protection in the SCCF and the Landscape Units to which it contributes.

³ BC. (1995). Biodiversity guidebook. Forest practices code of BC.
<https://www.for.gov.bc.ca/hfd/library/documents/bib19715.pdf>

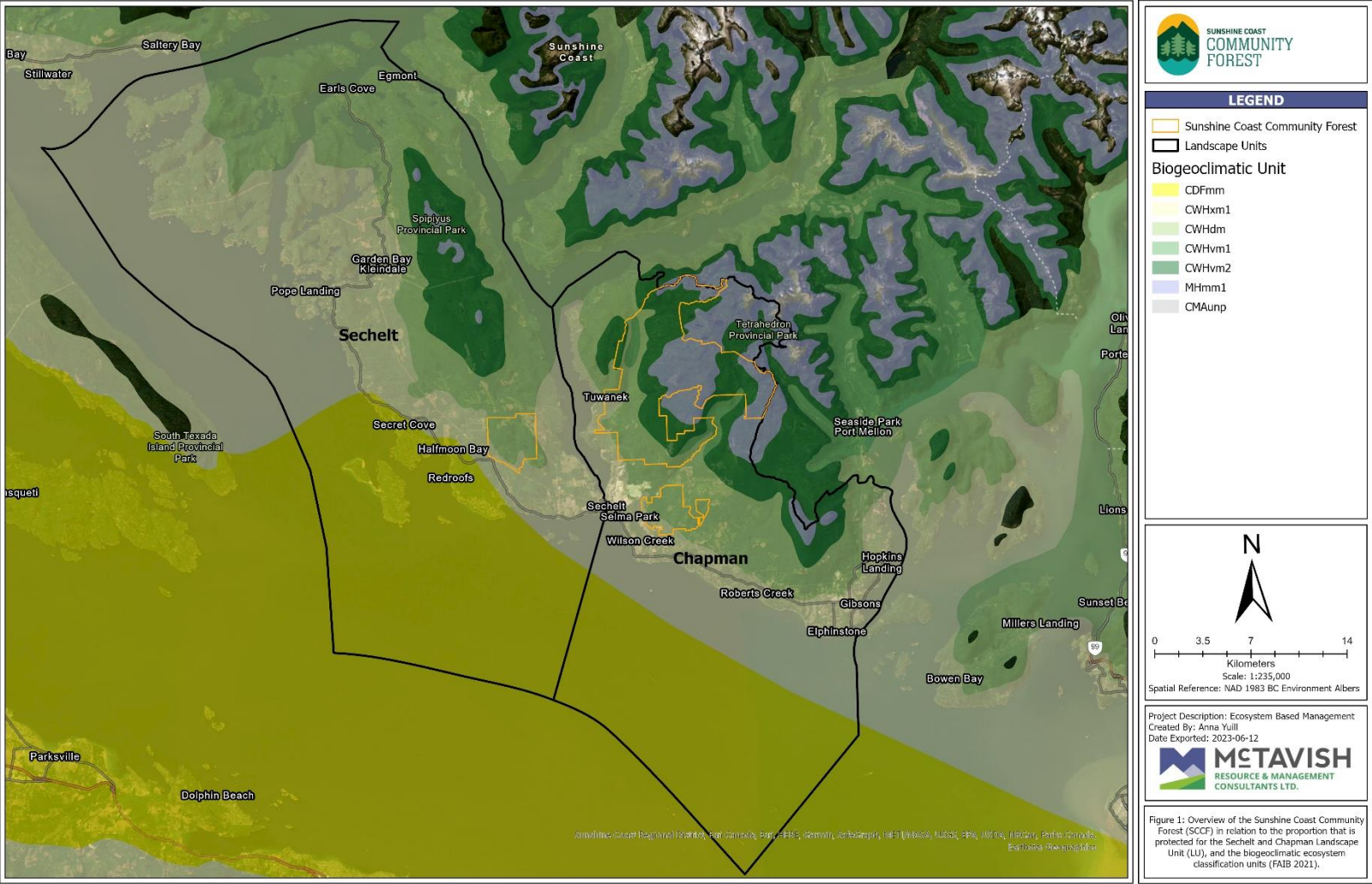


Figure 1: Overview and Biogeoclimatic Ecosystem Classification units (FAIB 2021) of the Sunshine Coast Community Forest (SCCF) tenure (yellow) in relation to provincial Landscape unit (black).

3.2 Principles of Design

A key attribute of a strong coarse filter is a well-designed reserve system. Reserves are established to protect specific resource values or biophysical features (e.g., cultural heritage resources and features, unstable terrain, scenic areas, and recreation features), and achieve objectives to maintain ecosystem representation, wildlife habitat, movement corridors, riparian forest, and other landscape design elements. Landscape and site reserves planned in the SCCF are areas where no, or very little, extractive resource use takes place, but the land is not necessarily formally designated as ‘protected’ under legislation.

In coastal BC, the ideal reserves would comprise mainly old forest, which is considered to be the dominant natural condition. However, little old forest remains, as such, reserves need to include younger forests that will eventually mature into old-growth. These younger forests are often found in more productive lower elevation sites and in ecologically valuable areas such as riparian zones, important wildlife habitats, and locations of cultural importance. Most EBM plans incorporate a transitional period, areas set aside today will become old, assuming no stand replacing natural disturbances. For instance, the Great Bear Rainforest Order (GBRO) Area allows young forests to be included in landscape reserves, recognizing that they will become old by the year 2264. This time frame accounts for the growth of a new tree at the beginning of the plan in 2016 to mature into an old tree 250 years later. The SCCF follows a similar principle when designing their conservation network, adding mostly mature forests as recruitment areas but also allowing younger forests in the conservation network when they align with ecologically or culturally valuable areas. Often younger forests are on more productive low elevation sites. The flexibility of including a range of forest ages within the a given landscape reserve in the GBRO Area and SCCF’s conservation network also allows for the continued economic use of some mature forests while the landscape reserve grows older.

Representing the full variety of ecosystems is an important pillar of creating a network of reserves. That ecosystem representation should be co-located as far as possible with other important values such as:

- Protecting existing old forest,
- Using recruitment to protect ecologically valuable younger forests, ideally those with old forest structures or other areas of ecological or cultural importance,
- Protecting areas identified by First Nations as containing important Indigenous forest values and heritage sites and features,
- Protecting large proportions of known occurrences of red-listed and blue-listed plant communities,
- Protecting habitat for sensitive species (see Wildlife **Section 5** and **Appendix 5**), and
- Identifying a functional Timber Harvesting landbase.

Reserves should be designed in a way to include not only content but also consider geometry and position. Some important design principles include:

- Size – the larger the reserve the more ecologically valuable they can be as they can increase forest interior. However, having only a few large reserves would mean they would tend to be isolated from one another and it would be difficult to achieve all the desired values and representation targets and difficult to capture a variety of areas of high ecological or cultural value. Small reserves can often be useful for special, uncommon

to rare sites and communities that by their nature are inherently small (e.g., small wetlands).

- Configuration – Simpler shapes are more desirable in a reserve system. Highly irregular boundaries, protruding peninsulas and narrow linear/curvilinear polygons have a high proportion of edges, reducing the function of the forest and are less desirable.
- Distribution – reserves should capture a range of elevations and geographic positions in landscape units, although there are trade-offs between distribution and size (greater distribution usually means smaller reserves).
- Connection – creating connections to other reserves or linkages across to parks and protected areas spatial continuity and can facilitate the movement and migration of various species, and likely increases resilience in the face of climate change.
- Representation – protection should be distributed across the landscape capturing a variety of forested ecosystems.

Not all principles can be met equally, depending on where the most important values are located (e.g., riparian areas, culturally important areas, and old growth stands).

Because not much old forest remains in the SCCF, recruiting areas to become natural old forest over time is necessary. As well as thinking about the content and design principles above, determining area to recruit to old forest considers:

- Stands that have developed structural diversity relatively early as a result of disturbances (i.e., physical disturbances, insects or disease). Age class alone can be a poor measure of old-growth attributes; it is the attributes and structures associated with old forests that are of primary interest (i.e., structural stage 6 or 7.)
- More productive sites within a site series, since these are more likely to develop structural and habitat diversity quickly.
- Sites that will potentially develop red- or blue-listed plant communities over time. Low elevation, valley-bottom fluvial sites are especially important where earlier logging has impacted such sites.
- Areas with known human well-being values, which benefit by inclusion in reserves.
- Areas with biologically significant stands, e.g., riparian and older deciduous forest (mid and early seral deciduous stands commonly have high biodiversity values [e.g., soft or decayed wood suited to cavity nesting at a relatively young age]).
- Areas that increase forest interior within reserves, areas that improve connections among reserves and/or improve geographic or elevational distribution within the tenure.
- Sites that maximize carbon sequestration.
- Areas that are unlikely to be disturbed through time by either natural disturbances [avalanches, slides] or development [mining, power or other].

- Areas that have the potential to develop into regionally important species habitat if habitat is short in the overall tenure).

These building blocks can be augmented by other areas of ecological value and by land already constrained from timber harvest. The locations of building blocks also need to consider areas required to maintain economic opportunity.

3.3 SCCF Conservation Network

The SCCF plans to increase levels of protection to ensure a range of ecosystems and values are protected within the tenure within each LU. The current legally protected area is only 4% (see **Appendix VI** for current condition of SCCF) and the SCCF aims to reach 30%. Although inexact, current science suggests that 30% of natural habitat amounts is when species enter high risk of being lost. Thus 30% protection of old forest is a minimum target that is aimed for in some planning processes (e.g., the Great Bear Rainforest Order area). The situation is more complex in forests where mature forests also provide habitat value for most species that also use old forests, and when retention harvest systems provide older habitats in younger forests (see Lindenmayer and Franklin 2002 for thoughtful discussions of the complexities).

The SCCF has drafted a CN (Version 12) to share with shíshálh and the community for their input. The drafted CN is based on ecological data, field sampling, and design principles (see Appendix 2 for details). Key building blocks of the network included potential red and blue ecosystems, riparian zones, and areas with high Forest Attribute Scores. Additionally, the CN is meant to function in tandem with stand retention levels in the management zones to maintain biodiversity, cultural and social resources, and economic opportunity.

The CN depicted in Figure 2, 3, and 4 serves as preliminary concept and is aimed at guiding planning. Its purposes is to provide a foundational framework to facilitate discussions and decision-making processes. This draft CN is intended to be modified based on input from shíshálh, the community, and further assessments of forested stands that may have high ecological values(s). Currently, the preliminary CN provides a level of protection encompassing 42% of the entire SCCFs tenure area, inclusive of both the Forest Management Landbase⁴ (FMLB) and Non-FMLB. Within the FMLB specifically, 31% of the SCCF tenure area is covered by the (Table 1).

Current levels of protection for each of the tenure areas and BEC units as it pertains to the FMLB are as follows:

- **Angus/Gray/Chapman Creek Tenure Area**
 - 31% of the tenure area is protected under the current CN draft.
 - The CWHxm1 and CWHvm1 have the highest levels of protection, 68% and 57%, respectively.

⁴ The FMLB serves to delineate areas that are or have been forested and possess the capability to support tree growth. Typically, non-productive areas such as lakes, rock formations, and alpine zones are excluded from the FMLB. In contrast, areas that have undergone harvesting activities or possess a site index equal to or greater than 5 (stands that can grow trees 5 m tall in 50 years) are encompassed within the FMLB. Identification of the FMLB is commonly identified by the Vegetation Resource Inventory (VRI) and may be further supported by predictions of site index derived from Light Detection and Ranging (LiDAR) data.

- The CWH dm is at 31% protection.
- The CWHvm2 and MHmm1 are not yet at the 30% target. Currently, there are 84 ha in the CWHvm2 and 73 ha in the MHmm1 required to meet the 30% target.
- **Wilson Creek Tenure Area**
 - 31% of the total area is protected under the current CN draft.
 - 32% of the CWHdm is protected in the current CN.
 - 27% of the CWHxm1 is currently protected, 6 ha more is required to meet the 30% target.
- **Halfmoon Bay Tenure Area**
 - 31% of the total area is protected under the current CN.
 - 31% of the CWHxm1 and the CWHdm is currently protected.

The SCCF has committed to achieving a 30% coverage for each of the BEC Units within each tenure area. Currently, there is a 6-hectare deficit within the Wilson Creek tenure area. Several areas are under consideration and will be selected after additional fieldwork in 2024. It is important to note that although the CN does not currently meet the 30% threshold within the Angus/Gray/Chapman Creek tenure area, the current protection within the CWHvm2 and MHmm1 zones within this area is already well above 30% due to the deferral in the Chapman Creek watershed. If the deferral is lifted, the CN will need to be revisited to identify additional areas for protection to ensure the 30% target is met.

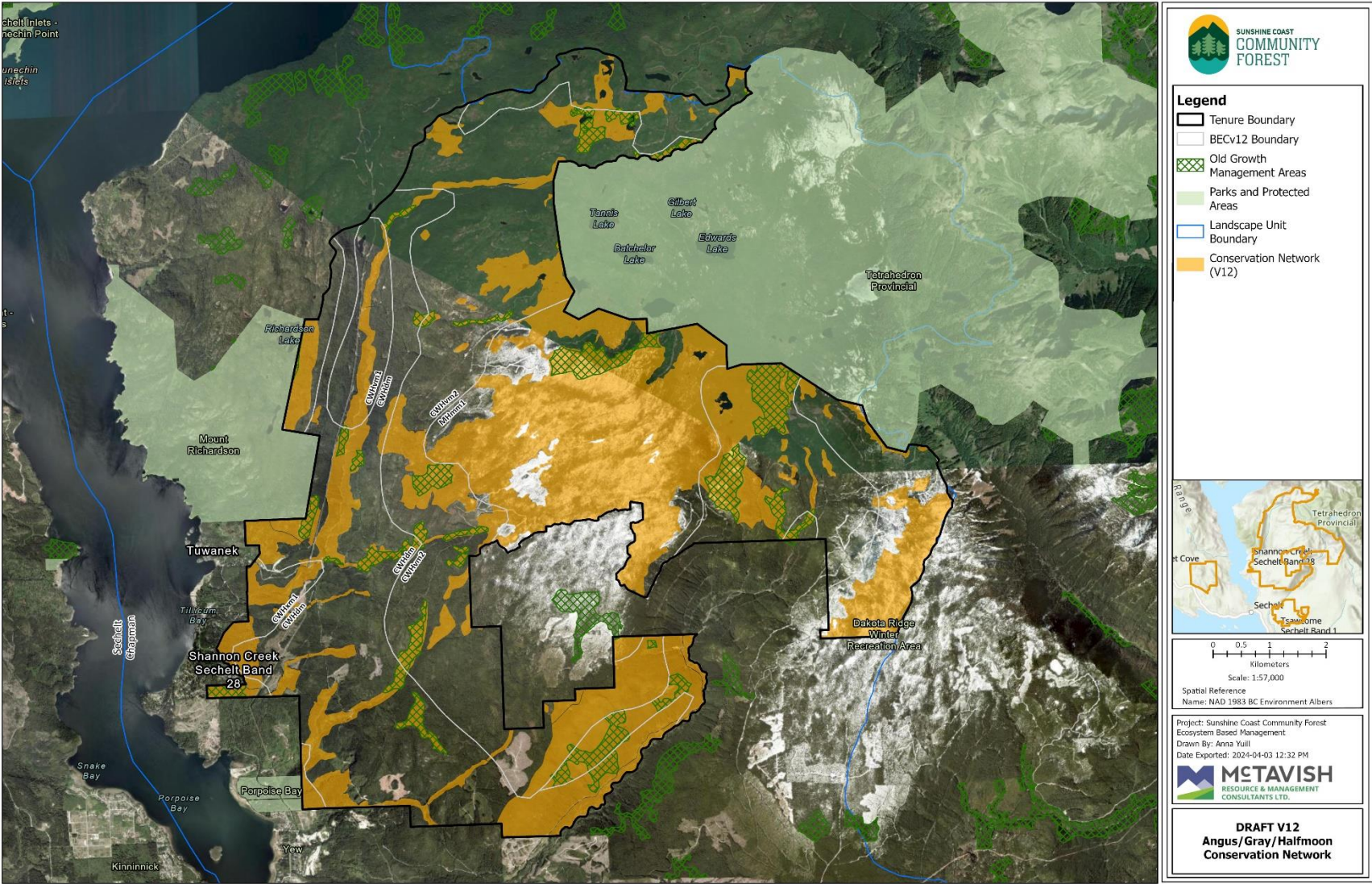


Figure 2: Preliminary draft Conservation Network for the Angus/Gray/Chapman Creek tenure area for the Sunshine Coast Community Forest.

