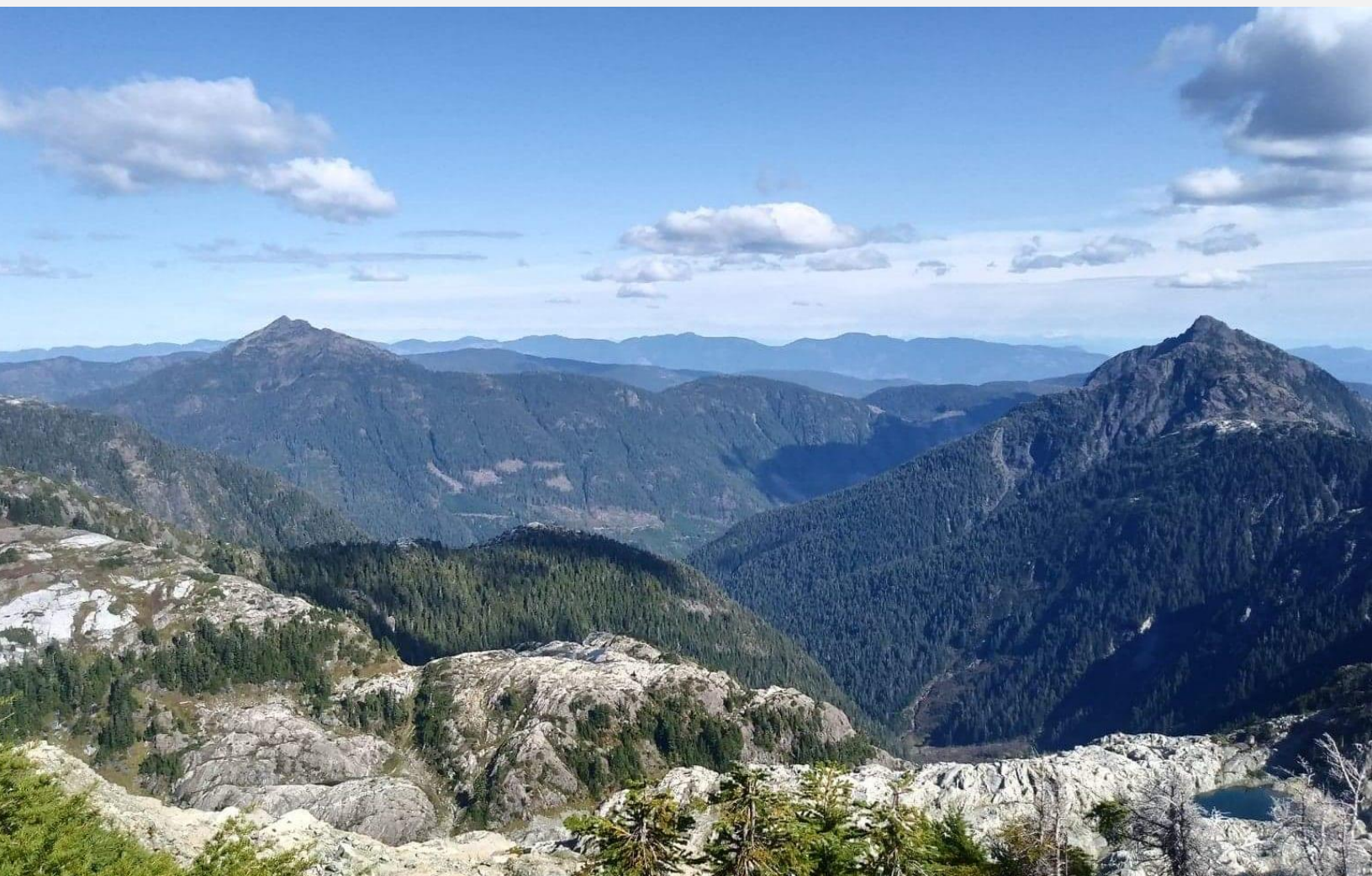# NAHMINT LANDSCAPE UNIT PLAN

June 29, 2023

Ministry of Forests

Nahmint Landscape Unit Plan

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Ministry of Forests
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1 INTRODUCTION

This document summarizes the biodiversity conservation plan for the Nahmint Landscape Unit (LU), where the result is the establishment of legal old growth management areas (OGMAs). This plan describes all the legal obligations, policy, guidelines, and key considerations that are the foundation for OGMA selection.

This plan is the culmination of 3 years of work that included background research, GIS analyses, interpretation of legislation, rationalized management decisions, field verification and documentation. This plan is accompanied by three appendices to give further context on management decisions and to provide transparency to this process.

This plan includes background information, a description of the LU, discussion of tenure holders, significant resource values, a summary of the OGMAs and its legal objectives. Appendix A discusses all planning elements in detail. Appendix B focuses on rare ecosystem management. Appendix C provides a snapshot of the delineated OGMAs that were visited in the field.

1.0 BIOLOGICAL DIVERSITY

The establishment of OGMAs is an important component of the *Forest and Range Practices Act* for managing the conservation of biological diversity.

Biological diversity has been defined as "the diversity of plants, animals and other living organisms in all their forms and level of organisation, including the diversity of genes, species and ecosystems as well as the evolutionary and functional processes that link them" (Research Branch, British Columbia Ministry of Forests, 1998). Around 500 species of animals (including non-vertebrates) are listed as imperiled or critically imperiled in British Columbia.[1]

Retention of old growth forest is important for wildlife, ecosystems, and overall preservation of biological diversity. The Nahmint LU was assigned a high biodiversity emphasis option. A biodiversity emphasis option is directly correlated to the maintenance of biodiversity. It gives a higher priority to biodiversity conservation but would have the greatest impact on timber harvest (Parminter, J., 1995).

1.1 HISTORY OF PLANNING IN THE NAHMINT LU

There is a long history of biodiversity planning in the Nahmint LU. In the 1970s, the Nahmint Watershed Integrated Resource Study was conducted. The original study was considered a "state of the art planning effort" and included feedback from interest groups and the public. In 1990, the Nahmint Watershed Review was completed, building off work done in 1970s and 80s and included proposed networks of biodiversity corridors throughout the valley (see Figure A- 2). In the early 1990s, Forest Ecosystem Networks (FENs) were created to conserve biodiversity by providing for connectivity across the landscape, conserving representative old growth and protecting important wildlife habitat. FENs were a

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[1] Searched critically imperiled and imperiled animals on Conservation Data Centre site: https://a100.gov.bc.ca/pub/eswp/

temporary measure until objectives for biodiversity were established through landscape unit planning (see Figure A- 3).

In 2004, legal ungulate winter range (UWR) for deer and elk were established. In 2005 and 2015, legal wildlife habitat areas (WHAs) were established for the protection of both marbled murrelet and northern goshawk. These legal reserve areas remain present in the Nahmint LU.

In 2007, a first draft Nahmint Landscape Unit Plan was developed. This was updated in 2012 as the draft Sustainable Resource Management Plan (SRMP). It summarized the Nahmint LU and detailed the criteria used for selecting OGMAs. In this draft plan, OGMA selection considerations included: biogeoclimatic (BEC) variant, patch size and connectivity, overlap with existing Forest Ecosystem Networks (FENs), inclusion of late successional habitat elements, regionally rare and underrepresented and areas with high wildlife habitat values. OGMAs were also selected to reduce their impacts on timber supply while maintaining good old growth representation. This draft plan was not finalized.

A considerable amount of past planning effort went into conserving elements of biodiversity. This work will be integrated where applicable to the current goals for Landscape Unit Planning and is demonstrated through this document and its supporting appendices.

1.2   SCOPE OF LANDSCAPE UNIT PLANNING

This goal of this plan is to establish legal OGMAs. This work was done in tandem with marbled murrelet WHA establishment as these reserve types have many synergies. This plan will prioritize meeting legal requirements and will incorporate non-legal policies, guidance and values that are compatible with old growth protection. Legal requirements for this plan occur on two slightly different but overlapping scales that can make this plan harder to comprehend. Everything is evaluated and planned at the Nahmint landscape unit scale except for objectives from the *Vancouver Island Land Use Plan Higher Level Plan Order*, which are specific to Special Management Zone 13. SMZ 13 will be introduced in the next section.

This plan will only apply to the Crown Land portion of the Nahmint LU. There are over 2,000 ha of non-crown land in the Nahmint that will be further described.

 Nahmint Landscape Unit Planning will focus on the following priority values:

1. Old Forest retention including:
    a. Ecosystem Representation (SMZ scale only)
    b. Regionally Rare and Underrepresented Ecosystems (SMZ scale only)
    c. Large tree retention including:
        i. Legacy Trees
        ii. Specified Trees

2. Wildlife Habitat
    a. Marbled murrelet suitable habitat
    b. Other wildlife habitat elements
3. Cultural Heritage Resource Values

Detailed information on the approach taken to include these values is further described in Appendix A section 6.

This LU Planning process uses the following supporting documentation:

Legislation:

❖ *Vancouver Island Land Use Plan (VILUP) Higher Level Plan Order (HLPO)* (2000)
❖ The *Forest and Range Practices Act* (*FRPA*) (2002)
❖ The *Order Establishing Provincial Non-Spatial Old Growth Objectives (PNSOGO)* (2004)
❖ *Land Use Objectives Regulation* (2006)

Guidance:

❖ Landscape Unit Planning Guide (LUPG) (1999)
❖ Biodiversity Guidebook (1995)
❖ Great Bear Rainforest Landscape Reserve Design Methodology (2016)
❖ Vancouver Island Summary Land Use Plan (VISLUP) (2000)

All landscape unit objectives in the Nahmint LU must be consistent with the HLPO in VILUP and other Objectives set by government.

The LUPG gives direction and is the primary resource for landscape unit planning. It includes key information from the Biodiversity Guidebook but takes precedence over the Biodiversity Guidebook for direction[2]. This guidebook addresses both priority and full biodiversity planning. Priority biodiversity planning is considered the focus for landscape unit planning and consists of retention of old growth forest and stand structure through wildlife tree retention (WTR)[3]. The specifications for Wildlife Tree Retention (WTR objectives) are now covered under the *Forest Planning and Practices Regulation* (FPPR), Part 4, Division 5, section 66 and will not be addressed in this Plan. Full biodiversity planning includes landscape connectivity, seral stage distribution, patch size and species composition. Full biodiversity considerations are further discussed in Appendix A 7.0.

Landscape unit planning is supported by the *Forest and Range Practices Act* (*FRPA*) and the *Land Act* through the *Land Use Objectives Regulation* and provides for the legal establishment of objectives to address biodiversity values.

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[2]See page 2: 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/policies-guides/lup_qas.pdf

[3]See page 2: 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/policies-guides/lup_guide.pdf

In addition to the primary OGMA values previously mentioned, OGMAs may capture other values that will enhance their function. Other considerations for OGMA delineation include:

- Landscape connectivity
- Interior forest condition and OGMA size
- Distribution and natural boundaries
- Climate change
- Visual Quality
- Recreation Resources

Detailed information on how these were considered is found in Appendix A section 7.

2   NAHMINT LU DESCRIPTION

The following section will provide a biophysical description of the Nahmint LU and summarize the current land status.

2.0   NAHMINT LU BIOPHYSICAL DESCRIPTION

The Nahmint LU is situated within the Windward Island Mountains Ecosection[4] in central Vancouver Island. The total landscape unit area is approximately 20,438 hectares.

Figure 1: Nahmint Landscape Unit, Central Vancouver Island

The LU ranges from low elevation riparian influence areas along the Nahmint River and Nahmint Lake, to very rugged and mountainous areas with large areas of subalpine forest. The highest point in the LU is Mt. Klitsa, which is approximately 1,639 m above sea level.

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[4] Page 44 https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/ecosystems/broad-ecosystem/an_introduction_to_the_ecoregions_of_british_columbia.pdf

Figure 2: Mount Klitsa

Dominant tree species in the LU are Douglas-fir, western redcedar, western hemlock, amabilis fir, with yellow cedar and mountain hemlock at higher elevations. According to the Köppen-Geiger[5] climate classification, the Nahmint climate is mainly temperate oceanic climate (Cfb) where there is no dry season and a warmer summer. The northwest section of the LU is classified as subpolar oceanic climate (Cfc), where there is no dry season and a colder summer. Using a BCTS Strait of Georgia mean annual precipitation rainfall chart by area, the Sproat/Nahmint Area has an average annual precipitation of approximately 5678 mm (data obtained June 2021).

The ecology of Nahmint is technically described using the Biogeoclimatic Ecosystem Classification (BEC) system. This is important as it relates to legal objectives and targets. The Nahmint LU is divided into biogeoclimatic zones, subzones, and variants. These groups represent climatic characteristics and are shown in the figure below:

Figure 3: Biogeoclimatic subzone variants in the Nahmint Landscape Unit
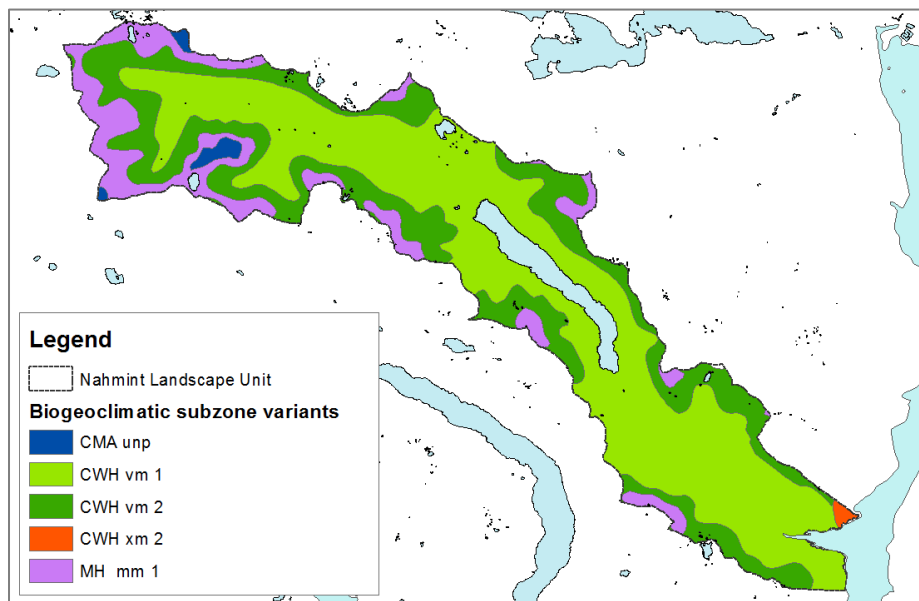
The Coastal Western Hemlock (CWH) and Mountain Hemlock (MH) biogeoclimatic zones dominate the Nahmint LU. Within these zones are the CWHvm, CWHxm, and MHmm subzones that further be divided

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into variants, which reflect geographic distribution within the subzone.[6] The Coast Mountain-heather Alpine (CMA) is not productive forest and therefore will not be a landscape unit planning priority. The figures below show the highlighted biogeoclimatic ecosystem classification (BEC) hierarchies that are present within the CWH and MH zones in the Nahmint LU:

Figure 4: Coastal Western Hemlock BEC Hierarchy Present in the Nahmint LU
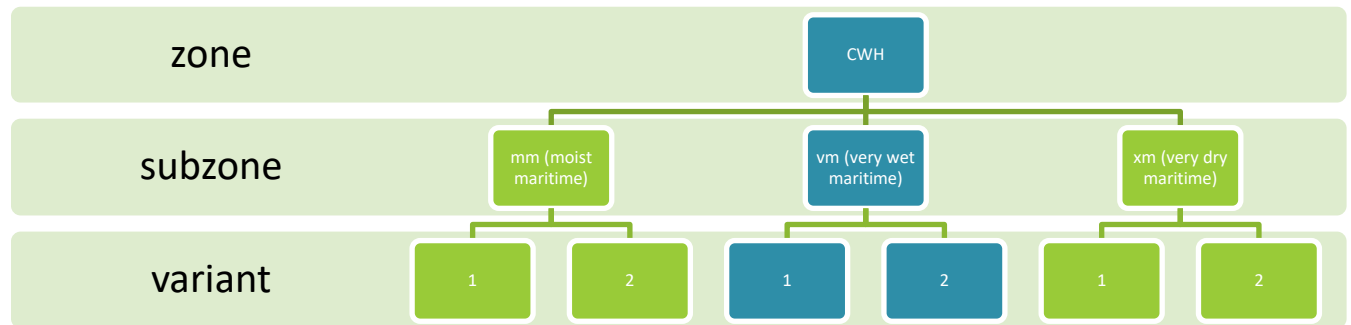
Figure 5: Mountain Hemlock BEC Hierarchy Present in the Nahmint LU
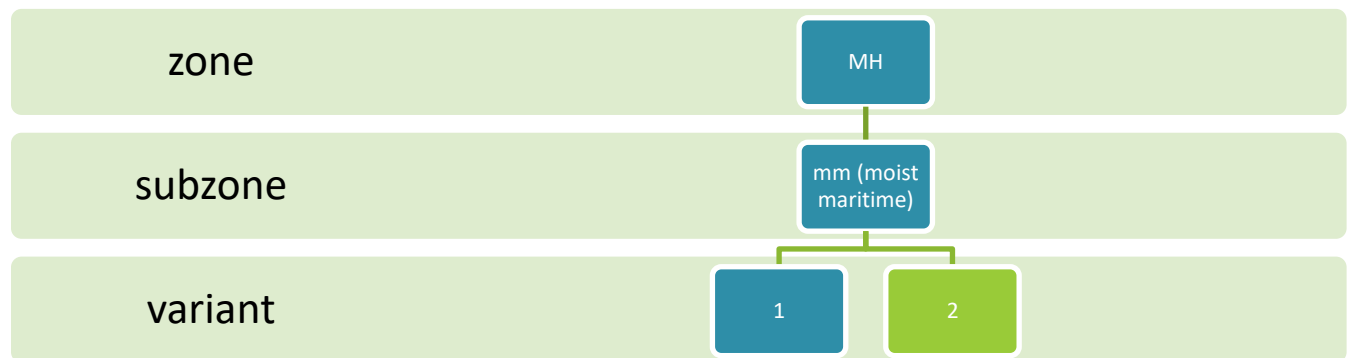
Nahmint's ecology is that of a transitional nature, as it borders the very dry maritime coastal western hemlock subzone (CWHxm), where summers are warmer and drier with moist mild winters with little snowfall and Douglas-fir dominant. It also borders the moist maritime coastal western hemlock subzone (CWHmm), which is intermediate between the CWHvm and CWHxm subzones, with more Douglas-fir than the CWHvm1[7]. Natural Disturbance Type (NDT) 1 dominates the Nahmint LU. This disturbance type means a forest that is typically uneven-aged or multi-storied with regeneration occurring in small gaps. Disturbances include wind, fire and landslides and the mean interval for these disturbances is generally 250 years in the CWH and 350 years in the MH biogeoclimatic zones.[8] Because of the transition to CWHmm and xm, it's important to note that the dominant NDT of these of these subzones is NDT 2,

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[6] For more information on individual subzones, see: https://www.for.gov.bc.ca/hre/becweb/downloads/Downloads_SubzoneReports/

[7] See page 50 and 63: https://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh28.pdf

[8] See page 15 of Biodiversity Guidebook, 1995: https://www.for.gov.bc.ca/hfd/library/documents/bib19715.pdf

where wildfires were often of moderate size and many larger fires occurred after periods of extended drought[9].

2.1   SUMMARY OF LAND STATUS

This section summarizes the land status of the Nahmint LU including traditional territory, current administrative boundaries, the harvestable landbase and Nahmint Special Management Zone 13.

2.1.1   TRADITIONAL TERRITORY

The entirety of the Nahmint Landscape Unit is located within čišaaʔatḥ (Tseshaht) First Nation traditional territory. The Hupačasath and Yuułuʔiłʔatḥ First Nation traditional territories overlap most of the LU. The following map shows the location of these boundaries:

Figure 6: First Nations Traditional Territory in Nahmint LU
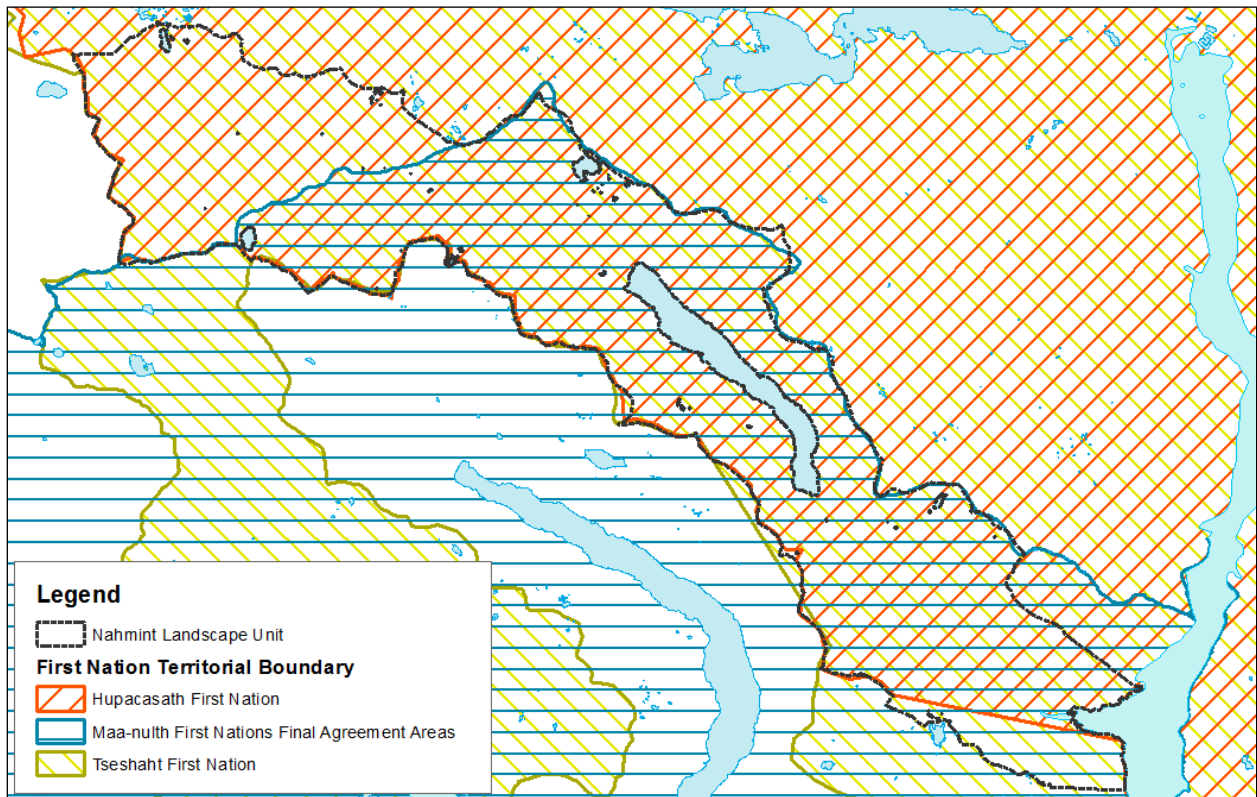
Map created December 2021

Note that there is no part of the Nahmint LU that is exclusive traditional territory. The following is a summary of First Nations traditional territories by area in the Nahmint LU:

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[9] See page 22: https://www.for.gov.bc.ca/hfd/library/documents/bib19715.pdf

Table 1: First Nation Territory Area Breakdown in Nahmint LU

First Nation	Territory Area in Nahmint Landscape Unit
čišaaʔatḥ (Tseshaht) Traditional Territory	20,325*
Hupačasath Traditional Territory	18,124
Yuułuʔiłʔatḥ Traditional Territory	15,678

*Linework discrepancies has resulted in this area being less than the area of the Nahmint LU.

2.1.2   ADMINISTRATIVE AND TIMBER HARVESTING LAND BASE

The Crown land portion of this landscape unit is managed by BC Timber Sales (BCTS) under the 2017 West Coast Forest Stewardship Plan (FSP), and by Interfor under the South Island Forest District West Coast Interfor Arrowsmith FSP. Non-crown land includes a small portion of Private Land, and the Yuułuʔiłʔatḥ First Nation has Treaty Settlement Land in the LU as part of the Maa-nulth Final Agreement.

Figure 7: Administrative Land Status and Timber Harvesting Land Base Status in the Nahmint LU
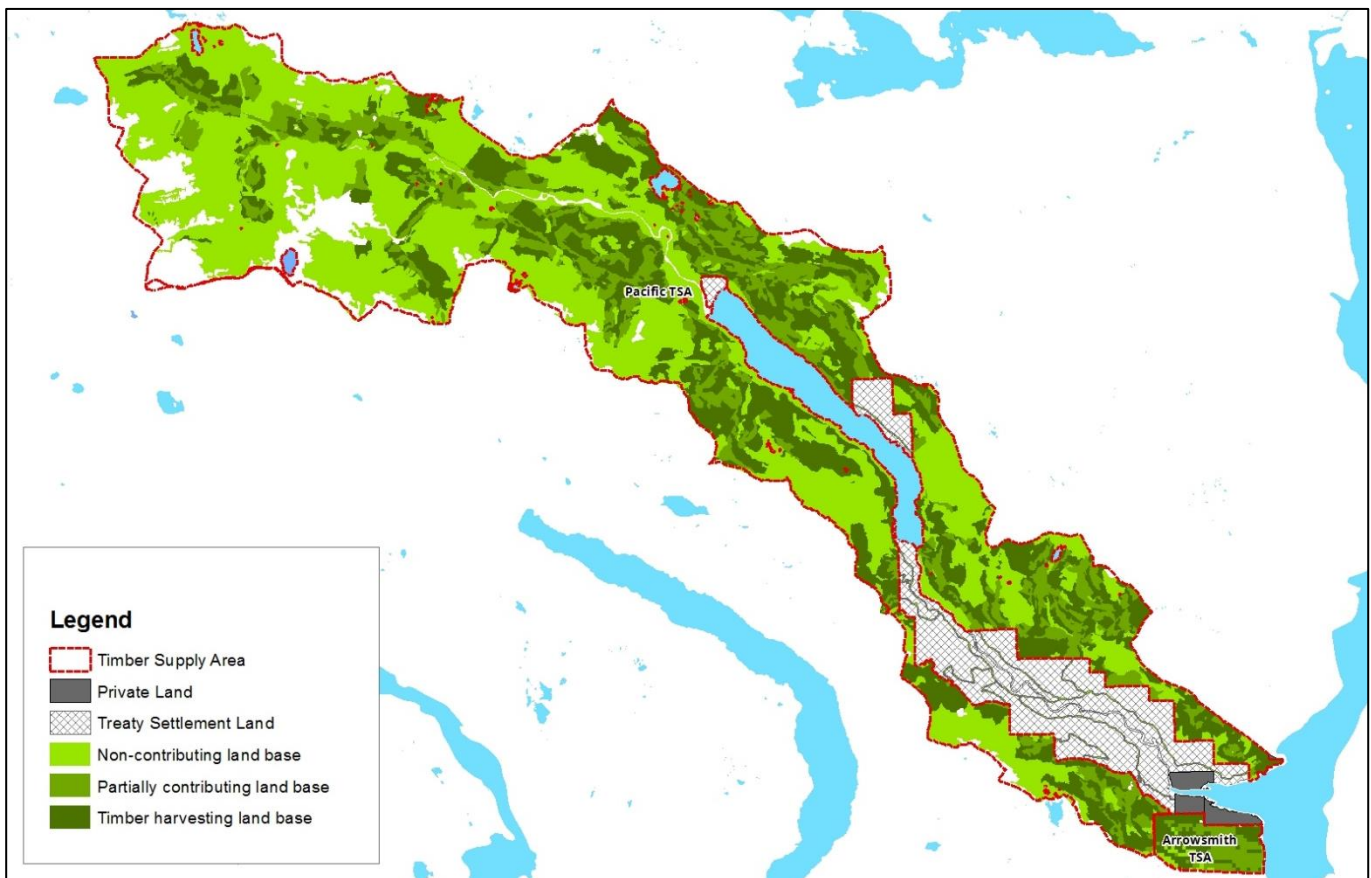
The Nahmint Landscape Unit Plan only applies to Crown land and does not apply to Private Land or Treaty Settlement Land. The timber supply modelling process divides up the Crown land into the non-contributing (NC), partially contributing (PC) and timber harvesting land base (THLB) as pictured in the figure above. The forested NC contributes to biodiversity objectives and targets. However, due to classification for net down areas (for example, WHA and UWR) or inoperability, the NC does not contribute to the allowable annual cut (AAC). The PC land base is where less than 75% of the area is available for harvesting. The THLB contributes to the AAC and is where most of the operable forest is located. The land status of the Nahmint Landscape Unit is numerically summarized below:

Table 2: Land Status of the Nahmint Landscape Unit

Nahmint Landscape Unit: 20,438ha					
	Crown Forest Land Base (CFLB)(ha):		Crown non-forested (very low productivity, water, rock etc.) (ha)	Non-Crown Land (ha)	
	15,674		2,621	2,143	
Timber Supply Area (TSA)	Arrowsmith TSA	Pacific TSA		Private Land	Treaty Settlement Land
TSA (ha)	415[10]	15,087[11]		165	1,978
Timber Harvesting Land Base Designation within the CFLB					
THLB (ha)	4,765				
PC (ha)	2,906				
NC (ha)	8,037				

Table updated November 2022

2.1.3 SPECIAL MANAGEMENT ZONE 13

The Nahmint Landscape Unit contains Special Management Zone (SMZ) 13. Special Management Zones were designated under the VILUP Higher Level Plan Order (HLPO), namely to:

From the Vancouver Island Summary Land Use Plan (VISLUP):

identify Crown land and coastal areas with regionally significant values or combinations of values requiring more comprehensive management objectives and strategies to minimize development impacts.

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[10] The TSA areas do not add up to the CFLB because the TSA boundary has linework errors and is smaller than the Nahmint LU boundary. Used the Nahmint LU as the official base boundary for subsequent calculations.

[11] Same comment as previous footnote.

Moreover, the overall VISLUP management guidance for SMZ 13 Nahmint is that:

> *Emphasis should be on high biodiversity values, with high levels of old seral forest retention; maintenance of recreational values associated with the Nahmint River and Lake.*

SMZ 13 is exclusively linked to the Vancouver Island Land Use Plan and its *Higher-Level Plan Order*, which is further discussed in section 5.0. Where legal objectives from *VILUP* Objectives in relation to SMZ 13, the SMZ 13 *HLPO* are concerned, only the SMZ 13 portion of the Nahmint LU will be evaluated. The SMZ covers most, but not all the landscape unit. The following map shows the location of the Crown land portion of SMZ 13 in the Nahmint Landscape Unit. Most of the landscape unit overlaps this zone:

Figure 8: Crown Portion of SMZ 13 in Nahmint Landscape Unit (as of Nov 2021)
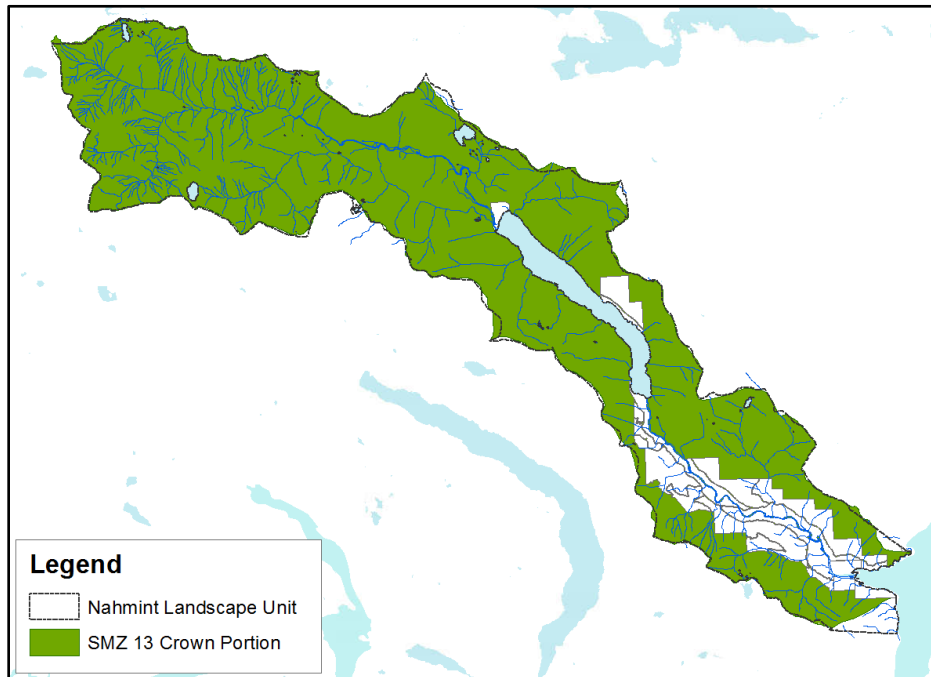
Map created November 2021

The following table further describes SMZ 13. SMZ 13 will require analysis at the site series level. This analysis uses terrestrial ecosystem mapping (TEM). The table below shows the portion of SMZ 13 that has available TEM.

Table 3: SMZ 13 Status

Area Description	Area (ha)
Total Area of SMZ 13	18,919
CFLB portion	15,261
TEM area available in SMZ13 CFLB	15,188

Table updated December 2022

The following table shows the breakdown of site series and age class in the Crown Land SMZ 13 portion of the Nahmint Landscape Unit.

BEC subzone	BEC site series	Crown Forest Land Base (ha)	Age Breakdown									
			Age 251+ (ha)	Age 200-250 (ha)	Age 141-199 (ha)	Age 121-140	Age 101-120	Age 81-100	Age 61-80	Age 41-60	Age 21-40	Age 1-20
AT		5.1	0.7	0.0	1.7	1.8	0.4	0.0	0.0	0.4	0.0	0.0
CWHvm1	00	336.1	140.7	46.5	12.8	0.2	21.6	7.3	6.1	60.1	28.6	12.2
CWHvm1	01	2,116.3	512.1	259.8	118.9	0.5	53.3	61.9	3.6	107.9	685.6	312.5
CWHvm1	02	70.7	14.4	7.8	8.4	1.6	5.5	5.3	0.0	12.8	4.3	10.5
CWHvm1	03	1,118.7	345.8	132.6	87.6	6.7	95.1	48.2	6.3	26.8	253.2	116.4
CWHvm1	04	1,371.4	463.0	207.8	64.0	0.7	45.1	88.7	2.4	36.0	267.8	195.7
CWHvm1	05	1,485.8	713.2	124.9	47.1	0.1	13.8	37.1	4.7	9.9	318.7	216.3
CWHvm1	06	521.5	219.3	93.2	33.9	0.0	5.8	7.8	4.6	8.1	99.3	49.5
CWHvm1	07	504.0	245.4	70.5	23.0	0.5	2.0	0.2	15.6	30.3	48.4	68.0
CWHvm1	08	149.2	103.8	11.9	3.6	0.0	1.3	0.0	0.0	8.7	5.3	14.5
CWHvm1	09	114.3	55.1	0.0	0.7	0.2	0.0	0.0	0.0	0.1	58.1	0.1
CWHvm1	10	43.4	29.8	1.0	0.2	8.7	0.0	0.0	0.0	0.2	3.4	0.0
CWHvm1	11	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
CWHvm1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
CWHvm1	13	2.7	0.5	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.1	0.0
CWHvm1	14	7.9	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0
CWHvm2	00	521.9	175.1	69.1	67.6	16.9	33.1	44.6	0.4	66.1	39.2	9.8
CWHvm2	01	1,355.3	268.8	307.4	186.7	0.8	45.7	79.9	0.0	8.5	283.0	174.4
CWHvm2	02	56.2	3.1	6.1	9.6	0.7	16.0	15.4	0.0	0.0	3.5	1.7
CWHvm2	03	1,004.8	189.6	215.7	179.8	7.7	97.7	118.8	0.0	4.2	126.0	65.2
CWHvm2	04	1,096.0	298.5	251.3	68.8	2.4	134.8	162.0	0.0	1.4	83.8	92.7
CWHvm2	05	780.4	282.1	167.1	170.0	9.7	35.9	7.4	0.0	11.4	11.7	85.1
CWHvm2	06	434.7	150.8	85.3	163.2	0.0	2.6	16.4	0.0	0.3	2.0	14.2
CWHvm2	07	353.0	113.1	60.1	92.6	14.7	2.6	0.1	0.4	18.3	25.9	25.2
CWHvm2	08	110.4	33.6	40.8	6.2	6.0	0.0	0.0	1.1	16.8	0.4	5.5
CWHvm2	09	46.3	12.5	15.7	4.2	0.0	0.0	0.3	0.0	11.7	0.5	1.3
CWHvm2	10	1.1	0.4	0.1	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0
CWHvm2	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CWHxm2	00	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0
CWHxm2	01	11.9	0.0	0.8	0.0	0.0	0.0	7.1	0.0	3.9	0.0	0.0
CWHxm2	02	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
CWHxm2	03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CWHxm2	04	2.2	0.0	0.8	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0
CWHxm2	05	4.2	0.0	0.0	0.0	0.0	0.0	2.5	0.0	1.7	0.0	0.0
MHmm1	00	364.8	74.0	110.2	45.3	17.5	18.8	0.0	9.1	73.5	16.2	0.2
MHmm1	01	266.7	62.0	121.0	52.1	5.1	13.2	0.1	0.0	6.1	0.1	7.0
MHmm1	02	508.4	117.1	241.2	63.1	17.7	34.2	0.0	7.6	16.2	6.6	4.7
MHmm1	03	196.6	27.6	95.1	11.8	22.1	7.0	0.0	4.4	24.2	4.4	0.0
MHmm1	04	108.8	20.1	35.1	41.0	0.0	4.8	0.0	0.0	2.2	0.7	5.0
MHmm1	05	59.6	15.0	37.4	3.6	1.7	0.0	0.0	1.5	0.4	0.0	0.0
MHmm1	06	59.8	11.1	8.7	33.0	0.1	0.0	0.0	0.0	7.0	0.0	0.0
MHmm1	08	15.4	2.4	9.0	3.1	0.0	0.9	0.0	0.0	0.0	0.0	0.0
MHmm1	09	3.1	0.3	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		15,210.7	4,702.0	2,837.2	1,604.4	144.3	693.7	712.4	67.9	577.6	2,383.5	1,487.8

Analysis updated November 2022

*Note that the total CFLB for this table is only the portion with TEM of SMZ 13 and will be smaller than the actual CFLB and smaller than the SMZ13 area as the TEM does not cover the entire area.

3   KEY RESOURCE TENURE HOLDERS

The following section describes the resource tenure holders that exist in the Nahmint Landscape Unit.

3.0   FOREST TENURE HOLDERS

BC Timber Sales is the primary tenure holder in the Nahmint Landscape Unit. They operate in the Pacific TSA portion of the LU and Interfor operates in the Arrowsmith TSA portion. BCTS was consulted throughout this process. They shared access to their operational information, LiDAR, and personnel to give feedback on OGMA locations. Interfor was also consulted through this process with respect to its small portion of the LU area and an OGMA location was created in the Arrowsmith TSA with their input.

In addition to this, Cisaa Forestry LLP and Hupacasath First Nation are signatory to BCTS' West Coast Forest Stewardship Plan holding non-replaceable forest licences and Forestry Licences to Cut.

3.1   MINING TENURE HOLDERS

The entire Nahmint LU is mapped as having very high metallic mineral potential and industrial mineral potential but only one known mineral occurrence. As of July 2021, there are 498.49 hectares of mineral tenures in Nahmint LU.

Exploration and development activities are permitted in OGMAs. The preference is to proceed with exploration and development in a way that is sensitive to the old growth values of the OGMA. If exploration and development proceed to the point of significantly impacting old growth values, then the OGMA would be moved and re-designated elsewhere.

4   SIGNIFICANT RESOURCE VALUES

This section summarizes significant resource values in the Nahmint LU including biodiversity, fish and wildlife, recreation and visual quality, cultural heritage resources, big trees, and timber.

4.0   BIODIVERSITY, FISH AND WILDLIFE

The Nahmint LU has a high proportion of older mature forest (141+ years old) and old seral forest (251+ years old). Nahmint has a lot of large Douglas-fir and western redcedar. The LU is a large valley with a lake and river system that connects to the Alberni inlet. Because of its geography, it has a diverse range of ecosystems, from low productivity high elevation dry outcrops to highly productive floodplain ecosystems. Biodiversity management in Nahmint is unlike most other landscape units on Vancouver Island as old growth protection in the SMZ 13 portion has an emphasis on regionally rare and underrepresented ecosystems. In SMZ 13, almost all ecosystems are either considered underrepresented, or regionally rare. More information on ecosystem definitions and ranking including "underrepresented" and "critically imperiled" is found in Appendix B.

