Robson Valley-North (former Robson Valley Forest District)
Sustainable Resource Management Plan

Biodiversity Chapter

Background Report:

The plan area for this document is made up of the following Landscape Units:

Crescent Spur Landscape Unit
Lower Morkill/Cushing Landscape Unit
Forgetmenot Landscape Unit
Upper Morkill Landscape Unit
North Trench Landscape Unit
Goat Landscape Unit

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Note: This document was initiated under the Ministry of Sustainable Resource Management. Advertising and consultation was conducted under that Ministry's mandate. The Ministry of Sustainable Resource Management and Land Water BC have been joined together under the Ministry of Agriculture and Lands, Integrated Land Management Bureau. Also, the Ministry of Water, Land and Air Protection is now known as the Ministry of Environment.

Table of Contents

Background Report – Robson Valley North Sustainable Resource Management Plan

1.0 Introduction

This report provides background information that was used during the preparation of growth management areas (OGMA) within the Crescent Spur, Lower Morkill/Cushing, Forgetmenot, Upper Morkill, North Trench, and the Goat landscape units. This report also provides a summary of selection criteria, rationale, and intent of legal objectives for the planning area. Much of the information on existing environmental conditions and biodiversity found in the planning area comes from contact with local residents.

Sustainable Resource Management (SRM) Planning is being undertaken in high priority areas of the province, and is an important component of the *Forest Practices Code* (FPC) which allows legal establishment of objectives to address landscape level biodiversity values. This importance is carried over to the Forest and Range Practices Act and the Government Action Regulation. Biological diversity or biodiversity is defined as: *'the diversity of plants, animals and other living organisms in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems as well as the evolutionary and functional processes that link them'*.

SRM planning implementation is intended to help maintain biodiversity values while achieving sustainable economic development of both land and resources. Retention of biodiversity is important for wildlife and provides benefits for landscape level management of other values such as; protection of water quality, habitat and movement conservation and preservation of other natural resources. The distribution of Old Growth Management Areas (OGMAs will be reviewed periodically to ensure they are ecologically suitable through time.

The Robson Valley North area is now included in the Headwaters Forest District and had completed draft Landscape Unit (LU) boundaries and established draft Biodiversity Emphasis Options (BEO) in accordance with the direction provided by government. There are 23 LU's within the former Robson Valley Forest District. This report outlines the SRM planning process and objectives for the northern most 6 LU's where portions of ancient Cedar-Hemlock forests are found. (See Table 1 for LU names and BEO's).

Delineation of old growth management areas (OGMAs) was undertaken by the Ministry of Sustainable Resource Management (MSRM) with information provided by Ministry of Forests (MOF) and Ministry of Water, Land and Air Protection (MWLAP) staff.

Input from licensees, government agencies, First Nations and other levels of government are being solicited and considered during this process. Advertising for public review and comment shall be used to garner local area knowledge and input. It is important to note that during public consultation, comments are being sought regarding the location of OGMAs and the establishment of legal objectives rather than the content of this report.

Once made legal, the distribution of OGMAs will be reviewed periodically to ensure their ecological suitability through time. A summary of all public comments, recommendations and the action considered for these shall be included in Appendix 8 of this document.

Table 1 Landscape Units and Biodiversity Emphasis Options within the Plan

Landscape Unit	**Biodiversity Emphasis Option (BEO)**
Crescent Spur	High
Lower Morkill/Cushing	Intermediate
Forgetmenot	Intermediate
Upper Morkill	Intermediate
North Trench	Intermediate
Goat	Intermediate

2.0 Business Case / Purpose

The plan area consists of 6 landscape units located at the northern end of the former Robson Valley Forest District and abuts the Prince George Forest District Boundary The communities of Crescent Spur and Loos are supported through numerous activities such as agriculture, tourism and other industries reliant on the utilization of natural resource values within the plan area. The plan area has been identified as a priority for establishment of old growth management areas (OGMAs) due to resource use initiatives and unique value of some biodiversity elements.

Landscape units adjacent to Robson Valley North in the Prince George Forest District have been identified as high priority for development of legal objectives because of the ancient forests of the Interior Cedar-Hemlock zone. These objectives have now been completed and enacted.

Rationale given for this priority is as follows:

In the Prince George Timber Supply Area- *Rationale for Allowable Annual Cut (AAC) Determination* – Effective June 1, 2002, Larry Pedersen, Chief Forester stated: "I encourage staff to complete landscape unit planning objectives for the ICH (Interior Cedar-Hemlock Biogeoclimatic zone) to ensure that rare Biogeoclimatic site series are identified and protected in OGMAs."

Forest Practice Board stated in Complaint investigation 010287 – *Timber Salvage Near Ptarmigan Creek East of Prince George- July 2001* , in their conclusions "6. The plan (forest development plan) covers somewhat controversial operations in a relatively poorly understood forest association. The timber supply and landscape-level management are currently under review. The next forest development plan should consider the best information available on sound forest management in the old stand in the interior cedar-hemlock association."

Also, in September of 2000 a conference was held by the University of Northern BC that was titled *Interior Cedar Hemlock- Stewardship Conference "Challenges of a Unique Ecosystem"*. The opening address by Jayme Buckmaster, Darwyn Coxson and Susan Stevenson states:
"Over time, some wet ICH stands develop special structural attributes associated with very old forests, such as large-diameter standing trees and coarse woody debris, hollow trees, very old woody substrates, and a high level of structural diversity on both horizontal and vertical dimensions. Goward, (1994) noted that the species diversity in some old growth ICH forest stands implies a continuity of forest cover that may reach millennia. Species such as pin lichens, which occupy the surface of bark on the lower trunks of old growth trees, may provide valuable indicators of "antique" forests."

Priority has been given this area because of the biological similarity but also because of the harvesting pressure for new blocks within the planning area and to help deal with the history of harvesting in this portion of the Forest District.

As an instrument for maintaining biodiversity values, SRM planning can mitigate impacts related to expansion of land and resource development. The establishment of OGMAs within the plan area shall help preserve a level of biodiversity and help mitigate the potential impacts on wildlife existence that may otherwise become threatened through land development.

The rationale and management direction for establishment of OGMAs is outlined in the following sections. Each of these resource subjects shall be presented individually, with biological and economic considerations taken into account and presented in summary format the benefits and impacts, management intent and legal objectives.

The six landscape units have many similar reasons for being a priority for biodiversity planning:

- Forest Development Plan pressure in landscapes that have unique old ecological features
- Immediate harvesting dealing with forest health issues
- many of the same ecologically characteristics

3.0 Summary of Benefits and Impacts

Within the context of the Ministry of Sustainable Resource Management and SRM Planning, the underlying purpose of establishment of OGMAs is to help pproduce greater certainty for other resource uses and yield increased economic and social benefits while maintaining environmental values.

The benefits and impacts of the establishment of OGMAs in Crescent Spur, Lower Morkill/Cushing, Forgetmenot, Upper Morkill, North Trench and Goat landscape units are summarized as follows:

- improved certainty about the management of old growth and old growth dependent species;
- improved certainty for forest licensees and the Ministry of Forests when preparing and approving Forest Development Plans or Forest Stewardship Plans;
- provides for recreation, education and tourism based opportunity in the very old forest sites adjacent to Highway 16 and into the adjacent communities;
- social benefits include the support and confidence of the local community (Crescent Spur and Loos) and the scientific community (UNBC);
- minimal to no short term impact to the timber supply of the Robson Valley Timber Supply Area (TSA); very small mid and long term impact to the timber supply;
- impact on the timber harvesting land base (THLB) of 4623 hectares or 8.8%;
- no impact on existing mineral, aggregate and gas permits or tenures; nor, exploration and development activities.

4.0 Landscape Unit Objectives for OGMAs

Landscape Unit objectives will be legally established within the framework of the FPC Act and as such will become Higher Level Plan objectives. Operational Plans covered by the FPC Act must be consistent with these objectives.

The Regional Director of the Ministry of Sustainable Resource Management establishes the Objectives as Higher Level Plan under Section 4 of the *Forest Practices Code of B.C. Act.* The Strategies are intended to guide other Statutory Decision Makers, such as the District Manager of Ministry of Forests, when reviewing or approving operational plans.