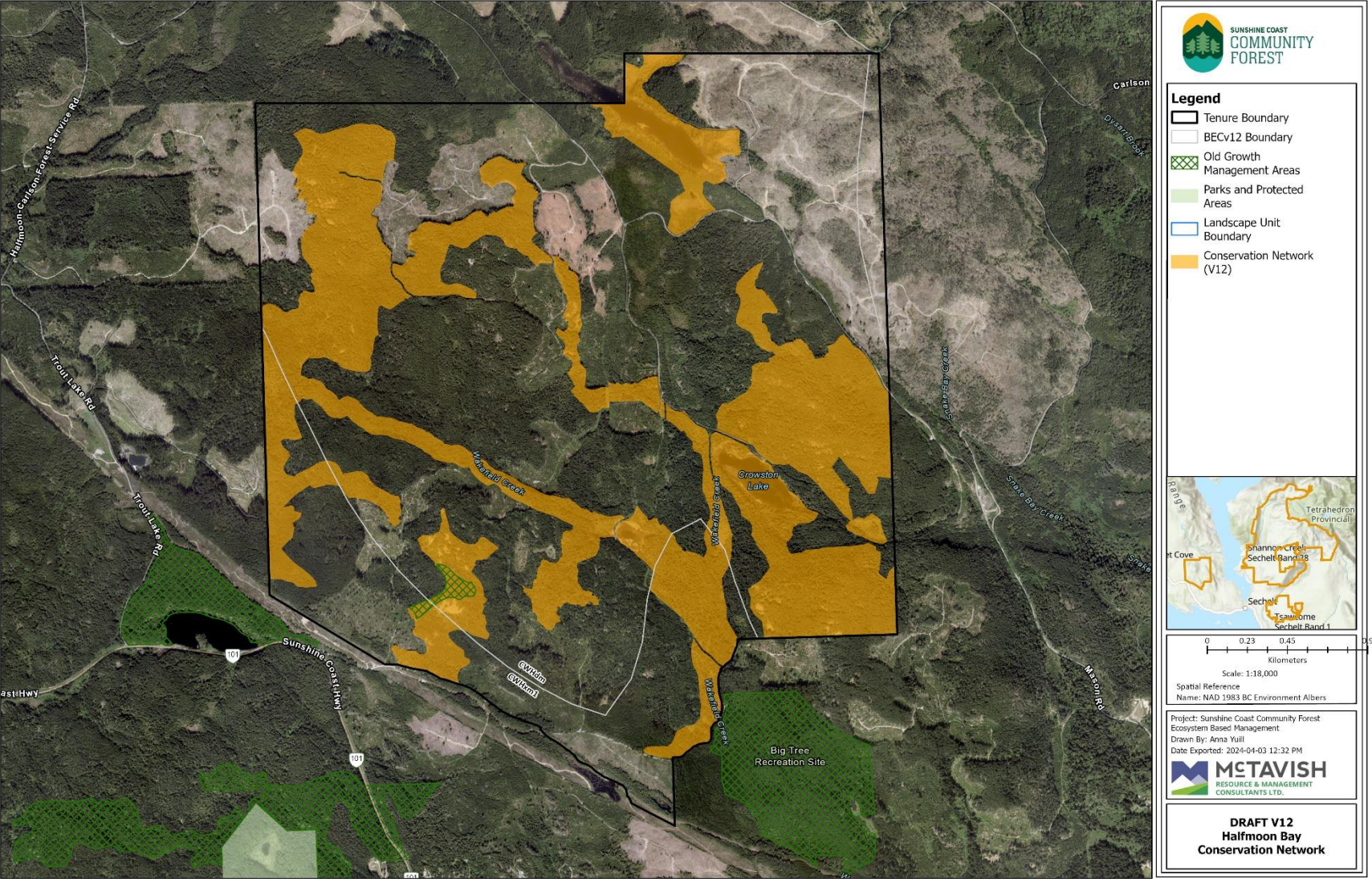


Figure 3: Preliminary draft of a Conservation Network for Halfmoon Bay tenure area for the Sunshine Coast Community Forest.

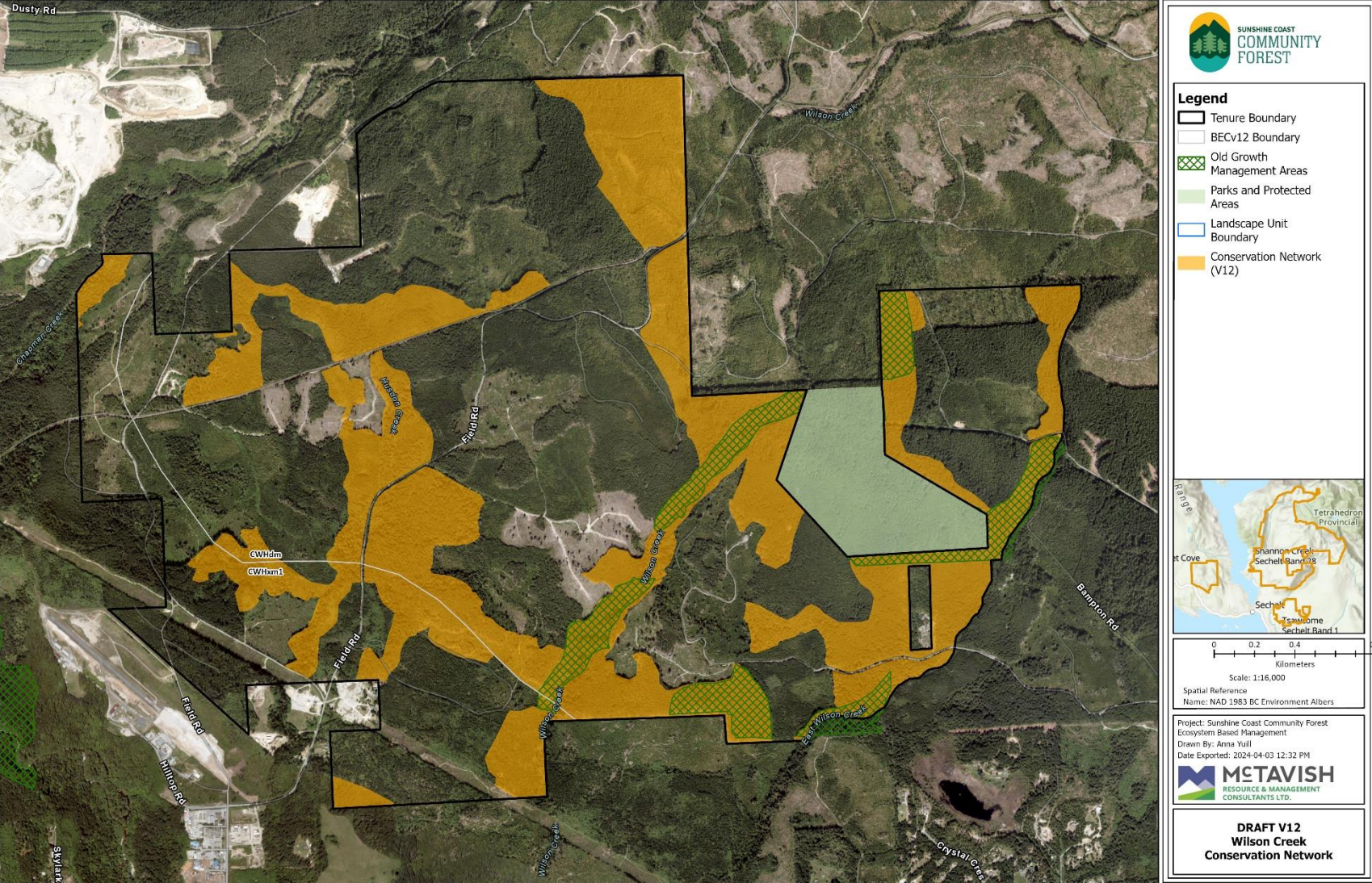


Figure 4: Preliminary draft of a Conservation Network for Wilson Creek tenure area for the Sunshine Coast Community Forest.

Table 1: Current levels of protection within the DRAFT Conservation Network design (V11) for the Sunshine Coast Community Forest as a whole and each individual tenure.

Sunshine Coast Community Forest – Entire Tenure							
BEC	Total Area (ha)	FMLB (ha)	Non-FMLB (ha)	Conservation Network – Total Area (ha)	Conservation Network – % of Total Area	Conservation Network – FMLB (ha)	Conservation Network – % of FMLB
CWHxm1	581	568	13	238	41	237	42
CWHdm	3,980	3,940	40	1,292	32	1,269	32
CWHvm1	459	446	13	254	55	254	57
CWHvm2	3,228	2,870	358	1,122	35	777	27
MHm1	2,542	1,117	1,425	1,665	65	262	23
Total	10,790	8,941	1,849	4,571	42	2,799	31
Sunshine Coast Community Forest – Halfmoon Bay							
CWHxm1	199	195	4	61	31	61	31
CWHdm	992	969	23	322	32	299	31
Total	1,191	1,164	27	383	32	360	31
Sunshine Coast Community Forest – Wilson Creek							
CWHxm1	192	187	5	50	27	50	27
CWHdm	852	850	2	304	32	304	36
Total	1,044	1,037	7	354	31	323	31
Sunshine Coast Community Forest – Angus/Gray/Chapman Creek							
CWHxm1	190	186	4	127	67	126	68
CWHdm	2,136	2,121	15	667	31	667	31
CWHvm1	459	446	13	254	55	254	57
CWHvm2	3,229	2,870	358	1,122	35	777	27
MHm1	2,542	1,117	1,425	1,665	65	262	23
Total	8,555	6,740	1,815	3,835	45	2,026	30

3.4 Management Zones

Zoning is becoming a growing practice in forest management to better meet management objectives for different values within a forest tenure. Zoning divides the tenure into different areas that will be managed for a dominant use or suites of uses. The notion that all values can be met in multiple use forestry has proven impossible since many values have competing or contradictory needs and require different management practices. For example, while it may be possible to manage for visual quality or recreation in an area primarily managed for timber, aligning the management for large patches of intact forest or areas designated for wilderness with a timber emphasis is often challenging and mis-aligned.

In BC, zoning is typically implemented at very broad scales. However, due to the small size of SCCF's tenure, zoning will involve smaller, more specific areas. Currently, the SCCF is considering five zones:

1. Water Quality Zone
2. Research Zone
3. Recreation Zone
4. Old growth zone
5. Integrated Forest Management Zone

Each zone has one or two dominant objectives that will guide management practices (see **Figures 5, 6, and 7**). Collaborating with shíshálh to protect their values and protecting areas to be part of the CN to eventually become old forest, are overarching objectives for all zones.

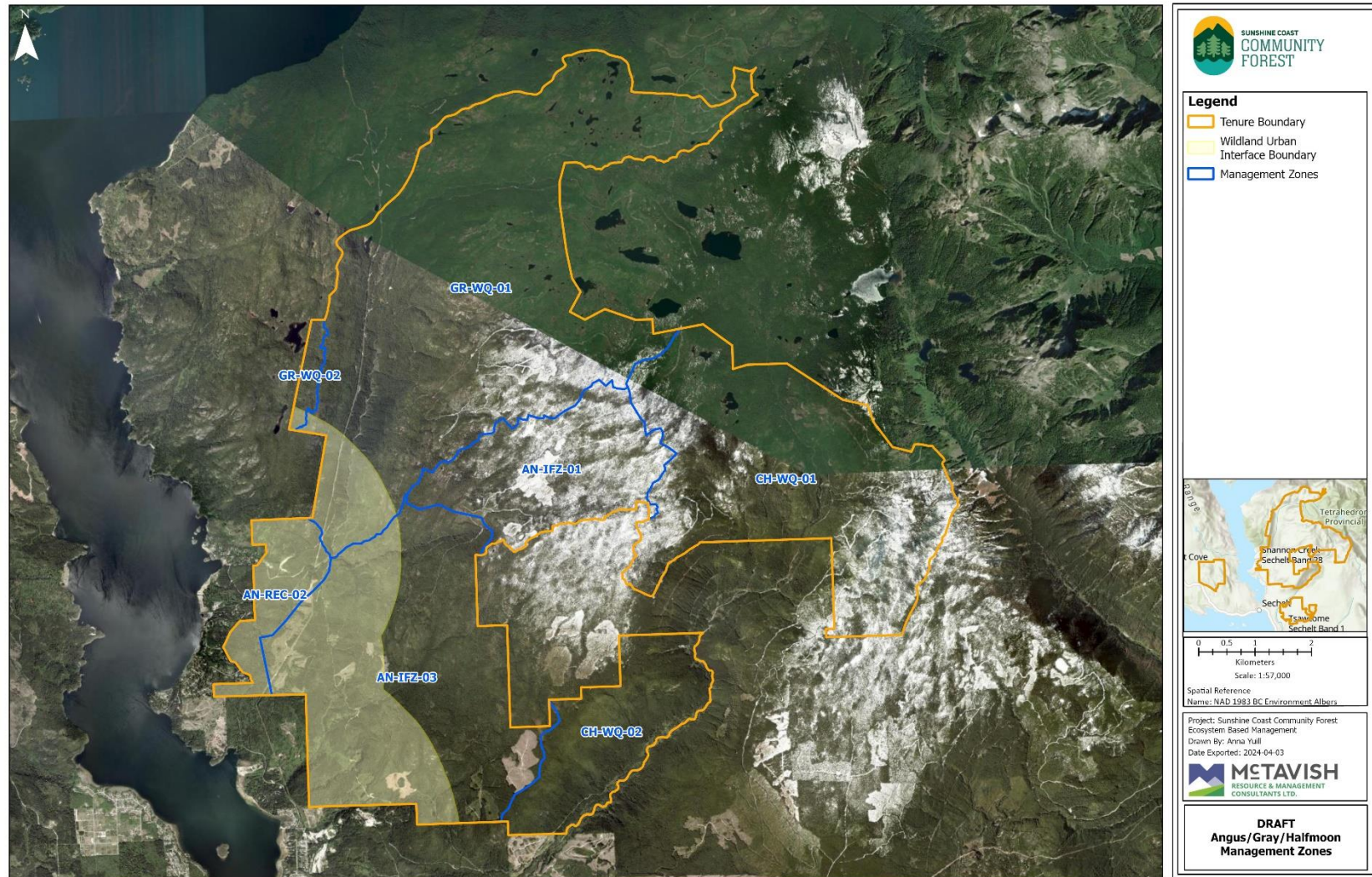


Figure 5: Draft Management Zones for the Angus/Gray/Chapman Creek tenure area for the Sunshine Coast Community Forest with Wildland Urban Interface (WUI) boundaries overlain in beige.

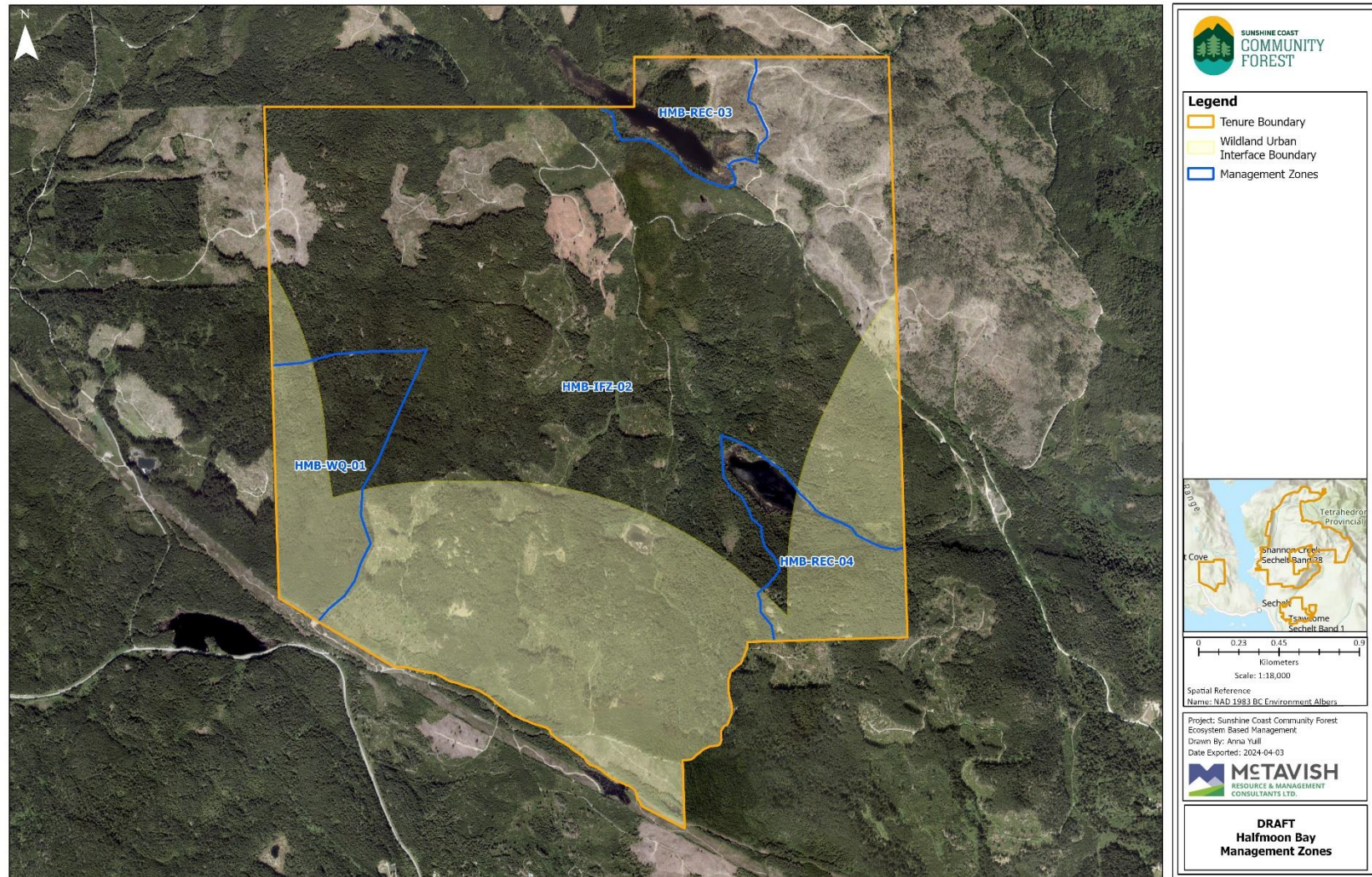


Figure 6: Draft Management Zones for Halfmoon Bay tenure area for the Sunshine Coast Community Forest with Wildland Urban Interface (WUI) boundaries overlain in beige.