The Nahmint River watershed (171 km^2) supports anadromous populations of winter and summer run steelhead, coho, chinook, chum, pink, and sockeye salmon, as well as resident populations of rainbow trout, cutthroat trout, pacific lamprey, and cottid species. The first of many natural barriers is located near the confluence of Kanyon Creek, which prevents passage for most anadromous fish, except for steelhead and a small number of coho and chinook, during specific flow conditions. Upstream of these barriers, fish presence is limited to rainbow and cutthroat trout, Dolly Varden char, steelhead, kokanee, pacific lamprey, and cottids. Provincial fisheries closures on the Nahmint River are in place annually from November 1st to April 1st to reduce fishing pressure on the vulnerable steelhead population.

The portion of the Nahmint River watershed upstream of Nahmint Lake is designated as a Fisheries Sensitive Watershed under the *Government Actions Regulation* of *FRPA*. This legislation requires that operators in a FSW follow practices that conserve natural hydrologic conditions, stream bed dynamics, and channel integrity, as well as prevent cumulative hydrological effects that would have adverse effects on fish.[12] The Nahmint FSW was designated in 2005 to protect habitat for anadromous steelhead.[13]

Wildlife resources of primary management concern in the Nahmint LU include marbled murrelet, *Brachyramphus marmoratus,* Roosevelt elk, *Cervus canadensis roosevelti*, black bear, *Ursus americanus*, northern goshawk, *Accipiter gentilis laingi*. Both the northern goshawk and the marbled murrelet have active BC recovery implementation plans.

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[12] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/582_2004#section14

[13] https://www.env.gov.bc.ca/wld/frpa/fsw/order/f-1-001_f-1-011.pdf

Figure 9: Bear Den Located in Nahmint Valley

In 2004, 10 ungulate winter ranges totalling 986 Ha were established for Roosevelt elk (4) and black-tailed deer (6) in the Nahmint and have been co-located with OGMAs in most locations. Future ungulate winter range effectiveness monitoring may result in changes or additions to UWRs in the Nahmint LU.

In 2005, a wildlife habitat area (WHA) was established to protect a northern goshawk breeding area in the Nahmint and is co-located with an OGMA. Goshawk inventory is ongoing and should an active nest be found in the Nahmint Landscape Unit, an additional WHA may be proposed in the future.

In 2015, 9 WHAs were established to protect marbled murrelet (MAMU) suitable nesting habitat. In addition to co-locating with these WHAs, OGMA planning has incorporated MAMU WHA design criteria and additional WHAs will be delineated in tandem with this plan in accordance with the 2021 Land Use Objectives Regulation (LUOR) and the 2021 Section 7 notice for MAMU (see Appendix A section 6.1.1. for more information). There are also smaller OGMAs (that do not meet MAMU WHA design criteria) that will protect smaller tracts of suitable MAMU habitat. When established, the MAMU WHAs and OGMAs protecting suitable MAMU habitat are intended to meet provincial management goals for MAMU habitat protection in the Nahmint

4.1   RECREATION/VISUAL QUALITY FOR RECREATIONALISTS

The Nahmint Landscape Unit has several recreational features. There are two recreation sites: Nahmint Lake Rec Site and Blackie's Beach. Gracie Lake is mapped and used as a recreation area although it is not an official recreation site. Recreational trails include the Brooke George trail to Mt. Klitsa, Mt. Anderson, portions of the Gibson- Klitsa trail and various routes including the Nahmint Mountain Mt. 5040 ridge route.

The Mt. Klitsa area is legally mapped as visually sensitive. There are approximately 290 hectares of visual quality objective

Figure 10: Tenting platform at Blackie's Beach

(VQO) polygons with the objective of "retention" in this area, which means that any alteration (harvesting) should be difficult to see, small in scale and natural in appearance. Most of these polygons have been captured in OGMAs. Another retention VQO polygon exists at the north end of Nahmint Lake and is captured in an OGMA. There is also high visual sensitivity around Nahmint Lake. Where possible, these areas are captured in OGMAs.

4.2   CULTURAL HERITAGE RESOURCES (CHR)

The Nahmint Landscape Unit has important cultural heritage resource value for First Nations. Cultural cedar is of primary interest for traditional uses like canoe building, carving, planks, welcome figures etc. Having cedar available for future generations is an important consideration for OGMA selection.

BCTS' Forest Stewardship Plan (FSP) commits to implementing the "Guidelines for Managing Cedar for Cultural Purposes", a strategy for managing western redcedar and yellow cedar, including monumental cedar. In the Nahmint LU, BCTS marks and reserves individual monumental cedar candidates when developing cutblocks. Where possible, OGMAs in this plan include identified monumental cedar candidates. BCTS' FSP also commits at the site level, to conserving species like Sitka spruce and yew, where practicable. These species will also be considered in OGMA delineation where possible.

As part of the Maa-nulth Final Agreement, Ucluelet First Nation has a signed "Monumental Cedar and Cypress[14] Harvest Agreement" where the Nation can harvest up to 250m^3 of monumental western redcedar or yellow cedar on provincial crown land within its Maa-nulth First Nation Area for cultural purposes. OGMA selection include stands that both species.

Cultural Heritage Resource value information shared with the Ministry that is compatible with OGMA planning was captured in OGMA delineation. This information is data sensitive and will not be apparent in this plan.

It is also important to recognize that First Nations' ability to access archaeological sites or trees for cultural use is not limited by OGMA designation.

4.3   BIG TREES

Nahmint is home to many trees of exceptional size. These include Douglas-fir and western redcedar that can grow beyond 200 cm and sometimes 300 cm in diameter. Large yellow-cedar grow in higher-elevation areas and can be over 100 cm DBH. Sporadic large Sitka spruce and yew trees have also been identified in the valley.

Big tree protection in Nahmint is legislated through the *Special Tree Protection Regulation*. In addition, BC Timber sales has an internal Coastal Legacy Tree Policy that voluntarily protects trees of a certain size in their coastal operating area including the Nahmint LU. See Appendix A section 6.1.4 for more detail.

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[14] Where "cypress" is synonymous with yellow cedar

4.4 TIMBER

Industrial timber harvesting has occurred in the Nahmint Valley for almost a century. Commercially valuable species in the Nahmint Landscape Unit are Douglas-fir, western redcedar, yellow cedar, western hemlock and amabilis fir. Of the total Nahmint LU Crown forested land base of 15,734 hectares, 4,765 hectares are in the timber harvesting land base (THLB) as of December 7, 2022.

The table below shows the age distribution of productive forest (crown forest land base) within the Nahmint LU.

Table 5: Age Distribution of Crown Forest Land Base within the Nahmint LU by BEC subzone variant

BEC Subzone	Percentage of Crown Forest Land Base by Age						
	251+ years	200-250	141-199	121-140	101-120	81-100	1-80
CMAunp	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
CWHmm1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CWHvm1	17.9%	6.6%	2.4%	0.3%	2.4%	3.1%	21.0%
CWHvm2	10.7%	7.8%	6.1%	0.3%	1.9%	1.4%	7.4%
CWHxm2	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.1%
MHmm1	2.6%	3.8%	2.0%	0.4%	0.2%	0.1%	1.1%

The following table shows a snapshot of older mature and old growth forests in the Nahmint Landscape Unit with the proposed OGMA configuration:

Table 6: Snapshot of mature and old growth forests status in Nahmint LU

	Age 251+		Ages 200-250		Ages 141-199	
Total Crown Forest Land Base (ha)	4,896	Percent of the CFLB (%)	2,877	Percent of the CFLB (%)	1,655	Percent of the CFLB (%)
Amount protected in OGMAs (ha)	3,059	62%	1,624	56%	899	54%
Other protected in addition to OGMAs (ha)	48	1%	13	0%	0	0%
THLB remaining unprotected (ha)	913	19%	576	20%	245	15%
PC remaining unprotected (ha)	336	7%	170	6%	54	3%
NC remaining unprotected (ha)	538	11%	495	17%	433	26%

Table updated November 2022

Of the total amount of forest age 251+ in the Nahmint LU, 62% will be protected in OGMAs. 56% of remaining forests age 200-250 will be protected in OGMAs and 54% of ages 141-199[15]. The remaining unprotected forests could be subject to harvest, although site level retention requirements means that not all of this area will actually be harvested. In addition, areas of the remaining forest has been

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[15] Note that the age information is based on inventory information and not on field verified ages. More information on inventory limitations is found in Appendix A section 8.2.1.

identified as potential for old growth deferral and future management decisions will determine the protection status of these area.

4.5   VALUES SUMMARY

The Nahmint Valley supports a plethora of values. Timber harvesting is both in conflict and compatible with other values in Nahmint. Harvesting has provided easier access to recreation, cultural heritage resources, and forage opportunities for ungulates, for example. Harvesting has also resulted in a fragmented landscape, introduced sediment into waterbodies, altered visual landscapes, and removed forests that support large trees, traditional use opportunities, recreation and more. At the site level, there are regulations that strive to strike the balance between benefiting from the economics of timber while adequately maintaining all other resource values. The goal for this plan is to legally protect areas that are ecologically diverse that functionally support values across the landscape. In addition, this will bring better certainty to where harvesting can continue while ensuring that other non-harvest values are being effectively managed at the landscape level.

5 LEGALLY BINDING DIRECTION

This section summarizes the legally binding direction applicable to the Nahmint Landscape Unit Plan. This includes the *Vancouver Island Land Use Plan Higher Level Plan Order* (HLPO) and the Order Establishing Provincial Non-Spatial Old Growth Objectives. Additional details can be found in Appendix A section 3. There are two scales of application that are noted: one at the SMZ 13 portion of the Nahmint LU and the other at the entire Nahmint LU scale.

5.0 VANCOUVER ISLAND LAND USE PLAN (VILUP) HIGHER LEVEL PLAN ORDER (HLPO)

SCALE OF APPLICATION IN THIS PLAN: SMZ 13 portion of the Nahmint LU

Objectives for Landscape Unit Planning must be consistent with established Higher Level Plan Order Objectives. The *VILUP HLPO* came into effect on December 1, 2000 and established the Nahmint Landscape Unit as Special Management Zone (SMZ) 13.

Objectives 1a) b), 4 and 5 apply to Nahmint SMZ 13 landscape unit planning (note that Objectives 1c and 2 of the HLPO apply to the Nahmint Landscape Unit but are operational direction and not applicable to the landscape unit plan):

> A. *For Special Management Zones 1 through 14 and 17 through 22:*
>   1. *Sustain forest ecosystem structure and function in SMZs, by:*
>   a. *creating or maintaining stand structures and forest attributes associated with mature[16] and old[17] forests, subject to the following:*
>   i. *the target for mature seral forest should range between one quarter to one third of the forested area of each SMZ[18];*
>   b. *in SMZs where the area of mature forest is currently less than the mature target range referred to in (i) above, the target amount of mature forest must be in place within 50 years; retaining, within cut blocks[19], structural forest attributes and elements with important biodiversity functions[20]; and*

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[16] From *VLUP HLPO*: The mature seral forest is defined as generally 80 to 120 years old or older, depending on species and site conditions. The structure of mature seral forests generally includes canopies that vary vertically or horizontally, or both. The age and structure of the mature seral stage will vary significantly by forest type and from one biogeoclimatic zone to another.

[17] From *VILUP HLPO*: The old seral forest is defined as generally greater than 250 years old, containing live and dead (downed and standing) trees of various sizes, including large diameter trees, and of various tree species, including broad-leaved trees. The structure of old seral forest varies significantly by forest type and from one biogeoclimatic zone to another.

[18] From *VILUP HLPO*: Mature seral targets will be established through landscape unit planning. See transition provisions under III.

[19] From *VILUP HLPO*: "Within cutblock" generally, means non-contiguous with cutblock boundaries.

[20] From *VILUP HLPO*: "Structural forest attributes and elements with important biodiversity functions" includes, but is not limited to snags, wildlife trees, downed logs.

> B. *for Special Management Zones 8, and 13, and parts of Special Management Zones 1, 3 and 11, which are located within landscape units with higher biodiversity emphasis:*
>> 4. *Maintain late-successional habitat elements and attributes of biodiversity[21] in forested ecosystems with emphasis on regionally rare and underrepresented ecosystems, by retaining old seral forest at the site series/surrogate level of representation[22].*
>> 5. *Retain late-successional habitat elements and attributes of biodiversity in patches of variable size.*

5.1 ORDER ESTABLISHING PROVINCIAL NON-SPATIAL OLD GROWTH OBJECTIVES

SCALE OF APPLICATION IN THIS PLAN: Entire Nahmint LU

In addition to meeting the VILUP HPO, the Nahmint Landscape Unit must meet old seral targets by variant through the Order Establishing Provincial Non-Spatial Old Growth Objectives.

The Nahmint Landscape Unit (LU) was established through the Order, effective June 30, 2004. Through this Order, Nahmint was given a high biodiversity emphasis. In addition, Natural Disturbance Types (NDT) were assigned to biogeoclimatic units. The following apply to the Nahmint LU:

Table 7: Natural Disturbance Types in Nahmint LU BEC Subzone Variants

NDT	BEC label	Zone	Subzone	Variant	Subzone Name	Variant Name
1	CWHvm1	CWH	vm	1	Very wet maritime	Submontane
1	CWHvm2	CWH	vm	2	Very wet maritime	Montane
2	CWHxm2	CWH	xm	2	Very dry maritime	Western
1	MHmm1	MH	mm	1	Moist maritime	Windward

Percent of old forest retention targets were assigned through this order based on biogeoclimatic zone, biodiversity emphasis and natural disturbance type. The following apply to the Nahmint LU:

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[21] This includes, but it not limited to large diameter (>60cm) live, decaying and dead standing trees (providing nest and cavity sites); downed wood, including large diameter pieces (50 to 150cm); deciduous broad-leaved trees, both in riparian and upland areas.

[22] The level of representation of old seral forest will be applied through landscape unit planning.

Table 8: Retention Targets by Natural Disturbance Type and BEC Zone in Nahmint LU

Natural Disturbance Type	Biogeoclimatic Zone	Age of Old Forest	Percent Old Forest Retention in High Biodiversity Emphasis LU
1	CWH	>250yrs	>19 %
1	MH	>250yrs	>28 %
2	CWH	>250yrs	>13 %

5.2   NON-BINDING HLP DIRECTION

SCALE OF APPLICATION IN THIS PLAN: Entire Nahmint LU

The Vancouver Island Summary Land Use Plan (VISLUP) summarized management objectives for the Nahmint LU:

Primary Objectives: wildlife, fish, biodiversity, visual resources, recreation resources, water.

Secondary Objectives: timber, tourism resources, cultural heritage resources, cave/karst, access.

See appendix A section 12.1 for full details on how the VISLUP was considered.

6   OLD GROWTH MANAGEMENT AREAS

Establishing OGMAs in Nahmint was challenging and involved multiple legal requirements at 2 different spatial scales. There were many non-legal values to consider, and in addition, good OGMA design was crucial to enable a functional set of legal reserve areas. OGMA selection was informed by a background research and information, using GIS tools, local knowledge, and field verification. Many of these details, including how values were considered in OGMA selection is outlined in Appendix A.

The following section provides a numerical summary of the delineated OGMAs in the Nahmint LU. Values that are not expressed numerically are discussed in Appendix A. OGMAs were designed to meet legal targets while including all priority values where compatible with OGMA planning parameters. See Appendix A section 6 and 7 for details. The methodology for delineating OGMAs is explained in detail in Appendix A section 9.

The total forested area protected through OGMA delineation in this plan is 5,643 hectares.

6.0   *VILUP HLPO* OBJECTIVE 1A)

To be consistent with *VILUP HLPO* Objective 1a), the total amount of mature forest (all productive forest greater than the age for mature by BEC variant age cut offs) protected in the Nahmint SMZ 13 was calculated as a percentage of the total SMZ 13 crown forest land base in the Nahmint LU.

Percent mature protected $= \left(\dfrac{55870 \; ha \; mature \; forest^{23} \;\; protected \; in \; Nahmint \; SMZ \; 13870}{15{,}261 \; ha} \right)$

= **38%**

This percentage protected exceeds the target for the *VILUP HLPO* Objective to maintain one quarter to one third mature seral forest in Nahmint SMZ 13.

6.1   *VILUP HLPO* OBJECTIVE 4

Consistent with *VILUP HLPO* Objective 4, site series targets were established. These targets are found in Appendix A section 9.1. For further detail on the establishment of site series targets, see Appendix B. The following table shows site series targets and how they are met:

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[23] Where mature is 80 years and older for CWHvm1, CWHvm2 and CWHxm2 and mature is 120 years and greater for MHmm1

Table 9: Site Series protected in OGMAs versus targets[24]

BEC subzone	Site Series	Site Series Target (%)	Site Series Target (ha)	Site Series Breakdown by Age classes in OGMAs										Total area delineated above target (ha)
				AC 9 Age 251+ (ha)	Old AC 8 Age 200-250 (ha)	Young AC 8 Age 141-199 (ha)	AC 7 121-140 (ha)	AC 6 101-120 (ha)	AC 5 81-100 (ha)	AC 4 61-80 (ha)	AC 3 41-60 (ha)	AC 2 21-40 (ha)	AC 1 1-20 (ha)	
CWHvm1	01	13	275	253	87	47	0.3	3	2	1	4	0.6	0.1	123
CWHvm1	02	24	17	10	3	7	2	0	0	0	0	0	0	5
CWHvm1	03	24	268	240	59	38	7	10	20	3	0.4	2	0.6	112
CWHvm1	04	24	329	240	68	41	0.7	2	30	0	0.7	0.3	3	55
CWHvm1	05	24	357	393	45	12	0.1	4	16	0.1	0.5	4	0.3	119
CWHvm1	06	24	125	137	45	15	0	0.1	0	0	4	0	1	77
CWHvm1	07	24	121	167	24	6	0.3	0.1	0	6	5	2	0.1	89
CWHvm1	08	24	36	93	9	3	0	0	0	0	7	0	0	76
CWHvm1	09	24	27	47	0	0.7	0.2	0	0	0	0	0.6	0	21
CWHvm1	10	24	10	30	0	0.2	9	0	0	0	0	0	0	28
CWHvm1	14	24	2	1	0	0	0	0	0	0	0	0.6	0	0
CWHvm2	01	13	176	160	135	110	0	4	14	0	6	0.3	0.1	253
CWHvm2	02	25	14	2	6	3	0.7	0.6	14	0	0	0	0	13
CWHvm2	03	25	251	134	107	49	4	4	34	0	0.7	2	0	85
CWHvm2	04	25	274	128	135	28	0.5	0.9	37	0	1	0.1	0.2	58
CWHvm2	05	25	195	168	100	115	8	3	4	0	8	2	0.4	213
CWHvm2	06	25	109	105	63	84	0	1	9	0	0.3	1	0.1	156
CWHvm2	07	25	88	83	35	51	3	0.1	0	0.4	3	1	0	88
CWHvm2	08	25	28	27	33	6	6	0	0	1	17	0	0	63
CWHvm2	09	25	12	12	15	4	0	0	0.2	0	12	0.3	0	32
CWHxm2	01	13	2	0	0.8	0	0	0	1	0	3	0	0	3
CWHxm2	02	13	0.1	0	0	0	0	0	0	0	0.6	0	0	0.5
CWHxm2	04	13	0.3	0	0.8	0	0	0	0.4	0	0	0	0	0.9
CWHxm2	05	13	0.5	0	0	0	0	0	0.4	0	1	0	0	0.9
MHmm1	01	45	120	51	94	43	5	5	0	0	6	0	0	83
MHmm1	02	35	178	104	216	44	14	23	0	8	14	6	0	250
MHmm1	03	45	88	27	86	9	22	3	0	4	24	4	0	91
MHmm1	04	45	49	19	29	39	0	2	0	0	2	0.7	0	43
MHmm1	05	45	27	9	34	2	2	0	0	1	0.4	0	0	22
MHmm1	06	45	27	11	9	30	0.1	0	0	0	7	0	0	30
MHmm1	08	45	7	2	9	3	0	0.9	0	0	0	0	0	8
MHmm1	09	45	1	0.3	3	0	0	0	0	0	0	0	0	2
			TOTAL	2,657	1,451	772	84	66	181	24	127	27	6	2,190

Table updated November 2022

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[24] Note: these totals will not equal landscape unit totals. SMZ 13 is smaller than the Nahmint LU. Moreover, the TEM (site series) spatial data does not completely cover SMZ 13.

Table Notes:

77% of the cumulative targets are met in Age Class 9. Some site series targets are exceeded in age class 9. 98% of the cumulative targets are met in ages 200+, which includes age class 9 and old age class 8.

There are also many site series that exceed their targets in age 200+, and this totals approximately 936 hectares exceeding targets.

Some targets are achieved only in lower age classes. CWHvm1(14) required age class 3 to meet the target of 1.89 hectares. This was because this site series was logged in the 1990s, and therefore, an inadequate amount of old forest was available to meet present targets. This logging pre-dates the *VILUP Higher-level Plan Order*.

During the OGMA delineation process, the target for CWHxm2 (02) though ecologically representative of the site series, was removed due to the lack of spatial presence being less than 1ha in the SMZ (see Table A- 33 Reason for Exclusion of Site Series from Targets). Opportunities for stand-level consideration may be given during future field verifications, i.e. setting aside as a wildlife tree patch (see Table A- 33 Reason for Exclusion of Site Series from Targets). After field verification, a small OGMA was created that captured the mapped 02 and other site series to create a functional-sized OGMA, so the (02) site series remains with a target and is displayed here. The OGMA is largely recruitment as it is in age class 3. There is no old forest available for this site series.

6.2   *VILUP HLPO* OBJECTIVE 5

Consistent with *VILUP HLPO* Objective 5, the following table shows the range of OGMA patch sizes in the Nahmint LU. For these calculations, patch size includes non-forested portions of the polygons:

Table 10: OGMA Patch Size Summary in Nahmint LU

Patch Size category	Total ha within patch size category (includes non-forested)	OGMAs per patch size	Percent of total number of OGMAs	Percent of Total OGMA area
2-19	132	17	43%	2%
20-49	408	12	30%	5%
50-99	141	2	5%	2%
100-149	401	3	8%	5%
150-249	234	1	3%	3%
250+	6,305	5	13%	83%
Total	7,621	40		

Table created December 2021

6.3 PROVINCIAL NON-SPATIAL OLD GROWTH ORDER

Consistent with the Order Establishing Provincial Non-Spatial Old Growth Objectives, the following are the BEC variant targets for the Nahmint Landscape Unit. The table also demonstrates how the targets were achieved:

Table 11: BEC variant targets and Area Protected in OGMAs in the Nahmint Landscape Unit

BEC Subzone variant	Crown Forest Land Base (ha)	Variant Target (%)	Variant Target (ha)	Area Protected in OGMAs (ha)	Percent of Variant protected (%)
CWHvm1	8,443	19%	1,604	2,458	29%
CWHvm2	5,578	19%	1,060	2,466	44%
CWHxm2	56	13%	7	18	32%
MHmm1	1,618	28%	453	1,431	88%
Total	15,695[25]		3,124		

Table updated December 2022

All variant targets have been met and exceeded.

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[25] This total does not equal the total CFLB due to linework inconsistencies, rounding and other small fragments of BEC subzones in the dataset that are not applicable to these targets, like CMA unp for example, which is unproductive. All variant targets are exceeded in this plan however, and will make up for hectares lost in the CFLB.

The following are the land use objectives for the Nahmint Landscape Unit:

Preamble

This Order establishes objectives for old growth management areas across the Nahmint Landscape Unit (LU). The goal of these objectives is to contribute to biological diversity at the landscape level. The established old growth management areas (OGMA) that are the outcome of this Order are consistent with legal Objectives on two separate but largely overlapping scales. The first scale is that of the entire Nahmint LU. At this scale, the established OGMAs are consistent with the *Order Establishing Provincial Non-Spatial Old Growth Objectives* where target amounts of old forest and recruitment are maintained by biogeoclimatic subzone variant **by LU**. The second scale is of the Special Management Zone (SMZ)13 portion that is located within the Nahmint LU. At this scale, the established OGMAs are consistent with the *Vancouver Island Land Use Plan (VILUP) Higher Level Plan Order (HLPO),* where regionally rare and underrepresented ecosystems are emphasized and protected at the site series level **within the SMZ 13 portion of the Nahmint LU**. In addition, minimum targets for site series-level protection are established in SMZ 13 through this landscape unit planning process and are defined in this Order.

Exceptions to the objectives established through this Order are described to address circumstances where activities may occur as well as address operational safety concerns. Due to the co-location with other reserves such as wildlife habitat areas and ungulate winter ranges and their associated established objectives, some OGMAs may not share the same exceptions. The objectives under this order may be periodically updated to incorporate new knowledge and address changing environmental, economic, and social conditions. First Nations traditional use of forest resources, treaty negotiations or settlements are not intended to be limited by the objectives established by this Order.

This preamble is intended to provide context and background; it does not form part of the Order.

ORDER OF THE MINISTER OF FORESTS

Land Act

Ministerial Order   No.

Land Use Objectives for the Nahmint Landscape Unit
situated in Central Vancouver Island within the South Island Natural Resource District

I.   Pursuant to s. 93.4 of the Land Act, I Sharon Hadway as Regional Executive Director for the West Coast Region, Ministry of Forests, establish objectives for the Nahmint Landscape Unit.

II.   This Order takes effect on the date the notice is posted in the Gazette.

III.   Pursuant to section 5(1)(b) of the *Forest and Range Practices Act* (FRPA), the holder of an Operational Plan (OP) must specify results and strategies within 12 months of the date that the order takes effect.

IV.   Pursuant to section 8(2)(b) of the FRPA, the holder of an OP must propose and submit for approval amendments to the OP within 12 months of the date that the order takes effect.

_____   _____
Date   *Sharon Hadway, Regional Executive Director, West Coast Region, Ministry of Forests*

(This part is for administrative purposes only and is not part of the Order.)

Authority under which Order is made:

Act and section: Land Act Section 93.4

Legal Objectives: Nahmint Landscape Unit

Part 1: Interpretation

1. Relationship with *Forest and Range Practices Act* objectives:

   a) Pursuant to Section 93.4 of the *Land Act*, for the purposes of the *Forest and Range Practices Act* (FRPA), the following land use objectives are established and apply to the Nahmint Landscape Unit (LU) shown on the map attached as Schedule A, with the centre point of the line establishing the area boundaries, and contained in the legal OGMA spatial layer (WHSE_LAND_USE_PLANNING.RMP_OGMA_LEGAL_CURRENT_SVW) stored in the British Columbia Geographic Warehouse;

   b) If there is a discrepancy between the areas shown on the map attached as Schedule A and the legal OGMA spatial layer stored in the British Columbia Geographic Warehouse (WHSE_LAND_USE_PLANNING.RMP_OGMA_LEGAL_CURRENT_SVW), the areas as detailed in the legal OGMA spatial layer will take precedence.

Part 1: Definitions

1. For the purpose of this order, the following definitions apply:

   "Old growth forest" a forest stand where the inventory age is greater than 250 years old.

   "**Recruitment of old growth forest"** to identify and conserve forest that is not yet old growth forest, with the expectation that this forest will in future achieve the objectives of old growth forest.

Part 2: Objectives

1. The Objectives for the OGMAs are as follows:

   a) Within the LU, retain old growth forest or recruit old growth forests in the old growth management areas shown on Schedule A (OGMAs) except as required and described in part 3 below.

   b) In the portion of the OGMAs referred to in paragraph a) above that is located in Special Management Zone 13 shown on Schedule A, maintain late-successional habitat elements and attributes of biodiversity in forested ecosystems with emphasis on regionally rare and underrepresented ecosystems by retaining old growth or by recruitment of old growth forest at the site series level to no less than the targets in Appendix A.

Part 3: Exceptions

a) Exceptions to Part 2 are as follows:

   a. Felling of danger trees to remove a safety hazard along cutblock boundaries, within road right-of-ways, or within recreation sites or trails, provided that felled trees are left on site as wildlife habitat unless removal is required for fire hazard abatement;
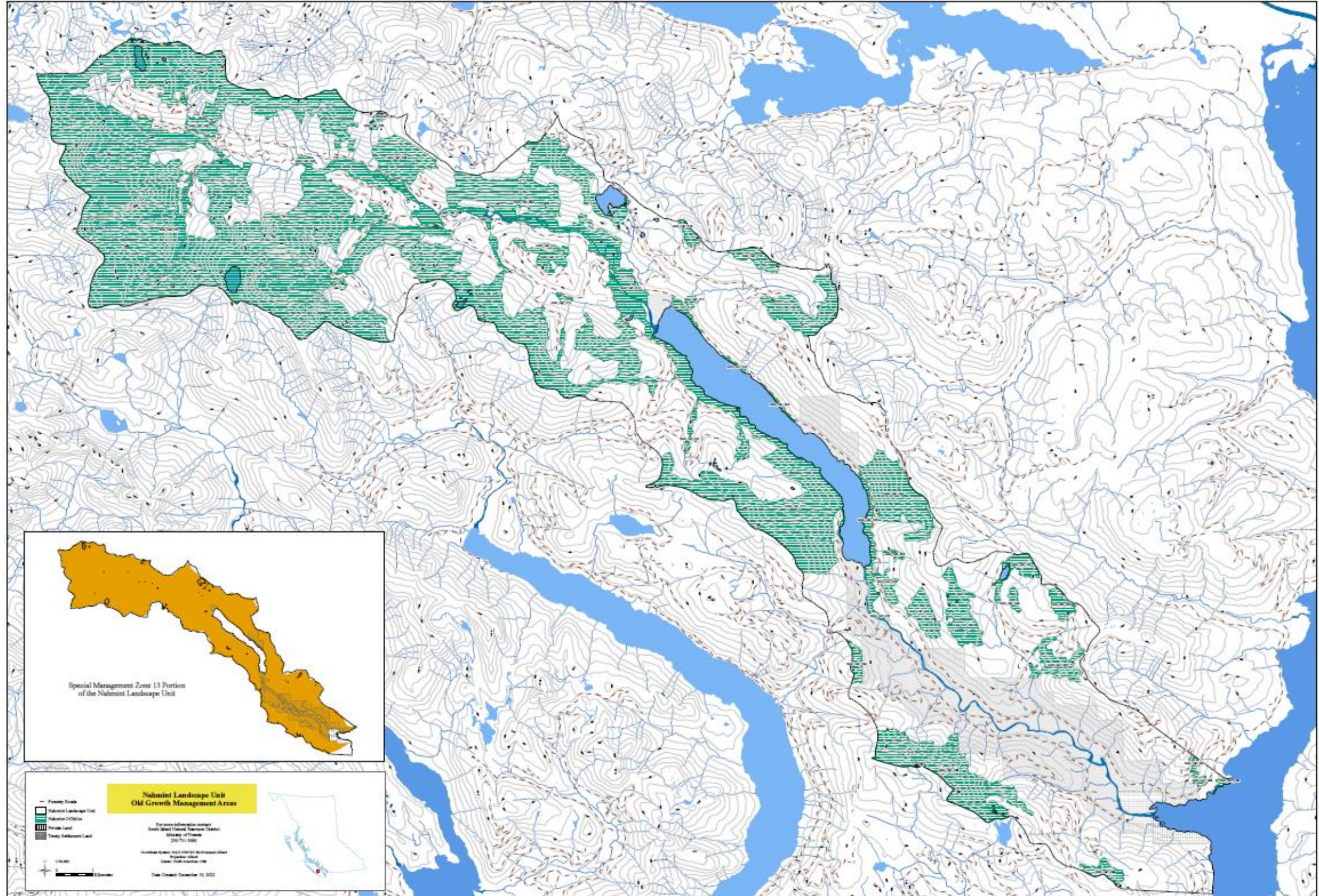
      b. Road maintenance, deactivation, or brushing and clearing on existing roads under active tenure within the right-of-way for safety purposes;

      c. Windfirming treatments along a boundary, up to 30m from an edge and impacting up to 2% of the total OGMA area;

b) All individual exceptions in accordance with Part 3 must be documented and submitted as digital and spatial data to the delegated decision maker no later than 2 months following the end of each calendar year.

Part 4: Effective Date and Transition

1. This Order takes effect on the date that notice of this Order is published in the Gazette.

Appendix 1 – Minimum targets for old growth forest retention for site series in the Special Management Zone 13 portion of the Nahmint Landscape Unit, in order to meet the objectives of this order.

Biogeoclimatic zone, subzone, and variant	Site Series	Rarity	Site Series Target (ha)
CWHvm1	01	Common	275
CWHvm1	02	Regionally rare	17
CWHvm1	03	Regionally rare	268
CWHvm1	04	Regionally rare	329
CWHvm1	05	Regionally rare	357
CWHvm1	06	Regionally rare	125
CWHvm1	07	Regionally rare	121
CWHvm1	08	Underrepresented Regionally rare	36
CWHvm1	09	Underrepresented Regionally rare	27
CWHvm1	10	Underrepresented Regionally rare	10
CWHvm1	14	Underrepresented Regionally rare	2
CWHvm2	01	Common	176
CWHvm2	02	Underrepresented	14
CWHvm2	03	Regionally rare	251
CWHvm2	04	Regionally rare	274
CWHvm2	05	Regionally rare	195
CWHvm2	06	Regionally rare	109
CWHvm2	07	Regionally rare	88
CWHvm2	08	Underrepresented Regionally rare	28
CWHvm2	09	Underrepresented	12
CWHxm2	01	Underrepresented Regionally rare	2
CWHxm2	02	Underrepresented Regionally rare	0.1
CWHxm2	04	Underrepresented Regionally rare	0.3
CWHxm2	05	Underrepresented Regionally rare	0.5
MHmm1	01	Underrepresented	120
MHmm1	02	Common	178
MHmm1	03	Underrepresented	88
MHmm1	04	Underrepresented	49
MHmm1	05	Underrepresented	27
MHmm1	06	Underrepresented	27
MHmm1	08	Underrepresented	7
MHmm1	09	Underrepresented	1

Special Management Zone 13 Portion
of the Nahmint Landscape Unit

Nahmint Landscape Unit
Old Growth Management Areas

APPENDIX

A

LANDSCAPE UNIT PLANNING DETAILS

Contents

List of Tables

List of Figures

Age Class (AC): Age class is referred to throughout this plan. There are 9 age classes:

Table A- 1 Age Class Definitions

Age Class	Age (year)
1	1-20
2	21-40
3	41-60
4	61-80
5	81-100
6	101-120
7	121-140
8	141-250
9	251+

Biodiversity: Defined in the Forest and Range Practices Act as the biological diversity of plants, animals, and other living organisms in all their forms and levels or organization, including the biological diversity of genes, species, and ecosystems.

Biogeoclimatic zone: Defined in the 1995 Biodiversity Guidebook as a geographic area having similar patterns of energy flow, vegetation, and soils because of a broadly homogenous macro-climate.

Cultural heritage resource: Defined in the *Forest Act* as an object, a site or the location of a traditional societal practice that is of historical, cultural, or archaeological significance to British Columbia, a community, or an aboriginal people.

Connectivity: Defined in the Landscape Unit Planning Guidebook as the degree to which late successional ecosystems are linked to one another to form an interconnected network. The degree of interconnectedness and the characteristics of the linkages vary in natural landscapes based on topography and natural disturbance regime.

Crown Forested Land Base (CFLB): From the LUPG (1999), the land base contributing to old growth and wildlife tree retention targets includes all Crown Forest, including tree farm license land and any private land associated with a tree farm license. The forested portions of provincial parks, protected areas, ecological reserves, and federal parks as noted above should also be included in the Crown forested land base. Woodlots are not included as part of the CFLB as they are not eligible for OGMA location.

Forest Ecosystem Network (FEN): Historical management designation, defined in the 1995 Biodiversity Guidebook as a planned landscape zone that serves to maintain or restore the natural connectivity within a landscape unit. A forest ecosystem network consists of a variety of fully protected areas, sensitive areas, and old-growth management areas.

Landscape Unit (LU): Defined in the 1995 Biodiversity Guidebook as a planning area, generally up to about 100 000 ha in size, delineated according to topographic or geographic features such as a watershed or series of watersheds. It is established by the district manager.

Late-successional habitat elements of biodiversity: defined in the *VILUP HLPO* (2000) as including, but not limited to: large diameter (>60cm) live, decaying and dead standing trees (providing nest and cavity sites); downed wood, including large diameter pieces (50 to 150cm); deciduous broad-leaved trees, both in riparian and upland areas.

Legacy Tree (Coastal Legacy Tree, CLT): From the 2017 BCTS Coastal Legacy Tree Best Management Practices, a tree that is of the species and the minimum diameter specified in the following table (included are only species applicable to the Nahmint Landscape Unit):

Table A- 2 Coastal Legacy Tree Diameter Minimum by Species Applicable to the Nahmint LU

Species	Diameter* (metres DBH) Guidance for Legacy Tree retention
Yellow cedar	2.1
Coastal Douglas-fir	2.1
Western redcedar	3.0
Sitka spruce (very small amounts of Ss in Nahmint LU)	2.2

Mature seral forest: defined in the *VILUP HLPO* (2000) and in the LUPG (1999) as generally 80 to 120 years or older, depending on species and site conditions. The structure of mature seral forests generally includes canopies that vary vertically or horizontally, or both. The age and structure of the mature seral stage will vary significantly by forest type and from one biogeoclimatic zone to another.

Natural disturbance type (NDT): Defined in the 1995 Biodiversity Guidebook as an area that is characterized by a natural disturbance regime.

Non-contributing land base (NC): Defined in the LUPG (1999) as the crown forested land base that does not contribute to AAC but does contribute to biodiversity objectives and targets. It includes parks, riparian reserves, inoperable forest and any other 100% net down areas, and partial net downs, such as environmentally sensitive areas as defined by the Timber Supply Review.

Non-forested area: Defined in the LUPG (1999) as a non-forested and non-productive land, such as alpine, swamps, grasslands, avalanche chutes, non-productive forest (forest below site index 5), and non-commercial brush, do not contribute to meeting old growth and wildlife tree requirements and are

not included in the Crown forested land base. Biodiversity seral stage forest targets and strategies are not applied to bunchgrass and alpine tundra biogeoclimatic zones, so these do not contribute to priority biodiversity targets and are removed from the Crown forested land base.

Old Growth Management Area (OGMA): defined in the *Forest Practices Code* of British Columbia Act *Operational and Site Planning Regulation* as an area established under a higher-level plan which contains or is managed to replace structural old growth attributes. Further defined in the 1995 Biodiversity Guidebook as areas that contain or are managed to replace specific structural old-growth attributes and that are mapped out and treated as special management areas.

Old seral forest: defined in the *VILUP HLPO* (2000) as generally greater than 250 years old, containing live and dead (downed and standing) trees of various sizes, including large diameter trees, and of various tree species, including broad-leaved trees. The structure of old seral forest varies significantly by forest type and from one biogeoclimatic zone to another.

Partially contributing land base (PC): Defined in the LUPG (1999) as areas where less than 75% of the timber harvesting land base polygon is available for harvesting.

Regionally Rare Ecosystem: For Nahmint Landscape Unit Planning, a red- or blue-listed ecological community as defined and listed by the Conservation Data Centre.

Site series: Defined in the 1995 Biodiversity Guidebook as sites capable of producing the same late seral or climax plant communities within a biogeoclimatic subzone or variant.

Specified Tree: A tree as identified in the *Special Tree Protection Regulation*. Trees that apply to the Nahmint Landscape Unit are as follows:

Table A- 3 Specified Tree Diameter Minimum by Species Applicable to Nahmint LU

Tree	Diameter at breast height (cm)
Yellow cedar	265
Douglas-fir	270
Bigleaf maple	198
Western redcedar	385
Sitka spruce	283
Pacific yew	63

Species at Risk (SAR): Defined in the *Forest and Range Practices Act* as a species identified within a category of wildlife that is endangered, threatened or vulnerable, established under the *Government Actions Regulation*.

Terrestrial Ecosystem Mapping (TEM): Is the stratification of a landscape into map units, according to a combination of ecological features, primarily climate, physiography, surficial material, bedrock geology, soil, and vegetation.

Timber harvesting land base (THLB): Defined in the LUPG (1999) as the Crown forested land base that contributes to the AAC, as defined in the Timber Supply Review, for a Timber Supply Area (TSA) or Tree Farm License (TFL).

Underrepresented ecosystem: For Nahmint Landscape Unit Planning, an ecosystem (site series or surrogate) that makes up less than 2% of a landscape unit.

