

Sunshine Coast
Landscape Unit Planning
Powell Lake Landscape Unit Plan



November 25, 2002

Prepared by:

Steve Gordon, R.P.Bio.
Forest Ecosystem Specialist
Ministry of Sustainable
Resource Management
Powell River Office

Steve Waghorn
Resource Information and
Inventory
Ministry of Sustainable
Resource Management
Powell River Office

Weyerhaeuser Company Ltd.
Stillwater Timberlands

Powell Lake Landscape Unit Plan

Table of Contents

Legal Objectives for the Powell Lake Landscape Unit	3
1.0 Introduction	5
2.0 Landscape Unit Objectives	6
3.0 Biodiversity Management Goals and Strategies	8
4.0 Mitigation of Timber Supply Impacts	12
Appendix I: Biodiversity Ranking Process: Ranking Criteria and Criteria Rationale	14
Appendix II: Landscape Unit Ranking and Biodiversity Emphasis Option Assignment	21
Appendix III: Wildlife Tree Retention Report	22
Appendix IV: Significant Ecological Features in the Powell Lake LU	23
Appendix V: Public Consultation Summary	27
Appendix VI: OGMA Summaries	29

Legal Objectives for the Powell Lake Landscape Unit

Pursuant to section 4 of the Forest Practices Code of B.C. Act, the following are Landscape Unit objectives for the Powell Lake Landscape Unit.

Objective 1

Maintain or recruit old growth forest attributes, in old growth management areas, that are established as shown on the attached map dated October 30, 2002. No timber harvesting, including salvage and single-tree harvesting, is to occur within old growth management areas. Road construction is not to occur within old growth management areas unless no other practicable options exist, in which case replacement old growth management areas may be required.

Maintenance, deactivation, removal of danger trees, or brushing and clearing on existing roads within the right-of-way for safety purposes are exempt from this objective.

The Statutory Decision Maker (SDM) may permit removal or falling of trees or road construction within an OGMA for reasons such as but not limited to the following:

- To prevent the spread of insect infestations or diseases that pose a significant threat to forested areas outside of OGMAs. This will be done in a manner that retains as many old growth forest attributes as possible.
- Construction of roads and yarding corridors, if the SDM determines that no other practicable option exists.
- Partial-cut timber harvesting within immature (<100 years old) portions of OGMAs, where it can be demonstrated that harvesting will accelerate development of old growth forest attributes and improve the stand for biodiversity purposes, without compromising other resource values. Harvest entries for the acceleration of old growth attributes are to be limited to recruitment OGMAs in Lower Biodiversity Emphasis Option Landscape Units.

First Nations traditional use of forest resources, treaty negotiations or settlements will not be limited by this objective.

Objective 2

Maintain stand level structural diversity by retaining wildlife tree patches. Cutblocks for which harvesting has been completed by each licensee will maintain adequate amounts of wildlife tree patches to ensure that over any 5 year period, commencing on the date the objectives are established, and across the Biogeoclimatic Ecosystem Classification (BEC) subzone the target percentage as noted in Table A is achieved. In addition:

- No timber harvesting, including salvage or single tree selection, is to occur within established Wildlife Tree Patches.

- Wildlife Tree Patches must include, if present, live or dead veteran trees (excluding danger trees), or remnant old growth patches.
- Wildlife Tree Patches must include larger trees for the stand and any existing moderate to high value wildlife trees (excluding danger trees).

Table A. Wildlife Tree Retention by BEC subzone in the Powell Lake Landscape Unit.

BEC Subzone	Total WTR (%)
CWHdm	10
CWHvm	12
MHmm	8

Note: As WTR is calculated at the subzone level, the CWHvm1 and CHWvm2 variants are combined.

CWHxm: Coastal Western Hemlock biogeoclimatic zone, very dry maritime subzone

CWHdm: Coastal Western Hemlock biogeoclimatic zone, dry maritime subzone

CWHvm: Coastal Western Hemlock biogeoclimatic zone, very wet maritime zone

MHmm: Mountain Hemlock biogeoclimatic zone, moist maritime subzone

WTR = Wildlife Tree Retention

BEC = Biogeoclimatic Ecosystem Classification

Sunshine Coast Forest District Landscape Unit Planning

Powell Lake Landscape Unit Plan

November 25, 2002

1.0 Introduction

The Powell Lake Landscape Unit (LU) lies within the Pacific Ranges Ecoregion, Southern Pacific Ranges ecosection. Lower elevation, productive and gentle-terrain sites have been extensively altered by past forest harvesting, fire and other disturbance factors. Moderate levels of old seral forest representation in low elevation biogeoclimatic zones within the Powell Lake LU reflects this disturbance history. Large amounts of inaccessible or constrained areas enable the Powell Lake LU to meet levels of old growth representation recommended by the Landscape Unit Planning Guide in all biogeoclimatic zones.

The Powell Lake LU contains several forms of land ownership and tenure. The Powell Lake LU is predominantly within Tree Farm License 39, administered by Weyerhaeuser Company Ltd. Small areas of Timber License chart also occur within the Eldred River portion of the Powell Lake LU. Parcels of private land also occur within the LU.

Weyerhaeuser Company Ltd. staff were directly involved through all phases of preparation of the Landscape Unit plan for the TFL 39 portion of the Powell Lake LU.

Situated within easy access of the community of Powell River, the Powell Lake LU supports a variety of outdoor recreation uses including: hiking, canoeing, boating, angling, camping, hunting, motorised recreation, ski touring, backpacking, mountaineering and rock climbing. Part of the Powell River canoe route is located within the Powell Lake LU.

The Powell Lake LU contains a wide range of natural resource values and features including Powell Lake itself, and numerous small stream systems flowing into the lake. The Eldred River, Goat Lake and Goat Island also occur in the LU. Numerous small wetlands, extensive rock bluffs, alpine meadows, avalanche tracks, and lakes of varying sizes also occur in this LU. Ecosystem complexity in the Powell Lake LU is ranked as moderate.

Four species of Identified Wildlife occur within the Powell Lake LU: the marbled murrelet (MAMU), mountain goat, grizzly bear, and the northern goshawk. As outlined in the Identified Wildlife Management Strategy (IWMS) the MAMU is to be managed through the placement of Old Growth Management Areas (OGMAs) within suitable MAMU habitat. This has been done in the Powell Lake LU plan, although limited large contiguous tracts of old growth forest suitable for MAMU nesting habitat remain. Portions of candidate MAMU habitat areas have been included in OGMAs in this LU plan wherever possible and consistent with current policy. Grizzly bears are usually restricted to the more remote portions of the LU, though occasional sightings of grizzlies within other portions of the LU have been reported.