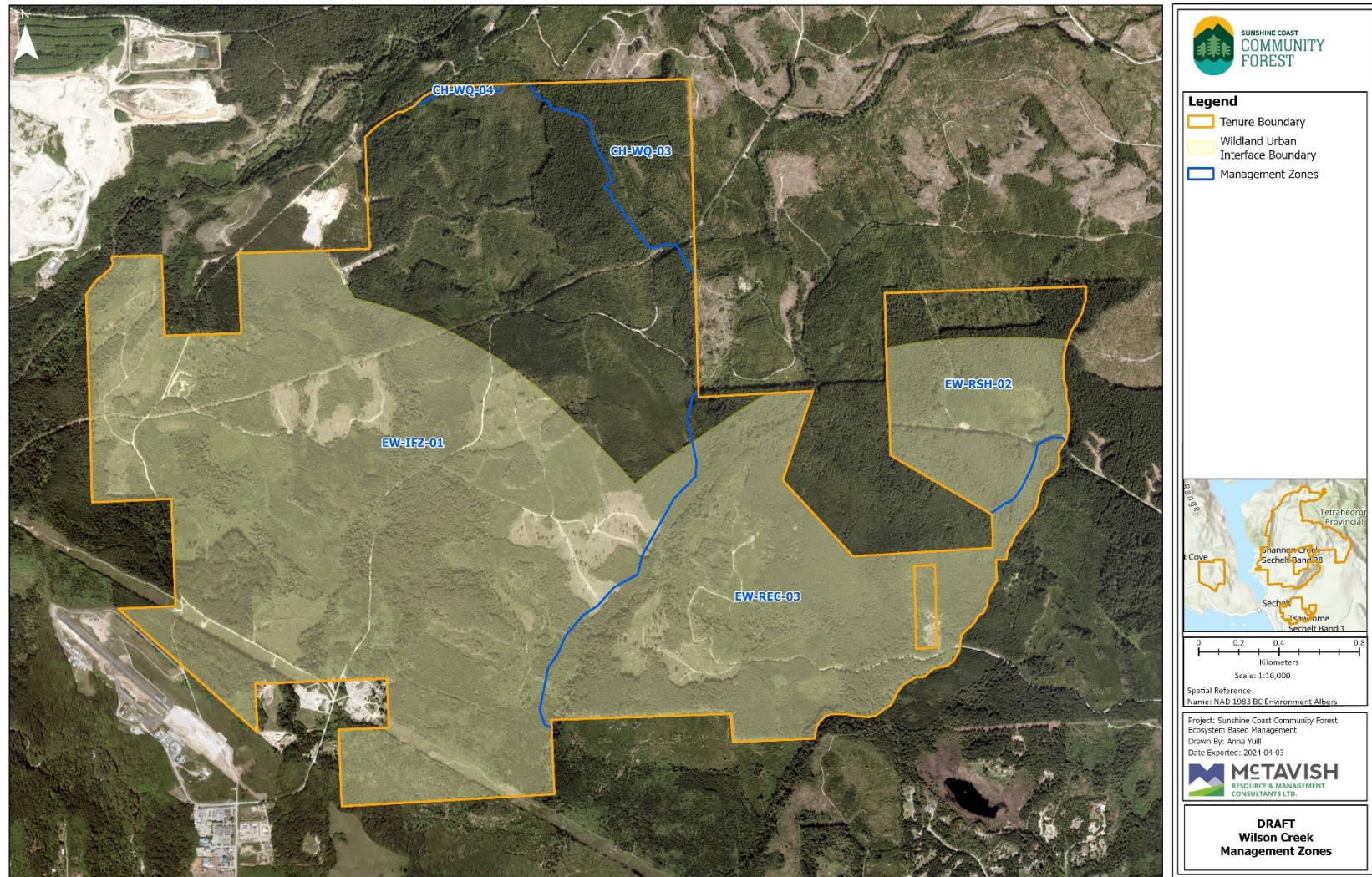


Figure 7: Draft Management Zones for the Wilson Creek tenure area for the Sunshine Coast Community Forest with Wildland Urban Interface (WUI) boundaries overlain in beige.

Water Quality Zone:

The main objectives in the Water Quality Zone include:

- **Maintaining the flow and water quality:** ensuring the flow and quality of water are preserved to provide drinking water and water for domestic use from community watersheds.
- **Sediment Risk Management:** maintaining watershed in a very low risk condition for sediment inputs and impacts to water flow amount and timing.

Overarching objectives include:

- Maintaining and restoring old forest.
- Protecting shísháhlh cultural values.

Management approaches to be implemented:

- Restore old growth features, this may utilize specific harvesting practices to create structures of older forests or improve waterflow and timing of flow.
- **Watershed Assessments:** Qualified Professionals (QPs) will conduct watershed assessments (ABCFP and EGBC 2008; 2010; 2020) every 5 to 10 years to ensure that harvest levels will remain at or below very low risk levels to water quality and flow (e.g., EBA 2000).
- **Harvest Systems:** In many areas within the zone, no harvesting will occur (e.g., Chapman Creek Watershed). However, in other areas, partial cutting or retention systems may be utilized to restore old forest attributes to improve snow retention, water flow, and timing.
 - In areas identified for harvest, over a 5-year period, 50% of the volume will be harvested using a retention system to maintain forest influence over 100% of the block.
 - All areas of the block will be within a tree height of the block edge, an internal retention patch, or individual dispersed retention trees.
 - Openings are targeted to average between 1 to 2 ha in size, with a maximum of 5 ha. Within the harvest unit, a low level of trees will be retained at a rate of 10 to 15 stems per hectare (sph), either scattered throughout the block (dispersed retention) or clumped together (group retention), depending on site-specific considerations for each block.
 - While some natural regeneration will occur, these blocks will be planted following harvesting to achieve full stocking for the next crop of trees.
 - Over a 5-year period, 50% of the volume will use a partial or intermediate cut system (i.e., Shelterwood or Group Selection) to maintain forest influence over the entire block for the entire rotation. Harvesting using this system will focus on ecosystem restoration, sensitive soils/features, or to maintain water quality.
 - The Shelterwood silvicultural system may be used to create openings ranging from 2 to 10 ha, where trees are harvested in two stages with a significant time gap between them. During the initial stage, up to 60% of the stand's volume is removed to improve conditions for the regeneration of natural seedlings. The second stage, scheduled for 10 to

20 years later, targets the majority of remaining overstory trees. However, at least 40 large trees per ha are retained to maintain continuous "shelterwood" and visual quality. Additional planting may be required to fill gaps following the second harvest.

- Group selection involves opening sizes averaging 1/2 to 1 ha, and trees are removed in one to three passes, separated by periods of more than 20 years. At the final harvest, some overstory trees should be retained in or around the opening to provide long-term structure to the forest. Any gaps in the stand will be fill-planted after the final harvest.
- **Stream Management:** All streams will be managed to maintain water quality.
 - All classified streams (S1 to S6) will be managed according to the Streamside Protection and Management Zones Procedure (See **Appendix III**). Non-classified drainages (NCDs) will not have a reserve zone established unless it is necessary to maintain water quality and is within 100m of fish-bearing reaches.
 - All classified lakes and wetlands will have 30m reserve zone, unless the Forest Planning and Practices Regulation (FPPR) classification warrants a larger reserve. Reserve zones around unclassified wetlands will be determined in the field by a QP based on maintaining water quality, flows, and supporting species habitat.
- **Conservation Network:** The CN will contribute areas that recruit old forest in the Water Quality Zone, with greater amounts of CN focused in these zones than in some other zones.
- **Wildfire Risk Management:** In areas where the Water Quality Zone overlaps with the WUI, management actions will be guided by the Wildfire Risk Reduction Plan ensuring alignment with BC government directions.
- **Road Management:** Roads will be carefully built and managed according to recommendations in Carson and Maloney (2021) and ABCFP and PENG (2012; 2021) standards (see Section 4.1 below).

Recreation Zone:

The main objectives in the Recreation Zone are:

- **Trail Maintenance:** Maintain the sanctioned and unsanctioned community-maintained legacy trails (long-standing trail networks) in the SCCF. Employ harvest systems that are conducive to maintaining user recreation experience.
- **Road Access:** Maintaining road access to facilitate trail network accessibility.

Overarching objectives include:

- Maintaining and restoring old forest.
- Protecting shíshálh cultural values.

Management approaches:

- **Trail Buffering:** In the Recreation zone, SCCF will buffer trails from harvest where practicable. When buffering is not practical, trails will be re-established.

- **Communication:** Recreation groups will be informed of planned harvest activities around long-standing trails and of any alterations to road access.
- **Integration with CN:** Considerations for long-established community trails will be incorporated into the design and placement of the CN. For example, Hidden Grove serves as an important building block in the current CN (V12) as do the trails near Phare and Crowston Lakes.
- **Harvest Systems:** Harvesting systems within the recreation zone will utilize retention and shelterwood system.
 - **Retention Systems** will maintain forest influence over 100% of the block. This means that all areas of the block will be within a tree height of the block edge, an internal retention patch, or individual dispersed retention trees.
 - Opening sizes are targeted at an average of 3 to 5 ha in size, with a maximum of 10 ha.
 - Within the harvest unit, a low level of trees will be retained. This low level of permanent retention will be 10 to 15 sph, either scattered through the block (dispersed retention) or clumped together (group retention) depending on site-specific issues for each block.
 - Although some natural regeneration will occur, these blocks will be planted following harvesting to achieve full stocking and the next crop of trees.
 - **Shelterwood systems** may be used but must ensure forest influence is maintained over the entire block for the entire rotation.
 - Opening sizes are targeted at an average of 1 to 2 ha in size, with a maximum of 5 ha.
 - Within the harvest unit, a low level of trees will be retained. This low level of permanent retention will be 10 to 15 sph, either scattered through the block (dispersed retention) or clumped together (group retention) depending on site-specific issues for each block.
 - Although some natural regeneration will occur, these blocks will be planted following harvesting to achieve full stocking and the next crop of trees.
- **Stream Management:** All streams will be managed to maintain water quality.
 - All classified streams (S1 to S6) will be managed according to the Streamside Protection and Management Zones Procedure (See Appendix III). NCDs will not have a reserve zone established unless it is necessary to maintain water quality and is within 100m of fish-bearing reaches.
 - All classified lakes and wetlands will have 30m reserve zone, unless the Forest FPPR classification warrants a larger reserve. Reserve zones around unclassified wetlands will be determined in the field by a QP based on maintaining water quality, flows, and supporting species habitat.
- **Road Maintenance:** Roads maintained for recreation will follow FRPA requirements. Considerations will be given to climate change and the expected increase in the frequency and magnitude of storm events (see **Section 4.1** Below).
- **Wildfire Risk Management:** In areas where the Recreation Zone overlaps with the WUI, management actions will be guided by the Wildfire Risk Reduction Plan currently in preparation, ensuring alignment with BC government directions.

- **Funding Priority:** Provide funding to create more recreational infrastructure or support trail associations doing the work.

Research Zone:

The Research zone encompasses a single area in Roberts Creek (Wilson Creek tenure area), which is legally mandated to be made available for collaborative use with the Province for silvicultural systems research. The main objectives in the Research zone are:

- **Silvicultural Research:** Cooperating with the Province to investigate the utility of alternative harvest approaches for maintaining biodiversity, regeneration, and tree growth.

Overarching objectives include:

- Maintaining and restoring old forest.
- Protecting shíshálh cultural values.

Management approaches:

- **Collaborative Research:** Within the Research zone, collaboration with the Province, shíshálh, and Universities will be pursued to continue and implement new and ongoing research into alternate silvicultural systems and stand treatments.
- **Wildfire Risk Management:** Where the Research zone overlaps with the WUI, management actions will be guided by the Wildfire Risk Reduction Plan currently in preparation, ensuring alignment with BC government directions.

Integrated Forest Management Zone:

The main objectives in the Integrated Forest Management (IFM) zone are to:

- **Economic Timber Harvest:** Sustain economic harvest of timber to support the local economies.
- **Ecologically Sound Practices:** Undertaking forest management using ecologically sound practices.

Overarching objectives include:

- Maintaining and restoring old forest.
- Protecting shíshálh cultural values.

Management approaches:

- **Harvest Systems:** Harvesting systems within the IFM zone will utilize retention and partial cut system.
 - **Retention Systems:** Maintain 50% forest influence on the block, considering forest health and safety constraints. Both group retention and individual tree retention will be implemented. The 50% threshold can apply to each block or be calculated as an average across the blocks for the year.

- **Partial Harvest Systems:** 5-10% of the volume from these zones will be obtained through intermediate cutting methods, such as group selection, commercial thinning and selective harvesting using value-added helicopters.
- **Trail Protection:** Legacy trails will be protected by internal retention where practicable and re-instated where it is not possible.
- **Riparian Zone Protection:** Enhance protection of riparian zones beyond the FPPR by implementing the Streamside Protection and Management Zones Procedure (See Appendix 6).
 - All classified streams (S6 to S1) will be managed as per the Streamside Protection and Management Zones Procedure (See **Appendix III**). NCDs will not have a reserve zone established unless it is necessary to maintain water quality and is within 100m of fish-bearing reaches.
 - All classified lakes, and wetlands will have 30m Reserve zone, unless FPPR classification warrants a larger reserve. Reserve zones around unclassified wetlands will be determined in the field by a QP based on maintaining water quality, flows, and supporting species habitat.
 - Protection of large non-fish-bearing streams will depend on proximity to fish and stream characteristics, such as flashiness, incisedness, and windfirmness of trees. Protection of small non-fish-bearing streams (S5/S6) will also depend on proximity to fish and stream characteristics with buffers being left where windthrow can be appropriately managed.
- **Visual Objectives:** Block design will consider visual objectives.
- **Road Design:** Road design will follow FRPA requirements but also consider climate change and expected increased frequency and magnitude of storm events. New roads will be minimized, rehabilitated block roads and roads that are not used for recreation access will be de-activated after planting.
- **Cultural Values:** Cultural values will be identified, and management approaches recommended by shísháhlh's archaeology team for every block and road.
- **Conservation Network:** The CN extends throughout all zones and will be respected during block layout. Layout and inventory may find appropriate areas to be added to the CN or places where the CN should be revised.
- **Wildlife Risk Management:** Where the Integrated Forest Management zone overlaps with the WUI, management actions will be guided by the Wildfire Risk Reduction Plan currently in preparation, ensuring alignment with BC government directions.

Consideration For Zones:

Each polygon in each zone will have different characteristics that need consideration during management. See **Appendix IV** for management approaches by polygon.

4.0 Constraints

4.1 Roads

Forestry practices require transportation networks, mainly roads mainly but also water transportation, to allow for the use, management, and protection of forest resources. While essential, roads can have negative effects on biodiversity. They can intercept subsurface water, channelize and transport water and sediment into streams, allow access for poachers, facilitate the movement of people, increase the spread

of invasive species, act as dispersal barriers for small organisms, cause direct mortality through collisions with vehicles, fragment and reduce the productive forest landbase. Road edges can influence adjacent forests by spreading noise, disturbance from people, and microclimate changes.