4.1 Old Growth Management Areas

OGMA objectives apply only to provincial forest lands. While Park and Crown forest lands outside of provincial forest may contribute to old seral representation, LU objectives do not apply to these areas. Water, Land and Air Protection staff with responsibility for parks indicated that "it will be incumbent on the statutory decision makers to determine if the OGMA objectives continue to be met if ecosystem management actions are taken within parks (with OGMA values indicated) and to designate additional OGMAs if required to meet OGMA objectives.

OGMAs were established in each Biogeoclimatic variant throughout each LU, as shown on the attached maps. This follows the coarse filter approach to biodiversity management whereby representative old growth stands are protected to maintain ecosystem processes and wildlife habitat requirements.

Old growth characteristics that are used to assess suitability to include in OGMAs, consist of: large diameter trees, variation in tree size, variation in tree species, dead standing trees, complex canopy structure, large size coarse woody debris both standing and fallen, gaps in the over-story canopy, under story patchiness, broken or deformed tops, heart/root rot and other pathogens. OGMAs should also meet minimum requirements for interior forest conditions. The impact of edge effect should also be considered.

5.0 OGMA and Recruitment OGMA Considerations and Rationale

This section is intended to provide information regarding LU planning considerations and to explain the rationale used during OGMA delineation.

5.1 Ecosystem Management: Wildlife habitat information was used, where available, for caribou, grizzly bear, fisher, wolverine, and Bull trout. These are all red or blue listed species in the plan area or are of regional importance. Each LU contains varying amounts of wildlife habitat from which to build on for ecosystem management. The declared ungulate winter range and corridors established under the FPC will also help provide a better foundation for ecosystem management. In addition, Wildlife Habitat Areas and Temperature Sensitive Streams that may be established in the future will add to the foundation and contribute to ecosystem integrity. Existing Land Act reserves for Wildlife Habitat Management Areas, Natural Environment Areas, Wildlife Habitat Emphasis Areas, and Recreation Conservation Management Areas are also identified as areas that contribute to ecosystem management especially in Crescent Spur LU. The habitat provided by these various processes, in conjunction with OGMAs, provides the fundamental backbone for which to maintain a functioning ecosystem.

An important part of the OGMA planning exercise was to ensure that these separate processes complemented each other. Larger patches of old growth provide core areas and existing wildlife corridors allow greater opportunity to improve connectivity. The intent is to maintain a series of old forest habitat patches with UWR and wildlife corridors across probable movement corridors to allow wildlife dispersal and genetic flow. Using both this approach and stand level biodiversity measures will increase the likelihood of sustaining viable wildlife populations that are well distributed across their natural range.

It should also be noted that natural processes such as insect feeding or disease will be allowed to occur within OGMAs provided that they do not pose a significant threat to forested areas outside OGMAs. These activities at endemic levels are considered a natural part of ecosystem variability and are expected to have varying effects on biodiversity. It is anticipated that delineation of OGMAs across the landscape reduces the likelihood of losing all OGMAs in one catastrophic event.

5.2 Timber Supply and Mitigation: During delineation of OGMAs for priority biodiversity provisions, an attempt was made to mitigate the short and long-term impacts on timber supply. For example, OGMAs were considered first in the non-contributing forest land base. Since representation must be at the variant level, the non-contributing land base could not always satisfy old forest requirements. Land base that was constrained due to other land uses, such as visual quality management, riparian buffers, or declared Ungulate Winter Range, was also considered in the selection of OGMAs. Generally, more THLB was required in lower elevation variants to capture significant old growth attributes, while in the higher elevations less THLB was required due to the larger amount of non-contributing land base. Partial contributing forest land base was used before contributing forest land base because of the ratio of non-contributing to contributing in this category. This

approach has less impact on contributing forest land base in a landscape with significant historical attributes that put pressure on the THLB.

OGMAs were chosen in the oldest available age class first, however old forest stands that were approved for harvesting on Forest Development Plans (FDP) were excluded from candidate OGMAs following direction outlined in the *Landscape Unit Planning Guide*. Licensees are also in the process of reviewing the maps and are identifying future harvesting opportunities so that timber supply impacts can be reduced wherever possible.

Licensees will identify areas where forest health issues for beetle management will require harvesting in the short term. These areas are determined not to be suitable for OGMAs unless there was a previous conservation designation or significant ecological reason for retention.

Where forest or mining roads must be constructed within OGMAs, they should be temporary where possible. Deactivation should occur upon completion of operational activities. Deactivation for temporary roads, should prevent motorized access (i.e. 4WD, ATV, motorcycle), should include re-contouring the right-of-way and include replanting, when feasible. Permanent roads (access required for a long period of time) can be constructed and maintained where there is no other practicable option. Where impacts from roads are deemed major and can not be mitigated, replacement OGMAs should be established.

Cone gathering is permitted within OGMAs provided it can be done without felling the tree.

5.3 Assessment Process and Selection Criteria: Individual OGMA polygons were assessed by forest cover information, satellite photograph interpretation, aerial reconnaissance and/or field inspections, in an attempt to evaluate stand attributes and biodiversity values/attributes. See Tables 2 and 3 for the Robson Valley North area total attributes. Appendices 1 through 6 detail OGMA attributes specific to each LU.

In the selection process an attempt was made to select OGMAs that were in proximity to biologically significant features such as large rivers, avalanche tracts, swamps, etc. Wildlife use through capability, suitability and probability reports and maps were utilized where information was available. Interior forest habitat and edge effect relative to OGMA size and placement were also considered. OGMA placement was considered for connectivity to constrained operating areas and provided a variety of aspects, slope positions and tree species.

Some non-contributing forest land such as riparian reserve zones are being utilized as a portion of the riparian/wildlife corridors and as such are contributing to the “core” wildlife habitat areas.

Table 2. OGMA requirements for the Robson Valley-North Planning Area

BEC Variant	Crown Forested Landbase	Full OGMA Target		Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
	Ha	%	Ha	Ha	%	Ha	%	Ha
ESSFmm1	62788	26	5177	5869	27.9	5473	2.0	396
ESSFwc3	66	.1	13	16	0.1	16	0	0
ESSFwk1	28917	28	5708	4689	18.7	3660	5.2	1029
ESSFwk2	3335	3	633	608	2.5	485	0.6	123
ICHmm	414	.2	37	0	0	0	0	0
ICHwk3	53176	41	8137	8133	29.9	5873	11.5	2260
SBSvk	2854	1.6	328	301	0.3	63	1.2	238
Total	**151550**	**99.9**	**20033**	**19616**	**79.4**	**15570**	**20.5**	**4046**

Table 3. Timber harvesting land base information by BEC, for the Robson Valley- North Planning Area.

BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
	Ha	Ha	% of BEC	Ha	% of BEC	Ha
ESSFmm1	62788	18317	2.2	396	97.8	17921
ESSFwc3	66	0	0	0	0	0
ESSFwk1	28917	7793	13	1029	87	6764
ESSFwk2	3335	1135	10.8	123	89.2	1012
ICHmm	414	5780	0	0	100	5780
ICHwk3	53176	18820	11.6	2260	88.0	16560
SBSvk	2854	817	29.1	238	70.9	579
Total	**151550**	**52662**	**7.7**	**4046**	**92.3**	**48616**

5.4 Monitoring and Review
Ministry of Sustainable Resource Management or the agency responsible will monitor activities within OGMAs as issues are identified. It is the intention to review this plan and assess proposed changes to OGMAs at least every 5 years.

OGMAs in the leading cedar stands and higher elevations are anticipated to be stable for a significant period of time. OGMAs in stand types that are more susceptible to stand level disturbance may be subject to review and change more frequently.

If forest harvesting or a natural disturbance is considered to have impacted the integrity and/or function of an OGMA, then an assessment will take place to determine whether the affected portion should be replaced by an equivalent area, or whether the entire OGMA should be replaced.

5.5 Boundary Mapping: Natural features were used for OGMA boundaries wherever possible to ensure they could be located on the ground. OGMAs were also delineated to include complete forest stands (forest cover polygons) wherever possible to reduce operational uncertainty and increase ease of OGMA mapping.