Though many streams in the Powell Lake LU are of low productivity due to high seasonal run off and low levels of instream nutrients, most low gradient stream systems support populations of resident cutthroat trout and Dolly Varden char. Anadromous salmon species do not occur in this LU, though Powell Lake supports a population of kokanee salmon.

Mountain goat winter range habitat has been identified throughout the Powell Lake LU. OGMAs have been placed within areas constrained by this resource value where suitable. OGMAs have also been placed to maximise overlap with other high value wildlife habitats such as riparian areas where appropriate.

The distribution of OGMAs will require periodic review. Wildfires and other natural disturbance may occur within OGMAs with varying effects on their effectiveness in providing biodiversity attributes; each instance will, therefore, have to be considered separately. In some cases, old seral forests may retain significant biodiversity attributes following natural disturbance such as wildfire if high densities of large snags persist. Some specific old seral habitat features may be lost due to natural disturbances, and revision of OGMAs may be required.

2.0 Landscape Unit Objectives

The Powell Lake LU received an “Lower” Biodiversity Emphasis Option (BEO) through the biodiversity value ranking and the BEO assignment processes (see Appendices I, II & IV). Table 1, below, lists the percentages of the LU’s productive forest area per natural disturbance type (NDT) designated for old seral representation as OGMA. The percentages of cutblock area required as Wildlife Tree Patches (WTP) for each of the LU’s biogeoclimatic ecological classification (BEC) units are also listed. The target figures listed in Table 1 are from the Landscape Unit Planning Guide (LUPG), Appendices 2 and 3. Assignment of a “lower” BEO does not imply that wildlife and biodiversity values are low, rather, it is a reflection of these values relative to other areas of the Sunshine Coast.

Note: Objectives apply only to Provincial forest lands within the LU.

TABLE 1: Required Levels for Old Seral Representation and Wildlife Tree Patches.

BEC Unit and NDT	BEC Variant Productive Forest	LUPG Old Seral Representation Target ²		OGMA Objective Provincial Forest ³		WTP Objective ⁴ (% of cutblock area)
		%	Ha	%	Ha	Table A3.1
CWHdm (NDT 2)	10218.3	>9	919.6	9.0	921.3	10
CWHvm1 (NDT 1)	3773.5	>13	490.6	12.7	484.2	12
CWHvm2 (NDT 1)	8437.8	>13	1096.9	13.1	1103.4	12
MHmm1 (NDT 1)*	4737.9	>19	900.2	19.0	901.5	8
Totals	27167.5		3407.3		3410.4	

1 NDT = Natural Disturbance Type. Refer to LUPG, Appendix 2.

2 % of total productive forest area within BEC unit, as per LUPG.

3 % of total productive forest area within BEC unit, as per LUPG, minus contributions from old seral representation within protected areas and Crown forest outside of Provincial forest.

4 WTP Objectives as per the LUPG, Appendix 3. Table A3.1 applies upon the designation of the Landscape Unit and its objectives.

CWHdm: Coastal Western Hemlock biogeoclimatic zone, southern dry maritime subzone

CWHvm1: Coastal Western Hemlock biogeoclimatic zone, submontane very wet maritime variant

CWHvm2: Coastal Western Hemlock biogeoclimatic zone, montane very wet maritime variant

MHmm1: Mountain Hemlock biogeoclimatic zone, windward moist maritime variant.

ATp: Alpine Tundra parkland. No old growth targets apply for this area, however, stands of timber contiguous with the MHmm1 OGMA have been delineated as OGMA.

5 ATp areas have not been included in the OGMA total

OGMA Objectives listed in Table 1 have been met through the delineation of OGMAs throughout the Powell Lake LU. Refer to OGMA map for their location, and to Table 3, below, for a breakdown of OGMA non-contributing (NC), constrained Timber Harvesting Landbase (THLB) and unconstrained THLB components.

TABLE 2: Wildlife Tree Retention (WTR) by Biogeoclimatic Ecosystem Classification Subzone

BEC Subzone	Total WTR (%)
CWHdm	10
CWHvm	12
MHmm1	8

WTP retention targets are calculated at the subzone level, thus the targets for both the CWHvm1 and CWHvm2 variants are the same.

As per the Biodiversity Guidebook, 75% of WTR requirements are assumed to be met through otherwise constrained areas such as riparian reserves.

TABLE 3: Non - Contributing, Constrained THLB and Unconstrained THLB Components of Powell Lake LU OGMAs:

BEC Unit	Total Old Seral Representation ¹	Non – Contributing ² Area in OGMA		Partially Constrained THLB ³ in OGMA		Unconstrained THLB in OGMA ⁴	
	ha	ha	%	ha	%	ha	%
CWHdm	921.3	369.3	40.1	428.5	46.5	123.3	13.4
CWHvm1	484.2	160.6	33.2	225.1	46.5	98.5	20.3
CWHvm2	1103.4	373.9	33.9	553.3	50.1	176.2	16.0
MHmm1	901.5	466.7	51.8	270.5	30.0	164.3	18.2
TOTALS	3410.4	1370.5	40.2	1477.4	43.3	562.3	16.5

1 Total Old Seral Representation from Table 1, above.

2 Non - Contributing Area in OGMA = forest land that does not contribute to the AAC, subject to 100% netdown

3 Constrained THLB in OGMA = Timber Harvesting Land Base that cannot fully contribute to the AAC due to site sensitivity or the need to manage for other resource values Netdown factors used in TFL 39 Management Plan 8 and TSR 2 figures for TSA lands were used for this calculation.

4 Forests contributing to the AAC calculation, otherwise unconstrained

Note: Table 3 is intended to show proportions of OGMA in each contributing class. Exact area totals may vary due to landbase classification system used or decimal rounding.

During OGMA placement, efforts were made to maximise overlap with constrained areas wherever appropriate. No existing proposed or approved cutblocks were affected by OGMA placement.

The establishment of an OGMA will not have an impact on the status of existing mineral and gas permits or tenures. 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; however, if exploration and development proceeds to the point of significantly impacting old growth values, then the OGMA will be moved.