Carson and Maloney (2021) noted that fine sediment from roads was the most often and most serious impact seen in their review of forestry impacts on water quality. They outlined some best practices to address fine sediment impacts through all stages of a road's life – location, design, construction, maintenance, and deactivation. The top four management recommendations to reduce fine sediment impacts from roads are: ensuring strategically placed culverts, spreading out logging debris on exposed soils, managing grader berms, and using good quality road materials.

The SCCF has an established road system that allows for access to a significant portion of the tenure that are important to the public for access to trails, berry and mushroom picking sites, and hunting areas. Additionally, roads provide critical access for fire control. However, the construction of new roads should be minimized. Any new roads should be designed to protect sensitive terrain, rare habitats, active floodplain areas and heritage and cultural areas and avoids unstable terrain and streams. Bridges and culverts are key points in a road system that can impact fish and other aquatic habitats and organisms and need to be designed with climate change in mind so that increased runoff is accommodated and directed appropriately.

Given the already extensive road system in the SCCF, it is critical to set high standards for new road construction and maintenance. Cut and fill slope practices should be avoided on steep slopes, full bench construction and end-haul should be used instead. Intercepted subsurface and surface water should be allowed, as much as possible, to infiltrate rather than flow quickly to natural watercourses. All exposed surfaces should be revegetated with native species or with non-native species that won't persist after native vegetation has re-established.

Roads that are no longer essential for ongoing forest management and recreational use should be rehabilitated/restored. Two avenues are possible:

1. **Reducing or eliminating traffic**, which can be achieved by implanting barriers like gates and removing culverts and water bars. Full exclusion of off-road vehicles can be challenging.
2. **Complete removal of the road and habitat restoration**, involving actions such as removing waterbars and culverts, reestablishing slope gradients, re-establishing natural drainage pathways, and pulling back road shoulders.

Sometimes full closures are not practical, but partial closures at specific times in sensitive areas should be considered. For instance, traffic can be limited during critical periods, such as when western toads are crossing roads during their dispersal periods, or near bear dens during denning periods. Effective strategies for implementing these restrictions include signage, social media announcements, and education efforts to inform the public about road closures or sensitive timing windows.

While it is ecologically valuable to minimize road densities, closing roads or removing roads to minimize road density is often challenging, especially, when roads are heavily used by recreationist who may strongly oppose road closures. Nonetheless, addressing specific sensitivities through timed closure and education efforts can lead to increased levels of acceptance.

The SCCF should aim for minimizing roads to less than 5% harvestable areas rather than the 7% allowed by FRPA.

The other aspect of the transportation system is where logs are stored and sorted before going to market. The SCCF does not have its own log storage and sorting facility but will use ones with high environmental standards and regularly check that their operations are certified and/or following best practices, as outlines in extensive and in-depth guidance documents from Fisheries and Oceans Canada (DFO)⁵ and MOF⁶.

4.2 Invasive Species

Forest management, particularly road systems, can facilitate the spread of invasive species, usually transported by vehicles and, less often, by people and pets, into the forest environment. Road edges often are areas where propagules of invasive plant species land, and with increase in light availability they often grow and flourish. While harvest openings can also host invasive species, they typically do so to a lesser extent than roads and landings. Many invasives have become too abundant and extensive to manage (e.g., dandelions, creeping buttercup, ox-eyed daisy), but others can still be met with rapid attack and effective limitation and control.

The Province and the BC Invasive Species Council provide [apps](#) to record invasive species, which allows for tracking of spread and has suggestions for control actions. The main invasive species on the SCCF that warrant immediate action are giant hogweed (*Heracleum mantegazzianum*) and the four knotweed (*Reynoutria* sp.) species present in BC. Additionally, Scotch broom (*Cytisus scoparius*) and Himalayan blackberry (*Rubus armeniacus*) may be site specific problems if harvest blocks are close to private or municipal lands that have established infestations.

Diligent practices should be in place to prevent the establishment, introduction, or spread of invasive vegetation and weed infestations. The following mitigation measures are recommended for preventing the introduction and/or spread of invasive plants:

- a) Trucks, machinery, and equipment, including hand tools, are to be thoroughly cleaned of soils prior to mobilization to the site to prevent the introduction/spread of invasive plants.
- b) Trucks, machinery, and equipment leaving the site are to be cleaned to the greatest extent possible as soils may contain seeds of invasive plants.

From an EBM perspective, controlling invasive species means acting quickly to control the ones that are still manageable. This includes continuous monitoring of roadsides for noxious species, with reports submitted on the app or within SCCF own data framework, followed by the timely removal of infestations.

Additionally, it is crucial to reduce the means of spread and suitable living space to address both newer and more established invasive species. This primarily entails the reduction of road densities and limiting the amount of open road available for travel. However, as previously discussed in the above road section,

⁵ <https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/274124.pdf>

⁶ https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/bc-timber-sales/ems-sfm-certification/corporate/log_handling_guidebook_west_coast_region.pdf

closing roads or reducing road densities is challenging, especially where roads are used heavily by recreationists or others. Nonetheless, a general reduction in open road density benefits many aspects of biodiversity and should be a topic of public education to increase levels of acceptance in road deactivation/closures.

4.3 Riparian Forest

Aquatic habitats and their associated nearby forests form a riparian system that connects terrestrial, freshwater, and marine ecosystems. Riparian areas play a pivotal role in the short and long-term storage and transport of energy, nutrients, organic material, and organisms, thereby contributing to overall ecosystem productivity and diversity. Depending on the characteristics of the individual watersheds, this system can extend from steep alpine headwaters through hillslope streams, lakes, wetlands, and floodplains to intertidal, estuarine, and marine environments at ocean shorelines. Thus, management practices over an entire watershed have implications for these habitats.

Hydroriparian systems, particularly those in floodplains, typically contain the most diverse and productive habitats within the forested landscape. Maintaining the physical condition, ecological function and water quality of these systems is critical to sustaining diverse species and fisheries values. Hillslope conditions adjacent to watercourses, hydraulic and fluvial disturbance regimes contribute to the character of these habitats. Maintaining adequate forest cover in critical areas is important in maintain natural disturbance regimes.

At the watershed scale, understanding the watershed's character and physical processes is important to development plans and management strategies aligned EBM objectives. This means that Equivalent Clearcut Areas need to be tracked and the newly revised Watershed Assessment Procedure followed. The SCCF tenure overlaps multiple watersheds, in which they are not the sole licensee, so managing water flow will involve multiple partners and a collaborative effort.

At the site level, the CN and management zone boundaries need to be designed to maintain hydrogeomorphic functions and manage the risk of windthrow that could compromise the integrity and function of the hydroriparian system. For the SCCF, the management approach for most streams is to set aside the legal (FRPA) reserve zone then provide additional protection to address site level issues (considering both fish and wildlife that use terrestrial portions of the riparian system). Thus, flat rich riparian zones will usually receive greater protection than legal minimums, whereas incised bedrock steep canyons will likely receive the basic legal protection (assuming it is adequate to protect the creek). The CN frequently extends the width of riparian zone to capture larger forested areas, utilizing various streams as anchors to create connections across the landscape.

5.0 Wildlife Features

Within the SCCF tenure area, a multitude of species inhabit diverse ecosystems and may potentially be influenced by forestry activities. The LU plan for Chapman specifies two focal species – Marbled Murrelet (*Brachyramphus marmoratus*) and Coastal Tailed Frog (*Ascaphus truei*), the LU plan for Sechelt does not designate any focal species but has conducted extensive inventory on potential Marbled Murrelet to allow overlap between Old Growth Management Areas (OGMAs) their potential habitat.

From the SCCF perspective, it is essential to adopt a comprehensive and holistic approach that goes beyond focusing solely on the two species noted in the LU plans. Instead, maintaining the CN that represents a range of ecosystems and ensuring a diverse range of seral stages will be important coarse filter actions to maintain and ensure healthy populations of most species. As well, in instances where the coarse-filter EBM approach may not sufficiently address the life requisites of specific species, additional protections or management measures will be considered.

Moreover, EBM must consider how roads affect wildlife. While there is a strong demand for recreational access and access to fight fires in areas within proximity to communities, it is essential to recognize that a high degree of access has the potential to negatively affect some wildlife species and biodiversity due to increased human presence, hunting/gathering activities, and the introduction of foreign species. (See **Section 4.1** for more on roads).

The SCCF has initiated a project assessing the wildlife species present, that categorizes species into groups based on their primary habitat needs, and then evaluates the abundance of those habitats within the tenure. This is a ‘coarse filter’ approach to maintaining species biodiversity by maintaining habitat availability. Through this assessment, the two most sensitive vertebrate species identified are the Northern Goshawk (NOGO) and Marbled Murrelet (MAMU), both not known to be present in the tenure at this time, however, NOGO are associated with larger patches of mature forest and there is suitable habitat already in SCCF forests. MAMU, in contrast, are birds of old forests and little habitat currently exists in SCCF forests. The CN and future development of mature and older forest structures should encourage the presence of these species within the SCCF tenure. If nests are discovered, site-specific management will be required. Site-specific management is part of a fine filter approach – taking actions to protect or manage localized species or habitats when they are found. Generally, for both species, it is recommended to establish a reserve ranging from 75 ha and up to 200 ha, depending on nest site characteristics.

SCCF has contracted work on habitat models for Northern Goshawk and Marbled Murrelet, so that they can understand where the best habitat features are currently located, and track those over time to maintain and/or improve nesting opportunities.

Other elements appropriate for fine filter actions include bear dens and nest sites of other birds (e.g., raptors, herons, and pileated woodpeckers). A few of these are discussed below. **Appendix V** provides more detailed information on various wildlife species.

5.1 Bear Dens

Coastal black bears often den in areas of interest for forest harvest. Black bear dens are usually found in large conifer trees of all species. Large deciduous trees, such as cottonwoods, often with above ground entrances, are also sometimes used. As well, dens can be found under logs, in old stumps, or sometimes in debris piles. Denning occurs from sea level to higher elevation (e.g., CWHvm2 and MH).

Denning black bears are susceptible to disturbance, resulting in physiological stress. These effects are particularly acute when disturbance occurs less than 200 m from the den (Linnell et al. 2000) but can extend to 1000 m of the den site. Knowing locations of bear dens in and adjacent to proposed forest operations is critical so that they can be protected and buffered from disturbance.

Limiting protection to just the den tree may be adequate for some male bears, but it is not adequate for female bears who need adjacent standing trees to provide safe escape routes for their cubs. Therefore, protection of bear dens in the SCCF should include not only protection of the tree itself, but also a reserve zone and flexible management zone to create a resilient habitat patch.

Helen Davis (Davis 2021a,b) suggests methods of identifying and protecting bear dens (using the best-available information to ensure that:

1. The den feature remains usable e by black bears into the future,
2. Bears that attempt to use the den are not disturbed or displaced by forest harvesting activities, and
3. Female bears that reproduce in dens have access, with their cubs, to secure escape cover after emerging from their dens.

Reserves zones should be 30 m diameter around a den feature, serving as the primary area necessary to provide cover and escape structures for female bears and cubs, and protection from wind disturbance. The reserve zone can be incorporated into stand retention and linked to other landscape level reserves to provide a management zone.

The management zone extends beyond the reserve zone, ensuring that the total area protected around the den is at least 1 ha. That management zone is intended to minimize the risk of windthrow in the reserve zone and provides additional cover and escape structures for female bears and cubs. Hence the buffer around the reserve zone can be ‘shaped’ to add protection on windward sides, link the reserve to nearby forest, or add an area away from nearby roads. Salvage of windthrown trees in the management zone should be minimal (e.g., if required for road access). Where practicable, suitable spruce, western redcedar and yellow cedar should be included in management zones for long-term den recruitment.

After establishing the reserve and management zone, human disturbance must still be considered. Roads should be located as far from a den as practicable (where practicable at least 75 m away and ideally >200m away). Human activities during denning seasons should be restricted to essential travel only. Harvest operations should be limited to late spring through early fall within 1 km of known den sites. These distances are conservative and under study and may be revised in future.

5.2 Other Species

Other localized features such as Pileated Woodpecker nests and raptor nests also require site level management, with buffers set in accordance with regulations⁷. The identification of these features is an important step in the inventory process for future harvest plans¹.

Furthermore, many other species are of local interest within the SCCF. Current provincial models of ungulate habitat quality are unavailable for wider use, so the SCCF has contracted work on identifying deer and elk seasonal habitats. These identified habitats will be integrated into the CN based on suitability.

⁷ For guidance on Pileated woodpecker nest identification see <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/pileated-woodpecker-cavity-identification-guide.html>

Additionally, a companion document focusing on wildlife habitat groupings within the SCCF will soon be made available, providing further insights and information on a variety of species. The basic approaches of the wildlife groupings are in **Appendix 6**.

6.0 Adaptive Management: Monitoring and Revision

The SCCF is embarking on EBM, which will involve learning as new approaches are implemented and will necessitate revisions in both planning and practices in response to new understanding. Documenting objectives, the intent of practices, and the results of those practices will be crucial to facilitate ongoing learning and growth. Two types of monitoring will be initiated in SCCF tenures: implementation monitoring and effectiveness monitoring.

Implementation Monitoring

Implementation monitoring aims to assess if the new EBM plans are being implemented as expected and to identify any issues that arise during implementation, allowing for the revision and improvement of management approaches.

Implementation monitoring essentially asks the question: did we do what we said we would? Key elements to monitor include:

- Is the level of variable retention and forest influence being met in each zone?
- Are the new 'reserve plus management zone width' stream buffers being applied consistently?
- Are retention practices keeping the large live trees, large down wood and large snags and are the patches anchored on important ecological and cultural features?
- Is 30% of the SCCF within the CN? Is it well distributed cross ecosystems?
- Have shíshálh and the community contributed ideas for the CN and EBM practices and have those ideas been considered?
- How often are recreation trails buffered versus re-established?
- Have road building practices followed recommended practices for climate change?

Effectiveness Monitoring

Effectiveness monitoring seeks to determine whether the EBM approaches are achieving the ecological objectives that were set out. Effectiveness monitoring is often challenging to quantify but important to pursue. While conducting large research projects on impacts of seral stage and stand features on species populations are beyond the budget of the SCCF, some key questions can still be answered. These could include for example:

- How are retained trees holding up to wind?
- What design of individual trees and patches are working best or not working well to keep trees standing?
- Are roads ditches and structures accommodating water run off as expected? What aspects of road design are working or not working and how can they be improved?
- Is water quality and quantity changing from baselines?
- Is forest interior habitat present?

- Is local habitat supporting the species we expect (e.g., are cavity nesters using retention areas and forest reserves; are red-legged frogs and other amphibians present in retained wetlands in and out of reserves)?
- Are cultural areas being protected/managed as expected from shíshálh's perspective?

The research zone present within the SCCF offers a unique opportunity for active experiments to augment learnings from the MoF on retention forestry. In other zones, less rigorous investigations could use citizen scientists to advance some of the broader learning. Topics like amphibian and insect use of wetlands, bird presence in different seral stages and under different retention practices, are examples where citizen science could contribute to monitoring learning process. These efforts will foster ongoing improvements in EBM within the SCCF tenures.