OGMA boundaries do not have to be legally surveyed. Potential trespass across OGMA boundaries will be enforced to a reasonable standard of measurement. This means that a licensee's proposed harvest area can only be expected to be in or outside of an OGMA as it is shown on the map. Therefore if a licensee submitted a plan showing proposed development outside the mapped OGMA boundary that would be taken as correct. However, the licensee is responsible for ensuring due diligence in locating their cutblock boundaries to the accuracy shown on the map. OGMAs will be mapped ranging from 1:35,000 to 1:55,000 scale.

Further, to deal with potential operational overlap between OGMAs and cutblocks, the following may be necessary. Where Category A approved or future cutblocks are located or proposed in close proximity (within 100m) to established OGMAs, the OGMA boundary may be modified to conform to the cutblock boundary. This would be undertaken to avoid isolating timber and create a more defined boundary for future reference. This provision is not a substitute for accurate mapping and block layout.

6.0 Other Biodiversity Provisions

The *Landscape Unit Planning Guide* makes reference to comprehensive biodiversity planning which includes elements such as: seral stage distribution, landscape connectivity, species composition, and temporal and spatial distribution of cutblocks (patch size), forest interior habitat and wildlife tree retention. While old seral connectivity, old seral species composition, and old seral interior forest habitat are partially addressed through the establishment of the OGMAs, these and other elements may be fully considered in future Sustainable Resource Management Planning.

7.0 Link to the Land and Resource Management Plan (LRMP)

The Robson Valley LRMP was signed off for approval in April 1999. Within that plan there are relevant sections to consider and guide OGMA establishment.

A relevant objective is to "manage for the maintenance of representative old growth stands and their attributes." Related strategies are:

- "Where appropriate, Forest Ecosystem Networks (FENs) will be established during landscape unit planning. FEN designs should maintain continuity/linkages between; critical wildlife habitat, protected areas, travel corridors, various landscapes (alpine, early seral, mature forests, old growth, etc) and where possible incorporate inoperable and/or unmerchantable forested areas". MSRM is not pursuing the inclusion of enhanced riparian/wildlife movement corridors because of the amount of Caribou Corridor that the Ministry of Water, Land and Air Protection has objectives for in this area.
- "Maintain well distributed representative areas of old growth within and across landscape units through consideration of the Biodiversity guidebook (FPC), Protected Areas and the work of the Robson Valley Old Growth Strategy document."

Also within the Robson Valley LRMP a relevant objective is to "identify and protect small, unique areas of unusual and rare species." Related strategies are:

- "Manage red listed communities and/or species of plants and animals by protecting habitat from disturbance and loss."
- "Manage blue listed species of plants and animals and their habitat to minimize loss of habitat and disturbance."
- "Identify and protect representative areas of macro-lichen forest with local public input."

The Crescent Spur, Lower Morkill/Cushing, Forgetmenot, Upper Morkill, North Trench, and Goat LUs are within several Resource Management Zones (RMZs), as identified in the LRMP. They include:

RMZ number	RMZ name	RMZ category
B1	Rocky Mountain Trench	Special Resource Management – Natural Habitat
D1	Morkill River	General
D2	Morkill River (Cushing Creek Subzone)	General
F1	Boundary/Horsey Creek	Special Resource Management-
L2	Goat River (Upper Goat River Subzone)	General
P1	West Twin	Protected Area
P4	Betty Wendle Creek	Protected Area
A	Settlement/Agriculture	

8.0 Appendices

Appendix 1 – Crescent Spur Landscape Unit
Appendix 2 – Lower Morkill/Cushing Landscape Unit
Appendix 3 – Forgetmenot Landscape Unit
Appendix 4 – Upper Morkill Landscape Unit
Appendix 5 – North Trench Landscape Unit
Appendix 6 – Goat Landscape Unit
Appendix 7 – Rationale for OGMAs in the Robson Valley
Appendix 8 - Public input and MSRM response/rationale

Appendix 1–Crescent Spur Landscape Unit

1.0 Crescent Spur Landscape Unit Description

The Crescent Spur LU encompasses 32,192 ha, which includes Catfish Creek and is bounded on the east side by LaSalle Creek north of the Fraser, and the Goat River, south of the Fraser River as well as a portion of the Fraser River. The west boundary is bounded by a portion of the Morkill River. Of the total area, 25,799ha (80%) is within the Crown forest land base, and 17,836 ha of Crown forest land is within the Timber Harvesting Land Base (THLB). The remaining 6,393 ha (20%) is non-forested or non-Crown (e.g., rock, alpine tundra, water, private land) and have been excluded from any OGMA contributions and calculations.

The Crescent Spur LU is situated within the Northern Columbia Mountains Ecoregion, and the Cariboo Mountains Ecosection as well as the Northern Park Ranges Ecosection. The landscape unit is comprised of four Biogeoclimatic Ecosystem Classification (BEC) subzones/variants ranging from low elevation Sub-Boreal Spruce (SBS) and Interior Cedar - Hemlock (ICH) to upper elevation Engelmann Spruce-Sub-alpine Fir (ESSF) adjacent to the high elevation Alpine Tundra.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity

Wildlife diversity and values are very significant within this Landscape Unit. Grizzly bear densities are rated high in upper elevations within LaSalle/Fleet Creek and Snowshoe Creek watersheds.

The lower elevations provide key winter range for moose, elk, mule and white-tail deer. These areas are also important as summer range for bears, ungulates and many other species.

The Fraser River and it's tributaries are also known to contain red listed White Sturgeon and blue listed Bull Trout and contribute vital spawning habitat for Chinook salmon.

2.2 Timber Resources

The forests of Crescent Spur LU have been harvested since the railroad was built in 1912-14. Timber accessible to the Fraser River was logged for bridge timbers, decking and railroad ties. Further timber removal was conducted when agricultural clearing was undertaken and more recently salvage logging of Hemlock looper killed timber has occurred.

There is high visual sensitivity throughout the Rocky Mountain Trench of which Crescent Spur LU is part of. Forest health concerns are moderate to high in this LU as hemlock looper, mistletoe, and bark beetle attack occur in mature timber stands.

Table 1. Age distribution of forests within the Crescent Spur Landscape Unit.

Age	% of Crown Forested Landbase
1-60	16.5
61-100	3.6
101-140	3.6
141-250	44.1
250+	32.2

2.3 Private Land: A small portion of the Crescent Spur LU is private land, all of which is adjacent the Fraser River. Much of the private land has been altered from its natural state for housing and agriculture.

2.4 First Nations: The Crescent Spur LU is located within the traditional territory of the Lheidli T'enneh First Nation as well as the Simpcw First Nation.

The establishment of these biodiversity elements are not anticipated to have a significant impact on Lheidli T'enneh First Nation or the Simpcw First Nation. Old growth management area establishment will not limit treaty negotiations or settlements.

2.5 Mining and Mineral Exploration: Subsurface resources (minerals, coal, oil, gas and geothermal) and aggregates are significant to the province. The potential for base or precious metals has been indicated in the Snowshoe Lakes area. There was active exploration occurring in the Crescent Spur area in 1999. OGMAs have been located to avoid existing tenures wherever possible. It is important to note that establishment of old growth management areas will not impact the status of existing mineral, aggregate and gas permits or tenures; exploration and development activities are permitted. 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 relocated.

2.6 Recreation: Recreational opportunities in the Crescent Spur LU are abundant. An existing hiking trail, the Goat River Historic Trail, leads from the Fraser River to and along the Goat River. Hiking, residential hunting and fishing, berry and mushroom picking and wildlife viewing/sight seeing occur. A commercial heli-skiing tenure is issued to Crescent Spur Helicopter Holidays which operates their lodge in Crescent Spur.

Recreational activities are permitted in the OGMAs where compatible. The opportunity to develop new trails will be considered when proposed. The anticipated impact to old growth values should be considered in the approval process.

2.7 Trapping and Guiding: Trapping and guiding tenures overlap this LU. OGMAs are not anticipated to impact these tenures. If necessary, it is intended that Trappers would be able to build trapline cabins within OGMAs. The trapper would

be expected to minimize site disturbance and minimize impact to old growth attributes.

3.0 Crescent Spur Landscape Unit Objectives

Legal objectives established under the Landscape Unit plan will be Higher Level Plan objectives.