3.0 Biodiversity Management Goals and Strategies

3.1 General Management Goals

Biodiversity management goals and strategies describe, in specific terms, the outcomes that the LU Objectives are to achieve. They also describe the rationale for the selection of OGMAs, some of the ecological features that OGMAs are to include, and some of the compromises made to balance the management of all values present in the LU. While Objectives are legally binding, management goals and strategies are not. The biodiversity ranking process identified many significant biodiversity values within the Powell Lake LU that must be managed for. The delineation of OGMAs cannot be undertaken without recognition of these significant values because OGMA delineation is the most effective provision of the Forest Practices Code (FPC) LU planning initiative for managing biodiversity. Refer to Appendix IV for detailed description of Powell Lake LU values considered in the LU planning process.

The development of biodiversity management goals and strategies is important not only for the conservation of biodiversity, but also to allow the development of strategies to mitigate short and long-term LU planning impacts on timber supply. For example, OGMA delineation was not guided strictly by age class or AAC contributions, as this approach could result in the inclusion of stands of marginal biodiversity value and significant timber supply impact within OGMAs. Individual forested polygons were assessed according to their specific attributes during the OGMA delineation process.

Efforts were made to include forested stands adjacent to high value wildlife habitats such as black/grizzly bear foraging areas within OGMAs wherever possible to maximise overlap between old growth representation and specific wildlife habitat requirements. Areas previously identified as Environmentally Sensitive Areas for wildlife were included in OGMAs where they provided mature or old forest representation or included under-represented ecosystem types. As a result, some forest stands not classified as “old growth” have been included in OGMAs to reflect operational constraints related to wildlife management.

The maintenance of marbled murrelet nesting habitat within the Powell Lake LU is also of concern. As per the guidance of the LUPG, OGMAs were established first in areas considered as “non-contributing” forest in the current Timber Supply Review. Limited amounts of suitable MAMU nesting habitat were captured in OGMAs in the Powell Lake LU due to the lack of large tracts of old growth available. During OGMA delineation, efforts were made to include as much of the candidate MAMU habitat in OGMA as possible, though harvesting activity within or adjacent to these areas has reduced total patch size and may reduce marbled murrelet nesting

habitat suitability. Further research will be required to determine if MAMU habitat requirements have been adequately addressed through the OGMA delineation process. OGMA revisions may be required if further analysis indicates MAMU nesting activity does not significantly overlap OGMA, to both mitigate timber supply impacts and maximise the efficacy of OGMA for protection of MAMU habitat.

Mountain goats occur in small herds in portions of the Powell Lake LU. Where suitable old growth stands exist within Ungulate Winter Range (UWR) habitats, these were included in OGMA to maximise overlap between OGMA delineation and specific wildlife habitat requirements. Due to the fact that UWR habitats are typically rocky, southerly aspect sites, not all old growth stands within UWR areas have been included to ensure biodiversity representation was not concentrated in a particular stand type.

Efforts were made during preparation of this LU plan to ensure OGMA were distributed throughout the LU and not concentrated in a particular drainage or mapsheet. This is in keeping with the “coarse filter” approach of biodiversity management whereby representative old growth stands are protected in order to maintain ecosystem processes and specific wildlife habitat requirements, which may be poorly understood.

In all cases, detailed air photo review was performed to confirm the forest cover attributes and suitability of a given stand for OGMA inclusion. Numerous stands have also been field checked to verify the presence of desirable old seral characteristics.

3.2.1 CWHdm Biodiversity Management Goals

1. Maintain old seral representation, to the CWHdm objective of 9.0 %, or 921.3 ha within Provincial forest through delineation of old growth management areas (OGMA) as per the attached maps. No harvesting activities, including salvage or single-tree harvesting, are to occur within OGMA.
2. Maintain areas that are representative of natural CWHdm ecosystem patterns and ecosystem mosaics.
3. Include rare or unique stands (such as Ss leading or pure Fd stands) within OGMA wherever possible.
4. Place OGMA where site location and topographic features provide the highest value wildlife habitat and biodiversity value such as the confluence’s of creek systems and adjacent to slide tracks, wetlands or other features where compatible with old growth representation issues.
5. Include mature ESAs for wildlife within OGMA where compatible with biodiversity objectives.

3.2.2 CWHdm Biodiversity Management Strategies

- A. Delineate OGMA to include existing stands of old growth or particularly high biodiversity value mature stands that will provide old growth characteristics in as short a time frame as possible. (Goals 1, 2)

- B. Include unique and constrained areas within OGMA. (Goals 1, 2, 3)
- C. Retain veterans within harvesting areas (Fd as well as Cw, Hw) to levels typical of densities found following natural disturbances as a focus of stand level biodiversity management (Goal 2)

3.3.1 CWHvm1 Biodiversity Management Goals

1. Meet the objective of 12.7% or 484.2 ha old growth retention in Provincial forest through delineation of OGMAs in existing old growth stands as shown on the attached map. No harvesting, including salvage or single-tree harvesting, is to occur within OGMAs.
2. Maintain areas that are representative of natural CWHvm1 ecosystem patterns and ecosystem mosaics.
3. Aggregate OGMAs wherever possible and consistent with biodiversity management objectives to provide for forest interior conditions within OGMAs.
4. Include unique or spatially significant stands within OGMAs where possible.
5. Maximise overlap between OGMA placement and high value marbled murrelet nesting habitat where consistent with policy direction and biodiversity considerations.

3.3.2 CWHvm1 Biodiversity Management Strategies

- A. Delineate OGMAs to include existing old growth stands (Goal 1)
- B. Delineate OGMAs to be as large and contiguous as possible and to contain as wide a range of sites as possible. (Goals 2, 3, 5)
- C. Retain veterans within harvesting areas (Fd as well as CW, Ss, Hw) to levels typical of densities found following natural disturbances as a focus of stand level biodiversity management. Retention of dominants as veteran recruits is recommended where veterans are not present in the stand. (Goals 2, 5)
- D. Include unique features and constrained areas within OGMAs where compatible with biodiversity management. (Goals 4, 6)

3.4.1 CWHvm2 Biodiversity Management Goals

6. Meet the objective of 13.1 % or 1103.4 ha old growth retention in Provincial forest through delineation of OGMAs in existing old growth stands as shown on the attached map. No harvesting, including salvage or single-tree harvesting, is to occur within OGMAs.
7. Maintain areas that are representative of natural CWHvm2 ecosystem patterns and ecosystem mosaics.