Ungulate winter range: Defined in the Forest and Range Practices Act as an ungulate winter range continued under section 180 (b)) [grandparenting objectives] of the Act or established under the *Government Actions Regulation* to protect habitat that is necessary to meet the winter habitat requirements of an ungulate species.

Wildlife habitat area (WHA): Defined in the Forest and Range Practices Act as a wildlife habitat area continued under section 180 (b)) [grandparenting objectives] of the Act or established under the *Government Actions Regulation* to protect the area necessary to meet the habitat requirements of a category of species at risk or regionally important wildlife.

Variant: Defined in the LUPG (1999) as a subdivision of a biogeoclimatic subzone. Variants reflect further differences in regional climate and are generally recognized for areas slightly drier, wetter, snowier, warmer, or colder than other areas in the subzone.

Vegetation Resource Inventory (VRI): Is an inventory of trees, vegetation, and other types of land cover, that consists of first photo interpretation and then ground sampling.

Wildlife tree retention area (WTRA): Defined in the Forest and Range Practices Act as an area occupied by wildlife trees that is located in a cutblock, in an area that is contiguous to a cutblock, or in an area that is sufficiently close to the cutblock that the wildlife trees could directly impact on, or be directly impacted by, a forest practice carried out in the cutblock.

2 NAHMINT CHRONOLOGY

To understand the full context of Nahmint Landscape Unit Planning, it is important to understand everything that has led up to today's plan. This includes understanding how the legislative landscape has changed over time as well as previous strategies for managing biodiversity and old growth.

The landscape unit management has changed a lot over time. In the early 1990s, Biodiversity Corridors were established as a consideration for maintaining biological diversity throughout the Nahmint Valley. These areas included both old-growth and second growth.

Later, Forest Ecosystem Networks were established under the *Forest Practices Code*, to primarily maintain and restore the natural connectivity throughout the Nahmint Landscape Unit. They were like the biodiversity corridors and likely built off that work. They included old growth, second growth, as well as non-forested areas.

In 2004, the Order Establishing Non-Spatial Old Growth Objectives legalized commitments to retaining old forest. From this order, draft OGMAs were eventually established, first in 2007, then with an update in 2012. These OGMAs concentrated on old and mature forest retention. There was also an emphasis on wildlife habitat. In 2004 ungulate winter ranges were established for Roosevelt elk and black-tailed deer, and in 2005 a Wildlife Habitat Area was established for northern goshawk. In 2015, nine other wildlife habitat areas in Nahmint were legally established for marbled murrelet.

Since the most recent draft Landscape Unit Plan in 2012, there have been significant geospatial data improvements. Two important improvements include new vegetation resource inventory information as well as the use of LiDAR. With this information, OGMAs can be more accurately delineated with a better sense of what values exist on the ground.

On top of this, other practices exist in the field presently that did not exist in 2012. Legacy tree protection is now something that BC Timber Sales manages as a best management practice.

The 1999 landscape unit planning guidebook remains the key guidance document for establishing OGMAs. Since the guidebook was established however, new policy and legislation have come in force with additional requirements. For instance, the *Vancouver Island Land Use Plan Higher Level Plan Order* came into effect with specific objectives for emphasis on regionally rare and underrepresented ecosystems for Nahmint SMZ 13. In 2020, a new *Special Tree Protection Regulation* was established giving protection to trees of exceptional size.

The following pages include a table illustrating the history of biodiversity reserve areas and factors influencing Landscape Unit planning over time. Following that are maps showing the historical reserves that existed over time.

		Pre- FRPA (Forest Practices Code in effect) pre-VILUP HLPO	Pre- FRPA (Forest Practices Code in effect) pre-VILUP HLPO	1995-present Biodiversity Guidebook In effect	1995-present Biodiversity Guidebook In effect	1995-present Biodiversity Guidebook In effect
				1999-present Landscape Unit Planning Guidebook in effect — Primary management priority: OGMA and WTP planning	1999-present Landscape Unit Planning Guidebook in effect — Primary management priority: OGMA and WTP planning	1999-present Landscape Unit Planning Guidebook in effect — Primary management priority: OGMA and WTP planning
				2000-present Vancouver Island Land Use Plan Higher Level Plan Order in effect — 2002-present Forest and Range Practices Act in effect — 2004- present Order Establishing Provincial Non-Spatial Old Growth in effect	2000-present Vancouver Island Land Use Plan Higher Level Plan Order in effect — 2002-present Forest and Range Practices Act in effect — 2004- present Order Establishing Provincial Non-Spatial Old Growth in effect	2000-present Vancouver Island Land Use Plan Higher Level Plan Order in effect — 2002-present Forest and Range Practices Act in effect — 2004- present Order Establishing Provincial Non-Spatial Old Growth in effect
		1990	1995	2007	2012	Present
		Biodiversity Corridors in Nahmint	FENs in Nahmint	2007 draft OGMAs as established through the 2007 Nahmint draft Landscape Unit Plan	2012 draft OGMAs as established through the 2012 draft Nahmint Sustainable Resource Management Plan	Present Day Status of OGMAs and other constrained areas in Nahmint LU
Overview of Biodiversity Reserve	Notes on Establishment	Biodiversity Corridors Established via the Nahmint Watershed Review, 1990.	FENs are legally established through the Forest Practices Code and the Operational and Site Planning Regulation. FENs in Nahmint (old TFL 44) were established pre-code but were legalized in 1995.	The first draft set of Old Growth Management Areas are established via the 2007 draft Landscape Unit Plan.	An update to the 2007 draft OGMAs has been made with the 2012 draft Sustainable Resource Management Plan	Entire Landscape Unit Plan has a re-look. Plan meets the requirements under the PNSOGO and also spatializes VILUP 1a) which results in a greater area protected compared to the 2007 and 2012 plans.
Overview of Biodiversity Reserve	Summary of reserve	Biodiversity (wildlife) corridor system composed of both old-growth and advanced second-growth. They serve to maintain biological diversity throughout the valley by containing both plant and animal species indigenous to the area.	FENs are areas that serve to maintain or restore the natural connectivity within an area. FENs were a temporary measure until landscape unit planning was completed and established objectives for biodiversity management.	•OGMAs are areas that contain or are managed to replace structural old-growth attributes and that are mapped out and treated as special management areas. •OGMAs maintain biodiversity values with a broad geographic distribution	•OGMA changes from 2007 to 2012 appear to be minor spatial adjustments, increasing connectivity, incorporating additional MAMU habitat	Many OGMAs from the 2012 version have carried over. Additional OGMAs were created to include values described below, better OGMA design, and also spatialize VILUP 1a) which has a target of 25-33% mature +old to remain in Nahmint
Overview of Biodiversity Reserve	Primary Considerations for establishing reserve	•Wildlife needs are priority •maintain biodiversity by containing both plant and animal species indigenous to the area.	•conserve biodiversity by providing connectivity across the landscape, conserving representative old growth and protecting important wildlife habitat	•fish: stands with riparian and floodplain attributes •visually important stands were selected as OGMAs along Nahmint Lake and along the Alberni canal. •ecosystem complexes •FENs •inoperable timber	•Priority biodiversity planning •Areas that overlap with suitable MAMU habitat (class 1, 2 and 3) were given high priority for inclusion as OGMAs. •FENs •Cultural cedar	1. old forest retention including: ecosystem representation, emphasis on regionally rare and underrepresented ecosystems, large tree retention including: legacy trees and specified trees 2. wildlife habitat 3. cultural heritage resources
Overview of Biodiversity Reserve	Area	6,198.5 ha	10,850.84 ha (includes water and rock)	2618.5 ha	2,562 ha	5,643 ha of forested area
Overview of Biodiversity Reserve	Legal Status	NON-LEGAL	Legal from 1995-2003. Under the OPR, a FEN ceases to exist once the portion of the area is within a landscape unit and an old growth management area is established within the landscape unit.	Although these OGMAs are draft status, retaining old growth is a legal requirement via the Order Establishing Provincial Non-Spatial Old Growth of 2004	Although these OGMAs are draft status, retaining old growth is a legal requirement via the Order Establishing Provincial Non-Spatial Old Growth of 2004	Legalized through Section 93.4 of the Land Act.
Overview of Biodiversity Reserve	Cultural Heritage Resources	Not included in Biodiversity Corridor selection	Not known to be included in FEN selection	Draft OGMAs overlapped some areas of interest for CHR purposes	Where possible, within the parameters of Landscape unit planning, cedar is incorporated into OGMAs. Draft OGMAs overlap some areas of interest for CHR purposes	Included but data sensitive
Overview of Biodiversity Reserve	Terrestrial Ecosystem Mapping (TEM)	TEM data did not exist in Nahmint at the time	TEM data did not exist in Nahmint at the time	Although site series mapping was available, it was not used to select OGMAs because the many other factors involved were significant influences. The distribution of OGMAs across the Landscape Unit and through the range of site series appeared to be exceptionally good.	TEM was not used for this draft. The SRMP states that inclusion of late successional habitat elements and attributes of biodiversity into OGMA was considered in OGMA selection, particularly in forested ecosystems that are regionally rare and underrepresented.	TEM used to determine targets for emphasis on regionally rare and underrepresented ecosystems and to delineate OGMAs accordingly.
Other Reserves	WHAs	No legal WHAs established at this time	No legal WHAs established at this time	Approximately 218.2 hectares of approved WHAs (established in 2005).	approximately 218.2 hectares of approved WHAs (established in 2005).	Total of 862 of suitable habitat protected in WHAs (pending upcoming legal establishment)
Other Reserves	UWRs	No legal UWRs established at this time	No legal UWRs established at this time	Approximately 864.9 hectares of approved UWRs (approved in 2004)	Approximately 864.9 hectares of approved UWRs (approved in 2004)	Approximately 865 hectares of approved UWRs (approved in 2004)

Nahmint Landscape Unit

Biodiversity Corridor Polygons (1991)

Biodiversity Corridors

Biodiversity Corridors Proposed May 1991

Additions Recommended Sept 1991
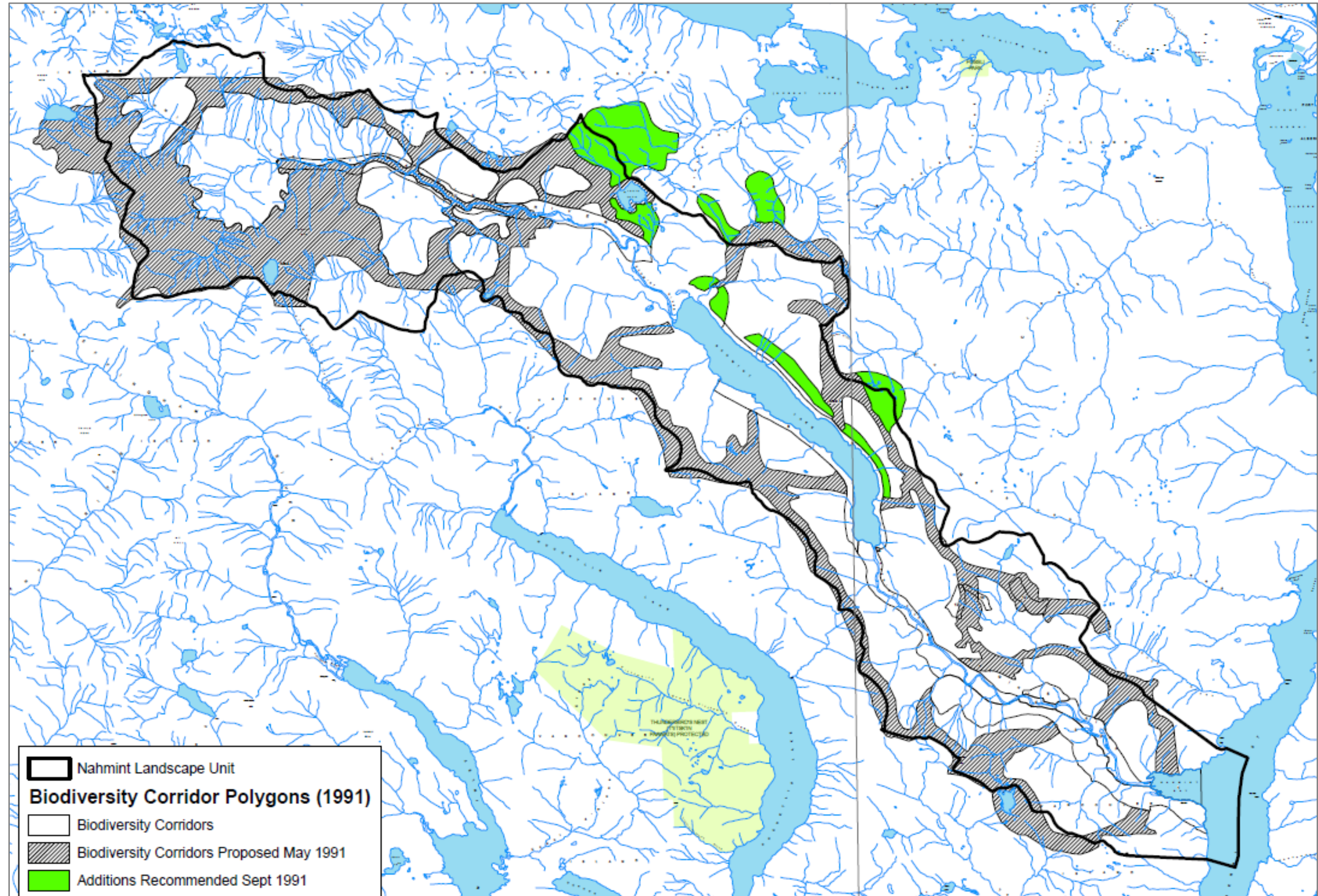
Figure A- 3 Forest Ecosystem Networks in Nahmint LU est. 1995 (data from 2004)
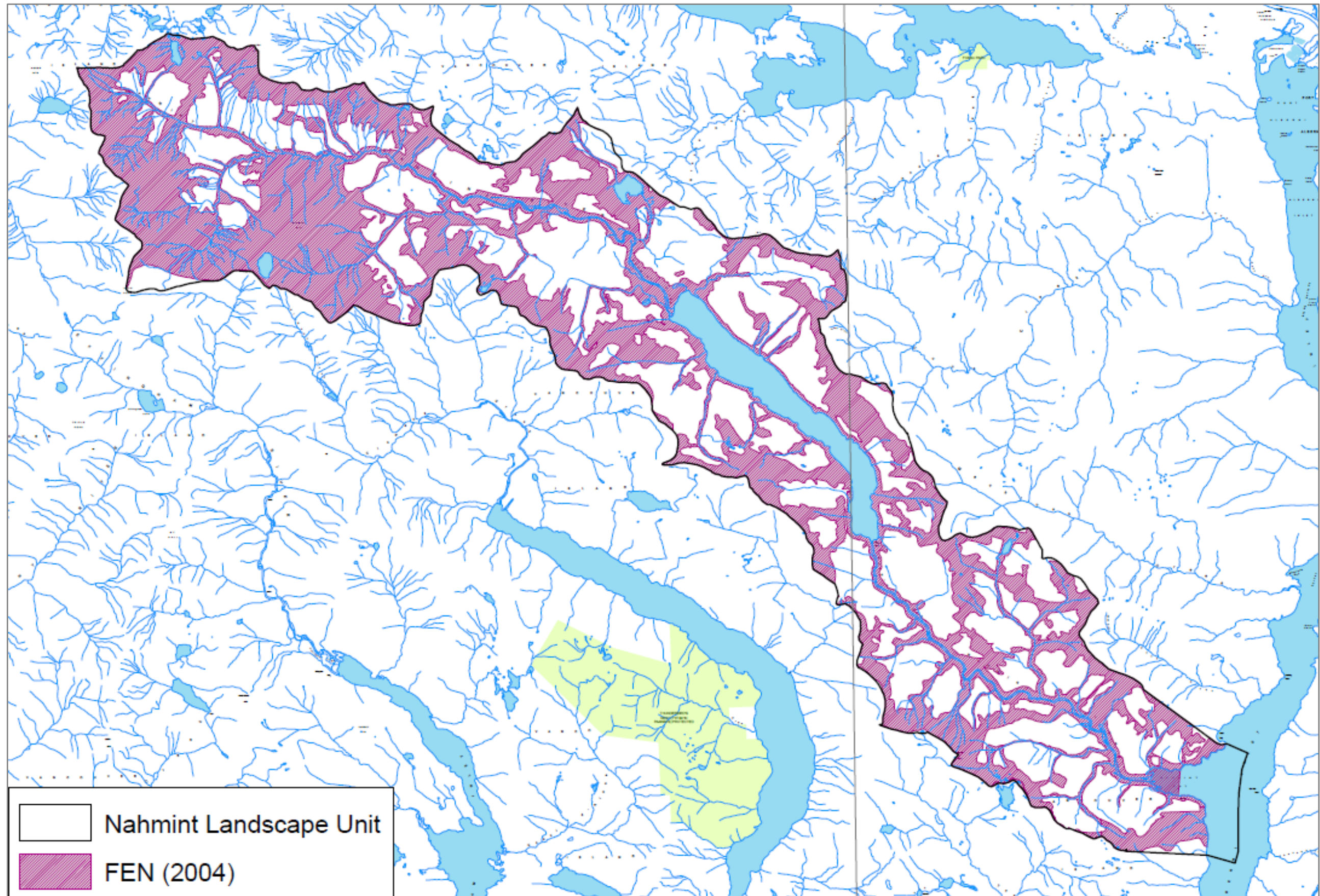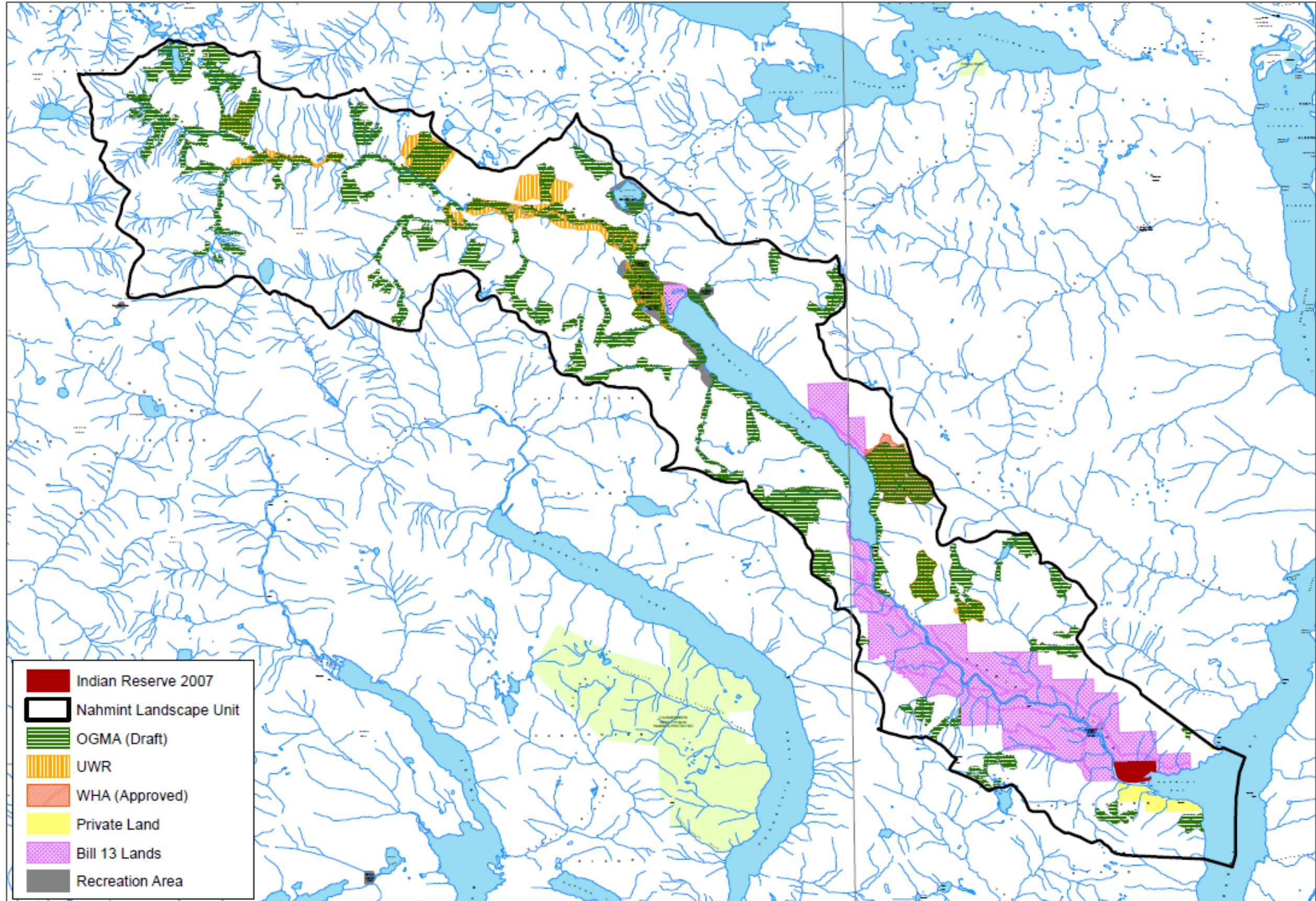
Nahmint Landscape Unit

FEN (2004)

Legend:
- Indian Reserve 2007
- Nahmint Landscape Unit
- OGMA (Draft)
- UWR
- WHA (Approved)
- Private Land
- Bill 13 Lands
- Recreation Area

Legend:
- Nahmint Landscape Unit
- OGMA (Draft 2012)
- UWR
- WHA (Approved)
- Private Land
- Signed Treaty Land

Legend

- Nahmint Landscape Unit
- OGMAs 2022
- Proposed Wildlife Habitat Areas
- Legal Wildlife Habitat Area
- Legal Ungulate Winter Range
- Private Land
- Treaty Settlement Land
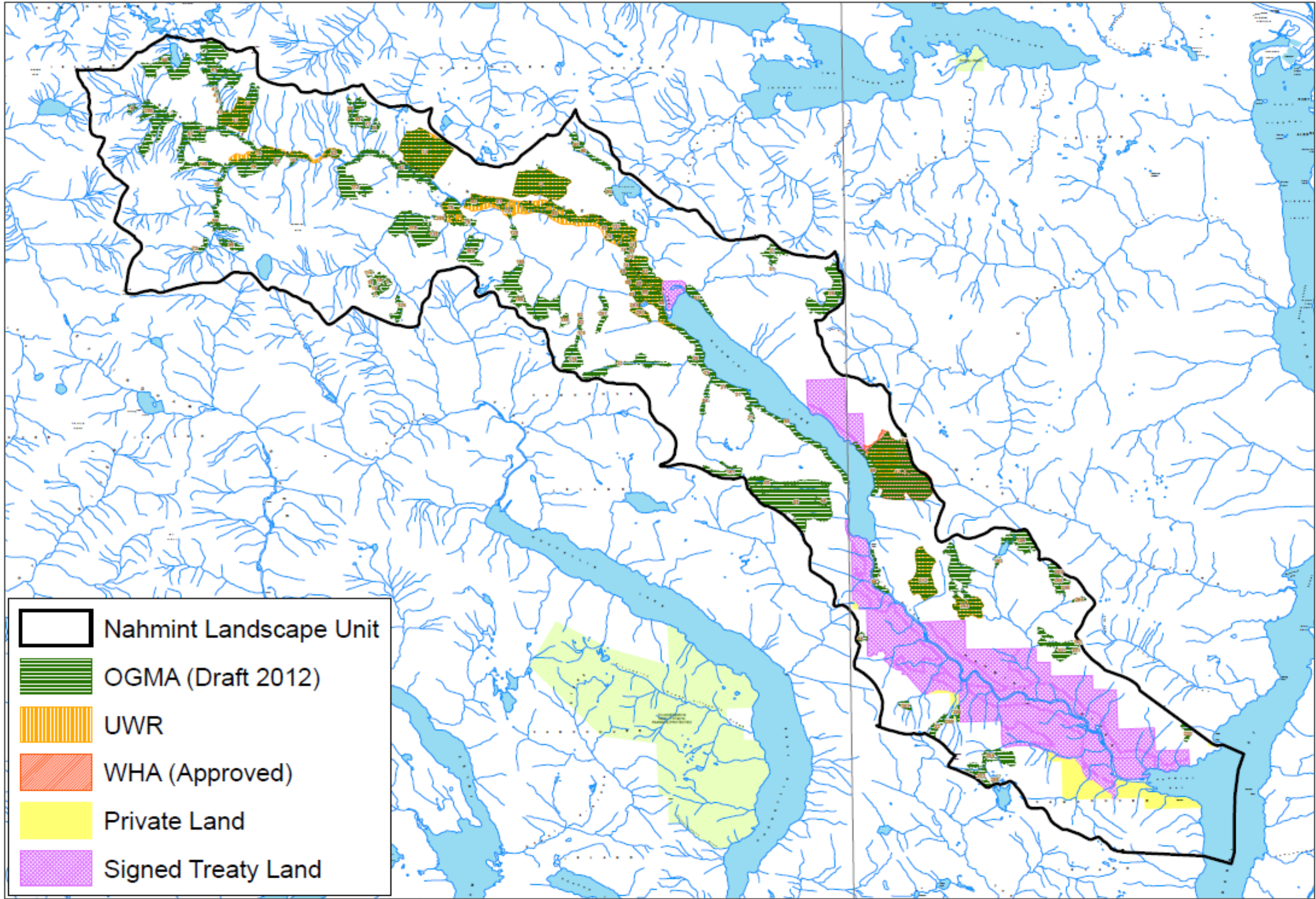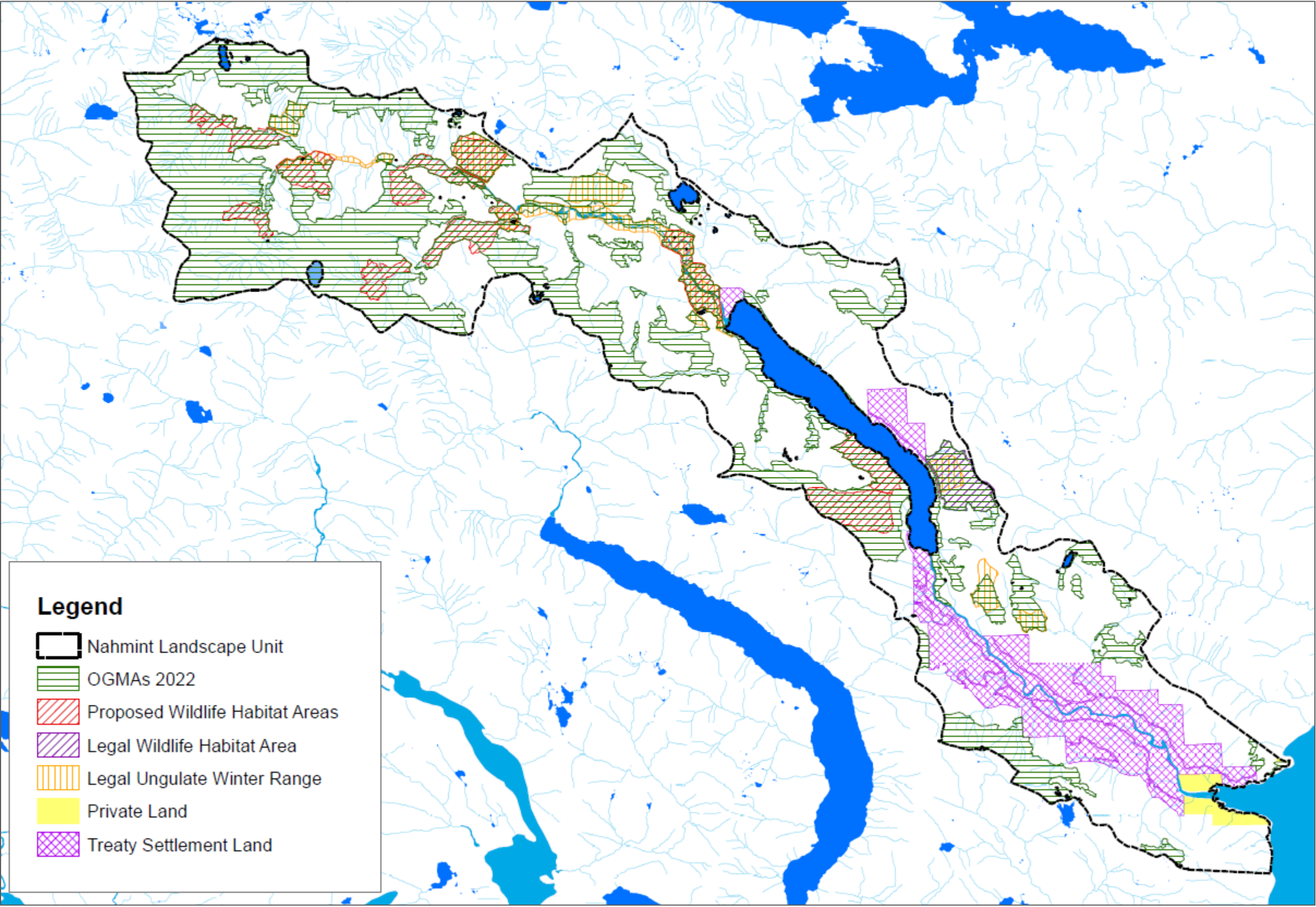
3   LEGAL REQUIREMENTS – LEGISLATION AND POLICY INTERPRETATION

The following section is meant to describe how legislation and policy is interpreted for this landscape unit planning exercise. Only sections applicable to the Nahmint Landscape Unit will be addressed.

3.0   ORDER ESTABLISHING PROVINCIAL NON-SPATIAL OLD GROWTH OBJECTIVE

Effective date of Order: June 30, 2004

Link to Order: 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/policies-guides/old_growth_order_may18th_final.pdf

Synopsis: This Order identifies the amount of old forest that will be maintained to address biodiversity values in Nahmint.

An Implementation Policy dated March 2004 was created to support the non-spatial old growth Order.

https://www.for.gov.bc.ca/ftp/DSI/external/!publish/Stewardship/SIFDC_Objectives_Matrix/6_Biodiversity/Old_Growth_Order_Implementation_Policy_March_19_2004.pdf

Interpretation of Order:

1. Biodiversity emphasis for landscape units

For implementing objective 2 below, biodiversity emphasis is assigned as

listed in Appendix 1, Table 1.

Table 1 indicates that Nahmint has a high Biodiversity Emphasis

2. Old growth objectives

To contribute to the conservation of biodiversity, licensees must maintain old forest by

biogeoclimatic variant within each landscape unit according to the age of old forest and

the percentage of old forest retention that is specified in Tables 1 through 4 and the

assignment of Natural Disturbance Types outlined in Appendix 3, and subject to

provisions 5 through 9 below.

Using the Provincial BEC layer, the biogeoclimatic variants applicable to Nahmint LU were determined. Natural Disturbance Type (NDT) was found in Appendix 3 of the Order and are as follows:

Table A- 4 Natural Disturbance Type in Biogeoclimatic Zones Present in Nahmint

NDT	BEC label	Zone	Subzone	Variant	Subzone Name	Variant Name
1	CWHvm1	CWH	vm	1	Very wet maritime	submontane
1	CWHvm2	CWH	vm	2	Very wet maritime	Montane
2	CWHxm2	CWH	xm	2	Very dry maritime	Western
1	MHmm1	MH	mm	1	Moist maritime	windward

Where NDT 1: Is defined in the Biodiversity Guidebook (1995) as ecosystems with rare stand-initiating events. The mean return interval for these disturbances is generally 250 years for the CWH and 350 years for the MH biogeoclimatic zones. These forest ecosystems were usually uneven-aged or multi-storied even-aged with regeneration occurring in gaps created by the death of individual trees or small patches of trees. When disturbances such as wind, fire, and landslides occurred, they were generally small and resulted in irregular edge configurations and landscape patterns.

And where NDT2: Is defined in the Biodiversity Guidebook (1995) as ecosystems where the mean return interval for these disturbances is about 200 years for the CWH. Wildfires were often of moderate size (20-1000ha), with unburned areas resulting from sheltering terrain features, higher site moisture or chance. Many larger fires occurred after periods of extended drought, but the landscape was dominated by extensive areas of mature forest surrounding patches of younger forest.

Using Tables 1-4 in the Order, the following old growth retention targets were determined:

Table A- 5 PNSOGO Old Forest Retention Targets by NDT and BEC Zone in the Nahmint LU

Natural Disturbance Type (NDT)	Biogeoclimatic Zone and variants applicable to Nahmint	Age of Old Forest	Percent Old Forest Retention in High Biodiversity Emphasis LU
1	CWH (vm1, vm2)	>250yrs	>19%
1	MH (mm1)	>250yrs	>28%
2	CWH (xm2)	>250yrs	>13%

Objectives 3, 4 and 5 are not applicable to the Nahmint LU.

6. Use of younger forests to meet old forest objectives

In intermediate and high emphasis landscape units where it can be demonstrated that

equal or better conservation benefits would result, stands less than the age of old, and

preferably mature forest, may contribute to the percentage of old forest retention defined in

Tables 1-4.6

Approach and rationale:

OGMA selection will prioritize old forest first (age 251+). Age classes younger than 251 may be used where the conservation benefits area equal or better. For Nahmint Landscape Unit Planning, older age class 8 (200-250) was first prioritized when using mature forest.

It is important to note that in some circumstances, particularly in the MHmm1, the amount of age class 9 naturally present on the landscape may not fulfill the site series targets established for this landscape unit plan or even the variant target established described in Objective 2 of this Order. In many cases, the vegetation resource inventory (VRI) suggests that large proportions of these site series are in old age class 8[26].

Using MHmm1(05) as an example:

Table A- 6 MHmm1(05) Presence in Age Classes Throughout the SMZ 13 portion of the Nahmint LU

BEC subzone	BEC site series	Crown Forest Land Base (ha)	AC 9 Age 251+ (ha)	Old AC 8 Age 200-250 (ha)	Young AC 8 Age 141-199 (ha)	AC 7 Age 121-140	AC 6 Age 101-120	AC 5 Age 81-100	AC 4 Age 61-80	AC 3 Age 41-60	AC 2 Age 21-40	AC 1 Age 1-20
MHmm1	05	59.6	15.0	37.4	3.6	1.7	0.0	0.0	1.5	0.4	0.0	0.0

Table updated December 2022

Important notes:

- The target for emphasis on this underrepresented ecosystem is 45% of the available hectares of the site series or 27 ha. There is not enough age class 9 site series in the Nahmint Landscape Unit to meet this target so younger stands need to be used.
- Looking spatially at age class 1-4, it is evident that 100% of MHmm1(05) that is mapped as immature, has never been logged. This means that young age classes are either naturally occurring for this site series or the VRI is incorrectly interpreting what is on the ground. This clarifies that none of the age class 9 available was ever depleted by harvest activities.
- **These nuances in the data are common and must be recognized.**
- The inventory age is an estimate and has not been verified in the field.
- See 8.2.1 for more information on VRI, its use in landscape unit planning and its limitations.

Objectives 7 and 8 are not immediately applicable to this plan.

Objective 9 is not applicable to the Nahmint LU.

---

[26] This is a possible limitation of the vegetation resource inventory and is discussed later in section 8.2.1.

Effective date of Order: December 1, 2000

Link to Order: 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/westcoast-region/vancouverisland-rlup/vancouverisland_rlup_fpc_11sep2002amend.pdf

Synopsis: This higher-level plan first established Nahmint as a Special management zone and then identifies objectives for mature and old forest and regionally rare and underrepresented ecosystems, which applies to Nahmint Landscape Unit Planning. Sections of this HLPO that do not apply to Nahmint LUP will not be addressed.

> ***A. for Special Management Zones 1 through 14 and 17 through 22:***
>
> ***1.*** *Sustain forest ecosystem structure and function in SMZs, by:*
>
> *(a) creating or maintaining stand structures and forest attributes associated with mature[27] and old[28] forests, subject to the following:*
>
> > *i.   the target for mature seral forest should range between one quarter to one third of the forested area of each SMZ3; and*
> >
> > *ii.   in SMZs where the area of mature forest is currently less than the mature target range referred to in (i) above, the target amount of mature forest must be in place within 50 years;*

Mature seral forest is defined as "generally 80 to 120 years old or older, depending on species and site conditions" Old seral is defined as "generally greater than 250 years old". Mature seral is inclusive of old seral.

In recognition of the high concentration of values and emphasis on biodiversity in the Nahmint SMZ, the higher end of the target for mature seral (33%) will be the goal for this plan.

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[27] The mature seral forest is defined as generally 80 to 120 years old or older, depending on species and site conditions. The structure of mature seral forests generally includes canopies that vary vertically or horizontally, or both. The age and structure of the mature seral stage will vary significantly by forest type and from one biogeoclimatic zone to another.

[28] The old seral forest is defined as generally greater than 250 years old, containing live and dead (downed and standing) trees of various sizes, including large diameter trees, and of various tree species, including broad-leaved trees. The structure of old seral forest varies significantly by forest type and from one biogeoclimatic zone to another.

Approach: Achieve 33% for 1a) (i) in this plan.

> **B. for Special Management Zones 8 and 13, and parts of Special Management Zones 1, 3 and 11, which are located within landscape units with higher biodiversity emphasis, as shown on Map 2:**
>
> *4. Maintain late-successional habitat elements and attributes of biodiversity[29] in forested ecosystems with emphasis on regionally rare and underrepresented ecosystems, by retaining old seral forest at the site series/surrogate level of representation[30].*

Challenge:

This section requires additional information for its interpretation as the *VILUP HLPO* does not define "regionally rare and underrepresented ecosystems" or what "emphasis" means.

Approach:

This approach is examined in Appendix B.

In summary, the following definitions apply:

Regionally rare ecosystem: For Nahmint Landscape Unit Planning, a red- or blue-listed ecological community as defined and listed by the Conservation Data Centre.

Underrepresented Ecosystem: For Nahmint Landscape Unit Planning, an ecosystem (site series or surrogate) that makes up less than 2% of a landscape unit.

Emphasis indicates an expectation to take careful consideration of regionally rare and underrepresented ecosystems and to stress the importance of maintaining them where minimum targets are established for all the site series in Nahmint.

Emphasis means that the targets for regionally rare and underrepresented ecosystems are always greater than the common ecosystems and usually greater than the variant target (unless all site series are rare within a variant). Emphasis by site series as using the preferred option in Appendix B 4.4 is summarized below:

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[29] This includes but is not limited to large diameter (>60cm) live, decaying and dead standing trees (providing nest and cavity sites); downed wood, including large diameter pieces (50 to 150cm); deciduous broad-leaved trees, both in riparian and upland areas.

[30] The level of representation of old forest will be applied though landscape unit planning.

Table A- 7 Emphasis Targets in SMZ 13 Portion of the Nahmint LU

BEC variant	Ecosystem type	Target to retain (%)
CWHvm1	Common	13
CWHvm1	Regionally rare or underrepresented	24
CWHvm2	Common	13
CWHvm2	Regionally rare or underrepresented	25
CWHxm2	Regionally rare or underrepresented	13
MHmm1	Common	35
MHmm1	Regionally rare or underrepresented	45

5. Retain late-successional habitat elements and attributes of biodiversity in patches of variable size.

Attributes of biodiversity are defined in *VILUP HLPO* as including but not limited to large diameter (>60cm) live, decaying and dead standing trees (providing nest and cavity sites); downed wood, including large diameter pieces (50 to 150cm); deciduous broad-leaves trees, both in riparian and upland area.

Approach:

The maintenance of these elements is inherent to OGMA selection as these elements are present in old growth forests. In addition, as wildlife is a primary value to consider when delineating OGMAs, there will be emphasis on important wildlife features like large diameter trees and suitable nesting habitat for the marbled murrelet, for example.

4 NON-LEGAL GUIDANCE FOR LANDSCAPE UNIT PLANNING

Non-legal guidance is important to summarize as this information is intended to influence the Landscape Unit Planning process and much of these guiding documents influence how legal objectives are achieved.

4.0 THE VANCOUVER ISLAND SUMMARY LAND USE PLAN

The following is key information from the Vancouver Island Summary Land Use Plan (VISLUP) that applies to the Nahmint Landscape Unit Plan. Much of the guidance from the VISLUP is also apparent in the higher-level plan Order. Because of this, the focus of this section will be on values not explicitly mentioned in legislation. Anything already addressed in the *VILUP HLPO* will not be explored in detail in this section. See Appendix A 3.1 for more information on the higher-level plan Order.