The Crescent Spur LU was ranked as a High biodiversity emphasis option through the Robson Valley Forest District Landscape Unit Planning Strategy in 1998. This High designation along with the BEC variant determines the percentage of the Crown forest land base that will be designated as OGMA. Table 2 outlines the total amount of OGMAs required in each variant and from which Crown forest category (i.e., Non Contributing-NC; Timber Harvesting Land Base -THLB)[1]. The old growth target figures in Table 2 are derived from Appendix 2 in the Landscape Unit Planning Guide.

To ensure that landscape level biodiversity values were represented across the landscape, OGMAs were established to the target in each BEC variant. The attached Crescent Spur LU map visually shows their distribution.

[1] Non Contributing (NC) forest land does not contribute to the Allowable Annual Cut. The Timber Harvesting Land Base (THLB) is made up of Contributing (C) forests and a portion of the Partially Contributing (PC) forests. Partially Contributing forests are "constrained" due to one of several factors such as unstable soils or wildlife habitat, but are still partially available for harvest. Contributing forest is unconstrained and available for timber harvest.

Table 2. Old growth management area (OGMA) requirements, Crescent Spur Landscape Unit.

BEC Variant	Crown Forested Landbase	Full OGMA Target		Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
	Ha	%	Ha	Ha	%	Ha	%	Ha
ESSFmm1	1234	3	160	349	6.1	322	0.5	27
ESSFwk1	2376	13	665	686	7.6	403	5.3	283
ICH wk3	20405	79	3877	4018	38.6	2042	37.3	1976
SBS vk	1784	5	232	235	0.6	30	3.9	205
Total	**25799**	**100**	**4934**	**5288**	**52.9**	**2797**	**47**	**2491**

Table 3. Timber harvesting land base information by BEC variant, Crescent Spur Landscape Unit.

BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
	Ha	Ha	% of BEC	Ha	% of BEC	Ha
ESSFmm1	1234	378	7.1	27	92.9	351
ESSFwk1	2376	1501	18.9	283	81.1	1218
ICH wk3	20405	14501	13.6	1976	86.4	12525
SBS vk	1784	1456	14.1	205	85.9	1251
Total	**25799**	**17836**	**14.0**	**2491**	**86.0**	**15345**

ESSFmm1: Engelmann Spruce – Subalpine Fir, moist, mild
ESSFwk1: Engelmann Spruce-Subalpine Fir, wet, cool
ICHwk3: Interior Cedar – Hemlock, wet, cool
SBSvk:Sub-boreal Spruce, very wet, cool

4.0 Crescent Spur OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Crescent Spur LU, most of the old growth targets are met within the non-contributing land base. In total, 2,491 ha of OGMA are identified in the THLB to meet old growth retention targets. The estimated impact to short term timber supply is minimal to none due to placement of OGMAs in areas experiencing other constraints (i.e., VQOs, adjacency issues, UWR, etc.). The mid and long term impact to timber supply is anticipated to be proportionate to the percent of OGMAs which are established in the THLB.

4.2 OGMA Age Classes: In locating OGMAs in the Crescent Spur LU, there were marginally deviations from direction in the Landscape Unit Planning Guide by merging information from new science with existing guidance. The most current information on large scale disturbance in the Prince George Forest Region comes from work done by Delong, 2002. In his report, *Natural Disturbance Units in the Prince George Forest Region: Guidance for Sustainable Forest Management,* Delong has moved away from Natural Disturbance types as identified in the Biodiversity Guidebook and has provided localized information on the type of natural disturbance patterns or units (NDU), and the frequency of which they occur in the region. In the entire Robson Valley North planning area there are two natural disturbance units. In the valley, the NDU is the Moist Trench- Valley while the upper elevations consist of the Moist Trench-Mountain. Because of the broad expanse of natural disturbance unit, if MSRM was unable to meet the target for a BEC variant, an attempt was made to meet it across the landscape.

Appendix 2–Lower Morkill/Cushing Landscape Unit

1.0 Lower Morkill/Cushing Landscape Unit Description

The Lower Morkill/Cushing LU encompasses 43,864 ha, includes Hellroaring and Cushing Creek which are tributaries of the Morkill River, as well as the Lower Morkill. Of the total area, 22,945 ha (52.3%) is within the Crown forest land base, and 10,035 ha of Crown forest land is within the Timber Harvesting Land Base (THLB). The remaining 20,919 ha (47.7%) is non-forested or non-Crown (e.g., rock, alpine tundra, water, private land) and have been excluded from any OGMA contributions and calculations.

The Lower Morkill/Cushing LU is situated within the Northern Park Ranges ecosection, with the northeast corner situated in the Hart Ranges ecosections. The landscape unit is comprised of four Biogeoclimatic Ecosystem Classification (BEC) subzones/variants ranging from low elevation Sub-Boreal Spruce (SBS) and Interior Cedar - Hemlock (ICH) to upper elevation Engelmann Spruce-Sub-alpine Fir (ESSF) adjacent to the high elevation Alpine Tundra.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity

This LU is known for its outstanding wildlife values. Extensive areas are rated high for caribou habitat. Small areas of medium caribou habitat occur in the higher elevations around Hellroaring Creek and Wallop Creek. A caribou movement corridor connects the Wallop Creek high value habitat with the Mt. Bagg/Hellroaring high value habitat. One other corridor exists in the upper half of Cushing Creek. This area is also frequented in the summer by the woodland caribou from the east slopes of the Rocky Mountains.

The majority of the forested area in this LU is rated high for grizzly habitat. Relatively high concentrations of grizzly are found in the entire Cushing Creek drainage. High populations of moose and wolves have also been observed in this valley. The Morkill River valley bottom, downstream of Hellroaring Creek is known as important winter range for moose, elk, mule deer and white-tailed deer. Prime mountain goat habitat has been identified in the Wallop Creek area.

The Morkill River is highly rated for fisheries values. As a tributary of the Fraser River, Chinook salmon are found in the Lower Morkill as are numerous fresh water species.

2.2 Timber Resources

The forests of the Lower Morkill/Cushing LU first saw harvesting in the late 1980s. There is evidence of spruce bark beetle throughout the susceptible stands. Road construction has been completed on most of Hellroaring and Cushing Creek and logging has been conducted along these roads in this LU. A significant portion of the LU has been taken up by Ungulate Winter Range and corridor which allows some harvesting as identified in the

management objectives for Ungulate Winter Range in the Omineca Region of the Ministry of Water, Land and Air Protection.

Table 1. Age distribution of forests within the Lower Morkill/Cushing Landscape Unit.

Age	% of Crown Forested Landbase
1-60	8.8
61-100	1.1
101-140	2.9
141-250	64.9
250+	22.3

2.3 First Nations: The Lower Morkill/Cushing LU is located within the traditional territory of the Lheidli T'enneh First Nation as well as the Simpcw First Nation.

There are no aboriginal sites indicated in this area but historic trails in the area were likely established by aboriginal use in the fur trading days. An archaeological overview assessment conducted in 1995 has shown moderate potential in the lower Morkill , mostly confined to the valley bottom.

The establishment of these biodiversity elements are not anticipated to have a significant impact on Lheidli T'enneh First Nation or the Simpcw First Nation. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration: Subsurface resources (minerals, coal, oil, gas and geothermal) and aggregates are significant to the province. While there is potential for base or precious metals in a band that runs from the south side of Hellroaring Creek across the Morkill River, there is no active mining occurring at this time. OGMAs have been located to avoid existing tenures wherever possible. It is important to note that establishment of old growth management areas will not impact the status of existing mineral, aggregate and gas permits or tenures; exploration and development activities are permitted. 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 relocated.

2.5 Recreation: Recreational opportunities in the Lower Morkill/Cushing LU were primarily restricted to extended packhorse trips or jet-boating on the lower reaches of the Morkill until 1988 when the Fraser River bridge was built and allowed road access. With road access, there has been an increase in sport fishing, canoeing and kayaking. The hunting regulations contain a vehicular restriction for the entire Morkill drainage. Most hunters use horses, although some walk or bicycle. A heli-skiing tenure is held by Crescent Spur Helicopter Holidays with extensive heli-skiing and hiking occurring in this LU. There is some potential for snowmobiling in the area and use is increasing.

Recreational activities are permitted in OGMAs where compatible. The opportunity to develop new trails will be considered when proposed. The anticipated impact to old growth values should be considered in the approval process.

2.6 Trapping and Guiding: Trapping and guiding tenures overlap this LU. OGMAs are not anticipated to impact these tenures. It is intended that Trappers would be able to build trapline cabins within OGMAs. The trapper would be expected to minimize site disturbance and minimize impact to old growth attributes.