8. Aggregate OGMA's wherever possible and consistent with biodiversity management objectives to provide for forest interior conditions within OGMA's.
9. Include unique or spatially significant stands within OGMA's where possible.
10. Maximise overlap between OGMA placement and high value marbled murrelet nesting habitat where consistent with policy direction and biodiversity considerations.

3.4.2 CWHvm2 Biodiversity Management Strategies

- B. Delineate OGMA's to include existing old growth stands (Goal 1)
- C. Delineate OGMA's to be as large and contiguous as possible and to contain as wide a range of sites as possible. (Goals 2, 3, 5)
- D. Retain veterans within harvesting areas (Fd as well as CW, Ss, Hw) to levels typical of densities found following natural disturbances as a focus of stand level biodiversity management. Retention of dominants as veteran recruits is recommended where veterans are not present in the stand. (Goals 2, 5)
- E. Include unique features and constrained areas within OGMA's where compatible with biodiversity management. (Goals 4, 6)

3.4.1 MHmm1 Biodiversity Management Goals:

1. Achieve the target of 19.0% or 901.5 ha old growth representation in Provincial forest through delineation of OGMA's as per the attached map. No harvesting, including salvage or single-tree harvesting, is to occur within OGMA's.
2. Attempt to make OGMA's as large and contiguous as possible to maximise their suitability for MAMU habitat nesting wherever possible and consistent with current policy to include non-contributing forest stands within OGMA.
3. Include rare or under-represented stand types within OGMA's where possible and compatible with biodiversity objectives.
4. Place OGMA's in areas with ecological or topographic features to capture the highest habitat complexity possible.

3.4.2 MHmm1 Biodiversity Management Strategies

- A. Delineate OGMA's to include as much suitable MAMU habitat as possible. (Goals 1, 2,)
- B. Delineate OGMA's to be contiguous with adjacent OGMA's in the CWHvm1. (Goals 2, 4)
- C. Include stands in OGMA's with least amount of operable timber and highest MAMU habitat suitability, where these values are compatible. (Goals 1, 2)

4.0 Mitigation of Timber Supply Impacts

The Powell Lake LU plan has been developed to maximise the effectiveness of the Forest Practices Code's biodiversity management provisions while minimising impacts on timber supply.

Specific measures adopted to minimise impacts of Powell Lake LU planning to the timber supply include the following:

As the majority of the Powell Lake LU is within TFL 39, the TFL license holder was directly involved in OGMA selection on TFL lands. Wherever possible, attempts were made to locate OGMAs so as to minimise impacts on current or future timber harvesting opportunities, while ensuring suitable old growth representation was achieved. Timber License holders were also consulted during the OGMA selection process.

Wildlife ESAs, constrained areas, Ungulate Winter Range (UWR), lower productivity sites, areas of difficult access and marginal economics were included within OGMAs where possible and where compatible with biodiversity objectives.

Old and mature forested stands with specific wildlife habitat values likely to be constrained operationally were included in OGMAs where compatible with current policy and biodiversity management objectives. This reflects a general principle to maximise overlap between constraints when delineating OGMAs.

Areas to be included in OGMAs were assessed according to MAMU habitat suitability, timber values and existence of road infrastructure for future harvest access. Stands at the periphery of habitat areas with a high degree of fragmentation were not included in OGMAs due to their lowered habitat suitability and ease of industrial access. Areas with high MAMU habitat suitability and a lower degree of habitat fragmentation are generally more difficult to access and have little existing industrial infrastructure. Inclusion of such areas in OGMA ensures protection of the most suitable MAMU nesting habitats, minimises impacts on timber supply through overlap of constraints and allows continued use of existing roads for future harvesting. Further assessment of the degree to which OGMAs provide suitable MAMU nesting habitat is required.

During the LU planning process, careful consideration was made to ensure that timber access was not cut off by OGMA delineation. Access corridors were left out of OGMAs and OGMA boundaries were delineated to simplify adjacent management.

Approved Forest Development Plans and TFL 39 Management Working Plan Number 8 maps were used during OGMA delineation to avoid proposed or approved developments.

OGMA boundaries used natural features wherever possible to ensure they could be replicated "on the ground". OGMAs were delineated to include complete stands of timber (forest cover polygons) wherever possible to reduce operational uncertainty and increase ease of OGMA mapping.

While OGMA placement within the “non-contributing” landbase is consistent with the LUPG, OGMA placement avoided areas in the NC with potential harvest opportunities where OGMA suitability could be maintained. To ensure the suitability of OGMAs to function as “coarse filters” for biodiversity management (Biodiversity Guidebook, 1995), areas in the non-contributing landbase with timber otherwise suitable for harvesting for forest harvesting were included in OGMA.

Many non-contributing areas are not included as OGMA at this time, mostly due to their young age class and absence of old growth characteristics. For example, narrow riparian strips were not included as OGMAs due to their inability to fulfil the “coarse filter” function outlined in the Biodiversity Guidebook (1995). Such riparian areas will contribute to meeting wildlife tree patch requirements for adjacent cutblocks. Periodic assessment and revision of OGMAs may be required as stand succession proceeds.

Appendix I: Biodiversity Ranking Process: Ranking Criteria and Criteria Rationale

BEO Ranking Criteria Rationale

98/05/13

Application of the Landscape Unit Ranking Criteria

The three categories of Biodiversity Emphasis Option (BEO) ranking criteria that have been developed for the Sunshine Coast Forest District are to be scored and considered in a separate manner. The first set of criteria, the ecological values, are to be scored first, determining an initial BEO ranking for the District's landscape units (LU). In ranking the LUs, the LU with the highest ecological values score is ranked number one, the next highest, number two. The timber values are scored next, with their resultant scores being used as tie-breakers for LUs that have generated similar scores through the ecological values criteria. Timber values scores rank in an opposite manner: out of two or more LUs that have similar ecological value scores, the LU with the lowest timber value score will be ranked highest. Thirdly, the other values criteria are scored, and they are used as tie-breakers for LUs that have scored similarly in both ecological and timber values. Higher other values scores rank the LU higher.