It is important to understand the context of the Vancouver Island Summary Land Use Plan. This is a non-legal document that speaks to the intent of Resource Management on Vancouver Island. At the time, it informed implementation to meet legal objectives like the *VILUP HLPO*. There are some elements that are addressed in the Summary that are not fully addressed in legislation. This section will capture elements that apply to this current planning process.

From the VISLUP, its intent and limitations are clearly acknowledged:

The strategies identified in this part of the Plan are defined as possible or desired actions or means for achieving resource objectives. They are offered as advice for consideration by decision-makers when making management determinations. Strategies are not legally binding, nor do they represent Ministry of Forests District Management policy.[31]

VISLUP also summaries the intent of SMZs:

The intent of the Special Management Zone (SMZ) is to identify Crown land and coastal areas with regionally significant values or combinations of values requiring more comprehensive management objectives and strategies to minimize development impacts. SMZ units are not intended as future protected areas and are available for a variety of extractive and non-extractive activities.[32]

At a minimum, all legislated requirements of the Forest Practices Code [now FRPA] apply. Where necessary to maintain the primary SMZ values, specific resource management objectives may be identified which exceed normal Code (Act) requirements.

The following table shows the VISLUP values associated with the Nahmint SMZ 13, if they are a primary or secondary level of management regime, if they are special or general management, and the intent of these designations. Application of these values to Nahmint landscape unit planning are summarized.

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[31] Page 32, VISLUP

[32] Page 35, VISLUP

Table A- 8 VISLUP Values, Intent and Applicability to the Nahmint Landscape Unit Plan

Value	Level of Management Regime	Management Regime	Intent	Description of Value in Nahmint	How applies through Landscape Unit Planning
			As Described in the Vancouver Island Summary Land Use Plan		
Timber	Secondary	Special	To manage forests in SMZs in keeping with the primary resource values identified for each SMZ	• Moderate to high productivity, high proportion of mature timber	• The landscape unit planning process sets out to limit timber supply impacts. Impacts are made when necessary to meet legal targets for landscape unit planning. The usage of THLB and operable forest for OGMA planning requires a rationale.
Water	Primary	General	Not described in VISLUP	• Low equivalent clearcut area	• ECA is N/A to Nahmint LUP, applies on a landscape level to Nahmint and there is a legal commitment to a watershed assessment through BCTS' FSP, which provides equivalent clearcut area.
Fish	Primary	General	Not described in VISLUP	• High anadromous values in Nahmint system	• OGMAs are located along Nahmint Lake and River and tributaries where possible to capture riparian areas.
Wildlife	Primary	Special	To identify and conserve as a priority the habitat for wildlife species.	• Dispersed pockets of winter range, overall high value and capability for ungulates, carnivores, marbled murrelet, and northern goshawk; waterfowl wintering area and estuary habitat in Nahmint Bay, lower Nahmint	• UWRs and WHAs have been established since the VISLUP. • Additional suitable marbled murrelet habitat will be protected through this LUP process. • Nahmint Bay area is Treaty Settlement Land and Private Land and does not apply to this planning process. • See section 6.1 for more detail on wildlife considerations in Nahmint.
Biodiversity	Primary	Special	To maintain natural elements and attributes of biodiversity with emphasis on rare and underrepresented ecosystems	• Mostly CWHvm1; high proportion of old seral forests; very large Douglas-fir in Nahmint Old Growth area (identified through Nahmint Watershed Review, 1991). Strategy: Maintain high proportion of old forest, including large Douglas-fir in the Nahmint Old Growth Area	• Nahmint OG Area identified in the 1991 Watershed Review will be legally protected as OGMA NAN-nah_006 through this process. It is also already a legal WHA and UWR. • Many OGMAs in this plan contain large Douglas-fir. OGMA NAN_nah_009 includes a very impressive stand of large old growth Douglas-fir.
Visual	Primary	Special	To ensure that the quality and integrity of visual resources are maintained or restored.	• High visual sensitivity all along lower Nahmint and surrounding Nahmint Lake	• OGMAs are established adjacent to Nahmint Lake where possible. • Lower Nahmint is a combination of Treaty Settlement Land, Private Land and Crown Land. There is a lot of historical logging in this area so less opportunity for OGMAs establishment.
Recreation	Primary	Special	To maintain the integrity of the significant recreation resources identified as primary values in SMZ.	• Associated with Nahmint River and Lake	• OGMAs established adjacent to Nahmint lake and River where possible. Nahmint and Blackie's Beach Recreation Sites are captured in OGMAs. The old growth surrounding Gracie Lake Recreation polygon captured in OGMA NAN_nah_009.
Tourism	Secondary	General	Not described in VISLUP	• Associated with Nahmint Bay, lake, and backcountry in upper Nahmint River	• OGMA NAN_nah_001 captures visually sensitive area near Mt Klitsa and Klitsa Trail and the Nahmint LU portions of the Gibson-Klitsa trail. This OGMA connects to adjacent OGMAs in the Sproat LU, managed by the Alberni Valley Community Forest. • OGMAs also capture significant peaks like Mt. Klitsa, Nahmint Mt., Mt. Anderson, and the Nahmint portion of 5040 to solidify protection around these resources. These OGMA include non-forested sections that do not count towards old forest targets.
Caves/Karst	Secondary	General	Not described in VISLUP	Not described in VISLUP	• Caves/Karst not applicable to Nahmint LUP.
Cultural Heritage Resources	Secondary	General	Not described in VISLUP	Not described in VISLUP	• Cultural Heritage Resources are incorporated into this plan through work with the Hupačasath, ćišaaʔatḥ and Yuułuʔiłʔatḥ Nations. Spatially identified areas are captured where possible but are data sensitive and will not appear on maps.
Access	Secondary	General	Not described in VISLUP	Not described in VISLUP	• OGMAs are buffered from built roads to allow for maintenance and road features (quarries for example).

5 LANDSCAPE UNIT PLANNING GUIDEBOOK CONSIDERATIONS

The intent of the Landscape Unit Planning Guidebook is to guide the overall process of OGMA establishment to meet legal requirements and meet the legal test in the *Land Use Objective Regulation*[33]. The entire LUPG has been referenced for this OGMA plan. Some of the highlights are summarized below. Additional important considerations are addressed in Appendix B section 3.0.

Biodiversity Considerations:

Where OGMAs must be established to achieve variant level representation, they should be delineated to maximize their value to biodiversity conservation. The following criteria should be considered:

- *Capture rare old growth site series within OGMAs, providing that their locations are known*
- *Where it is known or can be easily determined that certain site series are absent or under-represented in the NC land base, capture these in OGMAs delineated in the THLB*
- *Create OGMAs large enough to provide old growth in interior condition. Where suitable, consider clustering OGMAs along LU boundaries to increase forest interior and connectivity. Consults with adjacent districts and regions where common boundaries exist, and*

When it is necessary to delineate OGMAs in the THLB, older mature forest may be considered for establishment as OGMAs if:

1. *Older mature forest provides important old growth attributes that are equal to or better than those provided in stands that meet the old forest definition; and*
2. *Older mature forest is better suited for biodiversity conservation (e.g., it may be possible to obtain a larger patch of older forest or better representation)*

The approach from the LUPG as described above is the basis for OGMA delineation and the process to meet legal objectives associated with OGMAs. Since 1999, when the LUPG was written, additional tools for OGMA delineation have emerged, like LiDAR, and have been updated, like VRI, and additional values have been incorporated into Nahmint OGMA planning, like big tree retention and cultural cedar. Delineating OGMAs in consideration of these values has been built onto this process and is further described in Section 9.

Approach:

- The OGMA delineation process details are described in section 9.
- Rare old growth site series are addressed in Appendix B.
- Interior forest condition is addressed in 7.1.1.
- Usage of mature forest to meet OGMA targets is further explained in Section 9 and rationalized by site series in Table A- 34 Rationale for Using Mature Age Classes by Site Series.

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[33] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/357_2005

6   OGMA PRIORITIES AND VALUES

The values that will be of primary focus for OGMA delineation are as follows:

4. Old Forest retention including:
    a. Ecosystem Representation
    b. Regionally Rare and Underrepresented Ecosystems
    c. Large tree retention including:
        i. Legacy Trees
        ii. Specified Trees
5. Wildlife Habitat
6. Cultural Heritage Resource Values

6.0   OLD FOREST RETENTION

The primary objective of this Landscape Unit Plan is to set aside old seral forest. The following section describes attributes of old seral forest.

6.0.1   OLD SERAL ATTRIBUTES

The following are old seral attributes as described in the 1995 Biodiversity Guidebook. These attributes are first important to describe old growth stands and mature stands exhibiting old growth attributes.

Dead Wood:

Decaying wood has value as habitat, in nutrient cycling.

Coarse Woody Debris:

Fallen logs (coarse woody debris) provides cover, micro-climates, and breeding habitat for many organisms. The larger the logs, the greater the longevity and potential for nutrient cycling.

Standing Dead Trees:

Snags are important to retain for nesting and foraging habitat for many species. Snag recruitment is also so dying trees are also important to retain. A variety of diameters of these trees is important to meet the needs of a variety of species.

Large Living Trees:

Large, old living trees provide many unique habitat attributes. Arboreal lichen is most abundant on older trees and provides food for elk, for example. Large mossy limbs can be used as nesting platforms for birds like the marbled murrelet.

Tree Species Diversity:

Diversity of tree species means habitat requirements for a larger variety of organisms can be achieved than would be with a homogenous stand.

Structural Diversity:

A variety of canopy layers (vertical structure) and spatial patchiness (horizontal layers) is important for maintaining biological diversity. This variety of layers includes the naturally occurring forest understory of shrubs and forbs, which provide food and cover for numerous species. This creates more micro-climates and habitat than a homogenous stand.

Forest Soils:

A full range of soil conditions and humus forms on the landscape is a prerequisite for the development and maintenance of diverse flora and fauna.

These attributes will be maintained through OGMA selection by:

- Ensuring that the oldest forests are captured first for OGMA delineation, and that interior forest is priority to ensure the maintenance of these conditions
- Ensuring that there is adequate ecosystem representation with which the soil, species composition and tree size are likely to be diverse.
- Conducting field visits to a diverse selection of OGMAs to report on stand conditions and verify that GIS tools used for OGMA delineation are accurate.
- Meeting targets for protection of marbled murrelet suitable habitat, where attributes like large mossy limbs are present and verification of marbled murrelet suitable habitat.
- Incorporating large diameter trees into OGMA selection.
- Incorporating currently used wildlife trees. Where there is obvious current use and value, these trees should be retained.

6.0.2 ECOSYSTEM REPRESENTATION

The Nahmint LU is divided into biogeoclimatic zones, subzones, and variants. These groups represent climatic characteristics. A zone has characteristic webs of energy flow and nutrient cycling, and typical patterns of vegetation and soil. Subzones may include significant climatic variation marked by small changes in the vegetation on zonal sites and larger differences in the vegetation on non-zonal sites. In many cases, the subzone may be subdivided into biogeoclimatic variants. Variants are recognised for areas that are slightly drier, wetter, snowier, warmer, or colder than that considered typical for the subzone. These climatic differences result in corresponding differences in vegetation, soil, and

ecosystem productivity, although the changes in vegetation are not sufficient to define a new plant association. [34]

Ecosystem representation in the Nahmint LU is centred around emphasis on regionally rare and underrepresented ecosystems as this applies to most BEC site series that occur in the Nahmint LU. Common ecosystems are also represented through this process. Although less emphasized, targets have been established for common site series to ensure minimum representation. See Appendix B for the full examination of regionally rare and underrepresented ecosystems and management approach. The total target number of hectares is determined by the targets at the variant level. These targets are then distributed as described above.

In addition to this, ecosystem representation is also considered through a climate change lens and understanding that BEC subzones will shift over time. See 7.2 for more detail on climate change.

6.0.3 REGIONALLY RARE AND UNDERREPRESENTED ECOSYSTEMS

Information about regionally rare and underrepresented ecosystems, including definitions and management strategy, are summarized in Appendix B.

The following are tables by BEC variant of ecosystems that are likely to occur in the Nahmint Landscape Unit. This list of site series is derived from terrestrial ecosystem mapping. Regional rarity was determined using the Conservation Data Centre's Ecosystem Explorer website, for the most up to date rarity rankings. In addition to this, the TEM data was used to calculate the percentage representation of each site series in the landscape unit. From this, underrepresented ecosystems were determined. Please see Appendix B 2.0 and 2.1 for more detailed information.

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[34] https://www.for.gov.bc.ca/hre/becweb/system/how/index.html

Table A- 9 CWHvm1 Rarity by Site Series

Rarity for CWHvm1	Site series
n/a	00
Common	01
Underrepresented	02
Blue-listed	03
Blue-listed	04
Blue-listed	05
Blue-listed	06
Blue-listed	07
Underrepresented blue-listed	08
Underrepresented red-listed	09
Underrepresented blue-listed	10
Underrepresented	11
Underrepresented	12
Underrepresented	13
Underrepresented blue-listed	14

Table A- 10 CWHvm2 Rarity by Site Series

Rarity for CWHvm2	Site Series
n/a	00
Common	01
Underrepresented	02
Blue-listed	03
Blue-listed	04
Blue-listed	05
Blue-listed	06
Blue-listed	07
Underrepresented blue-listed	08
Underrepresented	09
Underrepresented	10
Underrepresented	12

Table A- 11 CWHxm2 Rarity by Site Series

Rarity for CWHxm2	Site Series
n/a	00
Underrepresented red-listed	01
Underrepresented red-listed	02
Underrepresented red-listed	04
Underrepresented red-listed	05

Table A- 12 MHmm1 Rarity by Site Series

Rarity for MHmm1	Site Series
n/a	00
Underrepresented	01
Common	02
Underrepresented	03
Underrepresented	04
Underrepresented	05
Underrepresented	06
Underrepresented	09

Note: The "00" site series is interpreted as non-productive or very low volume forest. When looking at ortho imagery it is mostly rock and water. Coding found within the TEM also confirms non-forest.

Note: Some of these site series will not appear in OGMA target calculations or in OGMA delineation as they do not occur on the ground or are non-forested or too small for OGMA management. This is addressed in Table A- 33 Reason for Exclusion of Site Series from Targets.

6.0.4 LARGE TREE RETENTION

The retention of exceptionally large trees is a new value of focus for this landscape unit planning exercise. New policy and legislation have been created for big tree management. This is reflected by including and recognizing the protection of big trees in the Nahmint OGMAs.

Since the establishment of the most recent 2012 draft Nahmint SRMP, both BCTS's Best Management Practices for Coastal Legacy Tree and the provincial *Special Tree Protection Regulation* were established.

6.0.4.1 LEGACY TREE RETENTION

In 2017, BC Timber Sales established "Best Management Practices for Coastal Legacy Trees"[35], which provides guidance around the protection of large diameter trees. This document includes diameter guidance for Legacy Tree Retention.

The diameter guidance for tree species applicable to the Nahmint Landscape Unit are as follows:

Table A- 13 Coastal Legacy Tree Diameter Minimum by Species Applicable to the Nahmint LU

Species	Diameter* (metres DBH) Guidance for Legacy Tree retention
Yellow cedar	2.1
Coastal Douglas-fir	2.1
Western redcedar	3.0
Sitka spruce (rarer in Nahmint LU)	2.2

*Diameter is measured in meters measured at diameter at breast height (DBH) which is measured at 1.3m vertical from the point of germination of the tree

Since 2017, new areas planned for harvest have been surveyed to locate and protect legacy trees. Where legacy trees are present, BCTS marks them for protection.

Where OGMAs have been field verified, legacy trees have been marked where encountered. LiDAR's Crown Height Model was used to help pinpoint taller trees with wide crowns that that have greater legacy tree potential. The following is an example of what the Crown Height Model can show. In this case, it shows trees 30m and taller, to pinpoint the tallest trees within the OGMA.

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[35] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/bc-timber-sales/policy/bcts-coastal-legacy-trees-bmp_june1_2019.pdf

Figure A- 7 Crown Height Model Showing Heights 30m and Greater in Nahmint OGMAs
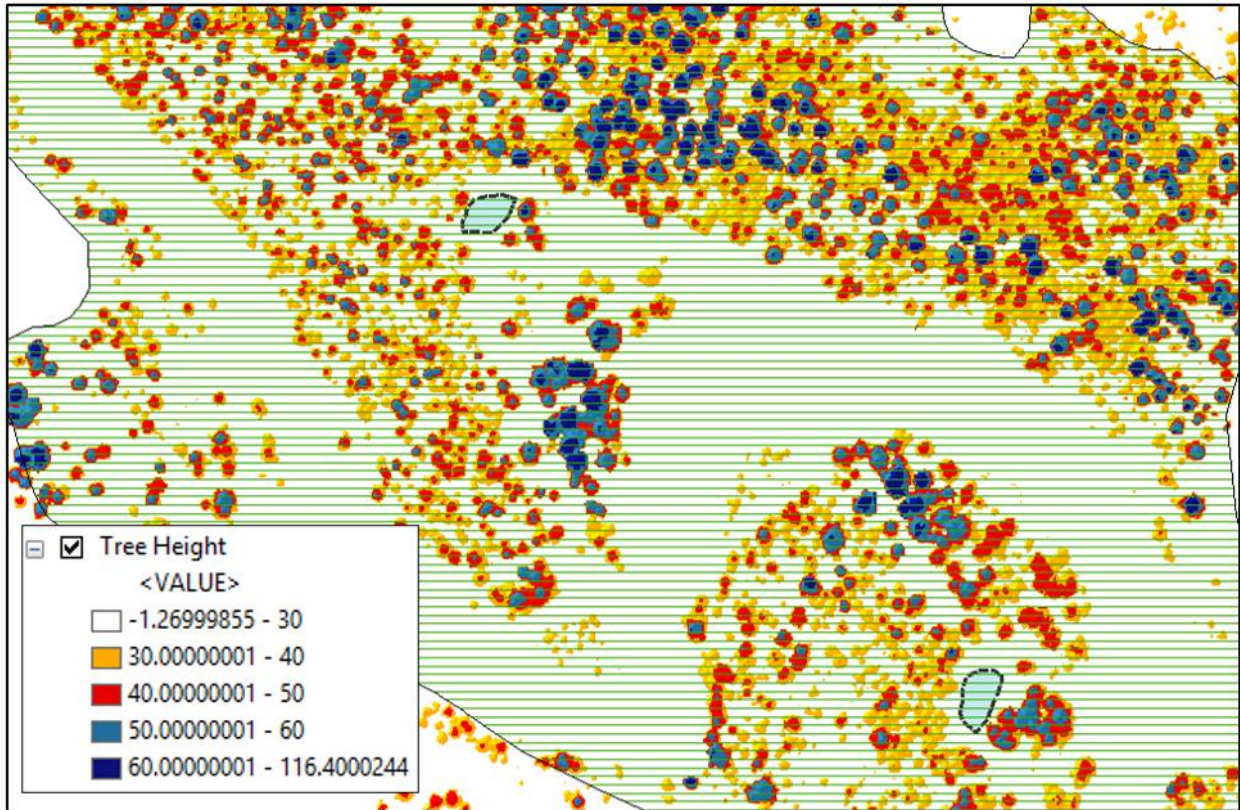
LiDAR was most useful for Douglas-fir and Sitka spruce where taller trees are often wider. For cedar, tree heights are often shorter and therefore do not stand out as much next to smaller diameter trees with the same height.

6.0.4.2   SPECIFIED TREE RETENTION

The *Special Tree Protection Regulation* was established in 2020 to legally protect specified trees (trees of exceptional size). Diameter criteria for tree species that are found in Nahmint are summarized:

Table A- 14 Special Tree Protection Regulation Diameter Guidance by Species Applicable to the Nahmint LU

Species	Diameter at breast height (cm)
Yellow cedar	265
Douglas-fir	270
Bigleaf maple	198
Western redcedar	385
Sitka spruce	283
Pacific yew	63

The *Special Tree Protection Regulation* states that trees meeting these diameter minimums are not to be cut, damaged or destroyed and that trees located within a 56m radius of the specified tree are not to be topped or destroyed unless exemption criteria are met.

For the purposes of OGMA planning in Nahmint, where possible, these trees will be captured within OGMA boundaries.

As with Legacy trees, LiDAR was used to look for trees with exceptional diameter during OGMA field review. Because of this, some specified trees have been identified and mapped.

6.0.4.3   SITE PRODUCTIVITY

Site productivity was voluntarily analyzed for this OGMA plan to gauge whether there was an adequate distribution amongst site productivity classes. This is a numerical way of showing that forests from highly productive valley bottoms to less productive forested wetlands are captured and distributed amongst protected areas similar to how they are naturally distributed. The following table summarizes productivity in Nahmint, including non-obligatory targets for site productivity representation, inserted based on the variant target from the *PNSOGO* (because this forms the area budget for OGMAs). The table includes the amount of each productivity class present in OGMAs, the percentage of the voluntary target that has been met and finally, the distribution of site productivity amongst OGMAs. Note that the productivity distributions do not perfectly meet targets because this table is meant to provide transparency around productivity distribution but does not represent a requirement for landscape unit planning. It is also important to note that a site index lower than 5 are considered non-forested and do not count towards OGMA targets so this range is not included in the table. Also, of note, the higher the productivity class, the higher the productivity.

Table A- 15 Site Productivity Analysis for Nahmint Landscape Unit

BEC Variant	Site Productivity Class	Area by site productivity class (ha)	Productivity Class distribution in variant (%)	Voluntary target productivity area for OGMAs (ha)	OGMA area by productivity class (ha)	Percentage of OGMA site productivity voluntary target met (%)	Productivity Distribution amongst OGMAs (%)
CWHvm1	5-10	5	0%	1	0	0%	0%
CWHvm1	10-15	69	1%	13	37	280%	2%
CWHvm1	15-20	102	1%	19	28	142%	1%
CWHvm1	20-25	1,019	12%	194	266	137%	11%
CWHvm1	25-30	4,412	53%	838	1,475	176%	61%
CWHvm1	30-35	2,390	29%	454	550	121%	23%
CWHvm1	35-40	273	3%	52	73	140%	3%
	Total	8,269	100%	1,571	2,428		100%
CWHvm2	5-10	30	1%	6	9	151%	0%
CWHvm2	10-15	291	5%	55	158	286%	8%
CWHvm2	15-20	632	11%	120	293	244%	14%
CWHvm2	20-25	2,614	46%	497	790	159%	39%
CWHvm2	25-30	2,050	36%	389	791	203%	39%
CWHvm2	30-35	128	2%	24	11	43%	1%
	Total	5,745	100%	1,092	2,050		100%
CWHxm2	20-25	19	43%	2	0	0%	0%
CWHxm2	25-30	10	24%	1	0	0%	0%
CWHxm2	30-35	14	33%	2	7	360%	100%
	Total	43	100%	6	7		100%
MHmm1	5-10	140	6%	39	113	290%	10%
MHmm1	10-15	1,460	65%	409	541	132%	50%
MHmm1	15-20	371	16%	104	220	212%	20%
MHmm1	20-25	250	11%	70	199	285%	18%
MHmm1	25-30	33	1%	9	10	110%	1%
	Total	2,253	100%	631	1,084		100%

Created December 2022

Notes:

- Overall, the distribution of site productivity classes within OGMAs is similar to the natural distribution. It is expected that the distribution of delineated OGMAs would not be the exact same as the natural distribution, where site productivity is not one of the primary selection criteria.

6.1 WILDLIFE HABITAT

The Nahmint Landscape Unit encompasses a wide variety of wildlife habitats, including riparian habitat around Nahmint Lake, Nahmint River and smaller streams, old growth forests, early seral stands, vegetated slide tracks, and some alpine meadows. Old forest provides winter habitat for ungulates, multi-layered canopies with complex understories, wildlife trees with cavities, big trees with large branches for nesting birds, large trees for use as bear dens, and a high diversity of niche and microhabitats for everything from invertebrates to lichens. Some species are dependent on old growth attributes for key life processes.

6.1.1 MARBLED MURRELET

The marbled murrelet *(Brachyramphus marmoratus)* is a small seabird that depends on large mossy platforms in old-growth forests for nesting habitat. This species has been designated as threatened by the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC) since 1990 and is provincially blue-listed, with key threats being loss of nesting habitat in old-growth forests and degradation of marine habitat and food sources. The province of BC released the Implementation Plan for the Recovery of Marbled Murrelet in 2018[36]; this document outlines the approach that BC will take to achieve population objectives and outlines future management actions. Direction from the Implementation Plan on habitat conservation targets was made into a legal requirement though a *Land Use Objectives Regulation* (LUOR) (2021) under Section 93.4 of the *Land Act* for the purpose of the *Forest and Range Practices Act* (*FRPA*) and a Section 7 notice (2021) under the *Forest Planning and Practices Regulation*[37]. This legislation will require spatial and aspatial habitat retention on provincial Crown land by landscape units, with spatial protections to be established through OGMAs and Wildlife Habitat Areas (WHAs). WHAs are established under the *Government Actions Regulation (GAR)* of *FRPA*.

The consideration of marbled murrelet nesting is integral to the Nahmint Landscape Unit planning process. OGMAs have been delineated to capture suitable marbled murrelet habitat, while the larger tracts of suitable habitat will be proposed to become legal WHAs. The proposed LUOR has aspatial habitat retention requirements at multiple spatial scales and allows some flexibility to shift habitat retention across landscape units. In the Nahmint, the suitable marbled murrelet habitat that will be spatialized where possible, to increase land base certainty around harvest management.

OGMA and WHA selection that prioritized marbled murrelet habitat focused on Class 1, 2 and 3 marbled murrelet habitat (Class 1 having highest density of suitable nesting platforms; classifications determined based on low-level aerial surveys with some ground truthing). Areas suitable for WHA status were flown

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[36] https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/species-ecosystems-at-risk/recovery-planning/implementation_plan_for_the_recovery_of_marbled_murrelet.pdf

[37] mamu_fppr7_wlppr9_2dec2021.pdf (gov.bc.ca)

(fall 2020) to ensure that the necessary attributes were present, and some minor adjustments were made based on this review.

The Nahmint Landscape Unit is in the West and North Vancouver Island conservation region for marbled murrelet and within the Central Landscape Unit aggregate. See figure below:

Figure A- 8 Marbled Murrelet Conservation Boundaries Applicable to the Nahmint LU
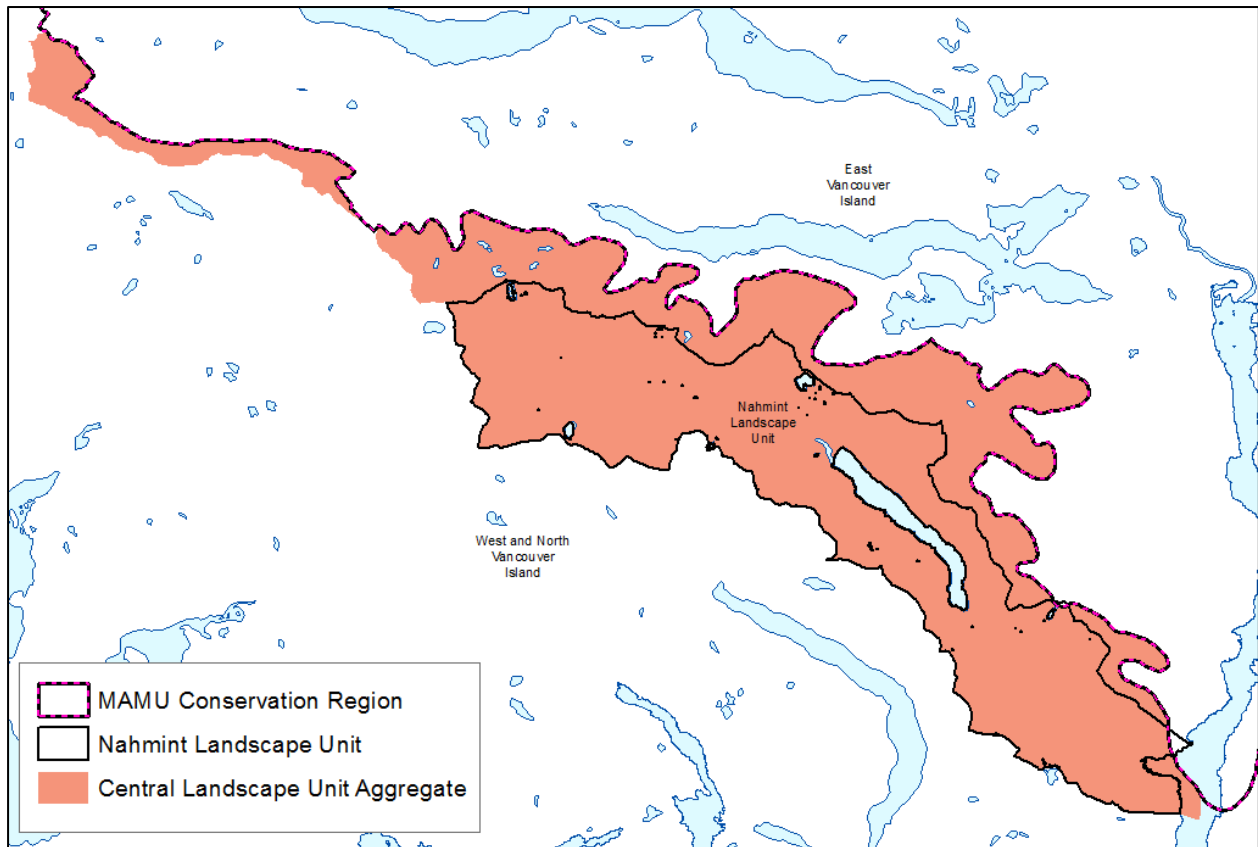
Map updated December 2022

The Nahmint Landscape Unit is part of the Central Landscape Unit Aggregate located in the West and North Vancouver Island conservation region. Within this aggregate, each landscape unit has minimum requirements for suitable habitat retention, and collectively, habitat retention in all landscape units must meet aggregate-level minimum thresholds. As planning is not occurring in other Central Aggregate landscape units, draft 'default' habitat targets have been incorporated into OGMA (and MAMU WHA) planning to meet the MAMU Order and Notice objectives. These 'default' targets are representative of no flexibility provisions being implemented. The following describes the 'default' habitat targets for suitable habitat retention in the Nahmint Landscape Unit:

The LUOR requires 1,520 ha of suitable marbled murrelet habitat to be retained within the Nahmint Landscape Unit. The Section 7 notice requires 853 ha of suitable habitat to be protected spatially

through WHA and OGMA establishment, with at least 712 ha needed for protection in MAMU WHAs and the remaining suitable habitat is to be protected in OGMAs.

The following is a summary of the overall targets for suitable habitat in the Nahmint LU and what is protected through the establishment of WHAs and OGMAs.

Table A- 16 Marbled Murrelet Suitable Habitat Targets and Resultant Protection in the Nahmint LU

	LUOR Spatial and Aspatial Objectives		LUOR Spatial Objectives		Remaining LUOR Aspatial Objective
MAMU legal objectives (LUOR[38])	Suitable Habitat Target (ha)	Existing Suitable Habitat Protection Outside of MAMU WHAs	WHA and OGMA Suitable Habitat Target (ha)	WHA Suitable Habitat Target (ha)	Suitable Habitat to be Maintained Aspatially to Meet Full Suitable Habitat Target for Nahmint LU (ha)
	1,520	104	853	712	563
Outcome of Landscape Unit Plan	Suitable Habitat Protected in Spatial Designations and Managed Aspatially (ha)	Existing Suitable Habitat Protection Outside of MAMU WHAs	Suitable Habitat Protected in WHAs and OGMAs (ha)	Suitable Habitat Protected in WHAs (ha)	Suitable Habitat to be Maintained Aspatially in Nahmint LU (ha)
	1,520	104	1,242	862	174[39]

All spatial targets for marbled murrelet suitable habitat are achieved through the establishment of WHAs and OGMAs in the Nahmint LU. 174 hectares will remain aspatially managed.

6.1.2 NORTHERN GOSHAWK

The northern goshawk (*Accipiter gentilis laingi)* is a raven-sized hawk that is specially adapted to maneuver under the canopy of mature and old forest, with short, rounded wings and a long tail. Northern goshawks require mature or old trees with large branches to build their stick nests (usually built at the base of the live forest canopy, against the trunk of the tree) as well as an understory that is open enough to maneuver but with sufficient prey habitat for foraging. They are federally listed as Threatened by COSEWIC and provincially red-listed. The main threats to the species include depletion

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[38] Marbled Murrelet Land Use Objectives Regulation: 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/biodiv-hab-mngt/mamu/mamu_luor_2dec2021.pdf

[39] Aspatially managed by BC Timber Sales

and fragmentation of their nesting and foraging habitats through activities such as road building and forest harvesting[40].

A provincial Implementation Plan for the recovery of the species was finalized in 2018[41], providing management direction for the *laingi* subspecies. The main objective of the plan is to protect 168 new priority breeding areas in BC through the establishment of reserves (such as WHAs) to contribute to population objectives, reflected as home range targets, in each conservation region in coastal B.C. The Nahmint is in the Vancouver Island Conservation Region which has an objective to establish 68 additional WHAs.

Currently there is one established northern goshawk WHA in the Nahmint (overlapping with an OGMA). There are ongoing northern goshawk inventory efforts to locate additional breeding areas and establish more WHAs in the Vancouver Island Conservation Region.

To date, 10 additional WHAs have been established and another 20 are proposed. None are in the Nahmint. Other Implementation Plan objectives include further research and recommendations for foraging habitat management.

6.1.3 UNGULATES:

In 2004, the *Order for Category of Ungulate Species* was created under the *Government Actions Regulation* of *FRPA*[42]. Both ungulate species that occur in the Nahmint LU are listed in this Order, which represent species that might require protection of winter range habitat as a requirement for survival. The inclusion of this category in *FRPA* enabled the creation of Ungulate Winter Ranges for both Roosevelt Elk (*Cervus eliaphus roosevelti*) and black-tailed deer (*Odocoileus hemionus*), which were first established in the Nahmint LU in 2004 to protect critical winter habitat for both species. On provincial Crown land, beyond the direct protection of ungulate habitat in UWRs, habitat for ungulates is, in some cases, indirectly protected through other conservation areas and reserves (e.g., OGMAs), and through stewardship practices on the managed land base.

The province is currently reviewing the effectiveness of ungulate habitat management, including the existing UWRs in the Nahmint and elsewhere in the West Coast Region, to determine if current management is effective and sufficient to meet population goals, where defined. If the outcomes of this work conclude that more habitat is required, new UWRs could be considered, or OGMAs may be amended after this initial establishment, to provide additional habitat.

6.1.3.1 ROOSEVELT ELK

The Roosevelt elk is provincially blue-listed and restricted in range to Vancouver Island and some areas on the Mainland Coast. Potential population threats include commercial forestry activities, predation,

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[40] https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/species-ecosystems-at-risk/recovery-planning/implementation_plan_for_the_recovery_of_northern_goshawk.pdf

[41] See above link

[42] https://www.env.gov.bc.ca/wld/frpa/species.html

climate change and unregulated hunting, leading to direct reduction in numbers and increase in overwinter mortality. Roosevelt elk provide an important ecological role as prey for large carnivores and through their strong influence on plant composition and successional stages from browsing. They are also important culturally to many First Nations and provide hunting and wildlife viewing opportunities for hunters and the public.

The province released the Management Plan for Roosevelt elk in 2015[43]. This plan outlines the overall management goal of increasing the population, expanding distribution, and mitigating risks to remove Roosevelt elk from the blue list within the 2015-2025 period. Elk is managed by Elk Population Unit (EPU), with population surveys and tracking done for some EPUs dependent on conservation priority and funding availability.

Roosevelt elk browse a wide variety of vegetation and tend to concentrate on forest edges, riparian areas, newly burnt forest stands and harvested areas, but they also require dense forests for security and for snow interception cover. Mature and old forest edges and riparian areas are highly suitable for elk where there is both security and food. Some elk move seasonally between seasonal ranges, while others remain in the same area year-round.

In 2004, four UWRs were established to provide legal protection to 404 ha of winter range habitat for elk in the Nahmint LU. Although elk habitat was not considered explicitly in the delineation of OGMAs in the Nahmint, additional winter range habitat will likely be protected through the protection of lower elevation old growth forests.

6.1.3.2   BLACK-TAILED DEER

Black-tailed deer are ubiquitous across British Columbia. Black-tailed and mule deer are provincially yellow-listed and are thus considered secure and not at risk of extinction. Of the three closely related subspecies of black-tailed and mule deer that occur in British Columbia, the Columbian black-tailed deer (*O. h. columbianus*; hereafter black-tailed deer) is the only subspecies that occurs on Vancouver Island. While black-tailed deer populations are generally considered stable, threats of habitat loss exist in urbanized landscapes.

Black-tailed deer have an important ecological role in providing food for several predators, most notably cougars and wolves. Black-tailed deer were, and continue to be, an important food source for many First Nations on Vancouver Island, and today support a significant recreational harvest[44].

On Vancouver Island, black-tailed deer inhabit a wide range of habitat types throughout the year. In late spring, summer, and fall, black-tailed deer use a variety of habitat types and will move to areas where forage quality is best. During winter and early spring, old growth forests are important in many coastal areas; providing critical security cover, snow interception, and forage during a season when food sources in other habitats are limited. On the coast, severe winters with prolonged periods of deep

[43] http://www.env.gov.bc.ca/fw/wildlife/management-issues/docs/roosevelt_elk_management_plan.pdf

[44] https://www.env.gov.bc.ca/wld/documents/muledeer.pdf

snowpack, particularly at lower elevations, can have significant affects on localized populations. Black-tailed deer populations are also affected by predator dynamics and varying habitat conditions influenced by forest harvest[45].

There is no formal plan guiding management of black-tailed deer in the province or on Vancouver Island. Since 2004, 461.1 ha of some of the highest quality deer winter range was protected in UWRs in the Nahmint LU. Work to monitor the effectiveness and sufficiency of these protected areas is ongoing and will inform whether changes to habitat management should be made.

6.1.4   OTHER KNOWN SPECIES AT RISK

6.1.4.1   RED-LEGGED FROG:

Northern red-legged frog (*Rana aurora*) is blue-listed (i.e., species of special concern due to its sensitivity and/or vulnerability to human activities or natural events) and categorized as a Species at Risk in the Identified Wildlife Management Strategy (IWMS) under *FRPA*, which identifies species that may be affected by forest or range management on Crown Land. In 2015, the Province of BC published a Management Plan for the Northern red-legged frog, and in 2018 the Province of BC - West Coast Region implemented recommendations to protect habitat by creating several new WHAs for this species on Vancouver Island, none of which occur in the Nahmint Landscape Unit.

Northern red-legged frog requires connected aquatic (breeding) and forested (foraging) habitats throughout its life history. Through most of its range, northern red-legged frog is at risk from human activities, including alteration of and development near wetland complexes, as well as modification of forested habitats from logging activities. In the Nahmint Landscape Unit, primary threats (i.e., classified as 'medium' or 'high' in Management Plan for the Northern red-legged frog) to this species' survival are habitat loss, fragmentation, and mortality from forestry roads, as well as the potential introduction and spread of invasive American bullfrogs (*Lithobates catesbeianus*)[46].

6.1.4.2   VANCOUVER ISLAND PYGMY OWL:

Vancouver Island pygmy owl (*Glaucidium gnoma swarthi*) is a blue-listed subspecies of northern pygmy owl that is endemic to Vancouver Island, in part because its population size is poorly understood[47]. In 2006, Vancouver Island pygmy owl was added to the Category of Species at Risk under *FRPA* and the IWMS. To date, there is no formal management guidance for the Vancouver Island pygmy owl, nor protection of habitat in WHAs.

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[45] https://www.for.gov.bc.ca/hfd/pubs/Docs/Srs/Srs05/Srs05_Chapter2.pdf (pg 55-61)

[46]B.C. Ministry of Environment. 2015. Recovery plan for the Northern Red-legged Frog (Rana aurora) in British Columbia. B.C. Ministry of Environment, Victoria, BC. 51 pp.: http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=10251

47 B.C. Conservation Data Centre. 2016. Conservation Status Report: Glaucidium gnoma swarthi. B.C. Minist. of Environment. Available: https://a100.gov.bc.ca/pub/eswp/ (accessed Nov 17, 2021)

Threats to the Vancouver Island pygmy owl are characterized by habitat loss from forestry and urbanization, particularly because of a reduction in wildlife trees that are critical features of breeding habitat, as well as reduced structural diversity in foraging habitats. In general, population expansion and increasing abundance of the barred owl (*Strix varia*) is also considered a potential threat to Northern pygmy owls.