3.0 Lower Morkill/Cushing Landscape Unit Objectives

Legal objectives established under the Landscape Unit plan will be Higher Level Plan objectives.

The Lower Morkill/Cushing LU was ranked as an Intermediate biodiversity emphasis option through the Robson Valley Forest District Landscape Unit Planning Strategy in 1998. This Intermediate designation along with the BEC variant determines the percentage of the Crown forest land base that will be designated as OGMA. Table 2 outlines the total amount of OGMAs required in each variant and from which Crown forest category (i.e., Non Contributing-NC; Timber Harvesting Land Base- THLB)[2]. The old growth target figures in Table 2 are derived from Appendix 2 in the Landscape Unit Planning Guide.

To ensure that landscape level biodiversity values were represented across the landscape, OGMAs were established to the target in each BEC variant. The attached Lower Morkill/Cushing LU map visually shows their distribution.

[2] Non Contributing (NC) forest land does not contribute to the Allowable Annual Cut. The Timber Harvesting Land Base (THLB) is made up of Contributing (C) forests and a portion of the Partially Contributing (PC) forests. Partially Contributing forests are "constrained" due to one of several factors such as unstable soils or wildlife habitat, but are still partially available for harvest. Contributing forest is unconstrained and available for timber harvest.

Table 2. Old growth management area (OGMA) requirements, Lower Morkill/Cushing Landscape Unit.

BEC Variant	Crown Forested Landbase	Full OGMA Target		Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
	Ha	%	Ha	Ha	%	Ha	%	Ha
ESSFmm1	12194	41.2	1097	1119	29.3	780	12.7	339
ESSFwk2	3280	23.4	623	608	18.2	485	4.6	123
ICH wk3	6793	33.1	883	873	23.4	628	9.3	248
SBS vk	678	2.3	61	66	1.2	33	1.2	33
Total	**22945**	**100**	**2664**	**2666**	**72.1**	**1926**	**27.8**	**743**

Table 3. Timber harvesting land base information by BEC variant, Lower Morkill/Cushing Landscape Unit.

BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
	Ha	Ha	% of BEC	Ha	% of BEC	Ha
ESSFmm1	12194	4821	7.0	339	93	4482
ESSFwk2	3280	1135	10.8	123	89.2	1012
ICH wk3	6793	3549	7.0	248	93.0	3301
SBS vk	678	529	6.2	33	93.8	496
Total	**22945**	**10034**	**7.5**	**743**	**92.5**	**9286**

ESSFmm1: Engelmann Spruce – Sub-alpine Fir, moist, mild
ESSFwk2: Engelmann Spruce- Subalpine Fir, wet, cool
ICHwk3: Interior Cedar – Hemlock, wet, cool
SBSvk: :Sub-boreal Spruce, very wet, cool

4.0 Lower Morkill/Cushing OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Lower Morkill/Cushing LU, geographic processes on the landbase have provided a challenge for resource extraction. The large volume of non-forested area (20,919 ha) coupled with the Ungulate Winter Range (UWR) and Corridor provides different opportunities for OGMA placement. In total, 743 ha. of OGMA are identified in the THLB to meet old growth retention targets. The estimated impact to short term timber supply is minimal to none due to placement in UWR and corridor. The mid and long term impact to timber supply is anticipated to be proportionate to the percent of OGMAs which are established in the THLB.

4.2 OGMA Age Classes: In locating OGMAs in the Lower Morkill/Cushing LU, there were marginal deviations from direction in the Landscape Unit Planning Guide by merging information from new science with existing guidance. The most current information on large scale disturbance in the Prince George Forest Region comes from work done by Delong, 2002. In his report, *Natural Disturbance Units in the Prince George Forest Region: Guidance for Sustainable Forest Management,* Delong has moved away from Natural Disturbance types as identified in the Biodiversity Guidebook and has provided localized information on the type of natural disturbance patterns or units (NDU), and the frequency of which they occur in the region. In the entire Robson Valley-North planning area there are two natural disturbance units. In the valley, the NDU is the Moist Trench- Valley while the upper elevations consist of the Moist Trench-Mountain. Because of the broad expanse of this natural disturbance unit, if MSRM was unable to meet the target for a BEC variant, an attempt was made to meet it across the landscape.

Appendix 3–Forgetmenot Landscape Unit

1.0 Forgetmenot Landscape Unit Description

The Forgetmenot LU encompasses 34,822 ha, which includes the upper reaches of Forgetmenot Creek and Ptomaine Creek. Forgetmenot Creek flows into the Morkill River which is a direct tributary of the Fraser River. Of the total area, 18,219 ha (52.3%) is within the Crown forest land base, and 6,269 ha of Crown forest land is within the Timber Harvesting Land Base (THLB). The remaining 16,603 ha (%) is non-forested or non-Crown (e.g., rock, alpine tundra, water, private land) and have been excluded from any OGMA contributions and calculations.

The Forgetmenot LU is situated within the Northern Park Ranges ecosection. The landscape unit is comprised of three Biogeoclimatic Ecosystem Classification (BEC) subzones/variants ranging from low elevation Interior Cedar - Hemlock (ICH) to upper elevation Engelmann Spruce-Sub-alpine Fir (ESSF) adjacent to the high elevation Alpine Tundra.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity

Extensive areas of this LU are rated high value summer range for caribou. Smaller portions are high or medium value habitat for caribou. The summer range is frequented by the woodland caribou from the east slopes of the Rocky Mountains. Grizzly bear habitat is also ranked high in forested areas of this LU. There is a volcanic area in the upper Forgetmenot that provides habitat for elk, moose and bighorn sheep.

2.2 Timber Resources

Timber harvesting does not have a long history in this area. Minor timber volumes have been logged from Forgetmenot Creek by the Ministry of Forests' Small Business Forest Enterprise Program. A significant portion of the LU has been taken up by Ungulate Summer Range which currently does not have management objectives about harvesting within this habitat. By placing OGMAs within these areas, it provides for some certainty for ungulate summer range.

Table 1. Age distribution of forests within the Forgetmenot Landscape Unit.

Age	% of Crown Forested Landbase
1-60	6.6
61-100	1.2
101-140	7.7
141-250	50.1
250+	34.4

2.3 First Nations: The Forgetmenot LU is located within the traditional territory of the Lheidli T'enneh First Nation as well as the Simpcw First Nation.

The establishment of these biodiversity elements are not anticipated to have a significant impact on Lheidli T'enneh First Nation or the Simpcw First Nation. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration: Subsurface resources (minerals, coal, oil, gas and geothermal) and aggregates are significant to the province. The upper Forgetmenot Creek north of Ptomaine Creek has gypsum potential as well as showings of phosphate and zinc, however there has been no active mining in this area. OGMAs have been located to avoid existing tenures wherever possible. It is important to note that establishment of old growth management areas will not impact the status of existing mineral, aggregate and gas permits or tenures; exploration and development activities are permitted. 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 relocated.

2.5 Recreation: Recreational opportunities in the Forgetmenot LU are similar to those in Lower Morkill/Cushing LU. Access was limited in the area until 1988 when the Fraser River bridge was built. This allows recreation users to use vehicles to access areas for hiking, sport fishing, canoeing and kayaking.

Recreational activities are permitted in the OGMAs where compatible. The opportunity to develop new trails will be considered when proposed. The anticipated impact to old growth values should be considered in the approval process.

2.6 Trapping and Guiding: Trapping and guiding tenures overlap this LU. OGMAs are not anticipated to impact these tenures. It is intended that Trappers would be able to build trapline cabins within OGMAs. The trapper would be expected to minimize site disturbance and minimize impact to old growth attributes.

3.0 Forgetmenot Landscape Unit Objectives

Legal objectives established under the Landscape Unit plan will be Higher Level Plan objectives.

The Forgetmenot LU was ranked as having an Intermediate biodiversity emphasis option through the Robson Valley Forest District Landscape Unit Planning Strategy in 1998. This Intermediate designation along with the BEC variant determines the percentage of the Crown forest land base that will be designated as OGMA. Table 2 outlines the total amount of OGMAs required in each variant and from which Crown forest category (i.e., Non Contributing-NC; Timber Harvesting Land Base-THLB)[3]. The old growth target figures in Table 2 are derived from Appendix 2 in the Landscape Unit Planning Guide.