The criteria are being applied in a separate, priority manner placing ecological values as the first priority because the entire BEO ranking process is designed to determine which LUs have biodiversity values that most require the additional biodiversity provisions of Higher and Intermediate BEOs. This is consistent with the FPC "Higher Level Plans: Policy and Procedures" October 31, 1996 (HLPPP) Section 5.10.2 Assignment of Biodiversity Emphasis Options - Chief Forester Direction - Policy, subsection 5, page LU15.

The FPC HLPPP offers two separate directions regarding protected areas and their affects on a LU's BEO ranking and assignment. In Section 5.10.2, page LU14 it states that first, higher BEOs should be assigned to LUs where ecosystems are poorly represented within existing protected areas, and then, further on it states that higher BEOs should be assigned for LUs adjacent to protected areas. The Sunshine Coast Landscape Unit Planning Team has followed the first direction because the Sunshine Coast Forest District received somewhat less protected area forest ecosystem representation than some other Districts making ecosystem representation a higher priority, and the location of some of the protected areas do not offer easily achievable opportunities for connectivity.

1) Ecological Values

Ecological Values criteria assess which of the District's Landscape Units require higher levels of biodiversity provisions.

a) LU NDT 2 OG Representation Opportunity (Current state)

Landscape Units should rank higher if they have greater amounts of old growth forest because they have more potential to meet the seral stage requirements of the Biodiversity Guidebook, and have a greater number of biodiversity management options available. This criteria assesses the present amount of old growth, not recruitable areas. Old growth representation is assessed by the remaining percentages of old growth within the NDT2 areas of the LUs. NDT1 representation does not need to be considered because of logging history; if

NDT1 is depleted, NDT2 will be more so. NDT1 is considered where NDT2 makes up less than 10% of the LU's THLB. Percentages used to assign scores for this criteria are based on the percentages required for old seral stage representation for each BEO in NDT2.

b) Recruitment Potential to Manage for Old Growth

LUs that are underrepresented in old growth may have age class 8 stands that may be recruited to provide old growth management areas of suitable habitat to meet the old seral stage biodiversity management requirements. If so, they are better suited to meeting the biodiversity requirements of a higher-level BEO and should be given a higher ranking. The percentages used to assign scores for this criteria, as in A above, are based on the percentages required for old seral stage representation for each BEO in NDT2.

c) Ecosystem Complexity

the greater the number of BEC units within a Landscape Unit, the greater the potential is that the LU provides habitat for a wider range of species compared to a LU with less BEC units. It is also more likely that a LU with numerous BEC units will be habitat for species that require a wider range of habitat. LUs with potential to be habitat for a larger number of species earn a higher ranking for biodiversity values.

d) Specific Wildlife Habitat Requirements

LUs that contain species that require specific habitat, ecosystems or ecosystem complexes are likely to require higher levels of habitat provision. LUs with species present that have been identified as being regionally significant, threatened or endangered may need to have habitat provided for them out of the operable landbase at higher than minimal levels, so these LUs will receive higher biodiversity rankings. Higher or Intermediate BEOs provide a greater range of habitat management options.

e) Sensitivity to Forest Development

Conversion of natural forest stands to even-aged management regimes reduces the range of habitats available to support an area's natural diversity of species. This reduction in habitat is greater in NDT 1 which is naturally uneven-aged, than in NDT 2 which is naturally even-aged. The greater the proportion of NDT 1 within a LU, the more the LU requires a higher BEO to provide habitat management options.

f) Connectivity

In addition to the presence of Old Growth, its spatial distribution is very important when assessing the biodiversity management options that remain within a LU. Higher BEO ranking scores will be given under this criteria to those LUs that have old seral stage forest in large contiguous stands, or in areas where harvesting has not disrupted natural connectivity due to natural patchy non-contiguous patterns.

g) Complex Ecosystems

LUs that contain large floodplains, estuaries, wetlands and herbaceous slidetrack/forest complexes are inherently habitat to a wider range of species than those LUs that do not. LUs that contain significant habitat features, in a District-wide context, will receive higher BEO ranking scores from this criteria to increase their eligibility to receive a BEO that will provide opportunities for maintenance of appropriate representation and linkages.

h) Inoperable Land Habitat and Biodiversity Representation

This criteria assesses the need for increasing the LU's priority and emphasis for biodiversity management by determining how much of a LU's biodiversity objectives can be met by default through habitat located in protected and constrained areas.

2) Timber Values Criteria

Timber values criteria assess the relative timber values of the District's Landscape Units and consider short and long-term contributions of the LU to the TSA in terms of value and volume. In the event of a tie of ecological criteria scores at the division between BEO assignment, Timber Values Criteria will be assessed to establish the BEO ranking. In order to minimise the impact on the timber supply in the long term, the LU with the lower timber value score will be given the higher BEO ranking.

a) Potential Timber Productivity

This criteria compares the products of LU average site index multiplied by THLB area. This represents the potential of the LU to produce timber. This criteria is intended to minimise impacts on the long-term timber supply.

b) Timber Maturity

This criteria gives higher ranking to LUs that have greater amount of mature timber available for harvest. This criteria is intended to minimise the impacts on timber supply in the short term.

c) Timber Value

This criteria assigns scores based on the relative value of timber harvested from the various LUs. Information associated with timber value appraisal would be considered. This criteria is intended to make LUs where timber values are high more likely to have a lower BEO ranking. Higher scores increase the BEO ranking of the Landscape Unit.

3) Other Resource Values

Resource Values besides ecological and timber values are considered with these criteria. The need for higher or lower BEO ranking is assessed based on the effects of other resource uses on biodiversity, and the impacts of provisions for other resource use on timber supply.

a) Visual Sensitivity

This criteria assigns higher scores for a LU if it is more visually sensitive to overlap the impacts of constraining VQOs with higher BEO assignments in order to minimise any reductions to the TSA's AAC.

b) Recreation/Tourism Significance and Capability

This criteria assigns higher scores for a LU if it has higher recreation values, for present and future use, in order to overlap the impacts of recreational and biodiversity provisions to minimise reductions to the TSA's AAC.

c) Mining, Hydro and Urbanisation

Mining, Hydro (damming, pipelines, generation sites, and rights of way) and urbanisation have potential to interfere with biodiversity management options and objectives. This criteria will assign lower scores where this potential exists.

d) Cultural Heritage Significance

This criteria assigns higher scores to LUs with higher cultural heritage significance. Based on consultation with affected First Nations and availability of traditional use and archaeology information.