7.0 References

- Forest Analysis and Inventory Branch (FAIB). 2022. Forest Vegetation Composite Polygons [Data set]. Data Catalogue (gov.bc.ca)
- Forest Analysis and Inventory Branch (FAIB). 2021. BEC Map [Data set]. Data Catalogue (gov.bc.ca)
- Association of BC Forest Professionals and Engineers and Geoscientists British Columbia (ABC FP and EGBC). 2008. Guidelines for management of terrain stability in the forest sector. <https://www.egbc.ca/getmedia/d0278061-31da-46be-822d32600f83a7fe/APEGBC-Guidelines-for-Management-of-Terrain-Stability-in-theForest-Sector.aspx>
- _____. 2010. Guidelines for professional services in the forest sector – terrain stability assessments. <https://www.egbc.ca/getmedia/684901d7-779e-41dc-8225-05b024beae4f/APEGBC-Guidelines-for-Terrain-Stability-Assessments.pdf.aspx>
- _____. 2012. Guidelines for professional services in the forest sector – forest roads. <https://www.egbc.ca/getmedia/b76d39fb-f39c-4939-8bc7-2c48013c4895/APEGBCGuidelines-Professional-Services-Forest-Roads.pdf.aspx>
- _____. 2020. Joint professional practice guidelines. Watershed assessment and management of hydrologic and geomorphic risk in the forest sector. <https://www.egbc.ca/getmedia/8742bd3b-14d0-47e2-b64d-9ee81c53a81f/EGBCABC FP-Watershed-Assessment-V1-0.pdf.aspx>
- _____. 2021. Joint professional practice guidelines. Professional services in the forest sector: crossings. Version 3.0. [https://tools.egbc.ca/Practice-Resources/IndividualPractice/GuidelinesAdvisories/Document/01525AMW23GFLUWJCAIFGI3P5YWZKMZS3G/Professional %20Services%20in%20the%20Forest%20Sector%20-%20Crossings](https://tools.egbc.ca/Practice-Resources/IndividualPractice/GuidelinesAdvisories/Document/01525AMW23GFLUWJCAIFGI3P5YWZKMZS3G/Professional%20Services%20in%20the%20Forest%20Sector%20-%20Crossings)
- Baker, S.C., S.J. Grove, T.J. Wardlaw, D.J. McElwee, M.G. Neyland, R.E. Scott, and S.M. Read. 2017. Monitoring the implementation of variable retention silviculture in wet eucalypt forest: a key element of successful adaptive management. *For. Ecol. Manag.* 394:27–41.
- Baker, S.C. and S.M. Read. 2011. Variable retention silviculture in Tasmania’s wet forests: ecological rationale, adaptive management and synthesis of biodiversity benefits. *Aust. For.* 74:218–232.
- Beese, W.J., J. Deal, G. Dunsworth, S. Mitchell, and T. Phipott. 2019. Two decades of variable retention in British Columbia: a review of its implementation and effectiveness for biodiversity conservation. *Ecol. Process.* 8:33. <https://ecologicalprocesses.springeropen.com/articles/10.1186/s13717-019-0181-2>
- Carson, B. and D. Maloney. 2021. B.C. Ministry of Forests, Range, Natural Resource Operations and Rural Development. Water Quality Effectiveness Evaluation: Water Quality Data Summary for 2008-2020. FREP Report # 42
- Davis, H. 2021a. Coastal bear den identification manual (Version 2). Artemis Wildlife Consultants, Victoria, B.C. http://artemiswildlife.com/AWC_Bear_Den_ID_manual_v2.pdf

- _____. 2021b. Stand-level retention guidelines for bear dens. Artemis Wildlife Consultants, Victoria, B.C. www.artemiswildlife.com/AWC%20stand%20level%20bear%20den%20retention%20guidelines.pdf
- EBA Engineering. 2000. Watershed assessment (CWAP) for Chapman Creek and Gray Creek, Sechelt, BC. Final report. 52 pp plus appendices.
- Forest Practices Code. 1995. Biodiversity guidebook. For. Pract. Code B.C., Victoria, B.C.
- Franklin, J.F., D.R. Berg, D.A. Thornburgh, and J.C. Tappeiner. 1997. Alternative silvicultural approaches to timber harvesting: variable retention harvest systems. In: *Creating a forestry for the 21st century: the science of ecosystem management*. K.A. Kohm and J.F. Franklin (editors). Island Press, Washington, D.C., pp. 111–139.
- Gustafsson, L., S.C. Baker, J. Bauhus, W.J. Beese, A. Brodie, J. Kouki, D.B. Lindenmayer, A. Löhmus, G.M. Pastur, C. Messier, M. Neyland, B. Palik, A. Sverdrup-Thygeson, W.J.A. Volney, A. Wayne, and J.F. Franklin. 2012. Retention forestry to maintain multifunctional forests: a world perspective. *Bioscience* 62:633–645.
- Huggard, D. 2004. Weyerhaeuser BC variable retention adaptive management program habitat monitoring 1999 to 2004 – summary and data report. Prepared for Weyerhaeuser BC Coastal Group.
- lil xemit tems swiya nelh mes stutula A Strategic Land Use Plan for the shíshálh Nation . June 2007.
- Lindenmayer, D.B. and J.F. Franklin. 2002. *Conserving forest biodiversity: a comprehensive multiscaled approach*. Island Press
- Linnel, J.D.C., J.E. Swenson and R. Anderson. 2001. Predators and people: conservation of large carnivores is possible at high human densities if management policy is favourable. *Animal Conservation forum* 4 (4):345-349.
- Outerbridge, R.A. and J.A. Trofymow. 2004. Diversity of ectomycorrhizae on experimentally planted Douglas-fir seedlings in variable retention forestry sites on southern Vancouver Island. *Can. J. Bot.* 82:1671–1681.
- Steventon, J.D., K.L. MacKenzie, and T.E. Mahon. 1998. Response of small mammals and birds to partial cutting and clearcutting in northwest British Columbia. *For. Chron.* 74:703–713.
- Sullivan, T.P. and D.S. Sullivan. 2001. Influence of variable retention harvests on forest ecosystems. II. Diversity and population dynamics of small mammals. *J. Appl. Ecol.* 38:1234–1252.
- Zielke, K., K. Byrne, and B. Bancroft. 2022. Windthrow management manual for coastal British Columbia. A compendium of information and tools for predicting and managing windthrow and on the BC Coast. BCTS Chinook and Strait of Georgia Business Areas. <https://www2.gov.bc.ca/assets/gov/farming-natural-resources-andindustry/forestry/bc-timber-sales/ems-sfm-certification/business-area/chinook/tchtsg-windthrow-manual.pdf>

Appendix I. Supplemental information on the Conservation Network

The current draft conservation network is primarily designed based on ecological objectives and recreational use. These considerations include, but are not limited to:

- Red- or blue-ecosystems in suitable condition have been included.
- Ecologically significant areas (i.e., wetlands, streams, and old forest) have been included.
- Connections built to existing reserves (i.e., parks and OGMAs).
- Inclusion of high-use recreation trails.
- Consideration of the parks located outside the tenure areas to help create larger areas of contiguous forest patches.

Additional considerations for cultural and community inputs are still required to finalize the conservation network. The current conservation network is considered a living design that will undergo continuous refinement after areas have been assessed. Refinements are typically ecologically focused based on the forest and recreation attributes observed. However, future revisions to the conservation network will be necessary and imperative and include:

- Input from the shíshálh,
- Input and review from the community,
- Additional forested attribute assessments and landscape context assessments within the Angus/Gray/Chapman area, and

Incorporation of results of the wildlife habitat suitability models (i.e., elk, deer, marbled murrelet, and northern goshawk).

In consultation with the SCCF operations manager, a preliminary conservation network has been developed, which captures 30% or more of the SCCF BEC units. The conservation network design is based on the principles and methodologies outlined in the Great Bear Rainforest Order and the Elements of Good Design. These principles include:

- Representation – protection should be distributed across the landscape capturing a variety of forested ecosystems.
- Distribution – reserves should capture a range of elevations and geographic positions on the landscape, although there are trade-offs between distribution and size (greater distribution usually indicates smaller reserve patches).
- Connection – creating connections to other reserves or linkages across to parks and protected areas provides spatial continuity and can facilitate the movement and migration of various species.
- Size – the larger the reserve the more ecologically valuable they can be as they increase forest interior.
- Configuration – highly irregular boundaries and peninsulas can have higher proportion of edges, reducing the function of the forest.

It is important to note that while these principles inform the conservation network's design, not all principles can always be met equally.

To support design of the Conservation Network, in 2021, the SCCF contracted Madone Environmental Services ('Madrone') to complete an Old Forest and At-Risk Ecological Communities: Interpretation and TEM Analysis for the Sunshine Coast Community Forest (the 'Study'). The objectives of the Study were to:

1. Conduct a desktop review of the existing TEM to identify areas to assess for retention of, and potential recruitment to, old forest,
2. Field assesses potential areas for recruitment and retention,
3. Rank field verified stands on their old forest attributes, and
4. Recommend stand for recruitment and retention based on their rankings and context with the landscape.

The detailed report for the Study is available on the SCCFs website. While most of the CN needs to be in younger forest due to the lack of old forest and location of important values, one component of the CN is to include the remaining old forest and include structurally complex second growth as recruitment. The Study assessed several areas for forest attributes and identified 10 locations that could serve as building blocks for a conservation network that would help the SCCF achieve a 30% BEC unit goal for conservation of biodiversity and promotion of old forest attributes. The 10 building blocks were based on the assessment of 34 priority areas identified based on ecological attributes (i.e., possible red or blue listed communities, potential for old forest attributes, stands with larger quadratic mean diameters, stands with the potential to have Veteran Overstory Trees (VOTs)). The 10 locations included:

- Three (3) areas in Halfmoon Bay
- Three (3) areas in Wilson Creek, and
- Four (4) areas in Angus/Gray/Chapman.

Over the last two years and using the methods outlined in the study and Land Management Handbook 72, "Guidelines to Support Implementation of the Great Bear Rainforest Order with Respect to Old Forest and Listed Plant Communities", continued assessment of forested areas within the SCCF has been ongoing. To date, a total of 120 plots have been established, including those within the original Study. These plots provide a systematic way to rank ecosystem units based upon their stand-level attributes. Of the 120 plots

- 63 assessments have been carried out in Angus/Gray/Chapman,
- 32 assessments have been carried out in Halfmoon Bay, and
- 25 assessments have been carried out in Wilson Creek.

Forest Attribute Scores (FAS) range from these assessments range 0 to 11.5 throughout the tenure area (**Figure II-1**). With many of the areas having a score between 3 and 3.5. FAS between 6.5 – 11.5 are considered to pass that FAS and have sufficient features that support Old Forest attributes, many of these ecosystem units have been included in the conservation network, where feasible. In areas where the FAS is around 5 – 6 (does not pass the FAS) the ecosystem units may not have features that indicate Old Forest attributes but could be considered good recruitment for future Old Forests.

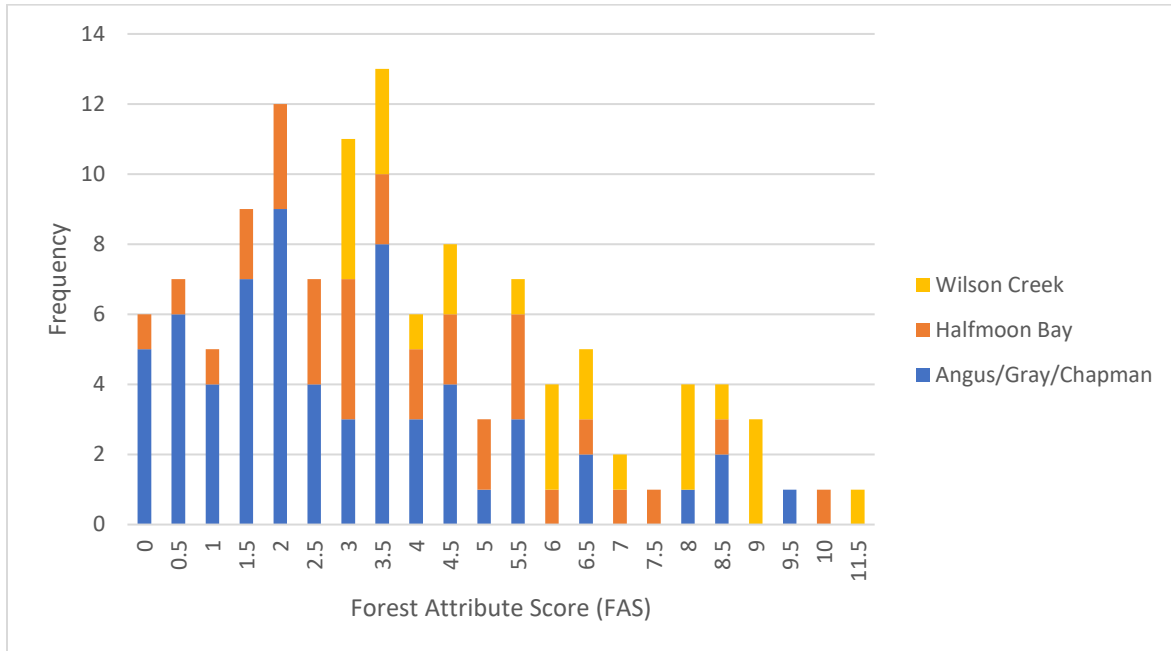


Figure II-1: Frequency distribution of all Forest Attribute Scores (FAS) conducted to date, November 7, 2023, per tenure area.

Forest attribute scores are one of many inputs used to the design of the Conservation Network, ensuring old forest is protected and identifying areas of structural complexity for recruitment. These assessments identify only a small proportion of the Conservation Network. Most of the Conservation Network includes areas that do not pass the FAS but have features, or are in locations, that capture other important ecological, social or cultural values.

Appendix II. Stand-level Practices

Glossary of Terms	
Clearcutting	Complete removal of trees within a designated area
Selective Logging	Individual trees or groups of trees or specific tree species are selectively harvested while leaving the surrounding forest intact
Variable Retention	A general term describing harvesting that retains trees within a harvested area, preserving specific ecological features or habitat elements. It can include selective logging, clearcuts with reserves of dispersed or aggregated retention, or the retention silvicultural system.
Retention silvicultural system	A specific silvicultural system intended retain individual trees or groups of trees to maintain structural diversity over the area of the cutblock for at least one rotation, and leave more than half the total area of the cutblock within one tree height from the base of a tree or group of trees, whether or not the tree or group of trees is inside the cutblock.
Wildlife Tree Retention	Specific trees within a harvest area are preserved to provide habitat for wildlife species, such as cavity-nesting birds, bats, or mammals.
Single-stem harvesting	Individual trees are selectively harvested, promoting a multi-aged forest with minimal disruption to the overall canopy.
Partial Cutting	Involves the selective removal of only a portion of trees within a forest stand, leaving the remaining trees and vegetation intact. Allows for the retention of some canopy cover and the preservation of certain forest attributes.
Shelterwood	Harvest patterns that leave some overstorey to shade and protect the new understorey trees. Often multiple entries are used to open the stand, or groups or strips are left as protection, then harvested after young trees are established.
Group Selection	Harvest that creates opening less than 1 or 2 tree lengths so that openings are protected/influenced by surrounding trees.

Importance of Retaining Structures:

Although the SCCF has examples of patch and dispersed retention in clearcuts, it has now adopted the retention silvicultural system which adds more requirements to amounts and distribution of retention. Scientific evidence continues to grow to support the importance of retaining trees from the previous stand to allow more rapid recovery of ecosystem function of the new stand, both for above and below ground ecosystem function.

Some natural disturbances remove all forest cover, but most leave patches of live and dead trees and logs. In the SCCF, historically, fires could be large but infrequent (in the order of hundreds of years between large fires), forests landslides are uncommon, and windthrow tends not to cover large areas. More common are 'gap dynamics' where insects and disease and lack of light availability kills individual and groups of trees. Although there is a suite of species adapted to early seral conditions following extensive fires, landslide and windthrow, almost none require areas devoid of trees, and most benefit from retaining structures in harvested stands.

Retaining structures from the original stand such as large trees, dead trees and large down wood, has been accepted as an effective approach at maintaining and creating structural diversity in harvested stands. These retained structures serve several important ecological functions (Huggard 2004; Outerbridge and Trofymow 2004; Steventon et al 1998; Sullivan and Sullivan 2001):

- Lifeboat species following logging by conserving their essential habitat (e.g., bat roost in snags, root networks for mycorrhizae),
- Structurally enrich the new stands to allow organisms to colonize more quickly,
- Modify post-harvest microclimate to make it less harsh for species,
- Facilitate movement of organisms through harvested stands, and
- Buffer protected or ecologically significant areas near harvested areas.

The retained structures help harvested stands attain the function of old stands sooner than if the structures were not retained.

EBM recognizes human well-being and should take into consideration harvest costs associated with complexities of retaining structures during harvest. The main questions for EBM are how much to retain and where to retain it. Thus, linking retention practices to management zones becomes a useful approach.

Silvicultural systems in the SCCF:

Traditional silvicultural systems on BC's coast and in the SCCF included 'clearcut with reserves' logging that is simple to implement and opens the area to full light to allow rapid growth of the next planting crop, while maximizing economic returns. Most clearcut logging in the SCCF has retained some structure in or near the harvested opening by leaving Wildlife Tree Retention Areas (WTRA); this "clearcuts with reserves" system is the most common harvest system on coastal BC. The patches of trees are retained in the block or adjacent to the block to provide some forest structures near to blocks until the next harvest.

Partial cutting is also used in the SCCF, but not commonly. SCCF has not engaged in helicopter (heli) logging nor single stem harvesting. Heli logging is expensive and most slopes in the SCCF allow for road access. Single stem harvesting from the ground is difficult and dangerous in forests with many tall trees and it is difficult to encourage adequate tree regeneration underneath.

Although the SCCF has examples of patch and dispersed retention in clearcuts, it has now adopted the retention silvicultural system which adds more requirements to amounts and distribution of retention.