Multiple detections of these owls were recorded throughout the Nahmint LU during call playback surveys conducted from 2008-2012[48], and detections were often noted to have occurred in old growth stands. While direct habitat protection has not been implemented for this species, OGMAs, WHAs, and riparian reserves in the Nahmint LU likely provide indirect habitat protection.

6.1.4.3 WHITE-TAILED PTARMIGAN:

The blue-listed *saxatilis* subspecies of white-tailed ptarmigan (*Lagopus leucura saxatilis*) is endemic to the high mountains of Vancouver Island, existing primarily in the Alpine Tundra BEC zone. This species was added to the Category of Species at Risk in the IWMS in 2006. To date, there has been no reserve implementation through WHAs for this species.

White-tailed ptarmigan on Vancouver Island occurs in alpine and subalpine habitats year-round because they rely on permanent snowfields for thermoregulation, camouflage, and forage[49]. Surveys to identify occurrence of this species were conducted across Vancouver Island in 2007-2008[50], including in the Nahmint LU, where the species was detected at high elevations. Threats to this species posed by forestry remain uncertain and undefined, as white-tailed ptarmigan typically rely on habitats that are outside of the TLHB. It is generally understood that habitat loss, resulting from climate change, poses the greatest threat to the persistence of this species.

Species at Risk Occurrence Information:

The BC Conservation Data Center retains a database of all known occurrences of species at risk (i.e. species listed as threatened or endangered under COSEWIC or provincially red- or blue-listed); this information is publicly viewable through iMap BC and the BC Species and Ecosystem Explorer: https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre. Where possible, known occurrences of species at risk were captured in OGMAs.

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[48] See iMap BC – WSI – SO – Owls – Nonsensitive layer

[49] B.C. Conservation Data Centre. 2018. Conservation Status Report: Lagopus leucura saxatilis. B.C. Minist. of Environment. Available: https://a100.gov.bc.ca/pub/eswp/ (accessed Nov 18, 2021).

[50] iMap BC- WSI - SO - Grouse, Ptarmigan and Allies – Nonsensitive layer

6.2   CULTURAL HERITAGE RESOURCES:

A Cultural heritage resource is defined in the *Forest Act* as an object, a site or the location of a traditional societal practice that is of historical, cultural, or archaeological significant to British Columbia, a community, or an Aboriginal people.

For the purposes of OGMA establishment in Nahmint, known cultural heritage resources were incorporated in to OGMAs where they are compatible with the intent of OGMAs (i.e., to protect old growth and maintain biodiversity).

Cultural Heritage Resources were captured in OGMAs using spatial information provided to the Ministry. In most cases, mapped CHR were captured in OGMAs. This information is data sensitive and will not be available to the public.

LiDAR and VRI were used as a guidance for inclusion of cedar in OGMA selection.

BCTS has identified monumental cedar candidates in the field. These marked monumental cedar candidates were incorporated into OGMAs where possible. Isolated patches of monumental cedar were not selected for OGMA inclusion due to their lack of connectivity; however, these are typically located in wildlife tree retention areas (WTRAs) or timbered leave areas (TLAs), which offer protection for these trees.

Traditional use of forest resources will not be limited by the establishment of old growth management areas. This means that the objectives defined in the Order establishing OGMAs in Nahmint, the WHA orders and any other legislation applicable to this area is secondary in priority to First Nations traditional use of a tree.

7 OTHER OGMA CONSIDERATIONS

7.0 FULL BIODIVERSITY PLANNING CONSIDERATIONS:

Although the focus of OGMA legalization is priority biodiversity planning, elements of full biodiversity as they are described in the Landscape Unit Planning guidebook will be addressed in this section. Some elements will be considered in this planning exercise.

Elements that will be considered are the following:

- Landscape connectivity

Elements that will not be considered to the extent described in the LUPG are the following:

- Seral stage distribution
- Temporal and Spatial Distribution of cutblocks (patch size)
- Species Composition

The LUPG suggests that when objectives for patch size, connectivity, seral stage distribution, stand structure (other than WTR) and species composition are developed, they should be implemented in draft status to evaluate their feasibility for a limited period prior to legal establishment.

Work has not been done to analyze seral stage distribution, and patch size.

Because of the availability of information on historical reserves showing connectivity (like forest ecosystem networks), there will be more consideration around connectivity.

7.0.1 LANDSCAPE CONNECTIVITY

Connectivity describes connections among habitat, species, communities, and ecological processes (Ministry of Forests, 1998). It is an important part of maintaining ecosystem functionality.

For this OGMA planning, connectivity will incorporate considerations from the biodiversity guidebook and use historical spatialized forest ecosystem networks (FENs) as the best available information. OGMA placement will also consider good design elements as described in the Landscape Reserve Design Methodology for the Great Bear Rainforest and further described in section 7.1. Connectivity considerations also link to climate change mitigation/adaptation, further described section 7.2.

7.0.1.1 BIODIVERSITY GUIDEBOOK

From the biodiversity guidebook, the following is a list of connectivity characteristics of natural mature/old seral stage ecosystems for all biogeoclimatic subzones of NDT 1 (which applies to the majority of Nahmint except CWHxm2) and the frequency at which they occur:

Table A- 17 Natural Connectivity Characteristics for NDT 1

Natural Connectivity Characteristics	Frequency of occurrence	Notes on Characteristics
Upland to upland	High	Horizontal
Upland to stream	High	
Upland to wetland	High	
Cross-elevation	High	vertical
Wetland complex	Low-moderate	Horizontal, flat topography
Stream riparian	High	
Island remnants	Low	Left after wildfire: Scattered vets; trees along rocky outcrops and stream gullies; trees around wetlands

The biodiversity guidebook states that management to reduce fragmentation and maintain connectivity in managed forest landscape should be guided by the type and degree of connectivity found in each disturbance type.

Approach:

In alignment with the biodiversity guidebook, connectivity will focus on maintaining the frequently occurring characteristics like upland to upland and upland to stream. It should be recognized that although occurring less frequently, characteristics like wetland complexes and island remnants should have some special consideration. Where these infrequent connectivity characteristics occur and are compatible with OGMA planning, they are maintained where possible.

To further illustrate the maintenance of connectivity characteristics, these characteristics are listed for each OGMA in Appendix C OGMA Summaries.

7.0.1.2 FOREST ECOSYSTEM NETWORKS (FENS):

FENs were originally delineated in the 1990s and served to maintain and protect forest networks that included old growth as well as other important ecosystems in their natural state. The idea was for there to be good distribution and enough area for the ecological integrity to be sustained.

Challenge: Since the development of FENs, administrative boundaries have changed. In the lower Nahmint area there is now Treaty Settlement land that overlaps many of the old FENs. This is no longer part of the Crown forest land base so is it not possible to have much cross-elevational connectivity in that part of the LU. Harvesting has also fragmented some of the original FENs.

Approach: Follow the old FENs where possible, understanding that the landscape has changed since they were first established and that some connections are no longer possible.

Challenge: One challenge encountered is that built roads broke up some of the connectivity especially in the lower to mid-elevation areas where the terrain is better suited to road building. Riparian areas and high-elevation tracts were important for establishing larger contiguous OGMAs and bridging the lower elevation OGMA together.

Challenge: Another challenge is designing for connectivity and OGMA size with a limited hectare budget for OGMAs. The target for old growth protection through OGMAs is set out in the *Order Establishing Provincial Non-Spatial Old Growth Objectives*. Within this target, design choices are made and when OGMA size and connectivity are both important, there are trade offs. The larger an OGMAs is, the less budget there is for connectivity and vice versa. OGMAs that are established beyond minimum targets require rationalization.

Approach: OGMAs are linked where possible (typically linked through the vm2 or MHmm1 where continuous connectivity exists).

Fortunately, there is significant of opportunity to both maintain connectivity in Nahmint and have larger patches. This is due to considerable information available on where the less operable landbase is in Nahmint (which has less timber supply impact, and therefore is easier to protect), which can help serve as corridors as well as increase patch sizes of OGMAs.

7.1 OTHER DESIGN CONSIDERATIONS

7.1.1 INTERIOR FOREST CONDITION AND OGMA SIZE

The size and shape of a forest patch or forest reserve influences the amount of interior habitat available. Interior habitat is the area that is not influenced by a 'hard' forest edge (e.g., road, cutblock); various definitions put this at 1-4 tree lengths or up to 200m from a hard edge. Interior forest is important as it provides specific ecological attributes, such as microclimate, stand structure and species composition, which may be different from habitat near exposed edges. To maximize habitat for interior species, a forest patch should be circular, continuous, and as large as possible (Laurance and Yensen 1991; Faaborg et al, 1993).

Interior forest condition was a consideration in the design of all OGMAs. Where possible, OGMAs were designed in a way to maximize their size where priority values were also located.

Interior forest condition and OGMA size follows considerations from:

- Landscape Reserve Design Methodology (2016)[51]
- Biodiversity Guidebook (1995)[52]
- Marbled Murrelet Implementation Plan Spatial Habitat Management Approach

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[51] 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/westcoast-region/great-bear-rainforest/great_bear_rainforest_landscape_reserve_design_methodology.pdf

[52] https://www.for.gov.bc.ca/ftp/hfp/external/!publish/FPC%20archive/old%20web%20site%20contents/fpc/fpcguide/biodiv/biotoc.htm

The following is from the Landscape Reserve Design Methodology used in the Great Bear Rainforest. These are considerations than can be applied to OGMA configuration in Nahmint, including interior forest condition and OGMA size:

- *Larger reserves are more ecologically valuable than smaller reserves because they include a greater amount of habitat, have more forest interior compared to edge habitat and have greater long-term integrity.*
- *Having only a few large reserves in an LU 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).*
- *The representation target for the LU at the lower levels can make it difficult to have both reserves spread out over the LU and have larger reserves. In these cases, a judgement needs to be made to find a balance between smaller representing reserves offer the whole LU or having larger reserves that are less connected.*
- *Configuration: Highly irregular boundaries, protruding peninsular shapes and narrow linear/curvilinear polygons have a high proportion of edge and provide little forest interior (recall that a circle is the optimum shape for minimal edge and maximal interior condition). Polygons with less edge and more interior conditions are more ecologically valuable than shapes with high edge to area ratios. Nonetheless, some ecologically important areas are typically long and narrow (such as riparian areas or cliff bands) and not be able to be widened into larger reserves, so long narrow reserves are sometimes appropriate.*

Information around interior forest condition from the Biodiversity Guidebook (1995) were also taken into consideration. The following is information from the BGB Appendix:

- *Microclimatic edge effects penetrate the forest to varying distances depending on the variable measured, but very little edge influence penetrates farther than 100-200m (2-4 tree heights in coastal British Columbia) into the forest. The magnitude of an edge effect is influenced by the surrounding vegetation and topography. The boundary between well-established second growth and old-growth forest is less distinct than the boundary between a recent clearcut and the same old-growth. Similarly, an edge that is protected by topographic features such as bluffs or the margins of a gully is less influenced by the surrounding open environment than an edge that is fully exposed.*
- *All patches of forest 400m wide will generally contain little, if any, forest interior. We recommend targeting 600m as a minimum width when providing forest interior as a management objective. This should give a core of 200m in the centre, which is buffered from most microclimatic edge effects. Managers wishing to protect the interior of a FEN from possible biotic edge effects should consider minimum sizes substantially greater than those required for microclimatic edge effects.*

The Marbled Murrelet Implementation Plan Spatial Habitat Management Approach was considered for OGMA design. Wildlife habitat is one of the priority values for OGMA selection, and so understanding the design methodology around MAMU habitat will enhance the ecological value of the OGMAs and align with the concurrent establishment of additional WHAs and OGMAs for the purposes of marbled murrelet suitable habitat protection. The following is information from the MAMU Implementation Plan Spatial Habitat Management Approach that was considered in Nahmint OGMA delineation:

- *For MAMU WHAs, a range of patch sizes is desirable, including some that are <50ha, 50-200 ha and >200 ha.*
- *Areas less than 20 ha should be carefully considered for their functionality.*
- *Where possible, areas larger than 100 ha are a high conservation priority and should be the focus.*
- *Areas with interior forest (>100m from a hard or unnatural edge) and interior suitable habitat is an important WHA design consideration.*
- *Protected nesting habitat should be well distributed within and among LUs, where possible.*
- *Due to known negative edge-effects as a result of increased predation risk and deleterious microclimates, habitat should be retained in a configuration that provides interior forest conditions and reduces the amount of edge. In general, MAMU WHAs should be at least 200m wide and preferable >400m wide to provide interior forest conditions and viable nesting opportunities. Suitable habitat that occurs naturally in smaller patches with natural edge is not considered to have the associated negative edge effects.*

There are many considerations when designing OGMAs with the goal of maximizing interior forest condition while incorporating all primary OGMA values and considering good distribution and connectivity given the overall budget for OGMAs. In consideration of all these factors, the following is the general approach taken:

Approach:

- The size of OGMAs were maximized where possible and especially where suitable marbled murrelet habitat was present in large contiguous tracts.
- OGMA size was maximized but with the understanding that there is a balance between achieving a large reserve and good distribution and connectivity given the overall budget for OGMAs.
- Small OGMAs were minimized but do exist on the landscape where priority values exist (large trees) or where an ecosystem may naturally have a smaller size (riparian or wetland).
- In this plan, OGMAs were enlarged or connected where possible to promote interior forest condition and to better protect priority values (in particular MAMU habitat). Age classes younger than 9 were included in OGMAs where there was opportunity to garner more interior forest condition. See Table A- 34 Rationale for Using Lower Age Classes by Site Series for more details on where younger age classes were used.

To describe forest interior condition maintained by OGMAs, forest interior was classified into "none, low, moderate and high" and documented by OGMA in Table C- 1 OGMA Summaries.

Table A- 18 Interior Forest Condition Summary

Interior Forest Condition Classification	Hectares of interior forest condition in an OGMA	Reason for classification
None	0-2	Likely to have negligible protection from edge
Low	2-20	Would have some protection from edge but not a substantial amount
Moderate	20-50	Likely to be 300-400m wide polygons
High	50+	Likely to have areas 400m+ in width

Interior forest condition area was calculated by taking the overall OGMA size, removing site index lower than 5 (to remove non-forested which would not contribute to interior forest) and then subtracting a 100m inward buffer from each polygon. This output was a first step. Other factors were visually taken into consideration and measured. For instance, where an OGMA was also buffered by a legal UWR, the amount of interior forest condition would increase for an OGMA.

Figure A- 9 Interior Forest Condition in OGMAs in the Nahmint LU
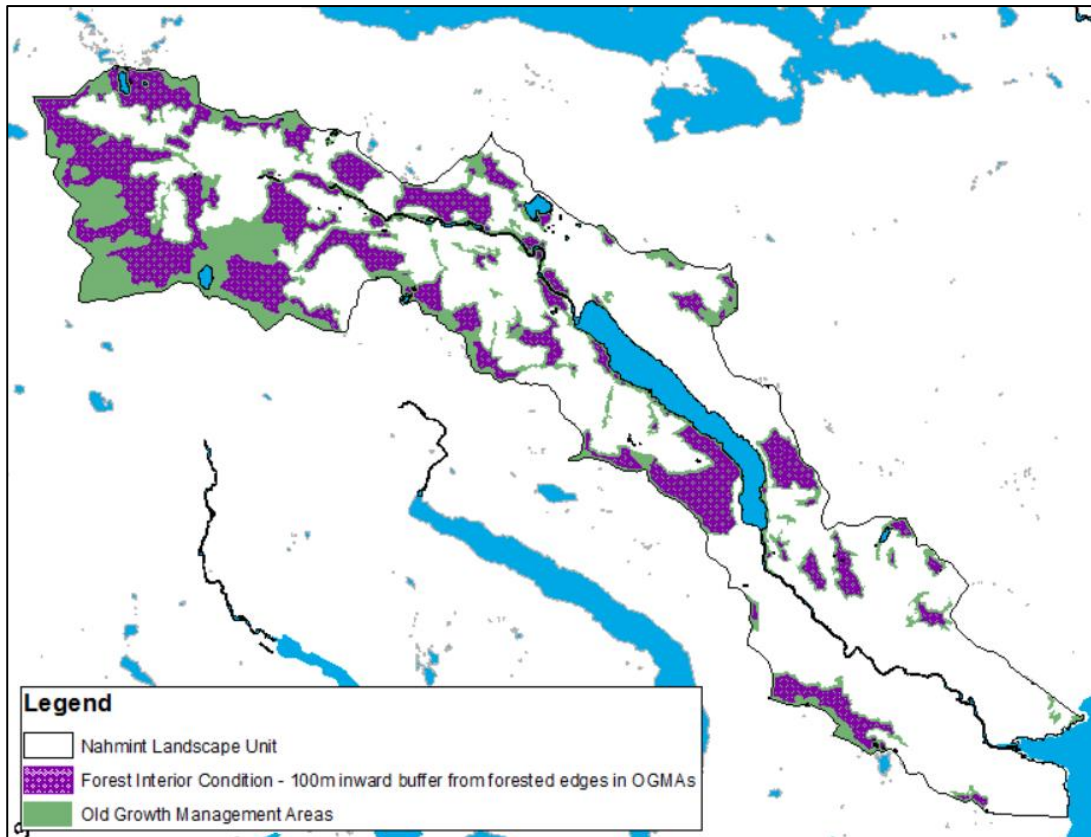
Map created November 2022

The total amount of forest calculated to be protected through OGMAs that has no or little edge influence (amount of forested OGMAs excluding a 100m buffer) is around 3100 hectares in the Nahmint Landscape Unit. This represents the minimum amount of OGMA interior forest condition. On the ground, many of these OGMAs are contiguous to mature forest but because that forest is not legally protected, for the purposes of this plan it is assumed that it could be logged and will not permanently enhance interior forest condition.

7.1.2 DISTRIBUTION AND NATURAL BOUNDARIES

Other elements of good design follow the Landscape Reserve Design Methodology for the Great Bear Rainforest and are as follows:

Distribution: Reserves should capture a range of elevations in the LU from valley bottom to ridge-tops and be geographically dispersed throughout the LU rather than concentrated in one area.

Reserve boundaries should "fit the landscape" wherever feasible using boundaries that follow natural breaks (e.g., ridgelines, basin boundaries, the edge of floodplains, the back of terraces and the active portion of fans).

Approach: Use these design concepts where possible.

7.1.3 VISUAL QUALITY

Visual Quality Objectives are defined in the *Forest Planning and Practices Regulation*. The following Visual Quality Objectives apply to portions of the Nahmint LU and represent the expected visual condition of a landform[53]:

Retention: Where an alteration is difficult to see, small in scale, and natural in appearance

Partial retention: Where an alteration is easy to see, small to medium in scale and natural and not rectilinear or geometric in shape

Modification: Where an alteration is very easy to see, and is:

   a) large in scale and natural in its appearance, or
   b) small to medium in scale but with some angular characteristics.

The following map shows areas with visual quality objectives in the Nahmint LU:

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[53] The following link provides the definitions for visual quality objectives and further description including photo examples of alterations.
https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/visual-resource-mgmt/vrm_a_guide_to_visual_quality_objectives.pdf
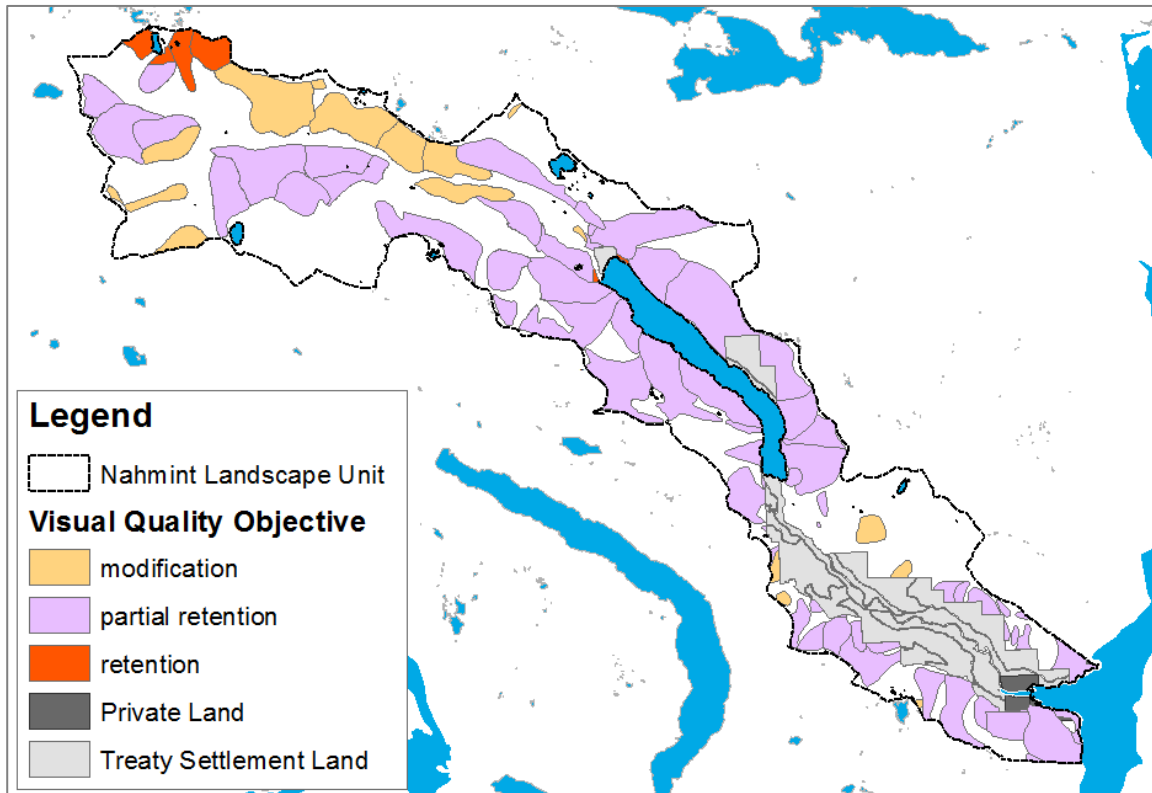
Map created Nov 2021

In addition, the Vancouver Island Summary Land Use Plan recognizes visual resources a primary objective and describes high visual sensitivity all along lower Nahmint and surrounding Nahmint Lake.

Approach: Maintain areas with "retention" visual quality objectives in OGMAs where possible. Consider areas with "partial retention" VQOs for OGMAs, with focus on old growth around Nahmint Lake.

7.1.4   RECREATION RESOURCES

The Nahmint Landscape Unit includes several recreational features. There are two official recreation sites: Nahmint Lake and Blackie's Beach. Gracie Lake occurs within a recreation polygon. There are recreation trails to Mount Klitsa via the Brooke George trail and portions of the Gibson-Klitsa trail. There is a trail to Mt. Anderson and routes to Nahmint Mountain and Jack's peak. Nahmint Lake and River are both used by recreators.

The maintenance of recreation resources is considered a primary objective in the Vancouver Island Summary Land Use Plan and describes Nahmint River and Lake. In addition to this, linkages to Mt. Gibson and Klitsa Mountain are mentioned as primary values.

Approach: Capture recreation features in OGMAs where possible.

7.2   CLIMATE CHANGE

Climate change was considered for this plan. There is no formal procedure for applying a climate change lens to the establishment of OGMAs so this process can be considered a preliminary approach. Climate change resources were explored to understand what is at risk and what are recommended adaptation measures. Existing climate change tools that could apply to OGMA planning were implemented where possible.

7.2.1   INCORPORATING CLIMATE CHANGE ASSESSMENT AND MANAGEMENT INTO FLNRORD DECISIONS: BACKGROUND REPORT

This background report on incorporating climate change assessment and management into FLNRORD decisions, underlines the benefits of establishing areas (like OGMAs) to maintain biodiversity across the landscape. The report states that, "current evidence strongly supports a relationship between forest resilience and biodiversity at multiple scales." (Daust, 2018). The report adds that resilience is supported by increased diversity, redundancy, and connectivity. It also adds, that where there are ecosystems, like Nahmint, with infrequent natural disturbance, the stands that are unmanaged store large quantities of carbon and OGMAs, for these reasons, contribute to climate change mitigation.

This report further summarizes the various tools that the Ministry of Forests has for managing for climate change. It specifically addresses old growth management areas and provides potential adaptation actions. The following table summarizes key climate impacts, main effects on values and potential adaptation actions taken from the report that may apply to Nahmint OGMAs:

Table A- 19 Key Climate Impacts, Main Effect on Values and Potential Adaptation Applicable to OGMAs in the Nahmint LU

Key Climate Impacts	Main Effect on Values	Potential Adaptation
Changed natural disturbance (wildfire)	• Loss of old-growth values	• Increased redundancy to allow for increased disturbance • Design OGMA network to include areas more likely to be resilient to disturbance
Drought	• Change in species composition; loss of old-growth values	• Design OGMA network to include areas more likely to be resilient to disturbance

Approach taken relative to report recommendations:

The OGMAs delineated in Nahmint are diverse. There is representation of each ecosystem that exists in Nahmint through site series targets. This includes emphasis on regionally rare and underrepresented ecosystems. Where possible, each ecosystem is maintained in multiple areas. There are however, some ecosystems that are mapped as only occurring in one area and maintained as such.

Connectivity was an important design consideration for the OGMAs and was maximized where possible. Areas that are naturally resilient to disturbance, like large old growth Douglas-fir stands, have been included in OGMAs, including one large historic fire break.

7.2.2 ADAPTING NATURAL RESOURCE MANAGEMENT TO CLIMATE CHANGE IN THE WEST AND SOUTH COAST REGIONS: CONSIDERATIONS FOR PRACTICIONERS AND GOVERNMENT STAFF

This document focuses on climate change management in the west and south coast regions.

It summarizes that climate change impacts are already occurring on a provincial scale. This includes extreme rainfall and dryness with a decrease in the snowpack. Regionally, in coastal BC, precipitation in winter months will increase and will decrease in the summer. With these changes, ecosystems will be impacted which includes the diminishing of the subalpine and alpine forests. According to this document, changes to natural disturbance dynamics are expected and include increased fire, drought, storms and windthrow.

This practitioners' and government staff guidance document outlines potential climate adaptation strategies. Planning considerations that may apply to this OGMA plan are summarized in the table below:

Table A- 20 Projected Ecosystem Changes and Potential Adaptation Strategies that can Apply to OGMAs in the Nahmint LU

Projected Ecosystem Change	Potential Adaptation Strategy
Increased stream temperature	Retain adequate riparian vegetation next to streams and wetlands
Loss of old forest habitat and connectivity, due to increased tree mortality	Create a network of retention areas and corridors at multiple scales • Include riparian areas, wildlife tree patches, and old growth management areas in retention areas • Include corridors crossing elevation gradients • Include habitat for specialised species and communities at risk
	Limit salvage in retention network (e.g. partial cut or avoid harvest)
	Particularly important where stands buffer microclimate or provide large structure
Increased fire hazard	Increase fire resilience at the landscape level by creating strategic fuel breaks, prescribing fire, and allowing ecologically appropriate fires in suitable locations to burn under appropriate conditions

This guide also emphasizes the importance of monitoring and that understanding changes over time will help with decision making.

Approach taken relative to guidance document recommendations:

The OGMAs include emphasis on riparian and wetland ecosystems, all of which are considered regionally rare or underrepresented in the Nahmint Landscape. A good representation of these ecosystems, based on targets established through this plan have been retained in OGMAs.

Connectivity was an important design consideration for OGMA delineation. Connectivity was balanced with OGMA patch size and was maximized where possible. OGMAs include cross-elevational corridors, riparian connectivity, and connection to wildlife habitat areas and to suitable marbled murrelet habitat.

Salvage harvesting is not an activity that is allowable in established OGMAs in the Nahmint Landscape Unit, except as described in the West Coast Region OGMA Policy where salvage harvest may occur where timber in OGMAs is damaged, destroyed, or dead after wildfire, flooding or to prevent the spread of insect infestations or diseases that pose a significant threat to forested areas outside of OGMAs.

Fire resilience work has not been a priority in the Nahmint Landscape Unit, in part because the Nahmint Valley does not interface with an urban area, which makes for a candidate area for wildfire risk reduction. There is one area in the Nahmint Landscape Unit that is a historic fire break. This entire break has been maintained as an OGMA.

7.2.3   CLIMATE CHANGE REFUGIA

The US Department of Agriculture's Climate Change Resource Center describes preserving climate change refugia as a climate change resistance strategy. Climate Change resistance is a method of climate change adaptation which "seeks to preserve, as much as possible, the historical structure, composition, and function of the ecosystem in the face of changing climate" (Morelli & Millar, Climate Change Refugia, 2018). Climate change refugia are "areas that remain relatively buffered from contemporary climate change over time and enable persistence of valued physical, ecological, and socio-cultural resources" (Morelli, Daly, Dobrowski, Dulen, & al, 2016).

Approach taken to consider climate refugia potential:

Currently, climate refugia is out of the scope of this plan and analysis cannot be done but should be explored to determine potential.

7.2.4   CLIMATEBC BIOCLIMATIC ENVELOPE MODELLING

University of British Columbia researchers analyzed how climate envelopes will change in the future, depending on climate scenarios (high versus low emissions) using ClimateBC climate variables[54]. Using

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[54] http://www.climatewna.com/ClimateBC_Map.aspx

ClimateBC, current biogeoclimatic subzone mapping (2021) was compared to the 2050 predicted subzones. The following figure shows current biogeoclimatic subzone mapping and the predicted 2050 BEC subzone shift (the Nahmint LU is sketched overtop of the figures):

Figure A- 11 Current Biogeoclimatic Subzone Mapping in the Nahmint LU

CWH mm | CWH vh | CWH vm | CWH xm | MH mm
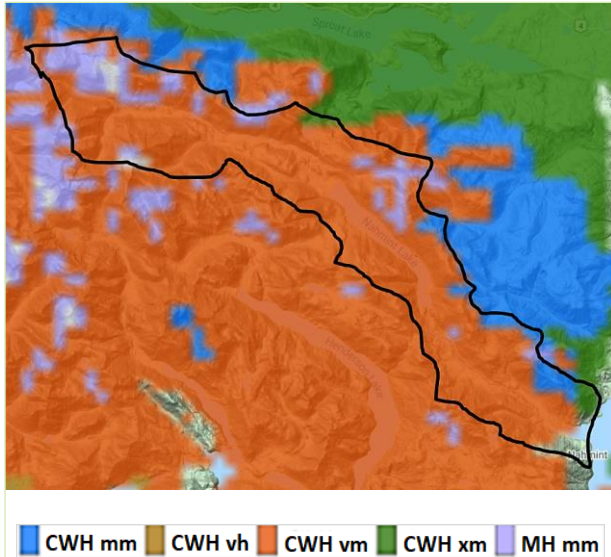
The LU is dominated by CWHvm including the vm1 and vm2 variants, with the MHmm1 present at higher elevations and a small area of CWHxm2 in the southeastern corner. It is evident from this map, and from local observations of the ecology that Nahmint is a unique area that has a transitional nature. It is transitional among multiple units that are higher in Fdc, primarily from the eastern part of the island:

- To the north of the Landscape Unit there is a convergence of CWHmm1-mm2 (where mm1 is heavier to Fdc than vm1).
- To the east and northeast there is a convergence of xm2-mm1 with both units being heavier to Fdc that the vm1.

Figure A- 12 Predicted Biogeoclimatic Subzones in 2050 from ClimateBC in the Nahmint LU

CWH mm | CWH vh | CWH vm | CWH xm | MH mm
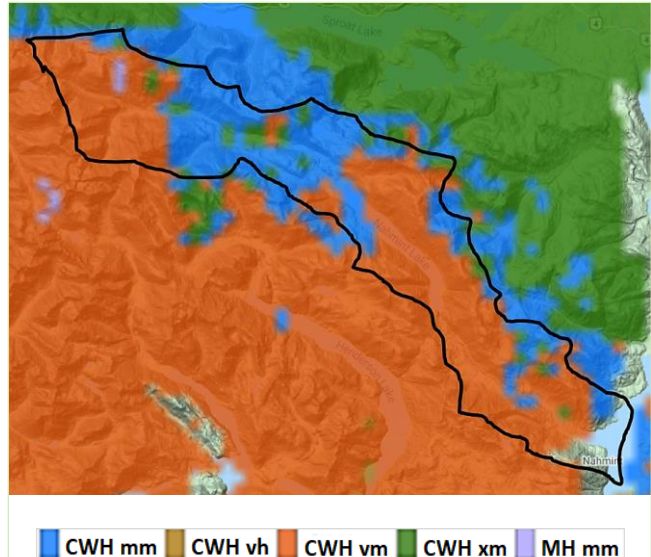
The predicted changes shown above are summarized:

- Some of CWHvm area will have CWHmm and CWHxm climates, a shift to drier subzones.
- Much of the MHmm will have a CWHvm climate or possibly xm, a shift to milder and drier climates.
- There will be little MHmm climate, and the vm will move to higher elevations with the introduction of other smaller pockets of other climates.

Approach taken relative to ClimateBC information:

This ClimateBC mapping predicts a shift to drier subzones in predominantly the south and west facing aspects, and part of the north facing aspects in the central part of the landscape unit. On the ground, the predicted shift to drier ecosystems is already evident particularly in the south and west facing aspects through field observations.

One of the goals of OGMA establishment is to have representative amounts of each biogeoclimatic subzone variant. There is a predicted shift into different subzones that aren't presently dominant in Nahmint. To recognize the future presence of additional subzones, the approach will be to ensure that, where these subzones are expected to occur, that there is an adequate representation of OGMAs within this "future variant" by establishing a "future variant" target. Representation in these areas is additionally important because, due to the superior growing conditions on the south and west facing aspects and the abundance of high value Douglas-fir in comparison to the north and eastern aspects, these areas are more vulnerable to harvesting, so presently ensuring representation is imperative. From this, a strategy was developed where the south and west aspects were looked at as a separate subsection of the LU with the goal of ensuring adequate ecosystem representation there.

The south and west facing slopes were analyzed for ecosystem representation as a stand-alone area. The goal was to achieve the portioned targets for site series representation in this area to ensure OGMAs are just as present and well-distributed on this aspect than they are in the north and east facing aspects. For example, where the site series target for OGMAs in the CWHvm1(03) is 24%, 24% of the CWHvm1(03) in the south-facing slopes should also be protected.

The amount of available large Douglas-fir was also taken into consideration for OGMA selection in terms of the resistance to fire and suitability as a fire break. A historical fire break was delineated as an OGMA and is also currently a legal WHA.

The following table shows south and west aspect site series targets and the amount represented in OGMAs

Table A- 21 Site Series Targets and Breakdown in OGMAs for South and West Aspects in the Nahmint LU

BEC subzone	BEC site series	Crown Forest Land Base (ha)	Site Series Target (%)	Site Series Target (ha)	AC 9	Percent target met in AC 9	Old AC 8 200-250 years old	Young AC 8 141-199 years old	AC 7	AC 6	AC 5	Percent target met in mature age classes (where mature is AC 5-9 in CWH and AC7-9 for MH)	AC 4	AC 3	AC 2	AC 1	Percent target met in all age classes	Number of hectares deficient
CWHvm1	01	758	13%	98	99	101%	14	12	0	3	0	130%	0	2	0	0	132%	
CWHvm1	02	40 [55]	24%	10	6	60%	0	0	0	0	0	60%	0	0	0	0	60%	4 [55]
CWHvm1	03	622	24%	149	98	66%	38	3	0	10	19	113%	0	0	0	0	114%	
CWHvm1	04	628	24%	151	118	79%	21	0	0	2	29	113%	0	0	0	2	115%	
CWHvm1	05	370	24%	89	108	121%	24	0	0	4	13	168%	0	0	0	0	168%	
CWHvm1	06	83	24%	20	28	139%	0	0	0	0	0	140%	0	1	0	0	147%	
CWHvm1	07	34	24%	8	23	290%	0	0	0	0	0	290%	0	0	0	0	290%	
CWHvm1	08	9	24%	2	6	267%	0	0	0	0	0	270%	0	0	0	0	270%	
CWHvm1	09	67	24%	16	40	250%	0	0	0	0	0	250%	0	0	1	0	254%	
CWHvm1	10	16	24%	4	15	371%	0	0	0	0	0	371%	0	0	0	0	371%	
CWHvm2	01	515	13%	67	49	74%	51	0	0	0	8	161%	0	0	0	0	162%	
CWHvm2	02	23	25%	6	1	24%	3	0	0	0	2	109%	0	0	0	0	109%	
CWHvm2	03	504	25%	126	51	40%	57	0	0	1	30	111%	0	0	0	0	111%	
CWHvm2	04	623 [56]	25%	156	40	26%	72	0	0	1	35	95%	0	0	0	0	95%	7 [56]
CWHvm2	05	275	25%	69	55	81%	45	0	0	1	3	151%	0	0	0	0	152%	
CWHvm2	06	58	25%	15	19	130%	11	0	0	0	9	269%	0	0	0	0	269%	
CWHvm2	07	46	25%	12	16	134%	0	0	0	0	0	138%	0	0	0	0	138%	
MHmm1	01	96	45%	43	21	49%	28	0	5	4	0	125%	0	0	0	0	135%	
MHmm1	02	155	35%	54	34	63%	56	0	10	11	0	184%	0	0	0	0	205%	
MHmm1	03	34	45%	15	1	8%	19	0	1	0	0	136%	0	0	0	0	138%	
MHmm1	04	34	45%	15	12	81%	10	0	0	1	0	150%	0	0	0	0	156%	
MHmm1	05	8 [57]	45%	3	0	0%	0	0	0	0	0	0%	0	0	0	0	0%	3 [57]
MHmm1	08	5	45%	2	2	95%	3	0	0	0	0	222%	0	0	0	0	222%	

Analysis updated December 2022

Notes:

- Some site series that are present in the entire LU are not present in the south and west-facing slopes of Nahmint and therefore, are not in the table above.
- Most of the site series targets in the south and west- facing slopes are achieved using ages 200+. Some of the drier ecosystems (02, 03, 04 site series in vm1 and vm2) targets are fully achieved using classes 5-9; however, most of the targets are met in older mature and old age classes.
- Overall, most site series are represented in OGMAs well beyond their proportional target for ecosystem representation.

[55] The south slope target for CWHvm1(02) is not achieved. There was not another 3.8 hectares of CWHvm1(02) that made sense in this portion of the landscape unit to designate OGMA due to the small size of the occurrences. Because of the lack of merchantability and operability of this ecosystem at the site level, this ecosystem will likely not be subject to harvesting.

[56] The table shows that CWHvm2(04) targets are not achieved; however, on the ground field work located the (04) site series that was mapped as CWHvm2(01)(03) and greater in size than the 7.3 hectare deficit shown and so the target is considered achieved. This also does not impede target achievement for CWHvm1 (01) and (03), which are 33.05 and 17.24 hectares above target respectively.

[57] A very small (~2ha) patch of MHmm1(05) could be delineated as an OGMA but it has poor OGMA design value: it is isolated and at the height of land. In the entire landscape unit, MHmm1(05) targets are exceeded by 22 hectares.

8   PLANNING TOOLS AND LIMITATIONS

This landscape unit planning process relies on the best information available. The primary tools used to inform OGMA planning are:

- Previous work
- Local knowledge
- GIS
- Field verification

8.0   PREVIOUS WORK

Previous work was an important foundational part of OGMA delineation. Previous work has many valuable aspects and has limitations that are important to recognize. The following table illustrates the key past-work that was referenced in delineating OGMAs, their value and limitations.

Table A- 22 Previous Work, its Value and Limitations

Previous Work	Value to current landscape unit planning	Limitations
Biodiversity Corridors	• Identified some key values reiterated in later plans (fire break for example)	• Older (1990s) polygons that used earlier datasets and are less accurate • Established before current legislation so does not fully apply to today • Second growth included in polygons, which is not the focus of this plan
Forest Ecosystem Networks (FENs)	• Shows connectivity throughout the entirety of the Nahmint Landscape Unit	• Older polygons that use less accurate datasets (latest polygons are dated 2004 but created before) • Established before current legislation (pre-*FRPA*, VILUP and *PNSOGO*) so does not fully apply to present plan • Second growth included in polygons, which is not a focus of this plan
2007 and 2012 Landscape Unit Plan and SRMP	• More recent biodiversity plans • Includes all the values still considered in landscape unit planning • Great foundational polygons to build off with many specific values identified by polygon • Some connectivity corridors present	• Although the same legislation applies, does not clearly demonstrate VILUP B4, unsure if and how TEM was used to support this objective. • No explicit process or targets found for regionally rare and underrepresented ecosystems, so nothing solid to work off in that regard.

8.1 LOCAL KNOWLEDGE

Local knowledge came from a variety of sources and included information from Ministry staff, First Nations, and First Nations representatives, ENGOs and interested members of the public. This knowledge is invaluable to this planning exercise and has greatly influenced the OGMA locations.