Criteria for Landscape Unit Biodiversity Emphasis Option Assignment

Draft Landscape Unit Ranking criteria is based on three separate sets of criteria. **Ecological Values Criteria** are first used to establish an initial ranking. **Timber Values Criteria** are then applied to LUs with similar Ecological Values scores. LUs with similar scores following the Timber Values ranking will be further assessed through the **Other Resource Values Criteria**. This ranking process is consistent with the direction within the FPC Higher Level Plans: Policy and Procedure, Chapter 5, section 5.10.

1) Ecological Values Criteria

(higher scores = higher BEO ranking)

a) LU NDT 2 OG Representation Opportunity (Current state)

Percentage of the LU's NDT 2 productive forest in old seral stage.
(NDT1 to be considered if NDT2 <10% of THLB)

>13%	H	8 points
>9-13%	M/H	6 points
>3-9%	M	4 points
>1-3%	L/M	2 points
0-1%	L	0 points

b) Recruitment Potential to Manage for Old Growth in NDT2

Options to manage for old growth using age class 8 and 9 combined.

>13%	H	4 points
>9-13%	M/H	3 points
>3-9%	M	2 points
1-3%	L/M	1 point
0-1%	L	0 points

c) Biogeoclimatic Complexity

For the number of Biogeoclimatic subzone variants within the LU:

7-8	H	5 points
6	M/H	4 points
5	M	3 points
4	L/M	2 points
3	L	1 point
1-2	VL	0 points

d) Specific Wildlife Habitat Requirements

This criteria is based on the presence of species that have been recognised as requiring specific forest habitat, (including regionally significant species, threatened and endangered species (according to Provincial tracking lists).

H 8 points

M/H	6 points
M	4 points
L/M	2 points
L	0 points

e) Sensitivity to Forestry Development

Based on the % of the productive forest land in the Landscape Unit within Natural Disturbance Type 1 :

81 - 100	H	4 points
61 - 80	M/H	3 points
41 - 60	M	2 points
21 - 40	L/M	1 point
0 - 20	L	0 points

f) Connectivity

Based on the relative abundance of options that remain to manage for natural connectivity and to meet connectivity objectives considering the current state of the LU.

H	4 points
M/H	3 points
M	2 points
L/M	1 point
L	0 points

g) Ecosystem Complexes

Based on the presence of significant, large floodplains, wetlands, estuaries, and herbaceous slidetrack/forest complexes.

H	8 points
M/H	6 points
M	4 points
L/M	2 points
L	0 points

h) Inoperable Land Habitat and Biodiversity Representation

Based on the amount of old seral stage representation and forest habitat (that is suitable to the biodiversity and wildlife needs of the LU) that is present within the LU, but does not contribute to timber harvesting landbase. (PAS areas, inoperable terrain, riparian reserves and otherwise constrained areas) Representation within all or any of the BEC units to be considered as well as interior forest condition availability.

H	0 points
M/H	1 points
M	2 points
L/M	3 points
L	4 points

2) Timber Values Criteria

(higher values = lower BEO ranking)

a) Potential Timber Productivity

Relative productivity of LUs will be assessed in terms of the LU's average site index. (SI50) multiplied by the LU's THLB.

b) Timber maturity and Mature Timber Availability

Based on the percentage of the LU's operable land base stocked with mature timber, and the amount of it available for harvest considering constraints imposed by VQOs, ESAs and Community Watersheds. Mature is greater than 120 years.

Total all of the mature and 50% of the timber in age classes 40 - 120 years:

>50%	H	5 points
41 - 50%	M/H	4 points
31 - 40%	M	3 points
21 - 30%	L/M	2 points
11 - 20%	L	1 point
0 - 10%	VL	0 points

c) Timber Value

Based on the estimated appraisal value of the LU's average stand within the LU's operable landbase, relative to all other LUs in the District.

H	5 points
M/H	4 points
M	3 points
L/M	2 points
L	1 point
VL	0 points

3) Other Resource Values (higher values = higher BEO ranking)

a) Visual Sensitivity

based on the percentage of the operable forest landbase within the LU with a VQO of P, R, PR from the landscape inventories.

>51%	H	5 points
41 - 50%	M/H	4 points
31 - 40%	M	3 points
21 - 30%	L/M	2 points
11 - 20%	L	1 point
0 - 10%	VL	0 points

b) Recreation/Tourism Significance and Capability

Based on the LU's potential to provide for recreational use and potential of area to be of interest and attraction to tourists, now and in the future, relative to all other LUs in the District.

H	5 points
M/H	4 points
M	3 points
L/M	2 points
L	1 point
VL	0 points

c) Mining, Hydro and Urbanisation

This criteria considers the potential for mining, hydroelectric projects, right of ways and urbanisation, in its present and future states, to interfere with the ecological integrity or biodiversity values of the LU, relative to all other landscape units. "H" represents greatest effects on the LU's biodiversity.

H	0 points
M/H	1 point
M	2 points
L/M	3 points
L	4 points
VL	5 points

d) Cultural Heritage Significance

This criteria assigns higher scores to LUs with higher cultural heritage significance. Based on consultation with affected First Nations and availability of traditional use and archaeology information.

H	5 points
M/H	4 points
M	3 points
L/M	2 points
L	1 point

Appendix II: Landscape Unit Ranking and BEO Assignment

Sunshine Coast Forest District

Landscape Unit Ranking and Biodiversity Emphasis Option Assignment. 98/09/09

LU Name	LU Number	Biodiversity Score	Rank	THLB Area (ha)	BEO Assigned
Toba	207	42	1	12813	H
Skwawka	213	37	2	3726	H
Homathko	201	36	3	8453	H
Southgate	203	35	4	3446	H
Deserted W/S*	219*	N/A	N/A	2462	H
				30899	9.7%
Brem	206	35	5	4883	I
Jervis (including Deserted River)	219	33	6	17246	I
Bute West	202	32	7	4508	I
Bute East	205	32	8	6504	I
Powell Daniels	211	31	9	2903	I
Brittain	218	27	10	8785	I
Bishop	204	26	11	1488	I
Salmon	224	26	12	19869	I
Homfray	209	24	13	8642	I
Quatam	208	23	14	8752	I
Narrows	223	23	15	10979	I
Howe	226	21	16	10939	I
Cortes	214	18	17	21517	I
Bunster	215	18	18	23057	I
				150072	47.2%
Lois	217	17	19	53544	L
Powell Lake	212	16	20	14229	L
Chapman	225	14	21	15917	L
Texada	219	13	22	13837	L
Sechelt	221	12	23	26082	L
Haslam	216	8	24	13597	L
				137206	43.1%
			Total THLB	318177	100%

* Deserted River Watershed, part of the Jervis LU, assigned "Higher" to utilise more of the 10% allotment for the SCFD.