Stand practices include more than just harvesting. The harvested area is sometimes prepared for planting, then planted, young stands can be spaced and older stands thinned before the stand is ready to harvest again. Historically, harvested stands in coastal BC and the SCCF were broadcast burned to prepare them for planting of monoculture Douglas-fir. This practice approximated the effects of fire but also created too much smoke for residents and removes fine debris and nutrients from the site. Today, most stands in the SCCF are planted with a combination of natural regeneration and planted seedlings. The SCCF does not use herbicides to control brush, but sometimes will manually brush competing vegetation. While spacing of young trees, and commercial thinning of older trees are part of the silvicultural regime to steward planted areas towards the next harvest, they often are not economically beneficial in the short term and are seldom done without opportunities provided by government investment. Nonetheless, the SCCF hopes to use thinning as a tool in their forest management.

How to retain:

At least some of the retained structures should be large (or at least as large as possible given the sizes in the stand), spatial distribution is important so that retention influences much of the block (retention at edges usually affects only a small proportion of the block), and structures should be retained for at least a rotation.

Most research suggest patches are more effective and withstand wind better than retaining individual trees (see Zielke et al. 2002 for windthrow management guidance). Whereas retaining individual trees focuses only on one habitat element (the tree itself), retaining a patch allows for trees, snags, down wood and understory to be maintained. Nonetheless, individual tree retention when focused on windfirm trees, can provide perch sites, nest sites, hibernacula, and allow for underground root connections to be maintained. Thus, a mix of retention is suggested, focused on patches, but with individual trees used in appropriate areas where they are most likely windfirm.

Open grown Douglas-fir trees and older western redcedar trees, often tend to be the most windfirm (depending on site conditions). Some stands of pure hemlock do not lend themselves to retention very successfully, unless windfirming treatments are effectively applied. Hemlock is a shallow-rooted species and notorious for blowdown in storms (which is expected to become more frequent and forceful with climate change). Strong storms, of course, can blow over even the most windfirm tree as intensity and frequency of storms increases. Nonetheless, even downed structure is better than no structure in post-harvest blocks.

Where to retain:

Identifying and prioritizing management objectives to define tradeoffs between economic, social and conservation goals should precede the development of a silvicultural prescription. Management Zones focused on old growth or recreation for example, could have higher levels of retention, whereas those focused on timber or fire management near homes and communities could have lower levels of retention. The site conditions of a harvested block will in part determine how much or what type of retention is possible. Gentle sites allow easier access and maneuverability of equipment to allow different patterns of retention. Available equipment and trained operators will also affect what types of retention can be used where.

Recognize that moving to retention, as well as leaving economic value behind as ecological capital, requires learning, sometimes requires new equipment, and costs will be larger until experience with the practice is gained. Consider moving towards retention in a graduated approach.

Appendix III. Streamside Protection and Management Zone Strategy

Waterbodies and their adjacent riparian habitats are unique environments in forests due to their role in water flow and their high diversity and productivity. The FRPA, its regulations and the Riparian Management Area Guidebook establish minimum riparian reserve and riparian management zones for streams, wetlands and lakes. While the reserve zone is considered a 'no go' area, the management zone is intended to protect the reserve zone, although high proportions of management zones are typically harvested. However, the SCCF has opted for a more ecologically conservative approach to managing riparian areas by exceeding the legal minimums to meet site-level features and objectives.

There are other approaches to riparian management in the province. For example, The Clayoquot Scientific Panel, for example, suggested a stream classification and protection levels based on substrate, width, slope and whether the stream was entrenched in a gully. Greater protection is given to low-slope, alluvial channels than to steeper streams flowing through bedrock. The Great Bear Rainforest Order generally applies 1.5 tree length buffers to most streams or protects both the FRPA reserve and management zone, with details varying based on proximity to fish habitat.

The SCCF wants to change from a simple distance-derived management zones, to a more comprehensive consideration of the values near each waterbody. FRPA schedules provide guidance on the considerations that should inform streamside area management close to the reserve zone. Considerations include:

- Is additional buffering or other management actions needed to protect the aquatic ecosystem from the introduction of materials that are deleterious to water quality or fish habitat?
- What role do the trees and understory vegetation in conserving water quality, fish habitat, wildlife habitat and biodiversity?
- What is the role of forest shading in controlling an increase in temperature within a temperature sensitive stream, if the increase might have a deleterious effect on fish or fish habitat?
- Are reserves sufficient to maintain stream bank and stream channel integrity?
- What is the relative importance and sensitivity of the waterbody under consideration in terms of fish and wildlife habitat?
- What type, timing or intensity of forest practices are most appropriate for the water quality and flow, fish, and biodiversity values of the watercourse?

Protection of watercourses will require assessing the role of riparian buffers on downstream values such as fish habitat, food sources, water quality, and protection of adjacent habitat for flora and fauna using streamside areas. Using these considerations, flatter areas will typically receive larger buffers than steep streams incised in bedrock. Most of riparian areas associated with larger streams is included in the CN, with much larger buffer than legally required by FRPA.

The protection of upland streams (non-fish-bearing S5 and S6s) within the SCCF will depend on their proximity to fish-bearing streams and stream characteristics. S5 streams can vary substantially in size and can convey substantial flows, S5's streams usually have a protected management zone (i.e., 30 m buffer), but that size may vary based on site characteristics. S6's streams, within a 100 m of a fish-bearing stream will have a minimum 20 m management zone. However, S6's located > 100 m from fish habitat, will have a management zone based on riparian and stream characteristics. S6's with unique microclimate, or

amphibian breeding presence, will receive a minimum of a 20 m protection zone. S6's without these special characteristics will receive a protection zone that suits the site and considers wind throw risk. Although a standing buffer is preferred, some S6's in windy situations may not have a standing tree buffer but will be high stumped and fall and yard away.

All non-classified drainages (NCD define) will follow the Riparian Management Area Guidebook best practices and use fall and yard away.

Monitoring of the actions applied and the results established management and protection will be critical in assessing if the stream and riparian habitat are adequately protected and will allow for improvements and modifications in practice over time.

Appendix IV. Objectives by polygon for each management zone

Research Zone:

EW-RSH-02:

- No harvest of old forest.
- Protect shíshááh cultural values.
- Objectives as stated for the broad zone: there is only one polygon in this zone which is legally associated with silvicultural systems research trials.
- Part of this polygon lies in the WUI and may need fire risk reduction actions.
- Potential for a mother tree project or high retention system research.

Recreation Zone:

AN-REC-02:

- No harvest of old forest.
- Protect shíshááh cultural values.
- Focus on maintaining Hidden Grove trails.
- Maintain visual objectives.
- Polygon lies within WUI.
- To check FSP and add consideration of trails around Tuwanek.

HMB-REC-03:

- No harvest of old forest.
- Protect shíshááh cultural values.
- Support recreation values and user experience around Phare (Wormy) Lake campsite and surrounding trails.
- Maintaining access roads to campsites and surrounding trails.
- Visual objectives are a secondary objective.
- Part of this polygon lies in the WUI and may need fire risk reduction actions.
- Maintain a lake buffer around Phare (Wormy) in the Conservation network.
- Continue managing invasive plants.
- Continue providing opportunities for naturalist and citizen scientists (e.g., wetland creation projects, bird box projects).

HMB-REC-04:

- No harvest of old forest.
- Protect shíshááh cultural values.
- Focus on Crowston Lake campsite and surrounding trails.
- Visual objectives are a secondary objective.
- Consider visual objectives.
- Part of this polygon lies in the WUI and may need fire risk reduction actions.

EW-REC-03:

- No harvest of old forest.

- Protect shísháhlh cultural values.
- Objectives as for broad zone.
- Focus on restoring 30% old forest,
- Part of this polygon lies in the WUI and may need fire risk reduction actions.
- Use higher levels of retention in harvested blocks.
- Focus on recruitment of Old Forest through the conservation network.
- Consideration of buffers for adjacent private properties.

Integrated Forest Management Zone:

AN-IFZ-01:

- Most of the area is old growth and will not be harvested, however, some forest management may be required for forest health outbreaks or wildfire.
- No harvest of old forest.
- Protect shísháhlh cultural values.

AN-IFZ-03:

- Objectives as for Integrated Forest Management Zone.
- No harvest of old forest.
- Protect shísháhlh cultural values.
- Visual objectives are a secondary objective.
- A larger portion of this zone lies within a WUI and will need active management for fire risk reduction actions.

EW-IFZ-01:

- No harvest of old forest.
- Protect shísháhlh cultural values.
- Maintain function of legacy trails.
- Part of this polygon lies in the WUI and may need fire risk reduction actions.

HMB-PZ-01:

- No harvest of old forest.
- Protect shísháhlh cultural values.
- Focus on restoring 30% old forest.
- Buffer existing forest trails where practicable.
- Maintain and enhance existing and recognized community trails.
- Part of this polygon lies in the WUI and may need fire risk reduction actions.

Water Quality

CH-WQ-01:

- No harvest in watershed for at least the deferral period.

- No harvest of old forest.
- Protect shíshálh cultural values.

CH-WQ-02:

- No harvest in watershed for at least the deferral period.
- No harvest of old forest.
- Protect shíshálh cultural values.

CH-WQ-03:

- No harvest in watershed for at least the deferral period.
- No harvest of old forest.
- Protect shíshálh cultural values.

CH-WQ-04

- A small sliver in East Wilson falls within the Chapman Creek Watershed and will be managed the same as the rest of the Chapman Watershed.

HMB-WQ-01:

- No harvest of old forest.
- Protect shíshálh cultural values.
- Protect Halfmoon Bay Creek water supply.
- Focus on restoring 30% old forest.
- Implement high levels (20%) of stand-level retention.
- Part of this polygon lies in the WUI and may need fire risk reduction actions.

GR-WQ-01:

- No harvest of old forest.
- Protect shíshálh cultural values.
- Focus on restoring 30% old forest.
- Implement high levels (20%) of stand-level retention.

GR-PZ-02:

- No harvest of old forest.
- Protect shíshálh cultural values.
- Focus on restoring 30% old forest.
- Implement high levels (20%) of stand-level retention.

GR-WQ-02:

- objectives as for Integrated Forest Management Zone.
- No harvest of old forest.
- Protect shíshálh cultural values.
- This polygon is mostly an OGMA to maintain.
- Part of this polygon lies in the WUI and may need fire risk reduction actions.

Appendix V. Wildlife Species Habitat Groups

1.0 Background and Context

The objective of the species habitat assessment is to categorize species into discrete habitat groups, enabling the evaluation of the likelihood sustaining these habitat and subsequent species for future forest planning practices. The habitat groups outlined in Section 3, below, focus exclusively on high-priority terrestrial vertebrates. Examination of the species habitat groups are also applicable to many species other than vertebrates. Assessment of non-priority vertebrates and priority non-vertebrates will be conducted in the future.

The assignment of species into habitat groups for the Sunshine Coast Community Forest (SCCF) tenure area is intended to:

- 1) Estimate the approximate quantity and location of suitable habitat for high-priority⁸ forest-dwelling vertebrates;
- 2) Enable the ‘scaling up’ of monitoring findings, providing estimates of the amount of suitable habitat, location, and timing; and provide credence to indicators assessing ecosystem representation and habitat by evaluating species associations with those measures;
- 3) Focus potentially expensive effectiveness monitoring on areas of greatest uncertainty; and
- 4) Allow for revisions of species assignments to monitoring groups as data is acquired, thereby increasing the credibility of the system over time.

2.0 High Priority Species in the Sunshine Coast Community Forest

High-priority species were identified using British Columbia’s Conservation Framework⁹. In 2008, the province adopted a conservation framework intended to make the allocation of conservation efforts more cost-effective in terms of allocation of resources and more effective in achieving desired outcomes. That framework is described in detail by Bunnell et al. (2009a). One aspect of the framework is a ranking of each species by priority in three different goals that broadly recognize the conservation adage – think globally act locally. These goals are:

1. **Contribute to Global Species Conservation.** Goal 1 recognizes that certain widespread species may occur sparsely in British Columbia but are under threat throughout their range. It is intended to ensure that some provincial resources are assigned to conserving species globally at risk, even when these are widely distributed.
2. **Prevent Species from Becoming At Risk.** Goal 2 is intended to be proactive and provide early detection of threats, thereby reducing the need for costly recovery actions. It is facilitated by

⁸ Group 4 and some riparian species are exceptions because their habitat is too finely discriminated to be included in GIS layers. For these species specifically designed guidelines can assign appropriate action to be undertaken when that habitat is encountered.

⁹ <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/implementation>

including all native species in assessments of priority, rather than focusing solely on those already 'at risk'.

3. **Maintaining Richness of Native Species.** Goal 3 represents efforts to sustain all native species, even when only jurisdictionally rare and abundant elsewhere. It is intended to ensure that challenging, jurisdictionally rare species will not be ignored in pursuit of Goal 2.

There are 6 potential ranks within the Conservation Framework, with 1 being the highest and 6 being the lowest ranks. The province reports rankings¹⁰ for each species evaluated within each of the three conservation goals. We considered high-ranking species to be those with a ranking of 1 or 2 in any of the three goals. All species with a high ranking and occurring within SCCF tenure were included. It is apparent (Table VI-2) that most species ranking highly within the conservation framework, rank highly in the proactive goal, goal 2. This observation emphasizes the role of monitoring in early threat detection.

Furthermore, species that are listed as being either red or blue by the BC Conservation Data Centre or listed by COSEWIC or SARA were considered. Thus, species considered at risk or of management concern were assessed by a variety of methods.

3.0 Species Habitat Groups

There are six species habitat groups:

- **Group 1:** Generalists, species that inhabit many habitat types or respond positively to forest practices.
- **Group 2:** Species that can be statistically assigned a broad habitat types or seral stages as defined by forest inventory, such as the Vegetation Resource Inventory (VRI) (e.g., recently disturbed, young forest, old conifer).
- **Group 3:** Species with a strong dependency on a specific habitat element (e.g., snags, down wood, understory or riparian areas).
- **Group 4:** Species restricted to specialized and highly localized habitats (e.g., heron rookeries, bat hibernacula). Group 4 species are managed and monitored when their locations become known.
- **Group 5:** Species for which patch size and connectivity are important (i.e., larger patches of forest).
- **Group 6:** Species that do not use forested habitats (e.g., marine, aquatic, meadows, grasslands, rocks)

Species can be assigned multiple habitat groups, but the first group is the primary assignment. A modifier code (**Table V-1**) is used to provide further refinement of the primary group assignment.

Table V-1: Species habitat group modifiers that can be used for Group 2 (species broad habitat types) and Group 3 (species with strong dependencies). Group 6 species could also be assigned modifiers, but these are non-forest dwelling species unlikely to be affected by Forestry.

Group	Group Modifier	Description
2 (uses broad seral stages)	RD	Recent Disturbance: 0 to 20 yrs. old; intended to represent the period of shrub abundance post disturbance (i.e., cutblock).
	C1	Conifer and mixed: 21-60 yrs
	C2	Conifer and mixed: age 61-140 yrs
	C3	Conifer and mixed: age >140 yrs
	PO	Productive old growth (high structural and old growth attributes)
	O	Open areas of low vegetation with retention (low amounts of structure)
	D	Deciduous dominated forest
	A	Needs forest but of any seral stage
3 (uses habitat elements)	c	Uses cavities and snags
	dw	Uses or found on down wood
	t	Uses or found on trees
	s	Uses or found on shrubs
	r	Uses or found in riparian areas of streams
	w	Uses or found in wetland or very moist areas
6 (uses non-forest)	mm	meadow
	cl	cliffs
	gr	grassland/pasture
	al	alpine
	cv	cave

4.0 Results of Assigning High Priority Vertebrate Species to Species Habitat Groups

Table V-2 summarizes the assignment of species to habitat groups, highlights are discussed below. It's important to note that species habitat groups are not discussed in order, rather Group 1 and Group 6 are discussed first as these are the least likely to be sensitive to forestry activities or are good candidates for monitoring impacts of forest practices.

Group 1 High Priority Species Summary

- Only five (5) high-priority terrestrial vertebrate species (American Kestrel, grizzly bear, northern rubber boa, band tailed pigeon, and rufous hummingbird) in Group 1. These species are considered **habitat generalists** and are highly unlikely to be adversely affected by forest practices.
- Group 1 species are not currently candidates for management or monitoring. However, if the range of Grizzly Bears expands into Angus/Gray/Chapman tenure area, there will be a need for species-specific management and monitoring. It is important to note that they are unlikely to reach Wilson Creek or Halfmoon Bay tenure areas in the near future.
- Rufous hummingbird's range has been expanding, encouraged by increasing numbers of hummingbird feeders in the region.

- The band-tailed pigeon is a species of concern. The pigeon uses mineral licks, which usually are highly localized. However, it was not designate it a Group 4 (localized habitat) species because observations suggest that, while it prefers mid-elevations, it occurs in all variant classes and all habitat classes..
- American Kestrels are known to use a variety of open and wooded habitats.
- Rubber Boa are rare or unlikely or to be found in the SCCF.