8.1.1 MINISTRY STAFF

Much of the local knowledge of Nahmint has come from Ministry staff, sometimes with decades of experience on Vancouver Island and in the Nahmint Valley. Local knowledge was often used in combination with GIS datasets to pinpoint areas of interest. Ministry staff knowledge includes but is not limited to ecology, location of large trees, terrain and engineering, access, and operability.

8.1.2 INDIGENOUS KNOWLEDGE

A significant portion of OGMA selection was also informed by First Nations use, where most of the available information has fortunately been made into a dataset and is considered a GIS tool. It is important to recognize that this information originated from local knowledge and cultural needs and use identified by Nations.

8.1.3 ENGOS AND MEMBERS OF THE PUBLIC

Information from ENGOs and interested members of the public has also been considered in OGMA planning where brought forward, including big tree locations, knowledge of wildlife habitat and recreational areas.

The Ancient Forest Alliance (AFA) shared the locations of some big trees in the valley. OGMAs were established around these trees. In 2019, during a field visit, the AFA brought up an area of interest called "Gracie's Grove", that is a tract of large old growth Douglas-fir. This area was possibly named by the Wilderness Committee in the early 2000s and there is minimal information available on it. Because this location became known to the Ministry in 2019, in early OGMA planning stages, there was time to do field visits. This area turned out to be a regionally rare ecosystem that, although the TEM data suggests that there is over 1000 hectares in Nahmint, seems to be rarer in the valley. Because of this, Gracie's Grove has been captured by part of a larger OGMA that includes an even larger tract of large Douglas-fir and additional areas identified in the field as regionally rare ecosystems that, despite what the TEM dataset suggested, has not been seen anywhere else.

8.1.4 LIMITATIONS:

Local knowledge is truly a valuable tool that is enhances when used in combination with other information sources, especially GIS information. The biggest limitation was not being able to access everyone that has this knowledge.

8.2   GIS

GIS tools have been an invaluable part of landscape unit planning. On such a large scale (Nahmint is ~20,000 hectares of land and water), GIS tools are critical to understanding the land. On the ground information is always the best but understanding that is it not possible to walk 20,000 hectares for this plan, GIS tools are at the forefront of this landscape-level exercise. Understanding how GIS tools work and what their limitations are enables better use of these datasets. In recognizing their limitations, and in combination with local knowledge and field verification, the efficacy of GIS datasets can be strengthened. The following section summarised key GIS tools used in Nahmint Landscape Unit Planning, what value they brought to the planning, their limitations and any specific important observations made while using them.

8.2.1   VEGETATION RESOURCE INVENTORY

The Vegetation Resource Inventory (VRI) was designed as a strategic level inventory for the purposes of reporting and answering broad level questions about the provincial land base. [58]

VRI was not designed to be an operational inventory, but since it is the only inventory available, it is used at a finer scale for Nahmint landscape unit planning, to demonstrate more specifically than in past draft plans how legal requirements are being met. VRI is often used in combination with terrestrial ecosystem mapping (TEM), which has similar inherent limitations, so there may be some compounding error. Nevertheless, it is the best information available for a landscape level plan. The following is an example of VRI mapping:

Figure A- 13 VRI Example in the Nahmint LU

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[58] For more information on VRI: https://www.for.gov.bc.ca/hfd/library/documents/bib106996.pdf
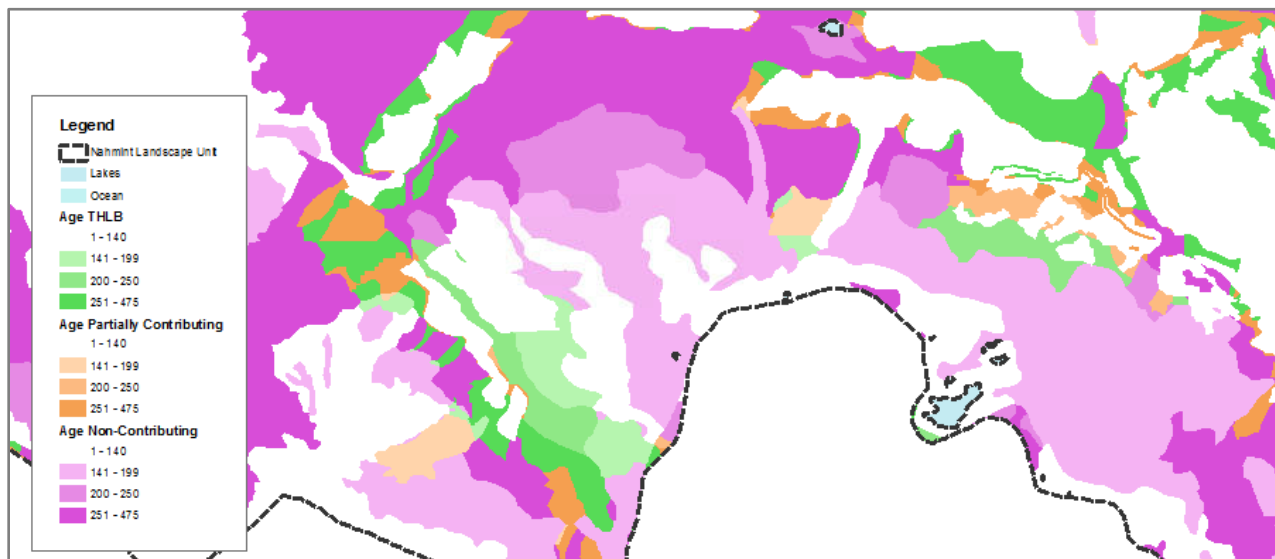
The following is a table that illustrates the primary values, limitations and specific observations made using the VRI dataset:

Table A- 23 VRI Value, Limitations and Specific Observations

Value	• Robust dataset with many important attributes such as: site index, age class, age, volume, species composition • Used to prioritize oldest age first for OGMAs • Used to parse out old age-class 8 (ages 200-250) as second priority
Limitations	• This layer is being used for planning at a scaler finer than what it was originally intended for (strategic scale); however, it is better than nothing. This is a limiting factor where this plan is judged against legislative objectives which require managing at a finer scale, which conflicts with VRIs intended usage. The outcome may be some inherent inaccuracies when managing to such fine-scale targets.
Specific Observations	• There are multiple VRI datasets. The typically used "R1" dataset (rank 1) appeared to be less accurate in describing age class. The L1 layer (layer 1) was the preferred dataset. It also had some inaccuracies, although these inaccuracies had fewer material effects on the plan. The inaccuracies were only known from having done field verification of several OGMA polygons and may have been difficult to pinpoint from the office. • The VRI shows a considerable amount of age class 8 in Nahmint that could in fact be much older. VRI interpretation looks at height as one way of estimating age. The CWHvm2 and MHmm1 variants were the principal areas with significant age class 8. These areas are higher elevation, naturally have shorter trees and in Nahmint, include more exposed areas with even shorter growth. These factors could be in part why age class was determined to be 8. What is known is that these areas have not been previously harvested, so if they are indeed less than 251 years old, there may have been a large-scale disturbance that occurred throughout a higher elevation band (in a ring shape throughout the valley), about 220 years ago. If there was not, it is like a VRI interpretation error.

It is important to understand what VRI is telling us in this exercise. One of the main priorities of OGMA delineation is setting aside old forest. Targets at the site series scale are established and considered the minimum required for ecosystem representation in Nahmint. The focus is on age class 9 first and then lower age classes where the conservation value is equal or better. **However, it cannot be assumed that minimum targets exist naturally[59] in Age class 9.** In some cases, especially in higher elevation BEC variants, the VRI data tells us that there is a lot of age class 8 and not as much age class 9. Note that the

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[59] Where VRI is the proxy for demonstrating the natural distribution of age classes 9 and 8 in Nahmint. It is understood though, that age class 8 could invariably be age class 9 and was simply misinterpreted.

error range for age is 38 years, so stands 212 years old to 288 years could be old or mature in the field. The inventory age is an estimate not a verified field age.

The following shows what VRI tells us about MHmm1(03):

Figure A- 14 Age Class Distribution of MHmm1(03)
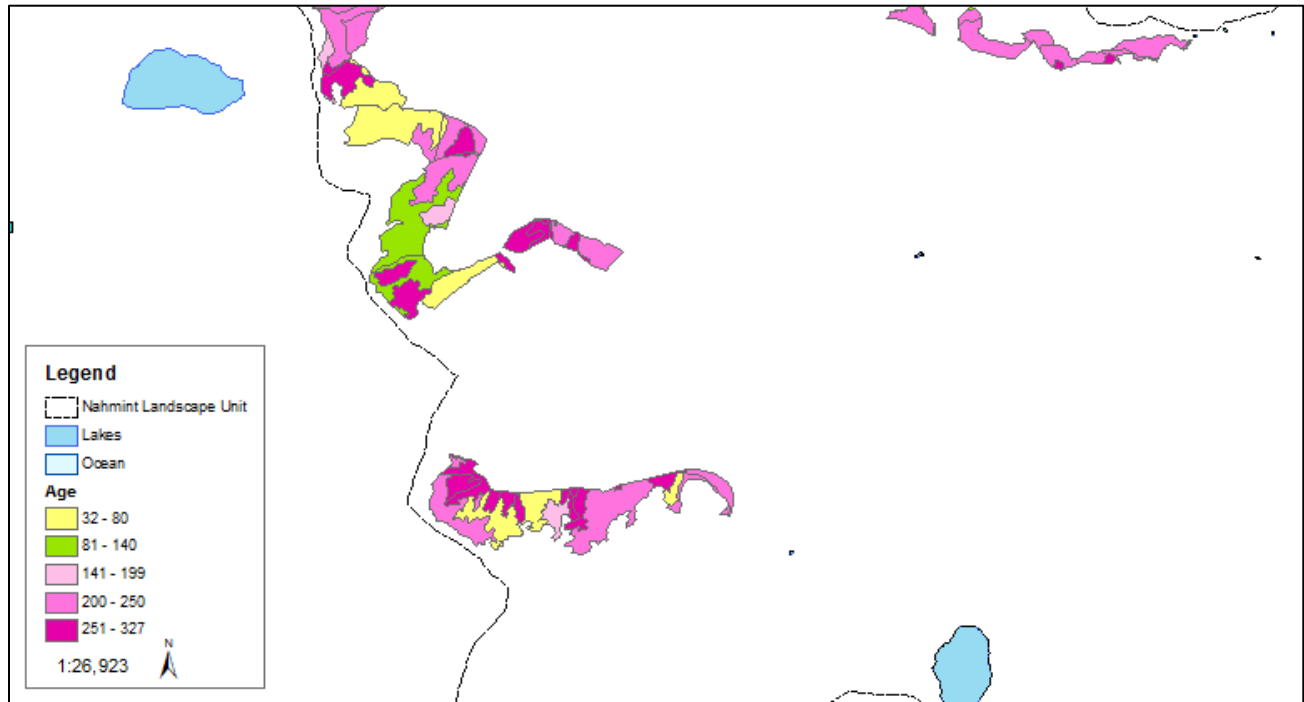
This figure shows most of MHmm1(03) that occurs in Nahmint (not all shown due to small image size). The target for representation in the MHmm1(03) is 88 hectares, or 45% of the available MHmm1(03) in Nahmint. The total variant target for MHmm1 is 28%. For illustrative purposes, if this target were to be applied to the (03) as a bare minimum target for representation it would be 55ha.

Using the best available information, none of the TEM-mapped MHmm1(03) has ever been logged in the Nahmint LU meaning the current age class distribution is essentially the natural age class distribution for MHmm1(03) as it is undisturbed by humans. The age class distribution is summarized in the table below:

Table A- 24 Age Class Distribution for MHmm1(03) in SMZ 13 Portion of the Nahmint LU

Total Crown Forest Land Base (ha)	AC9	Old AC 8 (200-250 years old)	Young AC 8 (141-199)	AC7	AC6	AC5	Immature Forest (AC 1-AC 4)
196.6	27.6	95.1	11.8	22.1	7.0	0.0	33 ha
Precent of CFLB	14%	48%	6%	11%	4%	0%	17%

Table updated December, 2022

A-60

Notes:

- Neither the site series target, nor the variant target could be met with the natural amount of age class 9 that is in MHmm1(03). Old age class 8 is needed to achieve the targets for representation.
- The younger age classes are naturally occurring and are not due to logging. Most appear to be slide track areas.
- **It is critical to check the VRI against imagery as a step to get an accurate depiction of the landscape. Field verification is even better. Without doing this and simply relying on data outputs (spreadsheets of information), erroneous conclusions about the land base will inevitably be made.**

8.2.2 TIMBER HARVESTING LAND BASE DATASET

The timber harvesting land base dataset that is derived for and updated during timber supply reviews is a part of determining the allowable annual cut. It can be used as a coarse depiction of where harvestable and non-harvestable areas are located. It is important to note that harvestable and non-harvestable in this context is not synonymous with operable and non-operable. A non-harvestable area could be an operable area that was set aside for marbled murrelet habitat protection, for example, and was subsequently netted out of the timber harvesting land base during a timber supply review. The following is a table that summarizes the value, limitations and any specific observations made when using the THLB dataset:

Table A- 25 Timber Harvesting Land Base Dataset Values, Limitations and Specific Observations

Value	• Roughly shows where the THLB, partially contributing land base (PC) and non-contributing land base (NC) is located. This helps identify priority areas for OGMA establishment (NC first when possible).
Limitations	• This layer is a coarse depiction of what is harvestable and not. The operational reality will not fully match up with the THLB layer. Using this layer was a first step but further investigation including field visit, was required for areas of operational uncertainty. This information is important to know for OGMA rationales.
Specific Observations	• Many areas of NC were observed to have either been harvested or have harvest opportunities, mapped THLB, conversely, had some non-operable areas. Communication with BCTS around operational reality occurred throughout this plan to ensure the most accurate outcome.

8.2.3 MARBLED MURRELET SUITABLE HABITAT MAPPING

Marbled murrelet suitable habitat mapping in Nahmint was done via low-level aerial surveys. The following is an example of marbled murrelet suitable habitat mapping in the Nahmint LU:

Figure A- 15 Marbled Murrelet Suitable Habitat Mapping
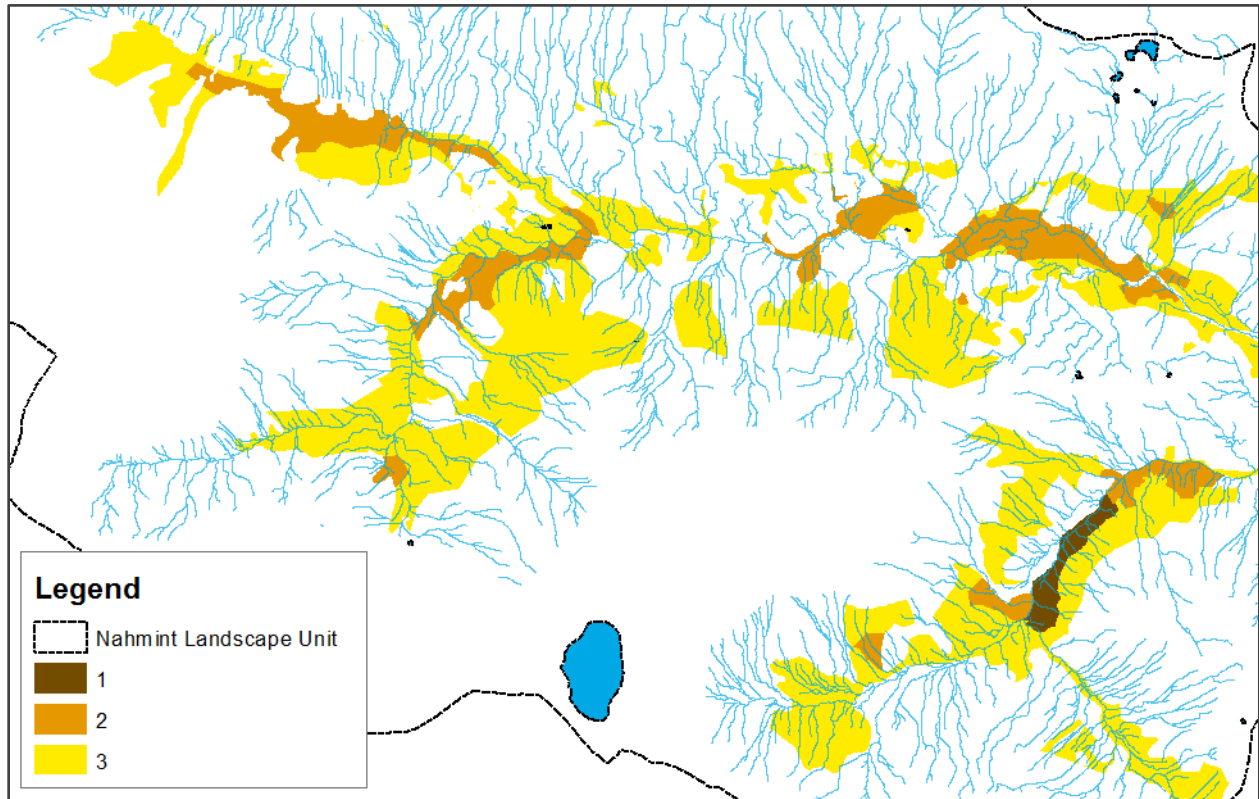
The following is a table that summarizes marbled murrelet suitable habitat mapping value for OGMA delineation, limitations and specific observations are summarized below:

Table A- 26 Suitable Habitat Mapping for MAMU Dataset Values, Limitations & Specific Observations

Value	• This layer is the best available information on currently suitable marbled murrelet habitat (class 1-3). It is critical to the establishment of MAMU OGMAs and WHAs.
Limitations	• All polygons have been verified by low-level aerial surveys (LLAS) which is the most accurate method for habitat determination; many have also been field reviewed. Due to the nature of the survey methods, LLAS is at a landscape-level scale, and therefore may be inaccurate at finer scales.
Specific Observations	• During aerial review (fall 2020) for draft WHAs and OGMAs, some areas of mapped suitable MAMU habitat were adjusted to better reflect current stand conditions.

8.2.4 TERRESTRIAL ECOSYSTEM MAPPING

Terrestrial Ecosystem Mapping (TEM) is the stratification of a landscape into map units, according to a combination of features, primarily climate, physiography, surficial material, bedrock geology, soil, and vegetation. TEM provides a biological and ecological framework for land management; a means of integrating abiotic and biotic ecosystem components on one map; basic information on the distribution of ecosystems and landforms from which management interpretations (e.g. broad-scale landscape planning, and site-specific interpretations) can be developed; a basis for rating values of resources or indicating sensitivities in the landscape; a historic record of ecological site conditions that can be used as a framework for monitoring ecosystem response to management; and a demonstration tool for portraying ecosystem and landscape diversity as well as enduring landforms. This dataset should be used and interpreted in consultation with a qualified ecosystem and/or terrain mapper. [60]

TEM is used primarily for its site series information in this plan. The TEM provides up to three deciles of site series information per polygon (see Appendix B section 2.1.2 for more information on deciles). Structural stage information from the TEM dataset was used in tandem with VRI data for additional certainty. It was also used to verify non-forested areas. The following is an example of TEM in the Nahmint LU:

Figure A- 16 Terrestrial Ecosystem Mapping Example in the Nahmint LU
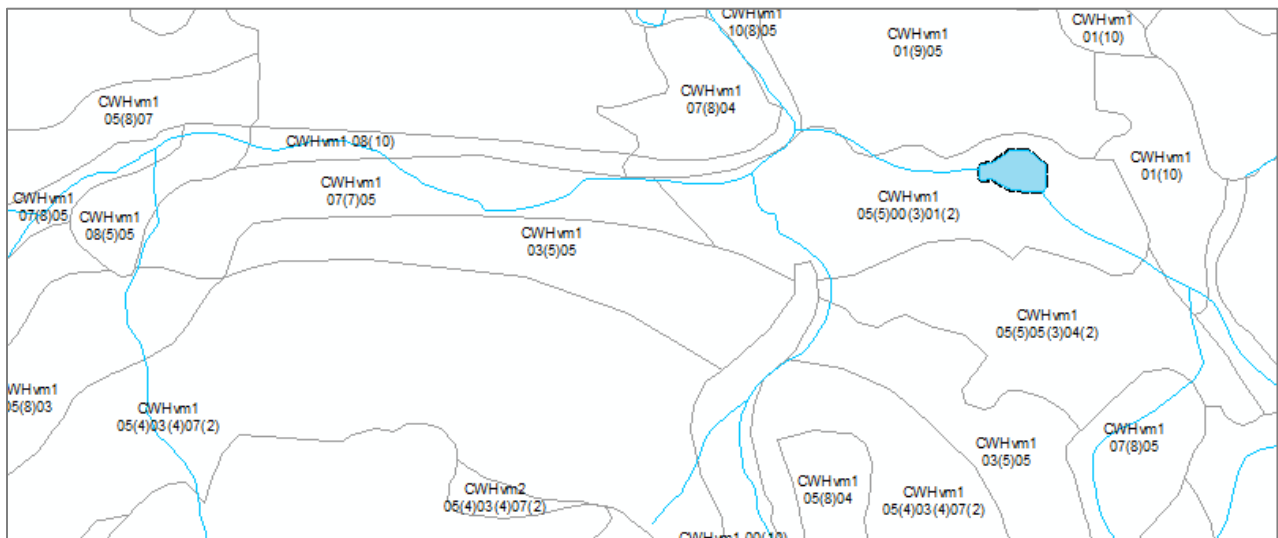
The TEM for the Nahmint LU was done in 1997 and 1998 and is considered the best landscape level information available for site series. The information that exists around these TEM projects is limited. A project summary for the lower Nahmint broadly summarizes the field component but not to any specific extent, which could have helped better understand TEM limitations. The report summarizes that of the

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[60] https://catalogue.data.gov.bc.ca/dataset/terrestrial-ecosystem-mapping-tem-detailed-polygons-with-short-attribute-table-greater-than-20-000-s

total number of plots sampled: ten were detailed plots, 44 were reconnaissance and 26 were visual descriptions from road access. 72 additional visual inspections were completed from the air. Plot effort was also concentrated in productive forest types.

The Upper Nahmint TEM QA (quality assurance) summary is the only information available for this dataset and is limited. The fieldwork took place in 1998. Weather was a limiting factor as the fieldwork occurred on one day, October 24. The greatest emphasis was placed on site series and structural stage identification.

The following table summarizes the value, limitations, and any specific observations with the TEM:

Table A- 27 Terrestrial Ecosystem Mapping Dataset Values, Limitations and Specific Observations

Value	• This is the best information available that reliably shows the location of wet, dry, and mesic ecosystem groupings. • This dataset is the only available way to quantify targets for emphasis on regionally rare and underrepresented ecosystems in Nahmint. • Used three deciles of site series information to establish targets for regionally rare and underrepresented ecosystem emphasis. • Used two deciles (3 too fine a scale) for OGMA delineation. • Used three deciles to do final analysis of site series present in OGMAs versus targets.
Limitations	• When trying to hone in on one specific site series for protection, it is not possible to know where in a multi-site-series polygon a particular site series may be located, making it difficult to ensure protection of a specific site series. For this reason, using the TEM dataset at this fine scale is an overextension of the dataset. • The TEM seems to show where dry, wet, and mesic ecosystems are, but doesn't necessarily differentiate well between ecosystems within those categories, which is the extent to which TEM is being using for this exercise. In other words, the TEM dataset capabilities are being overextended to do fine-scale planning. This limitation is accepted because TEM is the best information available to meet VILUP Objective 4. • Throughout field visits, it was evident that the site series suggested by the TEM may not exist on the ground. • TEM information drives ecosystem targets and yet may be inaccurately depicting where important site series are on the landscape.
Specific Observations	• Considerable CWHvm1(04) and vm2(04) was apparent in the TEM dataset – 1,371 hectares of CWHvm1(04) and 1,096 hectares of CWHvm2(04). On the ground, these ecosystems often ended up being (01) leading site series, often with components of (03) and sometimes components of (04). It is possible that many (01) site series are being protected through the OGMA plan rather than the (04) site series and only ground-truthing over time will locate more (04).

8.2.5 LIDAR

LiDAR (light detection and ranging) uses laser pulses to measure various distances from the earth. LiDAR provides detailed terrain information including slopes, contours, and accurate stream locations. It also provides tree height information. LiDAR was available for the majority of the Nahmint Landscape Unit and was used throughout the OGMA planning process. The following is an example of what LiDAR mapping can look like:

Figure A- 17 Example of LiDAR Mapping
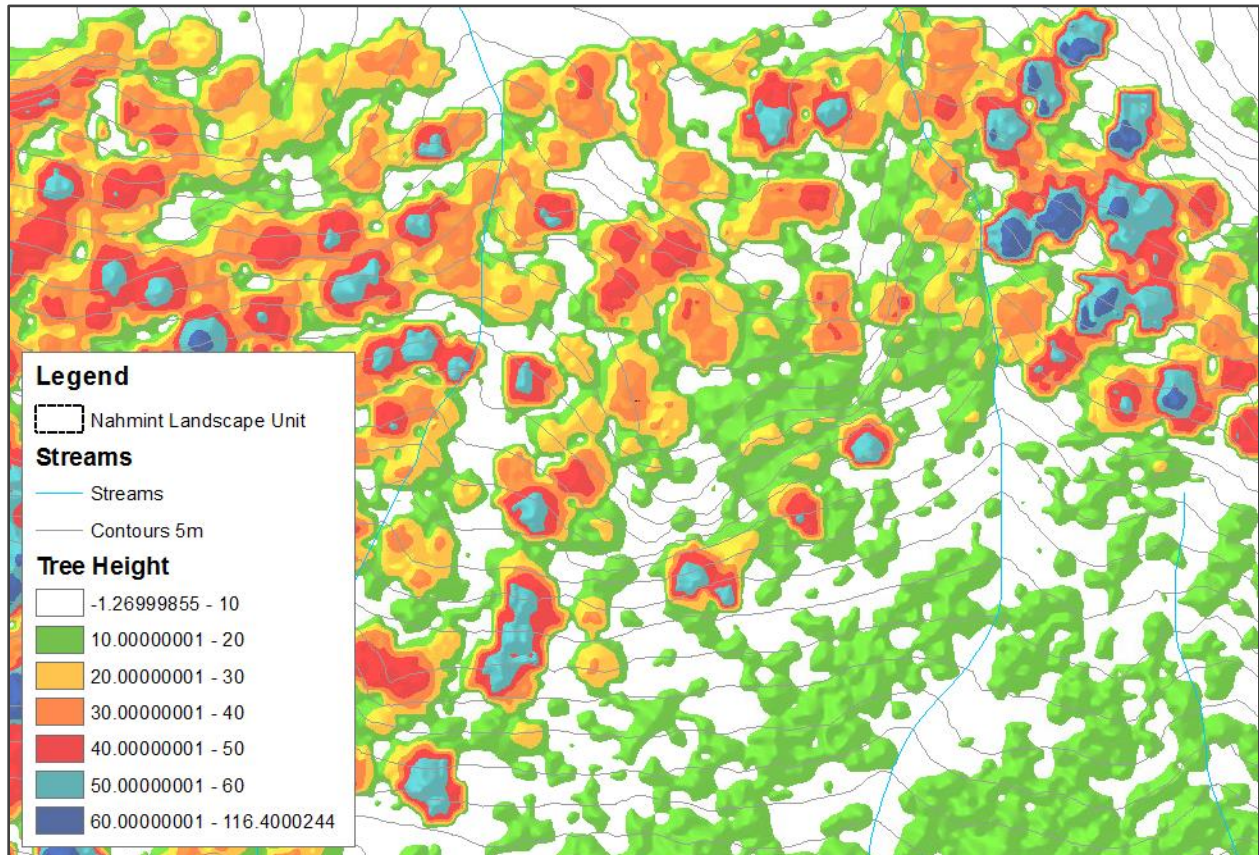
In the figure above, it is easy with LiDAR to distinguish the taller, larger, and older forested areas versus the younger and more uniform reforested areas. Trees of exceptional size are easier to find when looking at tree height and estimating how big the crown is (the individual "blobs" are likely one tree crown). The streams and contours are detailed and can help when drawing the OGMAs, to better align with natural boundaries.

The following table describes the value, limitations, and specific observations with LiDAR:

Table A- 28 LiDAR Values, Limitations and Specific Observations

Value	• LiDAR was the best source of information for OGMA design with respect to natural boundaries (streams, slope breaks, etc.) and was used for most of the OGMA drawing (except where LiDAR was not available). • LiDAR helped identify big trees using its Crown Height Model (CHM).
Limitations	• The contour layer was too detailed to trace for OGMA polygons and was not used where it would have resulted in too many vectors. It was a large layer that required breaking up into manageable clips for faster tracing as well.
Specific Observations	• In terms of looking for big trees, LiDAR was valuable where trees were very tall with larger crowns, as crown width can be observed with LiDAR. It was more difficult to use where tree heights were 30-45 metres tall as this is a common tree height in Nahmint, making it harder to distinguish the wider trees. • It was easier to find large Fdc and harder to find Cw due to the height and the Crown shape (a Cw crown can droop to lower heights and appear less distinguishable in the CHM).

8.2.6 OVERALL GIS CHALLENGES:

One of the main challenges with GIS tools, was how to reconcile the differences between what landscape level information tells us and what is observed in the field at the site level? GIS data is used to quantify targets and report on how targets are being met on the landscape. How should the discrepancies with on-the-ground observations be dealt with so that the reporting is accurate?

Approach:

➢ A focus was put on what the priorities were for meeting legislative requirements. These priorities included: having a solid understanding of where old forests were, having good ecosystem representation and emphasis on regionally rare and underrepresented, and understanding where suitable marbled murrelet habitat was located. The final reporting on OGMA targets will show numbers derived from GIS datasets with the caveat that updating these datasets to reflect ongoing site level observations is not feasible as it is a huge task so does have limitations. **The final reporting should be looked at with an understanding of data limitations and of the approach taken to reflect on-the-ground realities.**

➢ Understand that the VRI Dataset Used was Chosen to Better Reflect Reality:
  o As previously described, The VRI dataset chosen was slightly different than the normal provincial "R1" dataset, because when focusing in on the goal of having reliable old forest information, the L1 dataset appeared to be more accurate once comparing this data to on-the-ground observations. The L1 dataset's limitations has less of a negative material effect on the overall goal.

➢ Understand the importance of VRI Age Class 8:

- o Understanding that VRI shows a high incidence of age class 8, especially in high-elevation variants, led to the understanding that many targets would be met in large by age class 8, and whether it was in fact age class 8, it was the best available age to meet targets. It also meant that what the final report on targets looks like might be a different reality on the ground (older).
- ➢ Understand that there are discrepancies with TEM and on-the-ground site series observations:
  - o Some of the TEM limitations have less of a material effect on Nahmint planning simply because most ecosystems are regionally rare and underrepresented, so even if CWHvm1(07) turns out to be (08), or vice versa, they both require the same amount of protection anyway.
  - o It is trickier with the ecosystems that are closer related to the zonal (common) ecosystem or are components of a zonal matrix. CWHvm1(03), (04), and (05) apply to this situation. As previously described, when the (04)-site series was ground-checked for presence, it was often the (01) or (01)-leading. The (04) was so widespread according to the TEM, and so many hectares (over 2000), that it would not have been possible to field check all polygons. So when an (04) leading site was encountered, it was completely retained in an OGMA. These areas are made as a note in final OGMA spreadsheets as the TEM marks much of it as (01) and (03), but it is out of the scope of this project to update the TEM dataset, so reporting will not exactly reflect what was found on the ground.
- ➢ Understand how to best use the multi-decile information:
  - o CWHvm1(03) as an example is often a component of an (01) matrix and in small patches. When a TEM polygon is 50 hectares large and is 90% (01) and 10% (03), it is unclear where the 03 may be in this large polygon that is dominated by a common ecosystem. The trick is to ensure that the 03 is protected and not just 01. In these cases, field review, flights, google earth and ortho imagery helped.
- ➢ Understand that site series groupings are useful:
  - o It is important to also look at groupings of sites series, like wet and dry groupings of site series, rather than look at each site series separately, knowing that TEM did not seem to be accurate to that fine scale.
- ➢ Understand the importance of the leading site series:
  - o Some site series occur often as a secondary or tertiary component of a polygon, and it was important to look for areas where they were dominant to ensure that the wet and dry ecosystems were truly captured and not just always captured as a small component of another ecosystem.
- ➢ Adjusting GIS Datasets was not an option:
  - o Adjusting the GIS datasets was out of the scope of this plan. Detailed and systematic field verification would have been required to do this, and time and resourcing is not available for this endeavor.

9   DELINEATING OGMAS

The process for delineating OGMAs integrates the recommendations for priority biodiversity planning from the Landscape Unit Planning Guidebook (1999) as described in section 5, with the usage of new tools and the addition of other important values to consider in OGMA delineation.

9.0   THE PROCESS:

The following is the general process of OGMA delineation. The reality is that the process was far less linear than described. The draft OGMAs were constantly revisited with countless iterations, many OGMAs were looked at the field, and looked at from different data perspectives, and spatial information was continually re-looked at to use the most accurate and relevant pieces, all to ensure that the final draft product made sense.

1. VRI and TEM data were analyzed to show site series by age class in SMZ 13. This was used to establish targets for ecosystem representation including emphasis on regionally rare and underrepresented ecosystems. The targets are as follows:

Table A- 29 Site Series Targets for CWHvm1

BEC subzone	Site Series	Crown Forest Land Base (ha)	Percentage of LU	Site Series Target (%)	Site Series Target (ha)
CWHvm1	00	336	2.1%	0%	0
CWHvm1	01	2116	13.5%	13%	275
CWHvm1	02	71	0.4%	24%	17
CWHvm1	03	1119	7.1%	24%	268
CWHvm1	04	1371	8.7%	24%	329
CWHvm1	05	1486	9.4%	24%	357
CWHvm1	06	522	3.3%	24%	125
CWHvm1	07	504	3.2%	24%	121
CWHvm1	08	149	0.9%	24%	36
CWHvm1	09	114	0.7%	24%	27
CWHvm1	10	43	0.3%	24%	10
CWHvm1	11	0	0.0%	0%	0
CWHvm1	12	0	0.0%	0%	0
CWHvm1	13	3	0.0%	0%	0
CWHvm1	14	8	0.1%	24%	1.89
				Total	1,568

Table updated December 2022

Table A- 30 Site Series Targets for CWHvm2

BEC subzone	Site Series	Crown Forest Land Base (ha)	Percentage of LU	Site Series Target (%)	Site Series Target (ha)
CWHvm2	00	522	3.3%	0%	0
CWHvm2	01	1355	8.6%	13%	176
CWHvm2	02	56	0.4%	25%	14
CWHvm2	03	1005	6.4%	25%	251
CWHvm2	04	1096	7.0%	25%	274
CWHvm2	05	780	5.0%	25%	195
CWHvm2	06	435	2.8%	25%	109
CWHvm2	07	353	2.2%	25%	88
CWHvm2	08	110	0.7%	25%	28
CWHvm2	09	46	0.3%	25%	12
CWHvm2	10	1	0.0%	0%	0
CWHvm2	12	0	0.0%	0%	0
				Total	1,147

Table updated December 2022

Table A- 31 Site Series Targets for CWHxm2

BEC subzone	Site Series	Crown Forest Land Base (ha)	Percentage of LU	Site Series Target (%)	Site Series Target (ha)
CWHxm2	00	1.1	0.0%	0%	0
CWHxm2	01	12	0.1%	13%	1.55
CWHxm2	02	0.7	0.0%	13%	0.10
CWHxm2	04	0	0.0%	0%	0.00
CWHxm2	05	2.2	0.0%	13%	0.29
				Total	2.5

Table updated December 2022

Table A- 32 Site Series Targets for MHmm1

BEC subzone	Site Series	Crown Forest Land Base (ha)	Percentage of LU	Site Series Target (%)	Site Series Target (ha)
MHmm1	00	365	2.3%	0%	0
MHmm1	01	267	1.7%	45%	120
MHmm1	02	508	3.2%	35%	178
MHmm1	03	197	1.2%	45%	88
MHmm1	04	109	0.7%	45%	49
MHmm1	05	60	0.4%	45%	27
MHmm1	06	60	0.4%	45%	27
MHmm1	08	15	0.1%	45%	7
MHmm1	09	3	0.0%	45%	1.38
				Total	497

Table updated December 2022

Site series where targets were less than 2 hectares were looked at further as 2 hectares is the minimum OGMA size to have some functionality. Site series were investigated for their potential to be functional. As a result, the following site series will not have an official site series target:

Table A- 33 Reason for Exclusion of Site Series from Targets

Site Series	Reason for exclusion from targets
CWHvm1(11)	Less than 2 hectares present in entire SMZ. These are in fact tiny slivers along the Nahmint River and surrounded by treaty settlement land. The Crown land available in this area is not mappable and is probably due to linework errors.
CWHvm1(12)	Less than 2 hectares present in entire SMZ. This site series occurs in unmappable slivers along the Nahmint River and lake.
CWHvm1(13)	Less than 2 hectares present in entire SMZ. The (13) occurs as a tertiary decile where it is not possible to pinpoint where the site series might be located without ground-truthing, which did not occur. In addition, the *Pinus contorta/Sphagnum spp.* ecosystem that occurs in the (13) is in the wetland realm, and likely won't be harvestable, should it be encountered in the field.
CWHvm2(10)	Less than 2 hectares present in the entire SMZ. This site series is represented by small slivers that are not individually large enough to be a functional OGMA.
CWHvm2(12)	Less than 2 hectares present in the entire SMZ in stand-alone unmappable-sized slivers. However, most of this sites series has been captured as part of a wildlife habitat area.
CWHxm2(02)	Less than 2 hectares in entire SMZ. Area appears to be non-forested.

These site series will not have targets; however, they may be incorporated into OGMAs (where a functional OGMA could exist in combination with other site series). Otherwise, these areas will be managed at the site level.

2. Identified and mapped all age classes in the THLB, PC and NC using VRI and THLB data combined. The VRI was used in tandem with every other layer to ensure that where possible and appropriate age class 9 was used first, and then oldest age class 8 used second and so on. VRI layers of focus included:
   o Age class 9 non-contributing
   o Age class 9 THLB
   o Old age class 8 (200-250) non-contributing
   o Old age class 8 (200-250) THLB
   o Young age class 8 (141-199) non-contributing
   o Young age class 8 (141-199) THLB
   o Etc.
3. The 2012 (most recent draft OGMA version) and other hard reserves were used as a starting point and looked at against ecosystem targets to see where they were being met, or if there

were deficits or overachievements. Existing legal WHAs and UWRs were considered for OGMA delineation early on. As they are existing hard reserves, there is no longer a timber supply impact associated with their areas, which makes them a priority where old age classes occur and where ecosystem targets can be achieved. In addition, much work has gone into their establishment in terms of identifying habitat and biodiversity values. Considerable effort went in to the 2007 and subsequent 2012 update to draft OGMAs in Nahmint. These OGMAs showed consideration of the priority values at the time, good elevational distribution and included the full range of wet to dry ecosystems. It was clear that historical information like FENs played a part in OGMA delineation. These OGMAs included First Nations values (data sensitive) and important wildlife habitat, namely marbled murrelet. The current suite of OGMAs includes most of the 2012 delineated OGMAs. Some of these OGMAs may have altered to include more area or to better follow natural and administrative boundaries using today's best available information. Portions of OGMAs or entire OGMAs overlapped existing legal reserves where their values and attributes were compatible with OGMA delineation.

4. All other the primary values were overlayed, including cultural heritage resource information, big tree location and suitable marbled murrelet habitat and looked at with the TEM data to assess the current value of the existing draft OGMAs and legal reserve areas and to also gauge new opportunities for highest conservation value through co-locating values.

5. Core OGMAs were established as a first step towards spatial OGMA delineation. These OGMA were non-negotiable (values didn't exist elsewhere) or had very high conservation value and low to no THLB impact.

6. Elements of good design, particularly interior forest condition, OGMA size and connectivity were considered and looked at with all other values in mind and OGMAs were added and expanded opportunistically.

7. BCTS reconnaissance information was used to gauge where operable and non-operable areas were. OGMAs were first placed in non-operable areas and where OGMAs overlapped operable areas, a rationale was required.

8. Many OGMAs and OGMA candidates were field visited. Field visits led to further refinement of OGMA boundaries, the deletion of some historical OGMA candidates (one draft OGMAs was dying for example) and expansion where additional values were identified (big trees, rare ecosystems, etc.).