SCFD LU Planning Team: Brian R. Smart, Darryl M. Reynolds, Steve M. Gordon.

Appendix III: Wildlife Tree Retention Report
(VFR RLUPS Table 2.9)

Landscape Unit Total Area (ha)	BEC Subzone	Crown Forested Area (THLB + NC)	THLB (ha)	% of Subzone available for Harvest	% of THLB Harvested	% WTP Retention
	CWH dm	10218.3	8975.4	87.8	37.2	10
	CWHvm	12211.3	10554.8	86.4	63.1	12
	MHmm	4737.9	3762.6	79.4	26.7	8
	AT	307.9	173.4	56.3	N/A	3
63487.7						

¹CWHvm1/vm2 not differentiated in the above table.

VFR: Vancouver Forest Region

RLUPS: Regional Landscape Unit Planning Strategy

BEC: Biogeoclimatic Ecosystem Classification

THLB: Timber Harvesting Landbase

Appendix IV: Significant Ecological Features in the Powell Lake LU

This Appendix includes specific information regarding the Powell Lake Landscape Unit's (LU) biodiversity values that were considered in the biodiversity ranking and BEO assignment processes, and during the evaluation of stands for inclusion as OGMA's. Headings **a)** through **h)** correspond to the LU BEO ranking criteria. (Refer to "BEO Ranking Criteria Rationale 98/09/13", and "Criteria for Biodiversity Emphasis Option Assignment Process 98/09/09", Appendices I and II)

a) LU NDT2 Old Seral Representation

BEC Units and Seral Stage Distribution

Table 1

Table 1 lists the Powell Lake LU BEC units, corresponding natural disturbance types (NDT) and OG representation TFL 39 inventory summary data. (based on 1976 inventory, updated to 1998). Local updates (including current Forest Development Plans) have been incorporated.

BEC	NDT	TOTAL OG	
		%	ha
CWHdm	2	0.1	17.9
CWHvm1	1	1.4	258.0
CWHvm2	1	5.3	1757.7
MHmm1	1	14.7	2450.2

Table 2

The Powell Lake LU BEC units, NDT, LUPG representation recommendations, LU OGMA representation objectives, and non-Provincial forest LU old seral representation, based on TFL 39 (Arc Info) inventory summary data:

BEC Unit and NDT ¹	LUPG Old Seral Representation Target ²		OGMA Objective Provincial Forest ³		WTP Objective ⁵
	%	Ha	%	ha	% of cutblock area, ha
CWHdm	>9	919.6	9.0	921.3	10
CWHvm1	>13	490.6	12.7	484.2	12
CWHvm2	>13	1096.9	13.1	1103.4	12
MHmm1	>19	900.2	19.0	901.5	8
Totals		3407.3			

1) NDT = Natural Disturbance Type. Refer to LUPG, Appendix 2.

2) % of total productive forest area within BEC unit, as per LUPG.

3) % of total productive forest area within BEC unit, as per LUPG, minus contributions from old seral representation within protected areas and Crown forest outside of Provincial forest.

4) Protected areas contribute to old seral representation but are not designated as OGMA's.

5) WTP Objectives as per the LUPG, Appendix III. Table A3.1 applies upon the designation of the Landscape Unit and its objectives.

CWHdm: Coastal Western Hemlock biogeoclimatic zone, dry maritime subzone

CWHvm1: Coastal Western Hemlock biogeoclimatic zone, submontane very wet maritime variant.

CWHvm2: Coastal Western Hemlock biogeoclimatic zone, montane very wet maritime variant.

MHmm1: Mountain Hemlock biogeoclimatic zone, moist maritime subzone, windward variant.

* Additional areas will be assessed for inclusion in the CWHvm1 OGMA prior to the final LUP to bring OGMA's closer to target levels.

Some old growth patches less than 2ha, that are remnants left after harvesting, are not considered to contribute to old growth representation at the landscape-level for the following reasons:

Areas ≤ 2 Ha from logging origin often have a high degree of fragmentation and edge effect, subsequently, most are no longer representative of original ecosystem. As a result many are no longer capable of being habitat to the full range of species that originally occupied the site. Although they do provide valuable contributions to biodiversity, it is at the stand level, not the landscape level. The intention of OGMA's is to fulfil the landscape level habitat requirements for the LU's natural levels of biodiversity through the "coarse filter" approach; encompassing as many species' habitats as possible. Small remnant patches, of diminished habitat capability, cannot fill this role and their biodiversity contribution must be limited to that of stand-level.

Natural stands ≤ 2 Ha may be completely typical of natural stand structure, and may continue to function in its natural state. Natural edges are less intrusive than artificial edges (harvesting). Small natural patches may provide important habitat attributes at edges of natural openings such as swamps, rock outcrops, etc. Their OG contribution, however, could be diminished or eliminated in some cases if larger adjacent OG forest is removed. For example, a number of small patches of old timber within a slide track complex may provide temporary cover for a number of species that forage in the slide track but require larger adjacent areas of OG in close proximity for thermal and visual cover, escape and denning habitat and snow interception. They may no longer contribute as natural habitat for a specific species if they become significantly isolated from the other required habitat type.

It is difficult to map and track the contributions of patches smaller than 2ha. Some small patches may be reduced in size by windfall following harvesting and it is unlikely that this reduction could be accounted for. This approach is consistent with principles outlined in the Landscape Unit Planning Guide.

b) Recruitment Potential to Manage for Old Growth.

OGMA are predominantly located in old growth, mature and some other stands containing a significant veteran component. TFL 39 forest inventory data was used for OGMA selection and tracking. Some other younger stands have been selected as OGMA "recruitment area" for specific stand attributes or known high wildlife values. Together, these stands will be managed to meet the old growth management targets for the LU.

c) Ecosystem Complexity.

The Powell Lake LU contains 5 BEC variants, indicating a moderate level of ecosystem complexity. This ecosystem complexity was accounted for through OGMA delineation at the level of Biogeoclimatic variant rather than by subzone.

d) Specific Wildlife Habitat Requirements.