To ensure that landscape level biodiversity values were represented across the landscape, OGMAs were established to the target in each BEC variant. The attached Forgetmenot LU map visually shows their distribution.

[3] Non Contributing (NC) forest land does not contribute to the Allowable Annual Cut. The Timber Harvesting Land Base (THLB) is made up of Contributing (C) forests and a portion of the Partially Contributing (PC) forests. Partially Contributing forests are "constrained" due to one of several factors such as unstable soils or wildlife habitat, but are still partially available for harvest. Contributing forest is unconstrained and available for timber harvest.

Table 2. Old growth management area (OGMA) requirements, Forgetmenot Landscape Unit.

BEC Variant	Crown Forested Landbase	Full OGMA Target		Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
	Ha	%	Ha	Ha	%	Ha	%	Ha
ESSFmm1	17601	95	1584	1236	96	1234	0.2	2
ESSFwk2	55	0.6	10	0	0	0	0	0
ICH wk3	563	4.4	73	48	2.7	35	1.0	13
Total	**18219**	**100**	**1667**	**1284**	**98.7**	**1269**	**1.2**	**15**

Table 3. Timber harvesting land base information by BEC variant, Forgetmenot Landscape Unit.

BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
	Ha	Ha	% of BEC	Ha	% of BEC	Ha
ESSFmm1	17601	5960	0	2	100	5958
ESSFwk2	55	0	0	0	0	0
ICHwk3	563	309	4.2	13	95.8	296
Total	**18219**	**6269**	**0.2**	**15**	**99.8**	**6254**

ESSFmm1: Engelmann Spruce – Sub-alpine Fir, moist, mild
ESSFwk2: Engelmann Spruce- Subalpine Fir, wet and cold
ICHwk3: Interior Cedar – Hemlock, wet, cool

4.0 Forgetmenot OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Forgetmenot LU, most of the old growth targets are met within the non-contributing land base. Logging is conducted mostly along the major haul road. In total, 15 ha of OGMA are identified in the THLB to meet old growth retention targets. The estimated impact to short term timber supply is minimal to none. The mid and long term impact to timber supply is anticipated to be proportionate to the percent of OGMAs which are established in the THLB.

4.2 OGMA Age Classes: In locating OGMAs in the Forgetmenot LU, there were marginal deviations from direction in the Landscape Unit Planning Guide by merging information from new science with existing guidance. The most current information on large scale disturbance in the Prince George Forest Region comes from work done by Delong, 2002. In his report, *Natural Disturbance Units in the Prince George Forest Region: Guidance for Sustainable Forest Management,* Delong has moved away from Natural Disturbance types as identified in the Biodiversity Guidebook and has provided localized information on the type of natural disturbance patterns or units (NDU), and the frequency of which they occur in the region. In the entire Robson Valley-North planning area there are two natural disturbance units. In the valley, the NDU is the Moist Trench- Valley while the upper elevations consist of the Moist Trench-Mountain. Because of the broad expanse of natural disturbance unit, if MSRM was unable to meet the target for a BEC variant, an attempt was made to meet it across the landscape.

Appendix 4–Upper Morkill Landscape Unit

1.0 Upper Morkill Landscape Unit Description

The Upper Morkill LU encompasses 52,161 ha, which encompasses the upper Morkill River upstream of Forgetmenot and Cushing Creeks. Of the total area, 29,421 ha (56.4%) is within the Crown forest land base, and 6,590 ha of Crown forest land is within the Timber Harvesting Land Base (THLB). The remaining 22,740 ha (43.6%) is non-forested or non-Crown (e.g., rock, alpine tundra, water, private land) and have been excluded from any OGMA contributions and calculations.

The Upper Morkill LU is situated within the Northern Park Ranges ecosection. The landscape unit is comprised of one Biogeoclimatic Ecosystem Classification (BEC) variant. The Engelmann Spruce-Sub-alpine Fir (ESSF) variant.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity

Extensive areas of this LU are rated high value summer range for caribou. Smaller portions are medium value summer habitat for caribou. The summer range is frequented by the woodland caribou from the east slopes of the Rocky Mountains. Grizzly bear habitat is also ranked high in forested areas of this LU.

The Morkill River system is highly rated for fisheries values. Chinook salmon and fresh water fish species are present in the main Morkill River up to a barrier at Morkill Falls. The river above the Morkill Falls contributes to ensuring stream temperatures and food sources are favourable for the downstream fisheries.

2.2 Timber Resources

The forests of Upper Morkill LU have had harvesting occur in the early 1980s. Logging has been restricted to the lower portion of this LU as soil stability in this valley creates unfavourable harvesting conditions.

Table 1. Age distribution of forests within the Upper Morkill Landscape Unit.

Age	% of Crown Forested Landbase
1-60	6.2
61-100	4.6
101-140	10.5
141-250	49.1
250+	29.6

2.3 First Nations: The Upper Morkill LU is located within the traditional territory of the Lheidli T'enneh First Nation as well as the Simpcw First Nation.

The establishment of these biodiversity elements are not anticipated to have a significant impact on Lheidli T'enneh First Nation or the Simpcw First Nation. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration: Subsurface resources (minerals, coal, oil, gas and geothermal) and aggregates are significant to the province. OGMAs have been located to avoid existing tenures wherever possible. It is important to note that establishment of old growth management areas will not impact the status of existing mineral, aggregate and gas permits or tenures; exploration and development activities are permitted. 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 relocated.

2.5 Recreation: Recreational opportunities in the Upper Morkill LU are limited in nature but there is potential for backcountry recreation at the top end of this LU.

Recreational activities are permitted in the OGMAs and where compatible. The opportunity to develop new trails will be considered when proposed. The anticipated impact to old growth values should be considered in the approval process.

2.6 Trapping and Guiding: Trapping and guiding tenures overlap this LU. OGMAs are not anticipated to impact these tenures. It is intended that Trappers would be able to build trapline cabins within OGMAs. The trapper would be expected to minimize site disturbance and minimize impact to old growth attributes.

3.0 Upper Morkill Landscape Unit Objectives

Legal objectives established under the Landscape Unit plan will be Higher Level Plan objectives.

The Upper Morkill LU was ranked as an Intermediate biodiversity emphasis option through the Robson Valley Forest District Landscape Unit Planning Strategy in 1998. This Intermediate designation along with the BEC variant determines the percentage of the Crown forest land base that will be designated as OGMA. Table 2 outlines the total amount of OGMAs required in each variant and from which Crown forest category (i.e., Non Contributing-NC; Timber Harvesting Land Base-THLB)[4]. The old growth target figures in Table 2 are derived from Appendix 2 in the Landscape Unit Planning Guide.

To ensure that landscape level biodiversity values were represented across the landscape, OGMAs were established to the target in each BEC variant. The attached Upper Morkill LU map visually shows their distribution.

Table 2. Old growth management area (OGMA) requirements, Upper Morkill Landscape Unit.

BEC Variant	Crown Forested Landbase	Full OGMA Target		Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
	Ha	%	Ha	Ha	%	Ha	%	Ha
ESSFmm1	29421	100	2126	2908	99.2	2884	0.8	24
Total	**29421**	**100**	**2126**	**2908**	**99.2**	**2884**	**0.8**	**24**

Table 3. Timber harvesting land base information by BEC variant, Upper Morkill Landscape Unit.

BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
	Ha	Ha	% of BEC	Ha	% of BEC	Ha
ESSFmm1	29421	6590	0.4	24	99.6	6566
Total	**29421**	**6590**	**0.4**	**24**	**99.6**	**6566**

ESSFmm1: Engelmann Spruce – Sub-alpine Fir, moist, mild

[4] Non Contributing (NC) forest land does not contribute to the Allowable Annual Cut. The Timber Harvesting Land Base (THLB) is made up of Contributing (C) forests and a portion of the Partially Contributing (PC) forests. Partially Contributing forests are "constrained" due to one of several factors such as unstable soils or wildlife habitat, but are still partially available for harvest. Contributing forest is unconstrained and available for timber harvest.