9. The final OGMA shapes include mature forest, in particular old age class 8 polygons, where the conservation values are equal or better in the lower age class. This required a rationale. The following table shows by site series, where younger age classes were used with a rationale:

Table A- 34 Rationale for Using Lower Age Classes by Site Series

BEC subzone	BEC site series	Site Series Target	Site Series Target (ha)	Total AC 9 (ha)	AC 9 used in OGMAs (ha)	Outstanding hectares to meet target (Difference between target and AC 9 used)	AC 9 left that could be used to meet the remainder (column to left) but not used to be target	Rationale for not Using remaining AC 9 to meet the target	Old AC 8 Age 200-250 (ha)	Difference	Young AC 8 Age 141-199 (ha)	Difference	AC 7	Difference	AC 6	AC 5	AC 4	AC 3	AC 2	AC 1
CWHvm1	01	13	275	512	253	22	259	•Most of the remaining AC 9 is fragmented. •The best (largest and (01) dominant polygons with multiple values were delineated as OGMAs. •Large portion of the AC 8 used overlaps marbled murrelet habitat and a WHA. •AC 8 also used in lakeside OGMA to capture riparian ecosystem. •AC 8 used for connectivity in OGMA 15.	87	-65	47	-112	0	-112	3	2	1	4	1	0
CWHvm1	02	24	17	14	10	7	4	•Remaining AC 9 are very small slivers. •AC 8 used includes MAMU habitat •AC 8 enhances the size of a large OGMA.	3	3	7	-4	2	-5	0	0	0	0	0	0
CWHvm1	03	24	268	346	240	28	106	•AC 8 used overlaps MAMU habitat and legal WHAs •AC 8 used captures riparian ecosystems •AC 8 used captures a large OGMA with a known rare ecosystem •AC 8 used captures ungulate winter range	59	-31	38	-69	7	-76	10	20	3	0	2	1
CWHvm1	04	24	329	463	240	89	223	•A large portion of remaining AC 9 is very fragmented lacking design values like interior forest condition. This large area foes not overlap any other values. •AC 8 contributes to larger patch size in OGMA 1 •AC 8 used made OGMA 11 contiguous •AC 8 used captured goshawk habitat and a legal WHA.	68	22	41	-19	1	-20	2	30	0	1	0	3
CWHvm1	05	24	357	713	393	-37		•N/A target achieved in AC 9	45	-82	12	-94	0	-94	4	16	0	0	4	0
CWHvm1	06	24	125	219	137	-12		•N/A target achieved in AC 9	45	-57	15	-72	0	-72	0	0	0	4	0	1
CWHvm1	07	24	121	245	167	-46		•N/A target achieved in AC 9	24	-70	6	-76	0	-76	0	0	6	5	2	0
CWHvm1	08	24	36	104	93	-57		•N/A target achieved in AC 9	9	-66	3	-69	0	-69	0	0	8	7	0	0
CWHvm1	09	24	27	55	47	-20		•N/A target achieved in AC 9	0	-20	1	-21	0	-21	0	0	9	0	1	0
CWHvm1	10	24	10	30	30	-19		•N/A target achieved in AC 9	0	-19	0	-19	9	-28	0	0	0	0	0	0
CWHvm1	14	24	2	1	1	1		•Used all available AC 9	0	1	0	1	0	1	0	0	0	0	1	0
CWHvm2	01	13	176	269	160	16	109	•AC 8 used captured MAMU habitat and a legal WHA. •AC 8 used to enhance patch size and connectivity of other OGMAs.	135	-119	110	-229	0	-229	4	14	0	6	0	0
CWHvm2	02	25	14	3	2	12	1	•There is only 3.1 ha of AC 9 and 0.7 ha were not used. All the (02) dominant site in AC 9 were captured in OGMAs. One isolated patch where (02) was the secondary site series was not considered adequate for OGMA delineation due to its size and isolation. •One isolated patch of AC 8 was also not considered for OGMA use. •AC 7 was incorporated into a large OGMA and helped maintain connectivity. •Ac 6 was used to maintain connectivity in an OGMA. •Note: All AC 6, 7 and 8 are contiguous to each other and it is suspected that they are in fact all the same age class. vm(02) is a low productivity site that may be interpreted as younger due to its height. More AC 8 could be added to OGMAs but would be a poorer design so used these lower ACs (suspected to be older) instead. Furthermore, the unused AC 8 will likely never be logged as it likely very low value.	6	6	3	3	1	2	1	14	0	0	0	0
CWHvm2	03	25	251	190	134	117	55	•All (03) dominant AC 9 polygons were incorporated into OGMAs except for 1. This pack was not used due to awkward OGMA design that borders with cutblocks and lacks interior forest condition in comparison to other options. •AC 8 used to build larger sized OGMAs and enhance connectivity. •AC 8 used to capture MAMU habitat and legal WHAs.	107	9	49	-40	4	-44	4	34	0	1	2	0
CWHvm2	04	25	274	299	128	146	170	•There are options for more AC 9 to contribute to OGMAs but the values contained in these areas are fewer. Field walkthroughs in Nahmint have also shown that some of the mapped dominant (04) ecosystem is (01) dominant, which is a common ecosystem. In fact, in only one instance so far has the (04) been found, which is in a combination of mapped AC 9 and AC 8. •AC 8 used to capture MAMU habitat and WHAs. •AC 8 incorporated into large OGMA that captured a known rare ecosystem.	135	11	28	-17	0	-18	1	37	0	1	0	0

BEC subzone	BEC site series	Site Series Target	Site Series Target (ha)	Total AC 9 (ha)	AC 9 used in OGMAs (ha)	Outstanding hectares to meet target (Difference between target and AC 9 used)	AC 9 left that could be used to meet the remainder (column to left) but not used to be target	Rationale for not Using remaining AC 9 to meet the target	Old AC 8 Age 200-250 (ha)	Difference	Young AC 8 Age 141-199 (ha)	Difference	AC 7	Difference	AC 6	AC 5	AC 4	AC 3	AC 2	AC 1
CWHvm2	05	25	195	282	168	27	114	•There is one unused portion of AC 9 that is (05) leading that does not overlap any other values and therefore was not used. •AC 8 used to provide connectivity and enhancing patch size. •Some AC 8 used to capture MAMU habitat.	100	-73	115	-188	8	-196	3	4	0	8	2	0
CWHvm2	06	25	109	151	105	4	46	•AC 8 used provided more connectivity and larger patch size than the unused AC 9. •A large portion of AC 8 captured MAMU habitat and overlaps WHAs and the unused AC 9 did not.	63	-59	84	-143	0	-143	1	9	0	0	1	0
CWHvm2	07	25	88	113	83	5	30	•The largest dominant patches of CWHvm2(07) in AC 9 were selected for OGMA delineation. Remaining CWHvm2(07) dominant polygons in AC 9 were isolated or too small to be a functional OGMA. •AC 8 was used to provide for larger patch sizes which increases the potential for more interior forest condition.	35	-29	51	-80	3	-83	0	0	07	3	1	08
CWHvm2	08	25	28	34	27	0		•N/A target achieved in AC 9	33	-33	6	-39	6	-45	0	0	1	17	0	08
CWHvm2	09	25	12	13	12	0		•N/A target achieved in AC 9	15	-15	4	-20	0	-20	0	0	09	12	0	08
CWHxm2	01	13	2	0	0	2		•No AC 9 available.	1	1	0	1	0	1	0	1	01	3	0	0
CWHxm2	02	13	0	0	0	0		•No AC 9 available.	0	0	0	0	0	0	0	0	02	1	0	0
CWHxm2	04	13	0	0	0	0		•No AC 9 available.	1	-1	0	-1	0	-1	0	0	04	0	0	0
CWHxm2	05	13	1	0	0	1		•No AC 9 available.	0	1	0	1	0	1	0	0	05	1	0	0
MHmm1	01	45	120	62	51	69	11	•Most of the unused AC 9 occurs where MHmm1 is a secondary component of the ecosystem and did not overlap other known priority values. •AC 8 in (01) dominant areas were used to build a large OGMA. This AC 8 was also directly adjacent to AC 9 (01) and suspected to also be AC 9. •AC 8 used to capture recreation, visual quality values.	94	-25	43	-68	5	-72	5	0	0	6	0	0
MHmm1	02	35	178	117	104	74	13	•The unused AC 9 did not overlap other known priority values although had potential to increase OGMA patch size, but not nearly to the extent that the AC 8 can. •AC 8 (02) was vital to the creation of a large OGMA that also provides extensive connectivity throughout the northwest end of the valley. •AC 8 was used to capture recreational and visual quality values.	216	-142	44	-187	14	-200	23	0	8	14	6	0
MHmm1	03	45	88	28	27	61	0	•Used all but 0.49 ha of AC 9 available. This 0.49 is a very small, isolated AC 9 sliver occurring along the landscape unit boundary. •AC 8 was used to provide connectivity throughout the northwest section of the landscape unit and was integral to the establishment of a very large patch size.	86	-24	9	-33	22	-55	3	0	4	24	4	0
MHmm1	04	45	49	20	19	30	1	•Used all but 1.36 ha of AC 9. •AC 8 used to capture MAMU habitat including a legal WHA. •AC 8 used to increase patch size and interior forest condition for OGMAs.	29	1	39	-38	0	-38	2	0	0	2	1	0
MHmm1	05	45	27	15	9	18	6	•The unused AC 9 is in an isolated patch whereas a large AC 8 polygon provides major connectivity as well as increased patch size of a large OGMA. The AC 8 doesn't overlap any more priority values than AC 9 but supports better OGMA design. The AC 9 would be an overall less functional OGMAs.	34	-17	2	-19	2	-20	0	0	1	0	0	0
MHmm1	06	45	27	11	11	16	0	•Used all available AC 9	9	7	30	-23	0	-23	0	0	06	7	0	0
MHmm1	08	45	7	2	2	5	0	•Used all available AC 9.	9	-4	3	-7	0	-7	1	0	08	0	0	0
MHmm1	09	45	1	0	0	1	0	•Used all available AC 9	3	-2	0	-2	0	-2	0	0	09	0	0	0

Table updated December 2022

APPENDIX

B

REGIONALLY RARE AND UNDERREPRESENTED ECOSYSTEMS

Contents

List of Tables

1 INTRODUCTION

Defining regionally rare and underrepresented ecosystems is integral to finalizing the design of Old Growth Management Areas (OGMAs) in the Nahmint landscape unit (LU). The Nahmint LU is almost entirely within Special Management Zone (SMZ) 13 of the *Vancouver Island Land Use Plan Higher Level Plan Order* (*VILUP HLPO*). *VILUP HLPO* objectives 1, 2, 4 and 5 apply to the Nahmint SMZ 13. Of these objectives, Objective 4 is directly linked to landscape unit planning.

2 DEFINITIONS IN OBJECTIVE 4 *VILUP HLPO*

VILUP HLPO objective 4 states to:

Maintain late-successional habitat elements and attributes of biodiversity in forested ecosystems with emphasis on regionally rare and underrepresented ecosystems, by retaining old seral forest at the site series/surrogate level of representation.

Numerous terms must be defined to understand the intent of the overall objective. Ecological terminology is often inconsistent among policy, legislation, and guidance documents, creating confusion around interpretation. Definitions are made with reference to past legislation and policy from previous landscape unit and land use planning where possible.

➢ ***"Maintain […] by retaining"*** is taken to mean that forested ecosystems identified to meet the Objective, are placed within reserves, such as Old Growth Management Areas (OGMAs), Wildlife Habitat Areas (WHAs), Ungulate Winter Ranges (UWR), wildlife tree retention areas (WTRAs) and riparian reserves. The Landscape Unit Planning Guidebook indicates that the long-term goal is for old growth retention to be achieved through spatial means, as opposed to aspatial management (BC Ministry of Forests and Ministry of Environment, Lands and Parks, 1999, pp. 27-28). Throughout this document, the term 'retention' is taken to mean conserving the ecosystems within spatial reserves.

➢ ***Late-successional habitat elements and attributes of biodiversity*** are defined within the *VILUP HLPO* as a footnote: "[These] include, but [are] not limited to: large diameter (>60cm) live, decaying and dead standing trees (providing nest and cavity sites; downed wood, including large diameter pieces (50-150cm); deciduous broad-leaved trees, both in riparian and upland areas (Government of British Columbia, 2000)."

➢ ***Emphasis*** can be broadly defined as "special consideration of or stress or insistence on something" (Merriam-Webster Dictionary, 2020). There is no requirement for defining targets in the *VILUP HLPO*, so 'emphasis' in this context indicates an expectation to take careful consideration of regionally rare and underrepresented ecosystems and to stress the importance of maintaining them. Therefore, the goal of 'emphasis' will be achieved when specific measures are taken to ensure that regionally rare and underrepresented ecosystems are managed to a higher standard than other ecosystems during the Nahmint landscape unit planning process.

➢ ***Regionally rare*** as it pertains to ecosystems is not defined within the *VILUP HLPO*. This term is explored in detail below.

➢ ***Underrepresented*** as it pertains to ecosystems is not defined within the *VILUP HLPO*. This term is explored in detail below.

- An ***Ecosystem*** is "a landscape segment relatively uniform in the composition, structure, and properties of both the biotic and abiotic environments, and in their interactions" (Pojar, 1991, p. 11). In the context of *VILUP HLPO* Objective 4, this term is considered as part of "regionally rare ecosystems" and "underrepresented ecosystems" and is further discussed below.
- ***Old seral forest [hereafter late-successional forest]*** is defined within the *VILUP HLPO* as a footnote: "generally greater than 250 years old, containing live and dead (downed and standing) trees of various sizes, including large diameter trees, and of various tree species, including broad-leaved trees. The structure of old forest varies significantly by forest type and from one biogeoclimatic zone to another." The *VILUP HLPO* uses the outdated term "old seral forest;" in the remainder of this document the term "**late-successional forest**" will be used when referring to the attributes described in Objective 4. Late-successional elements are more likely to be found in the "**old forest structural stage**," but these terms are not equivalent. For Landscape Unit Planning, the focus will be on retaining late-successional forest by prioritizing the oldest age classes. Hereafter, the term "**old forest**" will be used in an operational sense when referring to areas mapped as being age class 9 (250 years or older).
- ***Site series/surrogate level of representation*** is not defined in the *VILUP HLPO*, although a footnote does clarify the means to achieve this: "The level of representation of [late-successional forest] will be applied through landscape unit planning." A surrogate is not necessary as site series information is available in the Nahmint landscape unit.

2.0   REGIONALLY RARE ECOSYSTEM

For landscape unit planning in the Nahmint landscape unit, a **Regionally rare ecosystem** is a red- or blue-listed ecological community as defined and listed by the Conservation Data Centre[61]

2.0.1   RATIONALE:

Red List: Defined by the Conservation Data Centre as of 2019 as a list of ecological communities, native species and subspecies in B.C. that are at the greatest risk of being lost[62].

Blue List: Defined by the Conservation Data Centre as of 2019 as a list of ecological communities, native species and subspecies in B.C. that are of special concern (formerly vulnerable)[63].

It is important to recognize that an ecological community[64] is not synonymous with a site series. A site series is "the set of all sites within a biogeoclimatic subzone or variant (regional or subregional climatic unit) of the BC Biogeoclimatic Ecosystem Classification (Meidinger & Pojar, 1991), that can support the same late successional plant community" (Banner, Meidinger, Green, & Saunders, 2019, p. 2). Thus, an ecological community, including a red- or blue-listed community, can be associated with more than one site series (across climatic units).

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[61] It is recognized that the CDC list is on a provincial scale and not regional. The CDC list is the best information available and in the absence of a regional listing, it will be applied to the Nahmint landscape unit. Moreover, the LUPG referenced the CDC listing as a source to capture rare ecosystems.

[62] https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/red-blue-yellow-lists

[63] https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data/red-blue-yellow-lists

[64] The term ecological community is used by the Conservation Data Centre. The *Great Bear Rainforest Order (GRBO)* also uses the term "plant community" to refer "generally to plant species composition and relative abundances of plant species that are characteristic of a site unit" (Banner, Meidinger, Green, & Saunders, 2019, p. 1). For the purpose of planning in the Nahmint landscape unit, the term ecological community will be used both to refer to a CDC listed community as well as in the general sense (synonymous with "plant community").

For example, Amabilis fir - Sitka spruce / devil's club is the name of a rare ecological community that occurs at the late successional stage of CWHvm1/08 and CWHvm2/08.

- ➢ CWHvm1 is a variant (climatic unit) within the Biogeoclimatic Ecosystem Classification.
- ➢ CWHvm1/08 (BaSs - Devil's club) is a site series.
- ➢ Forest communities of the CWHvm1 (08) in age class 9 (251 years old +) are late-successional compositionally and exhibit old forest structural stage.

Red- and blue-listed ecological communities of forest ecosystems are often the communities of the late-successional stage for a site series. The successional stage describes the physical attributes and species composition of an ecological community, generally related to the time elapsed since disturbance of that community. There is a temporal element to the definition and recognition of a (listed) ecological community; however, forest age (usually described by age class[65]) is not equivalent to successional stage and late-successional characteristics and communities can also occur in younger age classes. This requires field verification that late-successional species composition and other attributes are present. For this reason, the oldest age class is the best initial focus for conservation as it provides a higher likelihood that the rare ecosystem is present (would need field verification to be certain). Prioritizing the oldest age class is also in line with Objective 4 of *VILUP HLPO*, which is to maintain late-successional forest (see "old seral stage" definition above).

For example, because old (age class 9) CWHvm1/08 is likely/expected to exhibit/support/contain the blue-listed ecological community amabilis fir - Sitka spruce / devil's club, it should be the top priority for conservation where this age class exists in the landscape.

It is also important to acknowledge that where there is very little late-successional forest remaining to protect a rare ecosystem, the next best course of action is to provide recruitment areas. Conserving these areas will be an important action towards down-listing red- and blue-listed ecological communities (once they fit the appropriate late successional community composition and structure).

2.0.2 METHODOLOGY FOR DETERMINING REGIONALLY RARE ECOSYSTEMS:

1. **Use the Conservation Data Centre "Ecosystem Explorer" to query all red- and blue-listed ecological communities applicable to the Nahmint landscape unit.**

The Conservation Data Centre (CDC) assesses the level of risk that the B.C. species or ecological community currently faces of becoming extinct/extirpated. Based on this risk assessment, the CDC assigns a provincial Conservation Status Rank that can be used to set conservation priorities. The following are ranking codes used to describe ecosystems:

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[65] Age class 1 = 1-20 years, 2 = 21-40 years, 3 = 41-60 years, 4 = 61-80 years, 5 = 81-100 years, 6 = 101-120 years, 7 = 121-140 years, 8 = 141-250 years, 9 = >250 years

Table B- 1 CDC Rank Types for Ecosystem Rarity

Type of Rank	Meaning
S	Subnational ranks assigned and maintained by the B.C. Conservation Data Centre (state or provincial-level jurisdictions)
N	National ranks assigned by national and international conservation authorities
G	Global ranks assigned by national and international conservation authorities

Table B- 2 CDC Ranking Modifiers Used for Describing Ecosystem Rarity

Modifier code	Meaning
1	Critically imperiled
2	Imperiled
3	Special concern, vulnerable to extirpation or extinction
4	Apparently secure, with some cause for concern
5	Demonstrably widespread, abundant, and secure
NA	Not applicable
NR	Not yet assessed
U	Unrankable

"Range ranks" may be produced (e.g., S1S3 = subnationally critically imperiled to vulnerable) to transparently reveal the degree of uncertainty in a status when the available information does not permit a single status rank (Conservation Status Assessment, 2020). The following is the listing of ranks that apply to red and blue-listed ecological communities:

Table B- 3 Status Ranks for Red and Blue Listed Ecosystem

Ecosystem Status	Status Rank
Red-listed	SX*, SH*, S1, S1S2, S2
Blue-listed	S2S3, S2S4, S3, S3?

*SX means presumed extirpated and SH means historical species. These are omitted from the focus as they do not exist.

The subnational (S) rankings (1) critically imperiled; (2) imperiled; and (3) vulnerable will be the focus for this landscape unit planning exercise. Collectively, any ecological community applicable to the Crown Forest land base in the Nahmint landscape unit that contains the CDC ranking of S1, S2 or S3 will be referred to as "regionally rare" within this document and for the purposes of guidance provided within this document. The exception to this rule will be ecological communities with status ranks of S3S4, or S3S5, which are considered yellow-listed. There are also no yellow-listed ecological communities in the Nahmint Landscape Unit.

2. **Identify sites series within the Landscape Unit that are expected, at late successional forest stages, to support the regionally rare ecological communities.**

A search was conducted April 14, 2021, using the CDC Species and Ecosystem Explorer platform, querying Groups: Ecosystem Realm-Groups: Forest AND BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern) AND BGC Zone: AND BGC Zone, Subzone, Variant, Phase: CWHvm1, CWHvm2, CWHxm2, MHmm1.

This search resulted in 22 records of ecological communities; of these, 7 were in BEC variants and site series that are not present in the Nahmint landscape unit[66]. The Nahmint landscape unit planning exercise is limited to forested areas; thus ecosystems that are non-forested, including non-forested swamps were removed from the query.

The remaining 14 ecological communities are included on the following list of red- and blue-listed ecological communities applicable to the Nahmint landscape unit. Their applicability is based on the presence of site series in the Nahmint landscape unit where these ecosystems should occur at the late-successional stage.

Table B- 4 Red- and Blue Listed Ecological Communities in the Nahmint Landscape Unit

English Name	Prov Status	BC List	Applicable Site Series	Ecosystem Group
western hemlock - western redcedar / salal Very Wet Maritime	S3	Blue	CWHvm1/03 CWHvm2/03	Terrestrial Realm - Forest: Coniferous - dry
western redcedar - western hemlock / sword fern	S3?	Blue	CWHvm1/04 CWHvm2/04	Terrestrial Realm - Forest: Coniferous - dry
amabilis fir - western redcedar / three-leaved foamflower Very Wet Maritime	S3?	Blue	CWHvm1/05 CWHvm2/05	Terrestrial Realm - Forest: Coniferous - mesic
western hemlock - amabilis fir / deer fern	S3	Blue	CWHvm1/06 CWHvm2/06	Terrestrial Realm - Forest: Coniferous - moist/wet
amabilis fir - western redcedar / salmonberry Very Wet Maritime	S3	Blue	CWHvm1/07 CWHvm2/07	Terrestrial Realm - Forest: Coniferous - moist/wet
amabilis fir - Sitka spruce / devil's club	S3	Blue	CWHvm1/08 CWHvm2/08	Terrestrial Realm - Forest: Coniferous - moist/wet
Sitka spruce / salmonberry Very Wet Maritime	S2	Red	CWHvm1/09	Terrestrial Realm - Flood Group (F): High bench Flood; Terrestrial Realm - Forest: Coniferous - moist/wet
black cottonwood - red alder / salmonberry	S3	Blue	CWHvm1/10	Terrestrial Realm - Flood Group (F): Middle Bench Flood Class (Fm); Terrestrial Realm - Forest: Broadleaf - moist/wet
black cottonwood / Sitka willow	S2S3	Blue	CWHvm1/11	Terrestrial Realm - Flood Group (F): Low Bench Flood Class (Fl) Terrestrial Realm - Forest: Broadleaf - moist/wet

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[66] Sitka spruce / salmonberry Very Dry Maritime, Douglas-fir - western hemlock / salal Dry Maritime, western redcedar / slough sedge, western redcedar / black twinberry, western redcedar / sword fern - skunk cabbage, western redcedar / salmonberry, western redcedar / three-leaved foamflower Very Dry Maritime, western hemlock - western redcedar / deer fern

English Name	Prov Status	BC List	Applicable Site Series	Ecosystem Group
western redcedar - Sitka spruce / skunk cabbage	S3?	Blue	CWHvm1/14	Terrestrial Realm - Forest: Coniferous - moist/wet; Wetland Realm - Mineral Wetland Group: Swamp Wetland Class (Ws)
western hemlock - Douglas-fir / Oregon beaked-moss	S2	Red	CWHxm2/01	Terrestrial Realm - Forest: Coniferous - mesic
Douglas-fir - lodgepole pine / reindeer lichens	S2	Red	CWHxm2/02	Terrestrial Realm - Forest: Coniferous - dry
Douglas-fir / sword fern	S2	Red	CWHxm2/04	Terrestrial Realm - Forest: Coniferous - dry
western redcedar / sword fern Very Dry Maritime	S2S3	Blue	CWHxm2/05	Terrestrial Realm - Forest: Coniferous - mesic

2.1 UNDERREPRESENTED ECOSYSTEM

For landscape unit planning in the Nahmint landscape unit, an **Underrepresented ecosystem** is an ecosystem (site series or surrogate) that makes up less than 2% of a landscape unit.

2.1.1 RATIONALE:

This uses part of the definition of "rare ecosystem" in the 1995 Biodiversity Guidebook. The Biodiversity Guidebook defines a rare ecosystem as making up less than 2% of a landscape unit and is not common in adjacent landscape units[67]. For the purposes of Nahmint landscape unit planning, adjacent landscape units will not be assessed, and therefore will not be part of the definition of underrepresented ecosystems. The adjacent landscape units were excluded in the assessment of whether a site series is or is not underrepresented for the following reasons:

- The purpose of checking adjacent landscape units is to reduce the list of site series identified as underrepresented; therefore, removing this step is more precautionary or lower risk.
- All site series that make up less than 2% of the Nahmint landscape unit, except in the MHmm1, occur in such small amounts that it would be prudent to provide an additional emphasis on retaining them. Furthermore, due to this small, combined area there would be minimal timber supply impacts from keeping the full list of site series with less than 2% coverage.
- In a scenario where the total area within each BEC variant of underrepresented site series in the Nahmint landscape unit is retained, the associated timber harvestable landbase (THLB) impacts are low (see table below, site series area calculated using terrestrial ecosystem mapping (TEM) data and combined by BEC variant for simplicity). Therefore, the additional effort and resources required for a full analysis of adjacent landscape units is not warranted.

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[67] See page 76: https://www.for.gov.bc.ca/hfd/library/documents/bib19715.pdf

Table B- 5 Amount of THLB and PC in Exclusively Underrepresented Site Series

BEC variant	Area of underrepresented ecosystems, excludes ecosystems that are also red- and blue-listed, all age classes included (ha)	Area considered PC, age classes 5-9 only (ha)	Area considered THLB, age classes 5-9 only (ha)
CWHvm1	73.5	7	20
CWHvm2	104	4	7
CWHxm2	0	0	0
MHmm1	710	10	51

Table updated December 2022

- The Henderson landscape unit, an adjacent landscape unit that is most likely to contain some of the underrepresented site series that occur in the Nahmint landscape unit, is managed by a different forestry licensee than the Nahmint landscape unit and does not have the same obligations under VILUP (not in special management Zone 13). Therefore, it would be difficult to guarantee the presence of underrepresented site series in forestry reserves (e.g., OGMAs).

Determination of underrepresented ecosystems focusses on ecosystems in relation to their occurrence in planning or administrative units (e.g., landscape units), while the assessment of regionally rare ecosystems defers to current CDC listings to address concepts of biogeographical (or range) rarity (for definition of "regionally rare ecosystem" see above). The CDC rankings will capture anything that is underrepresented in the Nahmint landscape unit, but this process of also identifying underrepresented ecosystems will ultimately capture rarity across the forested landscape.

2.1.2 METHODOLOGY FOR DETERMINING UNDERREPRESENTED ECOSYSTEMS IN THE NAHMINT LANDSCAPE UNIT:

1. Determine sites series that individually comprise less than 2% of the land area within the LU.

All deciles of the TEM for the Nahmint landscape unit will be analyzed. All non-productive areas (where the site index is lower than 5[68]) will be removed from the analysis.

Decile: Each of ten equal groups into which an ecosystem can be divided according to its distribution. The minimum number of deciles that are attributed to an ecosystem is 0 and the maximum is 10. These can be converted into percentages where 1 = 10% and 10 = 100% coverage in a polygon.

For example, a polygon can be:

- CWHvm1 with the following deciles: 05(6)01(2)07(2)
- This equates to a mapped polygon comprised of 60% CWHvm1/05, 20% CWHvm1/01, and 20% CWHvm1/07 site series.

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[68] This is determined using Vegetative Resource Inventory (VRI) data. Site index is the height of the tree in meters with the widest diameter at breast height, for a given species, at age 50 within a 0.01 ha plot.

Using the above approach, numerous site series are considered underrepresented in the Nahmint landscape unit. The site series that are also included in the regionally rare ecosystem category (i.e., associated with red- and/or blue-listed ecological communities) are noted in **bold italic** font.

Table B- 6 Underrepresented Site Series in Nahmint LU

BEC variant	Site series
CWH vm1	02, ***08, 09, 10,11***,12,13, ***14***
CWH vm2	02, ***08***, 09, 10, 12
CWHxm2	***01, 02, 04, 05***
MHmm1	01, 03, 04, 05, 06, 08,09

2.2   REGIONALLY RARE AND UNDERREPRESENTED ECOSYSTEMS DEFINITIONS: DISCUSSION

It is challenging to find a consistent definition in previous policy and legislation of regionally rare and underrepresented ecosystems. In the Landscape Unit Planning Guidebook, the main policy tool to provide guidance for Nahmint landscape unit planning, these terms are differentiated only once and not defined.

For the purposes of planning in the Nahmint landscape unit, the "regionally rare" and "underrepresented" definitions above are meant to capture both the Biodiversity Guidebook (1995) definition for rare ecosystems as well as the guidance given in the Landscape Unit Planning Guidebook (LUPG) (1999) around managing rare ecosystems. These definitions are meant to reflect both the ecological and the planning aspects of managing "regionally rare and underrepresented ecosystems" (see discussion under Underrepresented Ecosystem heading).

The concepts of rarity and underrepresentation both have an element of spatial scale, and the causes of the rarity or underrepresentation can vary. Ecological communities can be rare due to anthropogenic disturbance reducing the late successional area where the communities are expressed, they can be naturally uncommon, or they could be common in a small geographic area but rare elsewhere. For the purpose of landscape unit planning in the Nahmint landscape unit, ecological communities that are naturally rare and ones that are rare for other reasons (e.g., human-caused landscape change) will not be differentiated.

The *VILUP HLPO* Special management Zones, such as SMZ 13 in the Nahmint landscape unit, require a higher level of environmental consideration than other planning regimes, particularly in terms of rare and underrepresented ecosystems. Therefore, it is prudent to consider other provincial government planning that has also focused on ecosystem rarity, such as the 2016 *Great Bear Rainforest Land Use Objectives Order (GBR Order)* on the North and Central Coast of British Columbia and the *2008 Clayoquot Sound Land Use Objectives Order (Clayoquot Order*). However, it should be noted that the *GBR Order* and *Clayoquot Order* were developed under a different system of guidelines than in SMZ 13 (ecosystem-based management).

The *GBR Order* objective for red- and blue-listed plant communities is to protect each occurrence (100%) of a red-listed plant community and 70% of each occurrence of a blue-listed plant community (or of total area of the blue-listed community within a landscape unit). The list of "Red- and Blue-listed plant communities" is defined in the *GBR Order* and may not align directly with Conservation Data Centre (CDC) listings. The *GBR Order* also has

ecological representation targets for site series groupings including "old forest" (defined within the Order) representation targets. (Ministry of Forests, Lands, Natural Resource Operations and Rural Development, 2016)

The *Clayoquot Order* uses the Conservation data Centre (CDC) listings of red- and blue-listed ecological communities and uses associated site series to identify the most likely occurrences for these communities. The Technical Planning Committee (TPC) adopted rare plant association targets of 100% of all red-listed site series in reserves and 50% of all blue-listed site series in reserves. The priority for reserve areas were age class 8 and 9, among other considerations. In addition to targets for red- and blue-listed ecosystems, the *Clayoquot Order* also has ecosystem representation targets. The TPC considered rare ecosystems as those site series that make up less than 2% of the watershed or that appear less than 6 times in watershed inventories; these rare site series may or may not include red- and blue-listed plant communities. The TPC adopted ecosystem representation targets of at least 30% of each site series in reserves, at least 50% of rare site series in reserves, and at least 20% of each site series/dominant tree species in reserves for forest age groupings of 201-400 years and 401-600 years (greater than 2ha in size). The *Clayoquot Order* suggests that rare ecosystems be protected in a greater proportion than their representation (one definition of emphasis) (Clayoquot Sound Technical Planning Committee, 2006).

3   STRATEGY TO ACHIEVE OBJECTIVE 4 IN *VILUP HLPO*

Consolidating the above definitions, the overall intent of Objective 4 is interpreted as:

To establish a process during Landscape Unit Planning in the Nahmint landscape unit that ensures that site series likely to contain red- and blue-listed ecological communities (regionally rare ecosystems) and site series that occur less than 2% in the Nahmint landscape unit (underrepresented ecosystems)[69], are maintained using the approach to emphasis described above within the parameters of Landscape Unit Planning outlined below. The priority is to maintain these site series in the oldest age class forest available as this is most likely to contain late-successional forest, the 'late-successional habitat elements and attributes of biodiversity' and the ecological communities of interest**.**

3.0   PARAMETERS OF LANDSCAPE UNIT PLANNING

Parameters from the Landscape Unit Planning Guidebook (LUPG) include:

- Apportion the target area for OGMAs by first determining how much suitable old forest exists for each landscape unit variant in the non-contributing land base. This is to a maximum of the full target area for each landscape unit variant. Where the OGMA target for the variant cannot be met entirely in the non-contributing land base, consider partially constrained areas prior to the non-constrained timber harvesting land base (THLB).[70]
- In intermediate and high biodiversity emphasis landscape units [including Nahmint], establish OGMAs to the full target. Where a shortfall exists, develop a recruitment strategy.[71]

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[69] In operationally using the regionally rare and underrepresented ecosystem definitions, hereafter will refer to the site series included in the "regionally rare and underrepresented" category to include both site series considered underrepresented and site series that are likely to contain red- and blue-listed ecological communities.

[70] 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/policies-guides/lup_guide.pdf

[71] See previous footnote.

- Old growth retention targets apply to the Crown forested land base, including portions of national parks, provincial parks and other protected areas that fall within landscape unit boundaries.[72]
- OGMAs cannot be established within parks, protected areas, or Crown land outside the Provincial Forest; therefore, where these areas are used to achieve the old growth target for the variant, the actual total area of all OGMAs established in the [non-contributing] must be reduced accordingly.[73]
- Once OGMA targets are calculated using the variant only rule, the area must be located to maximize conservation of biodiversity values subject to the use of constrained areas in the THLB. This applies to all Regions and Districts, unless a Region demonstrates to the Chief Forester's satisfaction that moving to a finer level of representation (e.g., site series or surrogate) will lead to no further impact on timber supply vis-à-vis the original analysis for the Code. If an RMZ objective established as a higher-level plan requires a finer level of representation (e.g., site series or surrogate), then the RMZ objective supersedes the Chief Forester's direction. RMZ objectives may also override previous policy on permissible timber supply impact.[74] Note that while the *VILUP HLPO* requires a site series level of representation, it does not define targets by the site series.
- At the Landscape Unit scale, projected THLB impacts are usually the additional amount of late-successional forest needed from the THLB to meet targets, once retention has been maximized in the non-contributing land base. The *VILUP HLPO* Objective 4 may require higher THLB impacts to meet the selection requirements outlined.

Parameters from the *Land Use Objectives Regulation*:

The Order establishing the rare and underrepresented objectives will need to meet tests in Part 2 of the *Land Use Objectives Regulation* of the *Land Act*: "Before making a section 93.4 order establishing or significantly amending a land use objective the minister must be satisfied that:

a) the land use objective or amendment will (i) provide for management and use of forest or range resources in a manner that has not otherwise been provided for under this regulation or another enactment, and (ii) provide for an appropriate balance of social, economic, and environmental benefits, and
b) the importance of the land use objective or amendment outweighs any adverse impact on opportunities for timber harvesting or forage use within or adjacent to the area that will be affected.

Parameters from the *Provincial Non-Spatial Old Growth (PNSOGO)*:

The *PNSOGO* variant targets represent the minimum target for retention in OGMAs. The Nahmint landscape unit has high biodiversity emphasis, which means that this landscape unit would innately have higher THLB impacts than other moderate and low biodiversity emphasis ones. Once a new order establishes old forest objectives over an area, the *PNSOGO* ceases to have effect over that area.

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[72] See LUPG pg. 15. 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/policies-guides/lup_guide.pdf

[73] See LUPG pg. 29. Link in previous footnote.

[74] See LUPG pg. 4. Link in previous footnote.

4   OPTIONS TO ACHIEVE OBJECTIVE 4 IN *VILUP HLPO*

In addition to following the above parameters of landscape unit planning, all suggested options will have the following commonalities:

- All options to meet Objective 4 need to fall within the parameters noted above, particularly the focus to first draw on the non-contributing landbase to meet the retention goals, and then to use areas that contribute to the THLB. All options are to meet one or more of the definitions of 'emphasis' described above (see comparison table for which definitions are met).

- All options will include a basement target for 'common ecosystems' (site series not in the rare and underrepresented category) to ensure that the approach to emphasis for rare and underrepresented does not result in overly low representation of all common site series. The basement target is set at 13%, with the rationale being that this is the lowest *PNSOGO* variant-level target for a high biodiversity emphasis landscape unit for BEC zones that exist in the Nahmint landscape unit.

- The implementation of any option should include the ability for adaptive management (e.g., to update red- and blue-lists periodically, and adjust changing forestry regimes) and must have an associated tracking system. The tracking system will be needed to track amounts in reserves given future amendments, as well as to track incremental protections from new reserves and from other forestry protection (e.g., occurrences of rare and underrepresented ecosystems in wildlife tree retention areas).

- The scenarios for all options have explored the total amounts of possible retention (ecosystem conservation) under each example but not the configuration to meet spatial reserve design criteria (e.g., size, connectivity). THLB impacts may increase depending on spatial configuration of ecosystems occurrences and other OGMA values. For example, to achieve interior forest condition, an underrepresented ecosystem that occurs on a small scale may require buffering, which may require more of the THLB. It is anticipated that map review and reserve design will also drive the process, as some occurrences of regionally rare and underrepresented ecosystems may be ecologically non-functional 'slivers and small patches, while others may easily be incorporated into reserves (e.g., WHAs, UWRs, riparian reserves).

- Given the definition of emphasis above, several approaches have been suggested through Landscape Unit planning to achieve emphasis. Regardless of the method used (see various Options below), most of the ways to achieve emphasis will be met concurrently. For example, emphasis can be achieved for rare and underrepresented by:
    - i.   (Area of a SS in reserves/ total reserve area) is greater than (area of SS in LU/ total LU area)
    - ii.   (Area of SS in reserves/ area of SS in landscape unit) is greater for R&UR than common
    - iii. (Area of SS in reserves/ area of SS in landscape unit) is greater than the variant target
    Where R&UR= rare and underrepresented, SS=site series, LU= landscape unit.

4.0   OPTION 1

Approach:

Manage to *PNSOGO* variant-level targets as maximum amounts by variant (total areas protected summing to at least the variant-level target). Distribute amounts by site series within a variant by using higher percentages for site series in the "regionally rare and underrepresented" category to provide emphasis. There is flexibility in setting the site series targets if emphasis is achieved. The following is an example of Option 1 using the CWHvm1 variant:

Table B- 7 Option 1 Emphasis Example

BEC variant	Site series	Crown forest land base (ha)	Target (%)	Area to retain (ha)
CWHvm1	00	336	0%	0
	01	2116	13%	275
	02	71	24%	17
	03	1119	24%	268
	04	1371	24%	329
	05	1486	24%	357
	06	522	24%	125
	07	504	24%	121
	08	149	24%	36
	09	114	24%	27
	10	43	24%	10
	14	8	24%	1.89
			Total Area (ha)	1,567 Where the total variant target is 1,604

Table updated December 2022

In the example above, the targets are set to emphasize regionally rare and underrepresented ecosystems as much as possible and in-keeping with the variant budget of 19% (calculated to be 1,604 hectares of Crown Forested Land Based) established through the *PNSOGO*. The following table summarizes the advantages and disadvantages of this approach.