Group 6 was added for completeness so that forest managers and the public can know the status of species that are present in the tenure but prefer **non-forested habitat**.

- 27 high priority vertebrate species were assigned to Group 6.
- Forestry practices are unlikely to affect these species, so they are not priority candidates for management or monitoring.

Combining Groups 1 and 6 indicates that 32 of the high-priority terrestrial vertebrate species potentially present are unlikely to be affected by forestry and are not considered good candidates for monitoring the impacts of forestry activities.

Group 2 species are statistically associated with a **particular seral stage**.

- Current analyses suggest that 22 species can assigned to Group 2.
- Many Group 2 species are associated with open forest (e.g., Townsend's solitaire, pine siskin, olive-sided flycatcher, evening grosbeak, mourning dove, hoary bat, long-eared myotis,) but many more are associated with older forests: southern red-backed vole, mountain goat (on winter ranges), brown creeper, western wood pewee, Pacific slope flycatcher, silver-haired bat, red crossbill, black-throated gray warbler.
- Three (3) bird species assigned to Group 2 are listed as threatened by COSEWIC.
 - Marbled Murrelet require large branches on old trees for nesting.
 - The Pacific Coast Flycatcher shows significant preferences for hardwoods and young conifers (that is, it is not restricted to a single specific habitat type).
 - Habitat usage of the Olive-sided Flycatcher make it difficult to assign a specific habitat type. When feeding, it appears to be an edge species (hawking insects) but obtains many insects over water. Its preferred habitat is likely edges near water, and small amounts of water are sufficient. Small waterbodies are scattered so it finds favourable foraging habitat in many areas.

Group 3 species show **strong dependencies on specific habitat elements**, such as cavity sites (3c), down wood (3dw) and understory (3s) or are dependent on wetland or riparian areas (3w,r). All can be affected by forest practices.

- Current analyses suggest that there are 25 high-priority vertebrate species. Most (10) are dependent on cavity sites, thus age and size of trees. Eight (8) are dependent on wetland or riparian sites, and five (5) on abundant understory and two (2) (one of uncertain presence) on down wood.

- Two cavity nesters (western screech owl and little brown bat) are listed by COSEWIC. None of the species greatly dependent on understory are listed by COEWIC, but three of the riparian/wetland species are – coastal tailed frog, red-legged frog, and western toad.
- The value of recognizing Group 3 species is that more readily sampled members can be selected as focal species to evaluate effects of forest practice.

Group 4 species use **highly localized habitat** that rarely can be discerned from strategic mapping due to the scale of mapping needed to accurately reflect their habitat. However, once the location of the habitat is known, appropriate management measures can be implemented. For such species, the most cost-efficient approach is to develop measures (i.e., Standard Operating Procedures) to be implemented should the species be encountered.

- Four (4) high priority species are assigned to Group 4: coastal tailed frog, painted turtle, harlequin duck, and black swift. When found, coastal tailed frogs and painted turtles benefit from enhance riparian protections, and upland forest connections for tailed frogs. Harlequin ducks are cavity nesters and are rare in coastal forests, any known nest sites should receive special protections. Black swift are usually cliff nesters but can be affected by the condition of the forest nearby, when nest sites are found they require site specific management measures.

Group 5, species for which the **distribution of habitat** appears more important than amount includes four species: Northern goshawk, fisher, wolverine, and marten. Fisher, wolverine, and marten are unlikely to be found within the SCCF tenure. Not listed in group 5, but benefitting from larger areas of forest is the Marble Murrelet, although its main restriction is presence of branches of sufficient diameter for nesting (hence was listed in Group 2 with an old forest association).

In summary, the most sensitive species to forestry will be those that require old forest (Group 2/C3), large areas (Group 5) or specific habitat elements (Group 3 c/dw/s and r). The intention is that the Conservation Network along with stand level retention will maintain habitats for these species. Species from these groups would be good candidates for monitoring.

Many species are shifting ranges in response to climate change, and it is becoming increasingly difficult to designate the ranges of species. It is important to recognize that species are moving and species composition in the tenure may change. As well, ranking and priority species change so the species and group assignments should be revisited at least every few years.

Note that work to date on species groups in the SCCF does not include invertebrates. It would be useful to consider high priority invertebrates in the future.

Table V-2: High priority terrestrial vertebrate species assigned to habitat groups 1 through 5 (excluding habitat generalists (Group 1) and non forest habitat users (Group 6))

Sunshine Coast Presence	English Name	Global Status	Prov Status	BC List	SARA	National GS	CF – Priority Goal 1	CF – Priority Goal 2	CF – Priority Goal 3	Dominant Species habitat Group	Modifier(s)/Secondary Group
Possible	Southern Red-backed Vole, <i>occidentalis</i>	G5T5	S1	Red			4	6	1	2	c
Unlikely	North American Porcupine	G5	S4	Yellow		4 - Secure (2005)	6	2	4	2	A
Yes	Mountain Goat	G5	S4	Yellow		4 - Secure (2005)	4	1	3	2	c
Yes	Ruffed Grouse	G5	S4	Yellow		4 - Secure (2005)	4	2	4	2	RD
Yes	Marbled Murrelet	G3G4	S3B,S3N	Blue	1-T (Jun 2003)	1 - At Risk (2005)	1	1	2	2	C3
Yes	Johnson's Hairstreak	G3G4	S1S2	Red		6 - Not Assessed (2000)	2	6	2	2	
Yes	Purple Finch	G5	S4B	Yellow		4 - Secure (2005)	6	2	4	2	RD
Yes	Brown Creeper	G5	S4S5B	Yellow		4 - Secure (2005)	6	1	3	2	C3
Yes	Roosevelt Elk	G5T4	S3S4	Blue			3	2	3	2	open, A
Yes	Evening Grosbeak	G5	S5	Yellow		4 - Secure (2005)	6	2	4	2	A
Yes	Olive-sided Flycatcher	G4	S3S4B	Blue	1-T (Feb 2010)	4 - Secure (2005)	5	2	3	2	O
Yes	Western Wood-Pewee	G5	S4B	Yellow		4 - Secure (2005)	6	2	4	2	C3, R
Yes	Western Toad	G4	S4	Yellow	1-SC (2018)					2	3r
Yes	Sooty Grouse	G5	S3S4	Blue			5	2	3	2	A, RD
Yes	Pacific-slope Flycatcher	G5	S4S5B	Yellow		4 - Secure (2005)	4	2	4	2	C2, C3, R
Yes	Silver-haired Bat	G5	S4S5	Yellow		4 - Secure (2005)	6	2	4	2	C2, C3, 3c
Yes	Hoary Bat	G5	S4	Yellow		4 - Secure (2005)	6	2	4	2	O
Yes	Red Crossbill	G5	S4S5B	Yellow		4 - Secure (2005)	6	2	4	2	C3
Yes	Townsend's Solitaire	G5	S4S5B	Yellow		4 - Secure (2005)	5	2	4	2	O, RD
Yes	Long-eared Myotis	G5	S4S5	Yellow		4 - Secure (2005)	5	2	4	2	A
Yes	Threaded Vertigo	G3G5	S2	Red	1-SC (Jul 2012)		4	6	2	2	C2, C3, R
Yes	Black-throated Gray Warbler	G5	S4B	Yellow		4 - Secure (2005)	4	2	4	2	C1-C3
Yes	Mourning Dove	G5	S4B	Yellow		4 - Secure (2005)	6	2	4	2	O
Yes	Pine Siskin	G5	S4B	Yellow		4 - Secure (2005)	6	2	4	2	A
Yes	Short-eared Owl	G5	S3B,S2N	Blue	1-SC (Jul 2012)	3 - Sensitive (2005)	6	2	3	3	gr, mm
Yes	Wood Duck	G5	S4B,S4N	Yellow		4 - Secure (2005)	6	1	3	3c	2(R)
Yes	Barrow's Goldeneye	G5	S4B	Yellow		4 - Secure (2005)	4	1	3	3c	r, w
Yes	Vaux's Swift	G5	S4S5B	Yellow		4 - Secure (2005)	4	2	4	3c	2(R), 6(mm)
Yes	Ensatina	G5	S4	Yellow		4 - Secure (2005)	6	2	4	3c	2(C2, C3)

Sunshine Coast Presence	English Name	Global Status	Prov Status	BC List	SARA	National GS	CF – Priority Goal 1	CF – Priority Goal 2	CF – Priority Goal 3	Dominant Species habitat Group	Modifier(s)/Secondary Group
Yes	Western Screech-Owl	G5	S4	No Status	1	3 - Sensitive (2005)	6	2	4	3c	2(D)
Yes	Western Screech-Owl, <i>kennicottii</i>	G5T4	S3	Blue	1-SC (Jan 2005)		3	1	2	3c	2(D)
Yes	Little Brown Myotis	GSG4	S4	Yellow	1-E (2014)					3c	
Yes	California Myotis	G5	S4S5	Yellow		4 - Secure (2005)	5	2	4	3c	
Yes	Chestnut-backed Chickadee	G5	S4S5B	Yellow		4 - Secure (2005)	4	2	4	3c	2(H)
Yes	Tree Swallow	G5	S4S5B	Yellow		4 - Secure (2005)	6	2	4	3c	
Yes	Violet-green Swallow	G5	S4S5B	Yellow		4 - Secure (2005)	4	2	4	3c	
Yes	American Marten	G5	S4S5	Yellow		4 - Secure (2005)	6	2	4	3d	2(C3, H)
Yes	American Shrew Mole	G5	S4	Yellow		4 - Secure (2005)	6	2	4	3d	2(R)
Yes	Northwestern Salamander	G5	S4S5	Yellow		4 - Secure (2005)	5	1	3	3r	2(C2,C3)
Yes	Townsend's Big-eared Bat	G4	S3	Blue		2 - May be at risk (2005)	5	2	3	3r	4(cv)
Yes	Wilson's Snipe	G5	S4S5B	Yellow		4 - Secure (2005)	6	2	4	3r	
Yes	Wilson's Warbler	G5	S4B	Yellow		4 - Secure (2005)	5	2	4	3u	r
Yes	Swainson's Thrush	G5	S4S5B	Yellow		4 - Secure (2005)	6	2	4	3u	2(C1,D,R)
Yes	Willow Flycatcher	G5	S4B	Yellow		4 - Secure (2005)	6	2	4	3u	2(R)
Yes	Yellow Warbler	G5	S4S5B	Yellow		4 - Secure (2005)	6	2	4	3u	2(RD)
Yes	Red-eyed Vireo	G5	S4B	Yellow		4 - Secure (2005)	4	2	4	3u	2(C2,C3)
Yes	Northern Pintail	G5	S4B,S5N	Yellow		4 - Secure (2005)	6	2	4	3w	
Yes	Pied-billed Grebe	G5	S4B	Yellow		4 - Secure (2005)	6	2	4	3w	r
Yes	Virginia Rail	G5	S4S5	Yellow		4 - Secure (2005)	6	2	4	3w	
Yes	Northern Red-legged Frog	G4	S3S4	Blue	1-SC (Jan 2005)	3 - Sensitive (2005)	3	1	2	3w	dw, 2(C2, C3)
Yes	Coastal Tailed Frog	G4	S3S4	Blue	1-SC (Jun 2003)	3 - Sensitive (2005)	4	1	2	4	st
Yes	Painted Turtle	G5	S3	No Status	1	4 - Secure (2005)	6	2	3	4	st
Yes	Painted Turtle - Pacific Coast Population	G5T2	S2	Red	1-E (Dec 2007)		4	6	2	4	st
Yes	Harlequin Duck	G4	S4B,S3N	Yellow		3 - Sensitive (2005)	4	1	3	4	3c
Yes	Collared Pika	G5	S3S4	Blue		4 - Secure (2005)	6	2	3	4	open, 2(NV)
Yes	Black Swift	G4	S4B	Yellow		4 - Secure (2005)	4	2	4	4	cl
Unlikely	Wolverine	G4	S3	No Status		3 - Sensitive (2005)	3	2	3	5	
Unlikely	Fisher	G5	S2S3	Blue		4 - Secure (2005)	4	6	2	5	
Yes	Northern Goshawk, <i>laingi</i>	G5T2	S2B	Red	1-T (Jun 2003)		1	6	1	5	2(C3)

Appendix VI. Chapman and Sechelt Landscape Unit Plans and Sunshine Coast Community Forest Ecological Context

Introduction

SCCF lies within the traditional Swiyah of the shísháhlh First Nation, who used the oceans, rivers, and forests from the marine environments to the uplands over generations. While Permanent village sites were located outside of the SCCF boundaries, the area sees continuous use, and indigenous heritage features are scattered throughout the areas. The forests and water resources remain essential for shísháhlh economic, cultural, and spiritual well-being.

Non-indigenous peoples arrived in the Sunshine Coast in 1800's, many were employed in resource extraction activities, primarily logging and fishing, with clearcuts, road development and other alterations to the landscapes as part of utilizing timber resource. Many of these activities occurred at low-elevations, operable year-round, and a high proportion of them are highly productive, providing good opportunities for intensive silviculture investments.

However, the community profile of the Sunshine Coast is changing, with more retirees, young people and a growing in the recreation and tourism sector. Walking, mountain biking, marine boating, and kayaking have become important contributors to the Sunshine Coast economy. The accessibility of the SCCF tenure has expanded recreational opportunities for locals and tourists alike. Visual quality has become highly important to both residents and tourists. Additionally, there is now a greater understanding that ecological integrity is important to meet economic goals and maintain various industries reliant on the forested land base.

The proximity to the Sunshine Coast communities has an impact on the relative values of the SCCF's resources and their corresponding management strategies. The tenure contains a wide range of significant natural resource values and features, as well as a diversity of social and cultural influences. Consequently, the management of these values is often complex and multifaceted.

Current Levels of Protection

When the Landscape Unit Plans (LUPs) were implemented in B.C., the intent was to assign the three levels of biodiversity emphasis options (BEOs) throughout the province (FPC Biodiversity Guidebook 1995), making sure that social and economic needs were priorities, thus the province has 45 % of its LUs in low BEO, 45% intermediate and 10% high BEO LUs. The choice of which LUs were assigned which BEOs is unclear. The Biodiversity Guidebook uses BEOs to set targets for old forest by BEC variant. The Sechelt and Chapman LUs are classified as low BEO LUs. This means that the targets for old seral forest representation are lower than in most¹¹ intermediate and high BEO LUs in the province. BEO targets for old forest for the BEC units overlapping the SCCF are as follows:

- CWHxm1: 9%
- CWHdm: 9%

¹¹ Intermediate and low BEOs in NDT1 and 2 (which includes the Sechelt and Chapman LUs) have the same targets for old forest, but intermediate BEOs have higher recommendations for 'mature plus old' forest.

- CWHvm: 13%
- MHmm1: 19%

Both the Chapman LU plan and the biodiversity chapter of the Sunshine Coast LUP¹² indicate that they are meeting full Old Growth Management Area (OGMA) targets. Most of those OGMA are composed of old and mature forest, with small proportion of mid and early seral (**Table I-1**). The Sechelt biodiversity chapter, written in 2004, documented less than 4% old forest remaining in the LU and less than 9% over 140 years old.

Table I-1: Seral class distribution for Old Growth Management Areas (Legal and Non-Legal) with the Sechelt and Chapman Landscape Units (LU). All values were derived from the Vegetation Resource Inventory (2022).

Landscape Unit	Recent (0-20 yrs)	Early (21-40 yrs)	Mid (41-80 yrs)	Mature (81-249 yrs)	Old (250+ yrs)
Sechelt	0	16	157	749	1,976
Chapman	5	26	229	2,245	1,227

An analysis of the current levels of protection within the Chapman and Sechelt LU's was conducted using the 2022 Vegetation Resource Inventory (VRI) data (FAIB 2022) for the entire area (**Table I-2** and **Figure I-1**) and for the Forested Management Landbase (FMLB) (**Table I-3** and **Figure I-1**). Based on the analysis all BEC units meet their BEO targets, except for the CWHxm1, with 6% in the Sechelt LU and 5% in the Chapman LU, compared to the minimum 9% outlined by the minimum BEO. Additionally, the CWHvm1 in the Chapman LU does not meet its minimum BEO of 13%, it is currently at 11%. These values are inclusive of parks, reserves, and Old Growth Management Areas (OGMA).

Table I-2: Total area (ha) for the Sechelt and Chapman Landscape Units (LU) per Biogeoclimatic units (BEC) in the Forest Management Landbase (FMLB) and Non-FMLB. All values were derived from the Vegetation Resource Inventory (2022).