4.0 Upper Morkill OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Upper Morkill LU, most of the old growth targets are met within the non-contributing land base. In total, 24 ha of OGMA are identified in the THLB to meet old growth retention targets. The estimated impact to short term timber supply is minimal to none. The mid and long term impact to timber supply is anticipated to be proportionate to the percent of OGMAs which are established in the THLB.

4.2 OGMA Age Classes: In locating OGMAs in the Upper Morkill Kinbasket LU, there were marginal deviations from direction in the Landscape Unit Planning Guide by merging information from new science with existing guidance. The most current information on large scale disturbance in the Prince George Forest Region comes from work done by Delong, 2002. In his report, *Natural Disturbance Units in the Prince George Forest Region: Guidance for Sustainable Forest Management,* Delong has moved away from Natural Disturbance types as identified in the Biodiversity Guidebook and has provided localized information on the type of natural disturbance patterns or units (NDU), and the frequency of which they occur in the region. In the entire Robson Valley-North planning area there are two natural disturbance units. In the valley, the NDU is the Moist Trench- Valley while the upper elevations consist of the Moist Trench-Mountain. Because of the broad expanse of natural disturbance unit, if MSRM was unable to meet the target for a BEC variant, an attempt was made to meet it across the landscape.

Appendix 5–North Trench Landscape Unit

1.0 North Trench Landscape Unit Description

The North Trench LU encompasses 55,938 ha, which includes West Twin, Elder, Legrand and Clyde Creeks as well as the lower portion of East Twin and Fleet Creeks. Each of these creeks flow into the Fraser River. West Twin Provincial Park covers a large portion of this landscape unit. Of the total area, 37,860 ha (67.7%) is within the Crown forest land base, and 7,873 ha of Crown forest land is within the Timber Harvesting Land Base (THLB). The remaining 18,078 ha (32.3 %) is non-forested or non-Crown (e.g., rock, alpine tundra, water, private land) and have been excluded from any OGMA contributions and calculations.

The North Trench LU is situated within the Northern Parks Ecosection. The landscape unit is comprised of five Biogeoclimatic Ecosystem Classification (BEC) subzones/variants ranging from low elevation Sub-Boreal Spruce (SBS) and Interior Cedar - Hemlock (ICH) to upper elevation Engelmann Spruce-Sub-alpine fir (ESSF) adjacent to the high elevation Alpine Tundra.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity

Wildlife diversity and values are very significant within this landscape unit. Grizzly bear densities are rated high in higher elevation locations in the Fleet and Clyde Creek areas. Lower elevations have moderate densities of grizzly due to other land use such as harvesting and agricultural clearing and the related access. A significant caribou travel corridor runs from the West Twin/Legrand area across the valley floor and up East Twin/Fleet Creeks.

2.2 Timber Resources

Logging has been important in the North Trench area since the railroad was built in 1912-14, when logs were needed for bridge timbers, decking and railroad ties. Forests easily accessible to the Fraser River were logged first. These areas adjacent the Fraser River have been further cleared for agriculture and settlement reasons. With large areas of Caribou habitat and West Twin Provincial Park and Protected Area in this LU, access to timber has been somewhat restricted.

Table 1. Age distribution of forests within the North Trench Landscape Unit.

Age	% of Crown Forested Landbase
1-60	13.0
61-100	16.9
101-140	5.2
141-250	38.7
250+	26.2

2.3 First Nations: The North Trench LU is located within the traditional territory of the Lheidli T'enneh First Nation as well as the Simpcw First Nation.

The establishment of these biodiversity elements are not anticipated to have a significant impact on Lheidli T'enneh First Nation or the Simpcw First Nation. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration: Subsurface resources (minerals, coal, oil, gas and geothermal) and aggregates are significant to the province. OGMA have been located to avoid existing tenures wherever possible. The potential for base or precious metals has been indicated in a high elevation band between La Salle Creek and East Twin Creek and in a wide band from Fleet Creek through McBride. It is important to note that establishment of old growth management areas will not impact the status of existing mineral, aggregate and gas permits or tenures; exploration and development activities are permitted. 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 relocated.

2.5 Recreation: Recreational is of great significance in the North Trench LU. Hiking and horse trails are present, with an established trail at Clyde Creek that enters West Twin Park. Berry picking and mushroom picking/wild crafting are popular in this area. Crescent Spur Helicopter Holidays utilizes Rider Mountain, north of East Twin Creek for commercial heli-skiing.

Recreational activities are permitted in the OGMAs and where compatible. The opportunity to develop new trails will be considered when proposed. The anticipated impact to old growth values should be considered in the approval process.

2.6 Trapping and Guiding: Trapping and guiding tenures overlap this LU. OGMAs are not anticipated to impact these tenures. It is intended that Trappers would be able to build trapline cabins within OGMAs. The trapper would be expected to minimize site disturbance and minimize impact to old growth attributes.

3.0 North Trench Landscape Unit Objectives

Legal objectives established under the Landscape Unit plan will be Higher Level Plan objectives.

The North Trench LU was ranked as an Intermediate biodiversity emphasis option through the Robson Valley Forest District Landscape Unit Planning Strategy in 1998. This Intermediate designation along with the BEC variant determines the percentage of the Crown forest land base that will be designated as OGMA. Table 2 outlines the total amount of OGMAs required in each variant and from which Crown forest category (i.e., Non Contributing-NC; Timber Harvesting Land Base-THLB)[5]. The old growth target figures in Table 2 are derived from Appendix 2 in the Landscape Unit Planning Guide.

To ensure that landscape level biodiversity values were represented across the landscape, OGMAs were established to the target in each BEC variant. The attached North Trench LU map visually shows their distribution.

Table 2. Old growth management area (OGMA) requirements, North Trench Landscape Unit.

BEC Variant	Crown Forested Landbase	Full OGMA Target		Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
	Ha	%	Ha	Ha	%	Ha	%	Ha
ESSF mm1	2338	3.9	210	257	6	253	0.1	4
ESSFwk1	9509	33.7	1807	809	18.9	799	0.2	10
ICH wk3	25207	61	3277	3157	74.2	3134	0.5	23
ICH mm	414	0.7	37	0	0	0	0	0
SBS vk	392	0.7	35	0	0	0	0	0
Total	**37860**	**100**	**5366**	**4223**	**99.1**	**4186**	**0.8**	**37**

[5] Non Contributing (NC) forest land does not contribute to the Allowable Annual Cut. The Timber Harvesting Land Base (THLB) is made up of Contributing (C) forests and a portion of the Partially Contributing (PC) forests. Partially Contributing forests are "constrained" due to one of several factors such as unstable soils or wildlife habitat, but are still partially available for harvest. Contributing forest is unconstrained and available for timber harvest.

Table 3. Timber harvesting land base information by BEC variant, North Trench Landscape Unit.

BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
	Ha	Ha	% of BEC	Ha	% of BEC	Ha
ESSF mm1	2338	568	0.7	4	99.3	564
ESSFwk1	9509	1126	0.9	10	99.1	1116
ICH mm	25207	316	7.3	23	92.7	293
ICHwk3	414	5780	0	0	100	5780
SBS vk	392	83	0	0	100	83
Total	**37860**	**7873**	**0.5**	**37**	**99.5**	**7836**

ESSFmm1: Engelmann Spruce – Sub-alpine Fir, moist, mild
ESSFwk1: Engelmann Spruce – Sub-alpine Fir, wet, cool
ICHmm: Interior Cedar – Hemlock, moist, mild
ICHwk3: Interior Cedar – Hemlock, wet, cool
SBSvk: Sub-boreal Spruce, very wet, cool

4.0 North Trench OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the North Trench LU, the majority of the old growth targets are met within the non-contributing land base. In total, 37 ha of OGMA are identified in the THLB to meet old growth retention targets. These areas were chosen where access to the timber is difficult and costly. The estimated impact to short term timber supply is minimal to none. The mid and long term impact to timber supply is anticipated to be proportionate to the percent of OGMAs which are established in the THLB.

4.2 OGMA Age Classes: In locating OGMAs in the North Trench LU, there were marginal deviations from direction in the Landscape Unit Planning Guide by merging information from new science with existing guidance. The most current information on large scale disturbance in the Prince George Forest Region comes from work done by Delong, 2002. In his report, *Natural Disturbance Units in the Prince George Forest Region: Guidance for Sustainable Forest Management,* Delong has moved away from Natural Disturbance types as identified in the Biodiversity Guidebook and has provided localized information on the type of natural disturbance patterns or units (NDU), and the frequency of which they occur in the region. In the entire Robson Valley-North planning area there are two natural disturbance units. In the valley, the NDU is the Moist Trench- Valley while the upper elevations consist of the Moist Trench-Mountain. Because of the broad expanse of natural disturbance unit, if MSRM were unable to meet the target for a BEC variant, an attempt was made to meet it across the landscape.