Table B- 8 Advantages and Disadvantages of Option 1

Advantages to this approach	Disadvantages to this approach
➢ Provides flexibility in actual targets set for site series. This allow target setting to be opportunistic based on actual distribution and THLB impacts. ➢ Keeps THLB impacts within the scope of current practices, using the 'ceiling' of the *PNSOGO* for the variant budget ➢ Allows for the ability to set a legally enforceable target by using site series targets in the Land Use Order. Links targets to variant-level targets from the *PNSOGO* and assures that these targets are met at the minimum. The approach may emphasize protection in less productive ecosystems that are considered rare, where, due to their lower productivity, would not regenerate as quickly as more productive sites.	➢ As the percentages to be maintained are increased for site series in the "regionally rare and underrepresented" category, the percentage targets for other ecosystems (non-regionally rare and underrepresented ecosystems) would need to decrease to the basement target, potentially resulting in less protection for these 'common' ecosystems. ➢ This approach does not focus on maintaining a natural proportion of ecosystems, as percentage targets are arbitrary to have the areas sum to the variant-level target under the *PNSOGO*. ➢ This approach may emphasize protection in less productive ecosystems that are considered rare and de-emphasize protection in zonal sites.

Estimated impacts:

- o The THLB impact for this scenario depends on where OGMAs are delineated and is estimated to be as low as 1 hectare and as high as 800 hectares.
- o There are a number of 2012 draft OGMAs that result in an overachievement in site series targets and could be deleted.

4.1 OPTION 2

Approach:

Use concepts from Ecosystem-based Management (EBM) to provide emphasis to rare and underrepresented ecosystems. Site series targets could come from the *Clayoquot Order* (50% of site series associated with blue-listed and 100% of site series associated with red-listed ecological communities) or GBR Order (70% blue-listed, 100% red-listed), with underrepresented using *Clayoquot Order* target for site series with less than 2% representation (50%). The *GBR Order* targets for site series associated with red- and blue-listed ecological communities are preferred as they are more recent and based on broad risk-based threshold research. The percentages would apply to the total amount of that site series in the Nahmint landscape unit but focus on maximizing retention in old forest. The following is an example of Option 2 using the CWHvm1 variant:

Table B- 9 Option 2 Emphasis Example

BEC variant	Site series	Crown forest land base (ha)	Target (%)	Area to retain (ha)
CWHvm1	0	336	0%	0
	01	2116	30%	635
	02	71	50%	35
	03	1119	70%	783
	04	1371	70%	960
	05	1486	70%	1040
	06	522	70%	365
	07	504	70%	353
	08	149	70%	104
	09	114	100%	114
	10	43	70%	30
	14	8	70%	6
			Total area (ha)	4,426 Where variant target is 1,604

Table updated December 2022

In the example above, the targets are straightforward and are not contingent on the *PNSOGO* variant target as a hectare budget. The amount of forest reserved is solely based on the EBM approach and steps outside of the current management regime in the Nahmint Landscape Unit. This approach would include large amounts of old growth recruitment in addition to the primary goal of maintaining existing old. The following table summarizes the advantages and disadvantages of this approach.

Table B- 10 Advantages and Disadvantages of Option 2

Advantages to this approach	Disadvantages to this approach
➢ Would provide a high level of retention to conserve regionally rare and underrepresented ecosystems. ➢ Higher total area maintained in reserves, which may increase habitat for wildlife and species at risk. ➢ Connects current Landscape Unit Planning with the ecosystem-based management approach used in the GBR and demonstrates accountability to the low-risk thresholds.	➢ The THLB impacts would be well beyond current management practices. To reduce short-term impacts, could consider a structure like the *GBR Order* and have reduced short-term targets with the full targets on a longer timeline. ➢ This requirement would drive regionally rare and underrepresented ecosystem representation above other values. Despite increase in total amount protected, values such as configuration, patch size, and opportunities to overlap with other values may be reduced. ➢ This may result in numerous small and non-contiguous protected areas. ➢ In the short term this approach would likely reduce the number of reserves with old forest (as the priority would be recruitment to achieve high representation targets).

Estimated impacts:

o The timber supply impacts are estimated to be between 2000-3100 hectares depending on where the OGMAs are established.

o This option is outside of the current management regime and would require significant legislative changes, an AAC reduction and possible compensation to licensees.

4.2   OPTION 3

Approach:

Maintain site series in reserves at least to the associated variant level targets under the *PNSOGO*, but with no maximum amount or ceiling. Focus on maximizing the amount of retention of regionally rare and underrepresented ecosystems in old forest, taking opportunities to recruit areas of old forest where other values exist. There is flexibility in setting the site series targets if emphasis is achieved. The following is an example of what Option 3 could look like. Note that this example is quite arbitrary and truly any target % that shows emphasis could apply.

Table B- 11 Example of Option 3

BEC variant	Site series	Crown forest land base (ha)	Target (%)	Area to retain (ha)
CWHvm1	0	336	0%	0
	1	2116	13%	275
	2	71	15%	11
	3	1119	20%	224
	4	1371	20%	274
	5	1486	30%	446
	6	522	30%	156
	7	504	30%	151
	8	149	50%	75
	9	114	36%	41
	10	43	37%	16
	14	8	25%	2
			Total retained (ha)	1,671 where variant target is 1,604

Table updated December 2022

The example above shows that with this approach to emphasis that concentrates more on values than on explicit target percentages, that although all site series will be emphasized, some will be emphasized more than others, which is dependent on the presence of other values and the ability to optimize the OGMAs as best as possible (i.e., the largest size with the most values and the least THLB impact). This approach emphasizes regionally rare and underrepresented ecosystems but also considers other values as high priority. The following table summarizes the advantages and disadvantages of this approach:

Table B- 12 Advantages and Disadvantages of Option 3

Advantages to this approach	Disadvantages to this approach
➢ Allows for flexibility to retain a higher amount of one ecosystem where opportunities are available and less of another where THLB impacts would be higher. ➢ Likely to increase the total amount of regionally rare and underrepresented ecosystems in old forest currently in reserves. The areas are maximized because reserve design can be flexible and take opportunities where there are high areas of a given site series in the non-contributing land base. These stands have the highest likelihood of containing regionally rare ecosystems and provide a range of other values (e.g., marbled murrelet habitat). ➢ Potentially will increase OGMA reserve area, without further impacting the THLB. ➢ Allows for balancing all reserve design values (wildlife habitat, patch size, connectivity, etc.), allowing for more meaningful reserves ➢ Scenario analysis indicates that using this approach will result in a level of protection for all site series in the "regionally rare and underrepresented" category, but to varying degrees.	➢ May not appear to provide transparency and accountability and may not gain public confidence, as no targets are specified. This could be mitigated by providing substantial detail on all other values that are incorporated into OGMA selection to rationalize size and configuration. ➢ May end up with low representation of 'common' ecosystems to the basement target. ➢ Likely to overachieve variant-level targets for most site series but would overachieve in low productivity ecosystems to a greater extent (e.g., MH), which could invoke criticism of focusing protection on these ecosystems.

Estimated impacts:

  o The THLB impact of this scenario is generally unknown because the OGMA delineation would focus primarily on values and emphasizing ecosystems as much as possible where it is easier to do so (in the non-contributing).

4.3   COMPARISON OF OPTIONS

The following table compares the 3 emphasis options based on several functional factors:

Table B- 13 Comparison of all Emphasis Options

Factor	Option 1	Option 2	Option 3
Overall strategy	*PNSOG variant target as ceiling, R&UR targets higher than common*	*Ecosystem-based management targets for R&UR*	*PNSOG variant target as basement, R&UR targets higher than common, maximize opportunistically*
Within LUP parameters?	Yes	No	Yes
Provides emphasis?	Yes (i, ii) and likely (iii)	Yes (i, ii, iii)	Yes (i, ii) and likely (iii)
THLB impacts	Small to large depending on ultimate OGMA configuration	Large increase	Small to large depending on ultimate OGMA configuration
Option for legal site series target?	Yes, systematic but arbitrary	Yes, based on EBM	Yes, quantitatively arbitrary, but more holistic
Linked to other planning?	Yes	Yes	Yes
Ability to balance other values	Flexibility in location of reserves, but total amount not to increase from current	Location of reserves driven by site series, but total amount highest	Flexibility in both location and number of reserves, allowing for consideration of many values
Total area protected	Same as current	Increase	Same as current with potential to increase
Protection of currently old forest	Likely same as current	Likely higher than current but also focus on recruitment to reach targets	Likely higher than current as this is main principle of approach
Ceiling target for total amount maintained in reserves?	Yes – total to add up to *PNSOGO*	No – but unlikely to achieve more than targets as these are high	No – total to add to approx. *PNSOGO* but ability to overachieve
Basement target when determining individual R+UR site series?	Yes – R+UR to be more than common, so at least 14%	Yes – site series targets set (50%, 70%, 100%)	Yes – R+UR to be more than common, so at least 14%
Basement target for individual common site series?	Yes – 13%	Yes – 13%	Yes – 13%

4.4   PREFERRED OPTION

Approach: Combine Options 1 and 3.

Rationale: Option 1 has a quantifiable baseline that shows transparency. There will be definitive targets established using this method, and it is also in consideration of the *PNSOGO* variant target, which has historically been used as the budget for OGMA delineation. Option 3 describes a holistic process where other values are considered to a similar degree as regionally rare and underrepresented ecosystems and allows the option to be opportunistic and create larger OGMAs that encompass multiple values and likely results in more areas reserved than the *PNSOGO* target.

Option 2 was not chosen because currently it delves outside of the current legislative regime and is out of scope for Nahmint landscape planning. Nevertheless, it was important to show the EBM approach as a means of comparison and to recognize this approach as a possible long-term goal, and that where feasible to do so, increase protection to slowly meet these targets over time.

5   IMPLEMENTATION METHODOLOGY

5.0   SHORT TERM

Retain site series in the regionally rare and underrepresented categories through OGMA design and placement, as part of the Nahmint Landscape Unit Planning process.

1. Focus OGMA design on areas that are currently age class 9, which contain site series that are in the regionally rare and underrepresented ecosystem category.
2. While following 1 above, maintain as much as possible in the non-contributing:
   - By aligning final OGMA design with current draft OGMAs as much as possible
   - Without leaving arbitrary slivers of land
   - Ground-truthing where necessary to ensure that rare ecosystems are truly being preserved.
3. Maintain age classes 5-8 (emphasis on oldest available) of site series in the regionally rare and underrepresented category where other important values like MAMU habitat and connectivity are enhanced. This will also serve as recruitment to late-successional forest, where red- and blue-listed ecological communities are more likely to occur.
4. Ensure that the Order under Section 93.4 of the *Land Act* (needed to establish OGMAs) captures the importance of managing for site series in the regionally rare and underrepresented categories, so that retention can be maintained and tracked in the case of future amendments.

5.1 LONG TERM OPPORTUNITY

Opportunistically increase retention of site series of regionally rare and underrepresented ecosystems or actual field verified occurrences of red- and blue-listed ecological communities.

1. Develop a system, in conjunction with BC Timber Sales and any other licensees in the Nahmint landscape unit, to track and record:
   a. Incremental protection of site series in the regionally rare and underrepresented category that are retained through other reserves, such as in Wildlife Habitat Areas and Wildlife Tree Retention Areas.
   b. Field-verified occurrences of red- and blue-listed plant communities, and whether incorporated into reserves. Rely on Standard Operating Procedure of main forestry operator in Nahmint landscape unit, BC Timber Sales, which advises retention strategies when encountering occurrences of red- and blue-listed ecological communities.
   c. Total areas of site series in the regionally rare and underrepresented category and of actual ecological community occurrences that are in retention areas in the Nahmint landscape unit to measure against the long-term goal.

APPENDIX

C : OGMA SUMMARIES

Contents

List of Tables

1   INTRODUCTION

The Nahmint Landscape Unit Plan included several field visits to a diverse cross section of proposed OGMAs. Several flights of the entire landscape unit occurred to get an overview of all Nahmint OGMAs and to focus on those that were not visited in the field. In the field, general observations were recorded that included notes on the ecology, wildlife features, cultural heritage resource values, and the presence of legacy or specified trees. Many photos were taken from aerial and on the ground views of OGMAs. This appendix summarizes the delineated OGMAs in the Nahmint Landscape Unit and notes the key values that are included in the OGMAs. A selection of OGMAs that were photographed are included with short descriptions.

Table C- 1 OGMA Summaries

| OGMA Name	Area (ha)	Primary Reason for Establishing OGMA	Interior Forest Condition	MAMU suitable habitat present?	Regionally rare or underrepresented ecosystem present?	Contains mapped big trees?	Connectivity characteristics
NAN_nah_001	3,770	includes slide track complexes, valley bottom to high elevation ridgetop ecosystems, lake, and stream RMZs, MAMU habitat, rare ecosystems, big trees	mostly high	yes	yes	yes	cross-elevational, upland-upland
NAN_nah_002	30	lower to upper slope, rare ecosystems	low	no	yes	no	
NAN_nah_003	9	valley bottom, MAMU habitat, rare ecosystems	none	yes	yes	no	riparian
NAN_nah_004	6	rare ecosystems	low to moderate	no	yes	no	
NAN_nah_005	5	rare ecosystems	low	no	yes	no	wetland-wetland
NAN_nah_006	139	lower to upper slope, mamu habitat, large OG Fdc, old fire break, rare ecosystems	high	yes	yes	yes	cross-elevational
NAN_nah_007	814	lower elevation to ridge top, includes slide track complexes, wetlands, mamu habitat, rare ecosystems, big trees	mod to high and low along riparian connectors	yes	yes	yes	upland-upland, cross-elevational, upland-stream
NAN_nah_008	9	valley bottom, mamu habitat, rare ecosystems	low	yes	yes	yes	riparian
NAN nah 009	547	valley bottom to upper slope, lake, and river RMZs, wetlands, MAMU habitat, rare ecosystems, big trees	mostly high, lower along Gracie Lake	yes	yes	yes	cross-elevational, riparian flat, wetlands
NAN_nah_010	5	valley bottom, mamu habitat, rare ecosystems	low	yes	yes	no	

OGMA Name	Area (ha)	Primary Reason for Establishing OGMA	Interior Forest Condition	MAMU suitable habitat present?	Regionally rare or underrepresented ecosystem present?	Contains mapped big trees?	Connectivity characteristics
NAN_nah_011	45	mid-slope, wetlands, rare ecosystems	low	no	yes	no	upland to upland
NAN_nah_012	3	rare ecosystems	low	no	yes	no	
NAN_nah_013	6	MAMU habitat, rare ecosystems, big trees	low	yes	yes	yes	
NAN_nah_014	39	valley bottom, RMZ, MAMU habitat, rare ecosystems, big trees	high	yes	yes	yes	riparian
NAN nah 015	808	Valley bottom to ridge top, Nahmint Lake RMZ, some stream RMZ, MAMU habitat, rare ecosystems, big trees	high in north and south, low along lake	yes	yes	yes	cross-elevational, riparian, upland-upland
NAN_nah_016	13	Nahmint Lake RMZ, valley bottom, Nahmint Recreation Site, MAMU habitat, rare ecosystem, big trees	low	yes	yes	yes	
NAN_nah_017	8	lower to mid slope, rare ecosystems	low	no	yes	no	
NAN_nah_018	20	high elevation to ridge top, rare ecosystems	low	no	yes	no	
NAN_nah_019	45	upper slope to ridge top, Mt. Anderson trail, rare ecosystem	none	no	yes	no	
NAN_nah_020	147	higher elevation to ridge top with steep gullies, rare ecosystems	moderate	no	yes	no	cross-elevational, upland-upland
NAN_nah_021	15	lower slope to mid-elevations, RMZ, some mamu habitat, rare ecosystems	low	yes	yes	no	
NAN_nah_022	3	Nahmint Lake RMZ, rare ecosystems	low	no	yes	no	

OGMA Name	Area (ha)	Primary Reason for Establishing OGMA	Interior Forest Condition	MAMU suitable habitat present?	Regionally rare or underrepresented ecosystem present?	Contains mapped big trees?	Connectivity characteristics
NAN_nah_023	5	Nahmint Lake RMZ, rare ecosystems	low	no	no	no	
NAN_nah_024	234	low to upper elevation ridge top, mamu and other wildlife habitat, rare ecosystems	mostly high	yes	yes	no	cross-elevational
NAN_nah_025	31	Nahmint Lake RMZ, some stream RMZ, MAMU habitat, rare ecosystems, big trees	low	yes	yes	yes	riparian
NAN_nah_026	9	mid-slope, rare ecosystems	low to moderate	no	yes	no	
NAN_nah_027	25	Nahmint Lake and River RMZ, MAMU habitat, rare ecosystems	low	yes	yes	no	riparian
NAN_nah_028	27	mid-slope, rare ecosystems	low to moderate	no	yes	no	riparian
NAN_nah_029	64	mid-slope, rare ecosystems	moderate	no	yes	no	cross-elevational
NAN_nah_030	116	upper mid slope, steep gullies, deer UWR	high	yes	yes	no	cross-elevational, upland-upland
NAN_nah_031	48	mid to upper slope, stream, and wetland RMZ, some MAMU habitat, rare ecosystems, big trees	low	very little	yes	yes	wetland-wetland, riparian, cross-elevational
NAN_nah_032	14	mid-slope, rare ecosystems	none	no	yes	no	
NAN_nah_033	35	high elevation to ridge, some RMZ and wetlands, rare ecosystems	low	no	yes	no	upland-upland
NAN_nah_034	28	upper slope, rare ecosystems	low	no	yes	no	
NAN_nah_035	77	upper slopes, steep gully, rare ecosystems	moderate	no	yes	no	cross-elevational

OGMA Name	Area (ha)	Primary Reason for Establishing OGMA	Interior Forest Condition	MAMU suitable habitat present?	Regionally rare or underrepresented ecosystem present?	Contains mapped big trees?	Connectivity characteristics
NAN_nah_036	366	mid to upper slope and ridge, includes slide track complexes, gullies, stream, and wetland RMZ, MAMU habitat, rare ecosystems	high	yes	yes	no	cross-elevational, upland-upland
NAN_nah_037	7	mid slope, rare ecosystems	low	no	yes	no	
NAN_nah_038	9	mid-slope, rare ecosystems	none	no	yes	no	
NAN_nah_039	35	upper slope to ridge top, MAMU habitat, rare ecosystems	low	yes	yes	no	upland-upland
NAN_Nah_040	7	low elevation, ocean side, rare ecosystems	none	no	yes	no	

NAN_NAH_001: This OGMA is the largest in the Nahmint LU and is over 3400 ha when including water and rock. This OGMAs spans from low elevation to the landscape unit edge at the height of land. Its values are numerous and include wildlife habitat for marbled murrelet, ungulates and bears, and recreation values including the Klitsa Trail and routes to Jack's Peak and Nahmint Mountain. It includes retention visual quality objectives, regionally rare and underrepresented ecosystems, excellent interior forest condition throughout the majority of the OGMA, and abundant connectivity. Known legacy trees also exist throughout this

Overview of NAN_NAH_001

OGMA. First Nation use areas are included here as well. Although water, rock and non-productive forest are included in the OGMA, they do not contribute to meeting overall legal OGMA targets.
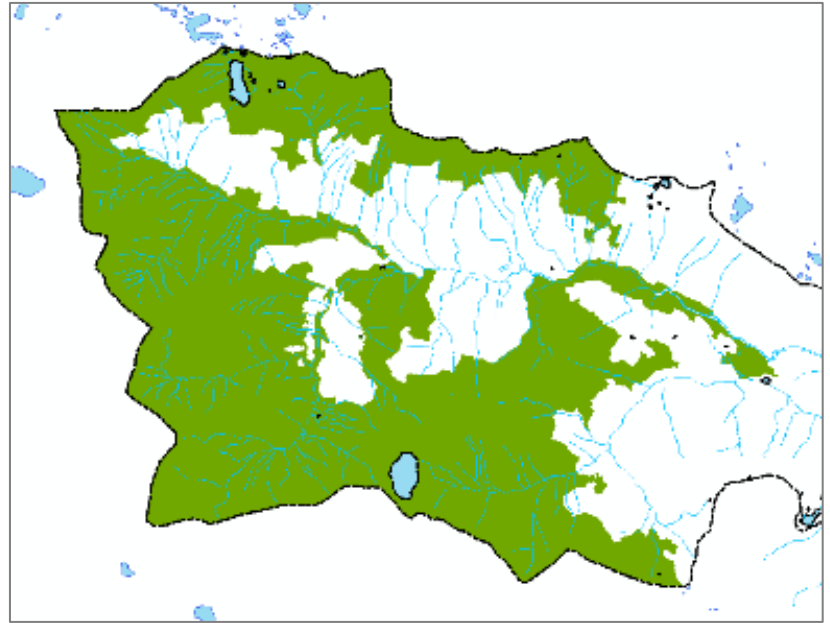
Photo 1 Taken from 5040 Peak, the back end of the Nahmint Valley's north aspect. The forested area seen below the ridgeline and Nahmint Mountain (the peak) is primarily OGMA.

This vast OGMA includes all the major ecological variants in Nahmint: CWHvm1, CWHvm2 and MHmm1. North, East and South-facing aspects are represented in this OGMA, as well as flat riparian sections along the Nahmint River.
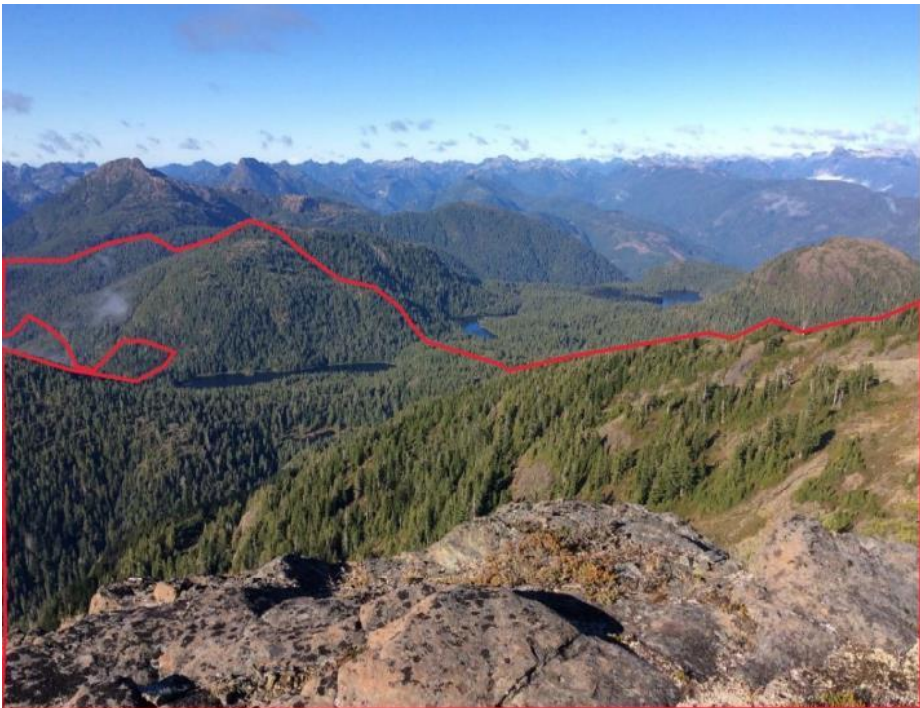
Photo 2 Taken from east of Beverley Lake, the MHmm1 emerges from the non-forested mountain peak. This is an example of an area that is included in OGMAs for its connectivity and recreational values but does not contribute to the overall legal OGMA targets for forested ecosystems.

View of a portion of OGMA NAN_nah_001 in the northwest part of the landscape unit. The OGMA extends right to the landscape unit boundary. Note that there are OGMAs in the adjacent landscape unit managed by the Alberni Valley Community Forest, that directly connect to this area.

Photo 3 Northwest section of OGMA wrapping around Richard's Lake and extending to the peak of Mt. Klitsa, where photo is taken.

NAN_NAH_001 NORTHWEST SECTION: This diverse high-elevation section includes wetlands, lakes, larger yellow cedar, amabilis fir and mountain hemlock, and shorter and rockier open canopies with less productive, and therefore, smaller diameter hemlock, amabilis fir and yellow cedar. This area includes portions of an old trail location, possibly once part of the Gibson-Klitsa trail.

Photo 4 BaHmYc with some larger yellow cedar. Understory herbaceous species consists of vaccinium and five leaf foam flower.

Photo 6 Larger yellow cedar is apparent throughout this section.

Photo 5 Richard Lake taken from the North side along an old trail. The perimeter of the lake is forested with BaHmYc.

Photo 7 Large hemlock approximately 200 cm DBH

NAN_NAH_001 LOW-ELEVATION RIPARIAN: This section is located below Nahmint Mainline and occurs in a riparian influenced, floodplain ecosystem along the Nahmint River. There is evidence of elk use, heavy brush, and presence of large Fdc and Cw.

Photo 8 Floodplain ecosystem by Nahmint River. High brush including lots of salmonberry. Lots of browse evidence and elk rubbing.

Photo 10 Legacy Douglas-fir, 229cm DBH

Photo 9 Two western redcedar self-grafted. Total DBH measured at 481cm.

Photo 11 Slug hanging out on western redcedar.

NAN_NAH_001 LOW-ELEVATION SECTION:

This section is located along Beverley Mainline. Overall, the forest is poorer quality timber but still important for its value to biodiversity and wildlife habitat. There are many dead trees and small diameter trees (less than 100cm DBH). This was observed to be mostly a zonal site, a commonly occurring ecosystem.

Photo 13 This area has a gradual slope with a few gullied sections throughout

Photo 12 Understory species include: blueberry, false azalea, some sword fern, foam flower, vanilla leaf, twisted stalk, step moss, deer fern, bunchberry, lanky moss, five leaved bramble

Photo 14 Hw60Ba40, zonal site but fewer species in the understory

NAN_NAH_004 AND NAN_NAH_005: These are high-elevation OGMAs located in the CWHvm2 variant. These small OGMAs were chosen for distribution, and for their riparian influence that will contribute to the overall targets for ecosystem representation with emphasis on rare site series.

Photo 15 NAN_nah_004: There is permanent standing water located in this OGMA and likely wetter receiving sites.

Photo 16 NAN_nah_015

NAN_NAH_006: This large, steep OGMA overlaps a legally established UWR and WHA. It contains large old growth Douglas-fir throughout with scattered legacy-size trees. There is a variety of site series represented in this site due to topography and riparian influence. This OGMA has historical significance as an important fire break.

Photo 19 Legacy Douglas-fir 207cm DBH.

Photo 17 Representation of the typical steeply sloped FdcHw stand in this area.

Photo 18 Douglas-fir leading stand with understory layer including sword fern, vanilla leaf, dull Oregon grape.

Photo 20 Brushier section of fir-dominated forest.

NAN_NAH_007: This is a large mid to high elevation OGMA with some connectivity to lower elevation riparian areas. This OGMA spans many ecosystems found in CWHvm1, vm2 and MHmm1 variants. This OGMA includes some class 3 marbled murrelet habitat and has good interior forest condition.

Photo 21 Mid to high elevation portion of OGMA.

Photo 22 Cross elevational connectivity along riparian sections.

NAN_NAH_007 SOUTHEASTERN SECTION: This southeastern portion of the OGMA encompasses a steep riparian area. The terrestrial ecosystem mapping estimates that this area as 100% (04) but on the ground (01) dominant with patches of (03) was observed. Western redcedar and yellow cedar are present in this OGMA but are not of great form or quality.

Photo 23 Hemlock and cedar with very brushy understory that was present throughout the field-verified sections of this OGMA.

Photo 25 Western redcedar with brushy understory.

Photo 24 Small yellow cedar component.

Photo 26 Gaps in the canopy created by broken or otherwise dead or dying cedar.

NAN_NAH_008: This OGMA is located along Nahmint River. This is a valley bottom with numerous legacy sized Douglas-fir and western redcedar.

Photo 28 Legacy Tree 080-006 227cm DBH.

Photo 29 Patch of larger trees. Some Douglas-fir are 175-200cm DBH. There is large Cw as well but not legacy size. This is a richer ecosystem.

Photo 27 Legacy Douglas-fir 080-004 275cm DBH. This is also a specified tree under the Special Tree Protection Regulation.

NAN_NAH_009: This is a large OGMA located on the south-facing slopes of the Nahmint Valley and in a central part of the LU. It spans from the Nahmint River to the height of land. This OGMA primarily consists of large Douglas-fir forests, a known occurrence of a rare ecosystem, wildlife habitat including suitable habitat for marbled murrelet and ungulate winter range. This OGMA contains many known legacy trees. It also includes First Nation use areas.

Photo 30 View of south facing slopes of the OGMA, east of the cutblock. The VRI data suggests that some of this area is age class 8.

Photo 31 View of part of the OGMA from Nahmint Lake.

NAN_NAH_009 REGIONALLY RARE ECOSYSTEM: On the south-facing slopes of central Nahmint, a known occurrence of a regionally rare ecosystem was located. This occurrence in entirely captured within the OGMA boundaries. It occurs here in the CWHvm1(04) and CWHvm2(04) site series. This site is Douglas-fir-leading with an understory dominated by sword fern and dull Oregon-grape and sometimes sparser with a lack of understory species. This site series generally lacks salal, deer fern and false azalea, which differentiates it from similar site series.

Photo 32 Rich, rocky soils indicative of the ecosystem.

Photo 33 CWHvm2(04) Sparse understory in sections.

Photo 34 Large Douglas-fir in overstory, sword fern, dull Oregon grape and some vaccinium in understory on mid-slope

NAH_NAH_009 GRACIE LAKE AND ENVIRONS: This area is located above Gracie Lake and continues northwest into high elevation. This area contributes to suitable marbled murrelet habitat targets and connectivity. Known legacy trees exist in this area.

Photo 35 OGMA shown around the south and west edges of Gracie Lake.

Photo 37 Large Douglas-fir in colluvial area with large boulders and rocky soils.

Photo 36 Large legacy Douglas-fir.

Photo 38 Steep section of OGMA with eastern aspect. This area is mapped as CWHvm2(01)(03), a zonal site with drier sections.

NAN_NAH_009
SOUTH FACING
SLOPES: This steep
OGMA section
overlaps a legal UWR.
It is a large contiguous
section that contains
several large Douglas-
fir, and larger western
redcedar located on
flatter benches, zonal
site series with both
richer sections as well
as drier 03 and 02
pockets.

Photo 39 Cedar and big leaf maple apparent in the overstory.

Photo 40 Example of dry rich 04 site series pocket.

Photo 41 Large Douglas-fir, 175cm DBH.

NAN_NAH_009 ALONG THE NORTH SIDE OF NAHMINT RIVER: This OGMA is located along Nahmint River. This area includes a deciduous component with big leaf maple occurring closest to the river. There are both legacy size Douglas-fir and western redcedar located here.

Photo 43 Legacy Douglas-fir 226cm DBH.

Photo 42 Legacy western redcedar 308cm DBH.

Photo 44 FdcCw forest type.

This OGMA is an isolated patch of old forest, surrounded by cutblocks. It is primarily a common site dominated by hemlock, yellow cedar, and balsam. There are some wet areas with standing water as well as drier rockier spots where pine is evident.

Photo 45 Hemlock balsam and yellow cedar dominated stand. Yellow cedar averages 20-25 cm and western hemlock 15-60cm with an understory of primarily vaccinium.

Photo 46 View of a larger hemlock in this OGMA.

Photo 47 Photo showing amabilis fir and yellow cedar component.

NAN_NAH_014: This OGMA is located adjacent to the Nahmint River on its northeast side and west of Nahmint mainline. This OGMA ranges from zonal ecosystem with drier patches to riverside floodplain site series.
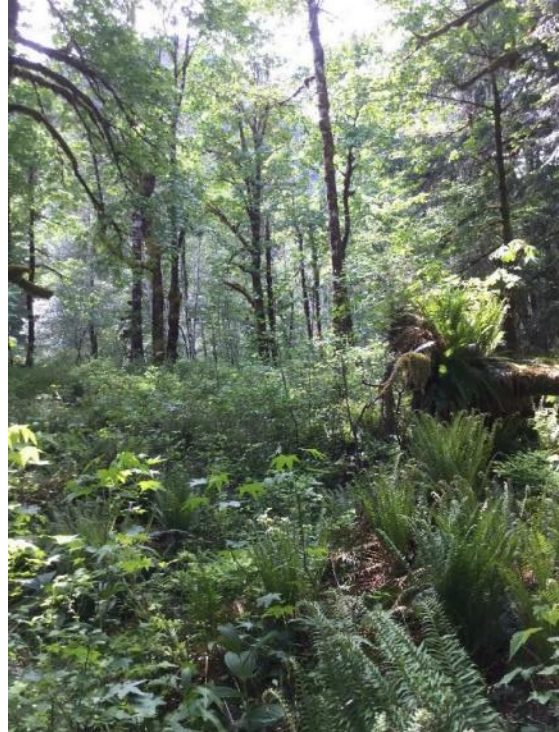

Photo 49 Big leaf maple, cottonwood, amabilis fir, western redcedar, Douglas-fir with an understory full of sword fern, salmonberry, vanilla leaf and hellebore.

Photo 48 Legacy Douglas-fir 260cm DBH.

Photo 50 Drier sections occur throughout the OGMA in small patches.

NAN_NAH_015: This is a large OGMA that follows a section of the Nahmint River, along the west side of Nahmint Lake and connects to a large area with excellent interior forest condition that extends up to the height of land. This OGMA includes lakeside riparian ecosystems, including rare floodplain ecosystems, and many hectares of suitable marbled murrelet habitat.

Photo 51 This area overlaps a WHA that was legally established in 2015. This is the most southern end of OGMA NAN-Nah-015. This OGMA section is important not only for its wildlife habitat but also for ecosystem representation as well as its excellent interior forest condition.

Photo 52 Part of the OGMA shown along the lake as well as connecting to higher elevations via a riparian corridor.

NAN_NAH_015 NAHMINT RIVERSIDE: This section is located along Riverside Mainline and the Nahmint River. The areas closest to the river are floodplain ecosystems with CWHvm1(09) and CWHvm1(10) present. There are many exceptionally large Cw, Ss and Fdc within this area, some meeting the *Special Tree Protection Regulation* specifications.

Photo 55 Large Sitka spruce. This is the only known area in Nahmint with Sitka spruce.

Photo 53 Legacy western redcedar 327cm DBH.

Photo 56 Well-developed herbaceous layer including sword fern, deer fern and three-leaved foamflower.

Photo 54 Typical western redcedar component of this area. Generally flat with copious sword fern and a lot of coarse woody debris.

NAN_NAH_015 BLACKIE'S BEACH AREA: This part of NAN_nah_015 overlaps Blackie's Beach Recreation Site. This OGMA section serves an important part of the connectivity along the lake. It contains class 3 marbled murrelet habitat and includes cedar leading sites.

Photo 57 62cm DBH yew tree on the side of trail.

Photo 59 OGMA seen from Blackie's Beach.

Photo 58 Western redcedar leading and lots of blowdown creating natural canopy gaps, which occur naturally in old growth.

Photo 60 CwFdcHw, salal, vaccinium, deer fern as main understory species.

NAN_NAH_015 MARBLED MURRELET HABITAT: This area is a large tract of class 3 marbled murrelet habitat and will also serve as a legal wildlife habitat area. This area has excellent interior forest condition and good connectivity. Field-verified species composition includes HwBa with diameters ranging from 10-80cm DBH as well as pockets of BaFdcCwHw with some largest Fdc and Cw. Much of this area is currently difficult to access.

Photo 61 This photo shows that this large OGMA ranges in elevation and like likely to contain a spectrum of ecosystems from dry to wet.

Photo 63 Legacy Douglas-fir DBH estimate of 210cm. Has a broken top.

Photo 62 Western hemlock and amabilis fir stand in a zonal ecosystem.

NAN_NAH_016: This OGMA is located within the Nahmint Recreation Site. This recreation site includes campsites and has boat access. Much of the site is dominated by zonal and drier ecosystems. The OGMA contains some marbled murrelet suitable habitat.

Photo 64 FdcHw in the overstory and western hemlock, western redcedar, vaccinium, sword fern, salal and vanilla leaf in the understory. Large old growth Douglas-fir with an average DBH of 70-120cm and high volume.

Photo 65 Legacy Douglas-fir 213cm DBH.

Photo 66 Dull Oregon grape in patches in the understory.

NAN_NAH_019: This is a high elevation OGMA located in the MHmm1 ecosystem variant. This OGMA was chosen mainly for its recreational value as Mt. Anderson, then OGMA distribution and ecosystem. This OGMA extends to the height of land, which is also the landscape unit boundary. This OGMA will contribute in part to ecosystem targets but some of it is not productive enough to contribute. These parts of the OGMA are for recreational value.

Photo 67 View of OGMA NAN-nah-019, also the peak of Mt. Anderson. This area includes portions of the trail to this mountain top. The TEM suggested that the forested areas are CWHvm2(03).

NAN_NAH_020: This is a large OGMA that is over 100ha in size. It spans across CWHvm1, vm2 and MHmm1 ecosystem variants. Terrestrial ecosystem mapping indicates that this area may contain rare ecosystems, and this is one of many OGMAs that serve to achieve ecosystem representation including emphasis of rare ecosystems.

Photo 68 Aerial view of a section of OGMA 21. This OGMA was not visited in the field but the general structure of this stand is apparent from this view. This area is high elevation with old forest. There are some snags, and some drier, rockier looking sections. TEM data suggest that this is MHmm1(02) dominant, a zonal site series and the only common ecosystem in the MHmm1 occurring in Nahmint.

NAN_NAH_024: This large OGMA is also a wildlife habitat area that was legally established in 2015. This OGMA ranges from age class 5 to old age class 8, to fully protect the wildlife features that exist. This OGMA spans low elevations to the height of land. It is important for connectivity and has good interior forest condition.

Photo 69 Aerial view of the centre of the OGMA showing what is likely drier, more exposed biogeoclimatic units.

Photo 70 Aerial view facing northwest of the OGMA showing where the OGMA partially borders treaty settlement land.

Photo 71 Aerial view of the majority of the OGMA area spanning from low elevation at Nahmint mainline to the height of land. Also pictured is another OGMA located between the mainline and the lake.

NAN_NAH_027: This OGMA is located south of Nahmint Lake and along the east side of Nahmint River and Lake. It varies from flatter terrain to steep with large boulders.

Photo 74 Steep and boulder cedar- leading area and many bear signs.

Photo 72 HwBa stand with some Douglas-fir vets.

Photo 73 Western redcedar-leading in steep area with large boulders.

Photo 75 Cedar.

NAN_NAH_031: This OGMA includes a wetland complex, riparian buffer along Empress Lake and a section along Kanyon Creek.

NAN_NAH_031 KANYON CREEK AREA: This part is located along Kanyon Creek and its tributaries. There is some riparian influence, but it also has quite steeply banked areas. The forest has uneven terrain with a lot of understory vegetation, namely vaccinium. The trees in this area are shorter that most OGMAs in Nahmint.

Photo 76 Maidenhair fern growing close to the creek.

Photo 77 Brushy understory throughout.

Photo 78 Small cascade along creek.

Photo 79 Forest canopy.

NAN_NAH_031 WETLAND COMPLEX: This section is located on the side of Empress Lake in a higher elevation area. Contiguous to this is steeper drier terrain that extends to the height of land which forms the landscape unit boundary. This is a very transitional site and contains most coastal conifer tree species: Hw, Hm, Ba, Cw, Yc, Fdc, and yew. This area does not look like valley-bottom old growth. The trees are shorter here, and that is the nature of the type of ecosystems represented. This area is important for ecosystem representation, its wildlife habitat values as a wetland complex, OGMA distribution and its connectivity to OGMAs located in the adjacent landscape unit.

Photo 81 One of a few small ponds located within the wetland complex. There is a lot of plant life unique to the wetter ecosystems.

Photo 82 View of Empress Lake, located adjacent to the OGMA.

Photo 80 Low volume patch of forest on very wet site dominated by sweet gale, as pictured in the foreground.

Photo 83 Wetland transitioning into a HwBa CWHvm2(01) site with lots of vaccinium and salal. Sporadic Douglas-fir and larger western yew trees in this area. White pine occurring in drier patches.

Photo 84 The largest wetland in this OGMA, full of sweet gale and standing water.

NAN_NAH_033: This OGMA is located on the landscape unit boundary. It is in an area with extensive historical logging so is more of an isolated OGMA. This OGMA is mapped to potentially contain richer and wetter ecosystems. This terrain has a gentle slope and a central receiving area that correlates with the ecosystem mapping.

Photo 85 The entirety of OGMA NAN_nah_033 pictured above.

NAN_NAH_035: Higher elevation OGMA located on the landscape unit boundary.

Photo 86 HwYc with vaccinium, queen's cup, vanilla leaf, deer fern, falsa azalea in the understory. Western hemlock averages 55cm DBH and yellow cedar averages 70cm DBH.

Photo 87: Larger western redcedar, 197 DBH.

Photo 88 Representation of HwBaYc on steeper slopes in zonal site.

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