FOREST MANAGEMENT LANDBASE AND NON-FOREST MANAGEMENT LANDBASE								
LU Name	BEC	Total Area (ha)	Parks and Protected Areas (ha)	Parks and Protected Areas (%)	Old Forest (ha)	Old Forest (%)	Old Forest in Parks and Protect Areas (ha)	Old Forest Protected (%)
Sechelt	CWHxm1	21,214	1,358	6	398	2	68	17
	CWHdm	19,661	1,961	10	1,531	8	382	25
	CWHvm1	-	-	-	-	-	-	-
	CWHvm2	6,235	2,202	35	1,314	21	766	58
	MHmm1	304	291	96	124	41	123	99

¹² Ministry of Sustainable Resource Management Coast Region Sustainable Resource Management Plan Biodiversity Chapter for Sechelt Landscape Unit. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/land-use-plans-and-objectives/southcoast-region/sunshinecoast-lu/sunshinecoast_lu_sechelt_plan_jun2004.pdf

Chapman	CWHxm1	6,664	345	5	36	1	36	100
	CWHdm	12,101	1,229	10	377	3	171	45
	CWHvm1	758	80	11	30	4	12	40
	CWHvm2	7,866	1,451	18	2,018	26	1,035	51
	MHmm1	5,638	1,774	31	3,993	71	1,510	38
Total		80,441	10,691	13	9,821	12	4,103	42

Table I-3: Total area (ha) for the Sechelt and Chapman Landscape Units (LU) for Biogeoclimatic units (BEC) in the Forest Management Landbase. All values were derived from the Vegetation Resource Inventory (2022).

FOREST MANAGEMENT LAND BASE (FMLB)								
LU Name	BEC	Total Area (ha)	Parks and Protected Areas - (ha)	Parks and Protected Areas (%)	Old Forest (ha)	Old Forest (%)	Old Forest in Parks and Protect Areas (ha)	Old Forest Protected (%)
Sechelt	CWHxm1	20,600	1,358	7	398	2	68	17
	CWHdm	19,661	1,961	10	1,531	8	382	25
	CWHvm1	-	-	-	-	-	-	-
	CWHvm2	6,209	2,182	35	1,287	21	747	58
	MHmm1	304	291	96	124	41	123	99
Chapman	CWHxm1	6,626	311	5	36	1	36	100
	CWHdm	12,019	1,147	10	367	3	161	44
	CWHvm1	758	80	11	30	4	12	40
	CWHvm2	7,251	1,287	18	1,403	19	87	6
	MHmm1	3,069	1,466	48	1,437	47	1,204	84
Total		76,497	10,083	13	6,613	9	2,820	43

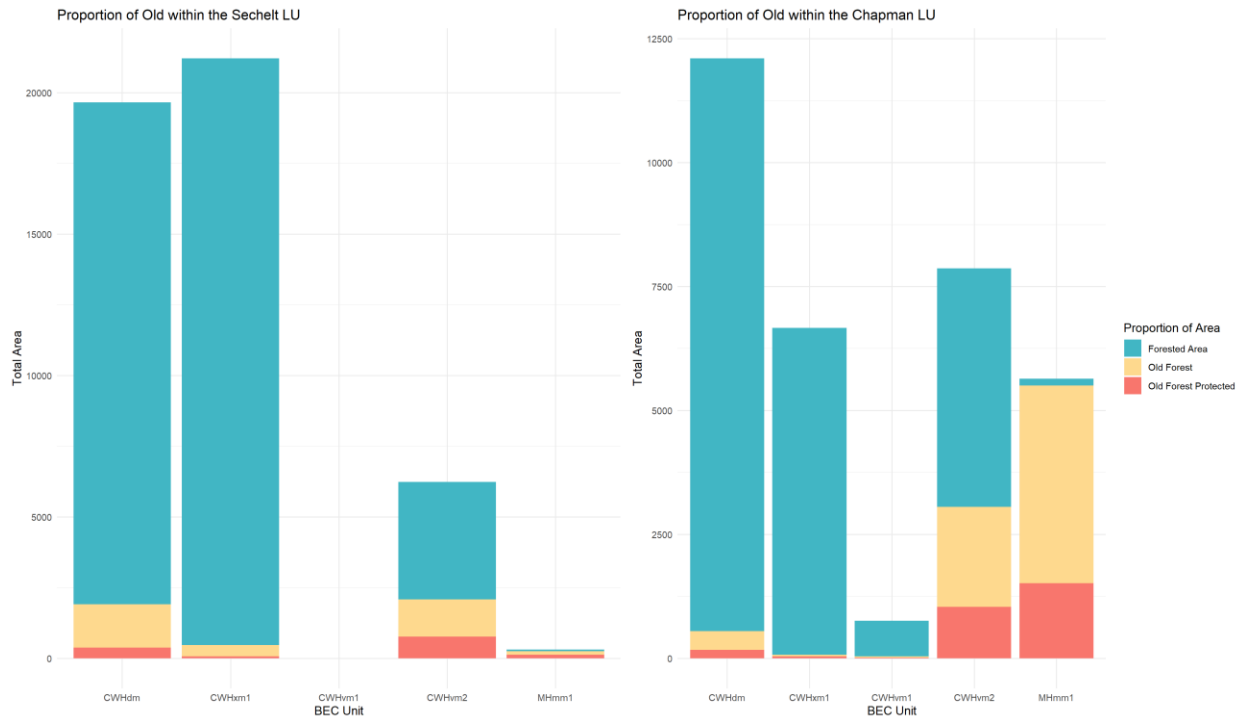


Figure I-1: Overview of the proportion of old forest within Biogeoclimatic units (BEC) for the Sunshine Coast Community Forest (SCCF) and the proportion that is protected for the Sechelt and Chapman Landscape Unit (LU). All values were derived using the Vegetation Resource Inventory (VRI) data release from 2022.

The above was a summary of the LU context. Within the SCCF itself, the only legally protected areas are the OGMAs (**Figure I-2**). There are no legal Ungulate Winter Ranges (UWRs) nor Wildlife Habitat Areas (WHAs) in the SCCF. The primary purpose of OGMAs is to conserve structural attributes associated with old growth forests. Currently, OGMAs conserve approximately 360 ha of old forest, which represents 4% of the FMLB in the SCCF (**Table I-4**). However, the distributed of OGMAs across the SCCF is uneven, the CWHm2 having the largest proportion of its area covered by OGMAs, accounting for 12% (145 ha) of the CWHm2. In contrast, the CWHm1 (3%) and MHm1 (< 1%) have the lowest proportional coverage of their BEC units captured in OGMAs.

In recognition of the current limited level of protection, the SCCF has made a firm commitment to elevate the levels of protection within their tenure area. They aim to surpass the established Biogeoclimatic Ecosystem Objectives (BEO) targets for each Biogeoclimatic Ecosystem Classification (BEC) Unit. To achieve this goal, they are in the process of designing a Conservation Network with the objective of encompassing 30% of the tenure area within each BEC Unit. This strategic initiative is driven by their dedication to enhancing biodiversity and promoting sustainability in their forest management practices.

Table I-4: Protection levels by BEC subzone and variant for the Forest Management Landbase (FMLB) in the Sunshine Coast Community Forest. All values exclude private land except total area.

BEC	Total Area in LUs (ha)	Total Area SCCF (ha)	Protected Areas LUs (ha)	Protected Areas LUs (%)	Protected Areas within the SCCF (ha)	Protected Areas within the SCCF (%)
CWHxm1	27,227	506	1,669	6	15	3
CWHdm	31,680	3,925	3,107	10	152	4
CWHvm1	758	373	80	11	44	12
CWHvm2	13,459	2,696	3,469	26	145	5
MHm1	3,372	1,077	1,756	52	5	< 1
Total	76,496	8,577	10,081	13	361	4



Figure I-2: Overview of the Sunshine Coast Community Forest (SCCF) and Old Growth Management (OGMA) both legal and non-legal in addition to provincial parks and ecological reserves that overlap the boundary of the tenure area.

Sunshine Coast Community Forest Inventory

The SCCF makes up 29% (9,457 ha) of the Chapman LU and 2% (1,151 ha) of the Sechelt LU (excludes area of LU overlapping the ocean). Currently the SCCF does not have its own detailed Forest Inventory and relies on a combination of VRI and internal knowledge to describe the forest’s characteristics.

The VRI classifies areas as being part of the Forest Management Landbase (FMLB) and other areas being excluded from the FMLB, areas that are identified as being part of the FMLB designates if the area is forested or can produce a stand of trees, areas that are included have a harvest history or a site index greater than or equal to 5. Within the SCCF 81% (8,577 ha) of the area been identified as being part of the FMLB as per the VRI (FAIB 2022). The age distribution of the SCCF FMLB, regardless of BEC unit, is dominated by mid seral (40 – 80 years); mature (80 – 250 years) and old (250+ years) make up a smaller portion of the tenure comparatively. Recent is defined as areas that have gone through recent disturbance and are regenerating (0 – 20 years). Early (20 – 40 years) and mature have a very similar distribution within the tenure. Each of these seral classes will have varying levels of stand complexity and dynamics present (Figure I-3).

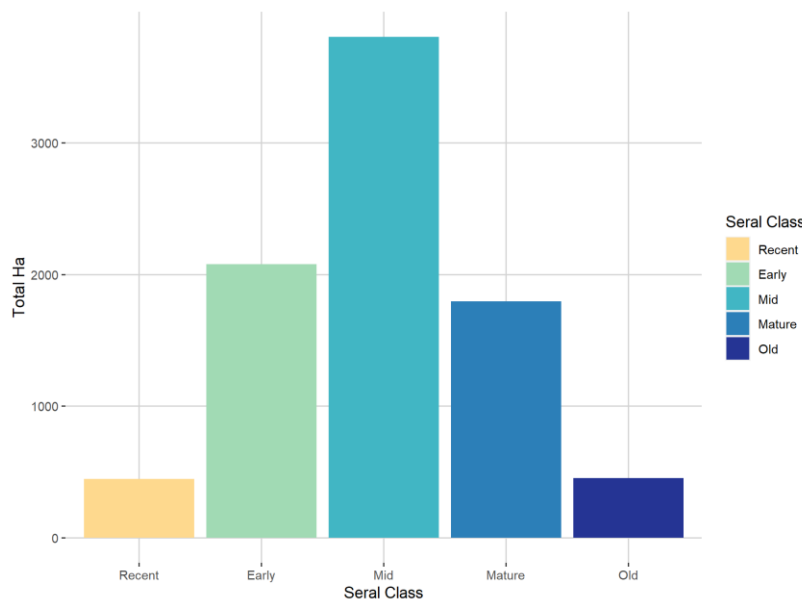


Figure I-3: Seral distribution within Sunshine Coast Community Forest’s Forest Management Landbase, generated using the Vegetation Resource Inventory 2022 data release.

The seral distribution can be described by its BEC unit for the SCCF (Figure I-4). Most of the tenure is in the CWHdm and CWHvm2 with the CWHvm1 and CWHxm1 contributing smaller areas. The seral distribution within the CWHdm is dominated by both mid and mature forest but has little old forest present, comparatively the CWHvm2 is dominated by mid seral forest but has a higher proportion of old forest than rest of the BEC Units

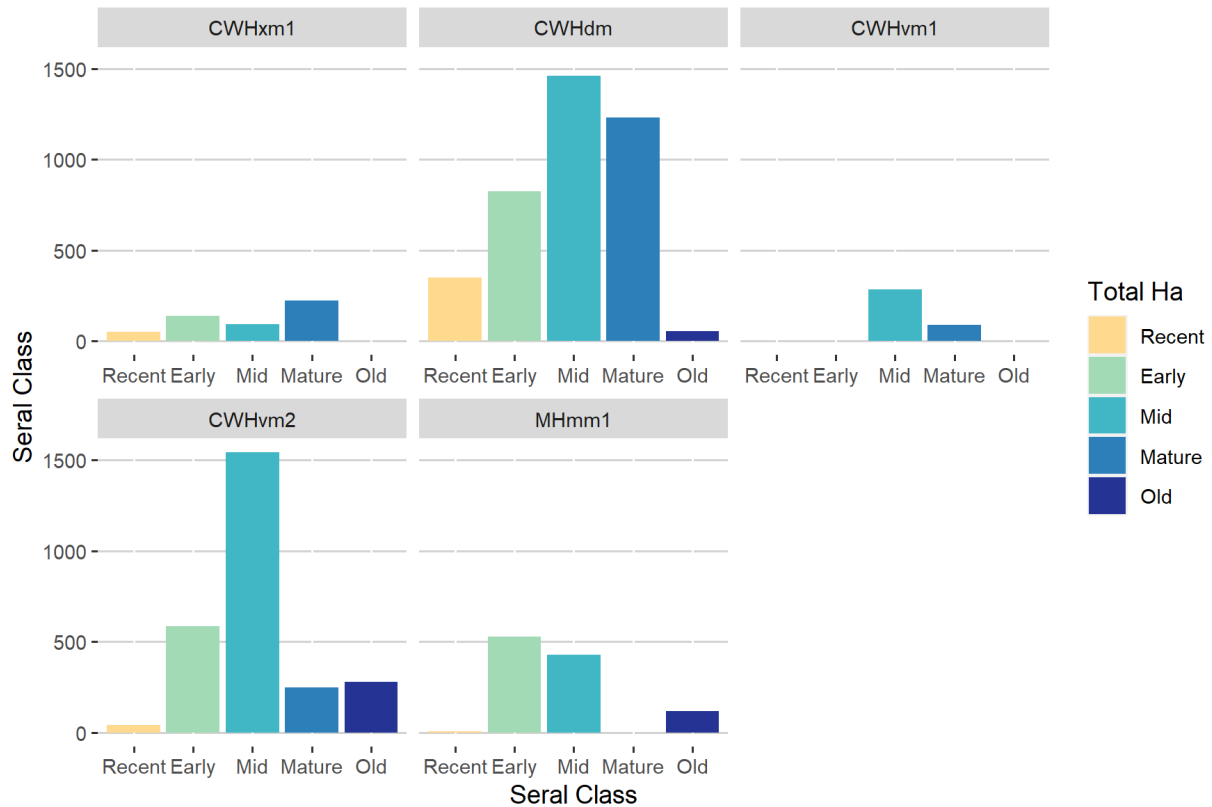


Figure I-4: Seral distribution of the Forested Management Landbase by BEC Unit within the Sunshine Coast Community Forest, generated using the Vegetation Resource Inventory 2022 data release.

To even further subdivided the seral distribution, it can be described by its proportion for BEC unit within the three separate tenure areas (**Table I-5**). The majority (50 ha) of Old, occurs within the Angus/Gray/Chapman Creek area whereas a very small portion (5 ha) occurs within the Halfmoon Bay area, and there is no Old Forest within Wilson Creek. Mature forest is the dominant seral class within both Halfmoon Bay (373 ha) and Wilson Creek (378 ha); the dominant seral class within Angus/Gray/Chapman Creek is the mid seral (3,428 ha). In each of the three tenures, recent forest disturbance (0 to 20 years old) is the smallest seral class. Most of the recent seral is within the Halfmoon Bay area (229 ha) with smaller portions occurring in both Wilson Creek (85 ha) and Angus/Gray/Chapman Creek (132 ha). However, if the recent with early seral classes (i.e., 0 to 40 years old) are combined they account for a greater proportion than other seral classes for all tenure areas -- Halfmoon Bay (401 ha) and Wilson Creek (465 ha), and Angus/Gray/Chapman Creek (1,657 ha).

Table I-5: Area in hectares and percent of the area for each biogeoclimatic unit for each of the age classes within Sunshine Coast Community Forest’s three different tenure locations, using the Vegetation Resource Inventory 2022 data release.

Tenure Area	BEC Unit	Age Class									
		Recent (0-20 yrs)		Early (20-40 yrs)		Mid (40-80 yrs)		Mature (80-250 yrs)		Old (250+ yrs)	
		ha	%	ha	%	ha	%	ha	%	ha	%
Halfmoon Bay	CWHxm1	23	0.3	14	0.2	6	0.1	105	1.2	-	-
	CWHdm	206	2.4	158	1.8	261	3.0	373	4.3	5	0.1
Wilson Creek	CWHxm1	29	0.3	94	1.1	9	0.1	42	0.5	-	-
	CWHdm	56	0.7	286	3.3	104	1.2	378	4.4	-	-
Angus/Gray/Chapman Creek	CWHxm1	-	-	30	0.3	78	0.9	76	0.9	-	-
	CWHdm	87	1.0	382	4.5	1,097	12.8	482	5.6	50	0.6
	CWHvm1	-	-	-	-	283	3.3	90	1.0	-	-
	CWHvm2	41	0.5	585	6.8	1,542	18.0	249	2.9	280	3.3
	MHm1	4	0.0	528	6.2	428	5.0	11	0.1	117	1.4
Grand Total		446	5.2	2,077	24.2	3,808	44.4	1,806	21.1	452	5.3

ⁱ For guidance on Pileated woodpecker nest identification see <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/pileated-woodpecker-cavity-identification-guide.html>