Appendix 6–Goat Landscape Unit

1.0 Goat Landscape Unit Description

The Goat LU encompasses 34,611 ha, which includes McLeod and Northstar Creeks, as well as the upper reaches of the Goat River. Of the total area, 17,306 ha (50%) is within the Crown forest land base, and 5,311 ha of Crown forest land is within the Timber Harvesting Land Base (THLB). The remaining 17,305 ha (50%) are non-forested or non-Crown (e.g., rock, alpine tundra, water, private land) and have been excluded from any OGMA contributions and calculations.

The Goat LU is situated within the Northern Columbia Mountains ecosection. The landscape unit is comprised of three Biogeoclimatic Ecosystem Classification (BEC) subzones/variants ranging from low elevation Interior Cedar - Hemlock (ICH) to upper elevation Engelmann Spruce-Sub-alpine fir (ESSF) adjacent to the high elevation Alpine Tundra.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity

Fisheries values are very high in the Goat LU. The main stem Goat is rated class A fish habitat up to and including the lower few kilometres of North Star Creek. There is a salmon spawning area near its confluence with McLeod Creek and salmon have been sighted up to the Big Bend area of the Goat River. Bull trout is a blue listed species present in the main Goat River. A Wildlife Habitat Area (WHA) is being proposed up stream of the confluence of the Milk River because of unique spawning habitat of bull trout.

The Goat LU contains critical habitat for several wildlife species. A large area of Mountain goat habitat exists in the vicinity of Goat Mountain between Kendall, Whitehorse and McLeod Creek. An area of caribou medium value habitat buffers the high habitat value area in upper McLeod Creek. South of the main stem Goat River and west toward North Star Creek is medium value habitat, with high value habitat in the Goat and North Star headwaters. The entire LU except the alpine tundra was rated as high grizzly habitat. A variety of furbearers are also present.

2.2 Timber Resources

The Robson Valley LRMP identified the Upper Goat as a general resource management sub-zone with harvesting of 445,000m^3 of timber during the first pass and joint sign off by the Ministry of Forests and the Ministry of Environment, Lands and Parks. There has been no logging in the Goat LU to date as there are no roads in the Upper Goat-Northstar-McLeod area while the licensee deals with issues related to access.

Table 1. Age distribution of forests within the Goat Landscape Unit.

Age	% of Crown Forested Landbase
1-60	0.1
61-100	0.6
101-140	3.0
141-250	79.8
250+	16.5

2.3 First Nations: The Goat LU is located within the traditional territory of the Lheidli T'enneh First Nation as well as the Simpcw Nation.

The establishment of these biodiversity elements are not anticipated to have a significant impact on Lheidli T'enneh First Nation or the Simpcw Nation. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration: Subsurface resources (minerals, coal, oil, gas and geothermal) and aggregates are significant to the province. There are no producing mines or active tenures in this area but it has been identified as having mineral potential. The entire LU with the exception of the middle-lower North Star Creek, shows potential for base or precious metals. There is a mining record of past production for gold near the confluence of the Goat and Milk Rivers. OGMAs have been located to avoid existing tenures wherever possible. It is important to note that establishment of old growth management areas will not impact the status of existing mineral, aggregate and gas permits or tenures; exploration and development activities are permitted. 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 relocated.

2.5 Recreation: Recreational opportunities in the Goat LU are limited because of difficult access. The special feature in this LU includes the historic Goat River Trail from the Fraser River to Barkerville. McLeod Lake at the headwaters of McLeod Creek; the substantial snowfields of the Goat Mountain Glacier and North Star Mountain are also special features. Lack of access is the limiting factor for recreational activity in this LU. The west half of the Goat River and North Star Creek are tenured to Canadian Mountain Holidays-McBride for heli-skiing. Snowmobiling in the Upper Goat River into the Barkerville area is becoming increasingly popular.

Recreational activities are permitted in the OGMAs where compatible. The opportunity to develop new trails will be considered when proposed. The anticipated impact to old growth values should be considered in the approval process.

2.6 Trapping and Guiding: Trapping and guiding tenures overlap this LU. OGMAs are not anticipated to impact these tenures. It is intended that Trappers would be able to build trapline cabins within OGMAs. The trapper would be expected to minimize site disturbance and minimize impact to old growth attributes.

3.0 Goat Landscape Unit Objectives

Legal objectives established under the Landscape Unit plan will be Higher Level Plan objectives.

The Goat LU was ranked as an Intermediate biodiversity emphasis option through the Robson Valley Forest District Landscape Unit Planning Strategy in 1998. This Intermediate designation along with the BEC variant determines the percentage of the Crown forest land base that will be designated as OGMA. Table 2 outlines the total amount of OGMAs required in each variant and from which Crown forest category (i.e., Non Contributing-NC; Timber Harvesting Land Base-THLB)[6]. The old growth target figures in Table 2 are derived from Appendix 2 in the Landscape Unit Planning Guide.

To ensure that landscape level biodiversity values were represented across the landscape, OGMAs were established to the target in each BEC variant. The attached Goat LU map visually shows their distribution.

Table 2. Old growth management area (OGMA) requirements, Goat Landscape Unit.

BEC Variant	Crown Forested Landbase	Full OGMA Target		Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
	Ha	%	Ha	Ha	%	Ha	%	Ha
ESSFwc3	66	0.4	13	16	0.5	16	0	0
ESSFwk1	17032	98.8	3236	3194	76	2458	22.7	736
ICHwk3	208	0.8	27	27	0.8	27	0	0
Total	**17306**	**100**	**3276**	**3237**	**77.3**	**2501**	**22.7**	**736**

Table 3. Timber harvesting land base information by BEC variant, Goat Landscape Unit.

BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
	Ha	Ha	% of BEC	Ha	% of BEC	Ha
ESSFwc3	66	0	0	0	0	0
ESSFwk1	17032	5166	14.2	736	85.7	4430
ICH wk3	208	145	0	0	0	145
Total	**17306**	**5311**	**13.9**	**736**	**86.1**	**4575**

ESSFwc2: Engelmann Spruce-Sub-alpine Fir, wet, cold
ESSFwk1: Engelmann Spruce Sub-alpine Fir, wet, cool
ICHwk1: Interior Cedar – Hemlock, wet, cool

[6] Non Contributing (NC) forest land does not contribute to the Allowable Annual Cut. The Timber Harvesting Land Base (THLB) is made up of Contributing (C) forests and a portion of the Partially Contributing (PC) forests. Partially Contributing forests are "constrained" due to one of several factors such as unstable soils or wildlife habitat, but are still partially available for harvest. Contributing forest is unconstrained and available for timber harvest.

4.0 Goat OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Goat LU, most of the old growth targets are met within the non-contributing land base. In total, 736 ha of OGMA are identified in the THLB to meet old growth retention targets. The estimated impact to short term timber supply is minimal to none. The mid and long term impact to timber supply is anticipated to be proportionate to the percent of OGMAs which are established in the THLB.

4.2 OGMA Age Classes: In locating OGMAs in the Goat LU, there were marginal deviations from direction in the Landscape Unit Planning Guide by merging information from new science with existing guidance. The most current information on large scale disturbance in the Prince George Forest Region comes from work done by Delong, 2002. In his report, *Natural Disturbance Units in the Prince George Forest Region: Guidance for Sustainable Forest Management,* Delong has moved away from Natural Disturbance types as identified in the Biodiversity Guidebook and has provided localized information on the type of natural disturbance patterns or units (NDU), and the frequency of which they occur in the region. In the entire Robson Valley-North planning area there are two natural disturbance units. In the valley, the NDU is the Moist Trench- Valley while the upper elevations consist of the Moist Trench-Mountain. Because of the broad expanse of natural disturbance unit, if MSRM was unable to meet the target for a BEC variant, an attempt was made to meet it across the landscape.

Appendix7

Rationale for Old Growth Management Areas in the Robson Valley