The Powell Lake LU is habitat to the following species of wildlife that have been recognised as requiring specific forest habitat, (including regionally significant species, threatened and endangered species, according to Provincial tracking lists): Marbled Murrelet, Mountain Goat, and northern goshawk. Grizzly bears occur sporadically in the LU. Only remote portions of the LU (i.e. the Eldred River valley and drainages flowing into the northern arm of Powell Lake) will be actively managed for grizzly bear habitat values as this LU is at the boundary of grizzly bear distribution and in light of the proximity of urban centres.

The Powell Lake LU hosts a significant population of mountain goats, distributed throughout the LU. Identified mountain goat winter range locations were considered in OGMA selection, as these areas are constrained. Suitable old growth stands within ungulate winter range were included in OGMA.

Old growth forest in the Powell Lake LU may be suitable for marbled murrelet (MAMU) nesting, though there are limited availability of large contiguous patches of old growth in this area. Areas of Suitable MAMU nesting habitat were selected for OGMA when possible. Further assessment of the degree of overlap between OGMA and MAMU nesting habitat is anticipated.

e) Sensitivity to Forest Development.

Approximately 78% of the Powell Lake gross land area is within Natural Disturbance Type 1 (Ecosystems with rare stand initiating events). The remaining +/- 20% is within the CWHdm, which is NDT2 (Ecosystems with infrequent stand initiating events), therefore, the LU is considered to have a moderate to high sensitivity to forest development overall.

This criterion was utilised in the assignment of BEOs but not in the delineation of OGMA.

f) Connectivity.

The Powell Lake LU has a large degree of harvesting disturbance history throughout the lower elevations, and scattered areas of natural disturbance (such as fire, insect outbreaks and windthrow) throughout. Early second growth stands are the predominant forest cover in some valley bottom portions of the LU. Higher elevation and inaccessible areas are largely old growth with some post-harvesting regeneration. Connectivity opportunities from lower to higher elevations exist only in a few areas due to the contiguous lower elevation harvesting history

Consistent with LU Planning Guide direction, connectivity is not a primary objective of the Powell Lake LU plan, however, the opportunity to maintain connectivity (i.e. degree of remaining management options) is an important criteria for BEO assignment as it is an indicator of the degree of harvesting and road density, and other disturbance in a given LU.

g) Complex Ecosystems.

The Ecosystem Complexes present in the Powell Lake LU are of relatively low significance in a District context. The Powell Lake LU has limited complex ecosystems including wetland complexes (Clover Lake., Eldred River riparian zone outflow), several avalanche tracks

providing herbaceous forage and natural meadows (upper Powell Lake, Bradburn and MacMillan Creeks, Eldred River). Perhaps the most striking feature of the Powell Lake LU are the high number of drainages and stream systems within the LU and the rugged topography surrounding Powell Lake itself.

OGMAs have been located near such ecosystem features whenever possible, as these areas are rich in biodiversity values. Adjacent old growth and mature forest adds valuable wildlife habitat structural features. As many such ecosystem complexes are heavily constrained by high water tables, riparian management areas, sensitive slopes and access, their inclusion in OGMA minimises impact on timber supply by recognition of operational constraints in LU planning.

h) Inoperable Land Habitat and Biodiversity Representation.

Due to harvesting history the majority of CWHdm and CWHvm1 representation is within areas that are not operable or have remained unharvested due to difficult access or other constraints. Most of the CWHvm2 and MHmm1 OGMA was delineated to be contiguous with OGMA in the adjacent CWHvm1 variant.

Riparian areas provide a minor contribution to the LU's OGMAs. Riparian OGMAs are located within stands that are not operable, already left as riparian reserves from past harvesting or in operable, or in stands previously identified as having high wildlife or biodiversity values and thereby constrained at the operational level. OGMAs in the riparian areas were designed to build upon constrained sites while being large enough to fulfil the coarse filter approach outlined in the Biodiversity Guidebook (1995). Narrow riparian strips are more suitable to function as Wildlife Tree Patches as opposed to OGMAs.

There are no protected areas or parks within the Powell Lake LU.

The remaining Old Growth Management Areas within the Powell Lake LU consist of Provincial Forest Land. Constrained and other lands available for old seral representation include:

- ESAs including Ungulate Winter Ranges and grizzly ESAs
- Steep and unstable terrain, gullies
- Riparian reserve areas
- Forested land of low productivity (low SI_{50})
- Portions of some NP polygons that contain some suitable forest cover.

All constraints have been incorporated into the calculation of non-contributing forest in the Powell Lake LU used in management Working Plan 8 for TFL 39.

Appendix V: Public Consultation Summary

The draft Powell Lake Landscape Unit plan was advertised for a 60-day public review period beginning May 18, 2002 and ending July 19, 2002. Comments received during the review period are summarised below.

A letter dated August 15, 2002 was received from R.E. Walz on behalf of the Powell River Parks and Wilderness Society. In his letter, Mr. Walz highlighted a potential OGMA candidate in the Useless Lake area. This suggestion was jointly reviewed by MSRM and Weyerhaeuser Forestry staff and found to be a suitable OGMA candidate from both an ecological and recreational standpoint. Changes to the OGMA configuration in light of this input resulted in approximately 55 hectares of OGMA being designated in this area, including advanced second growth around the lake/wetland complex and a remnant stand of old growth CWHvm2.

During the public review period, a helicopter overview flight of the entire Block 1 portion of TFL 39 was conducted jointly by Weyerhaeuser Forestry and the Ministry of Water, Land and Air Protection Rare and Endangered Species Biologist to assess marbled murrelet nesting habitat potential in the TFL. One old growth stand in particular was highlighted as containing high value MAMU habitat in the MacMillan Creek area. This area was included in OGMA to increase the representation of old growth MAMU nesting habitat captured through the Landscape Unit planning process.

A letter dated June 17, 2002 was received from Weyerhaeuser Forestry Ltd., outlining concerns with the WTP objectives wording. Changes were made to the draft text to address these concerns, making the WTP retention targets applicable to the area within a cutblock while allowing flexibility to meet targets in each BEC zone through time. This letter also highlighted the MacMillan Creek area as high value MAMU habitat and indicated inclusion of this area in OGMA was acceptable to the licensee. As per above, inclusion of this area in OGMA increased the representation of large old growth patches in OGMA while maximising overlap between OGMAs and specific wildlife habitats.