Mackenzie Phase 1
Sustainable Land Use and Resource Plan

Mackenzie Biodiversity Chapter

Background Report:

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

Gaffney / Manson River
Gillis / Klawli
Parsnip
Twenty Mile
Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson
Misinchinka-Tudyah B
Kennedy

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Background Report – Mackenzie Biodiversity Chapter for the Mackenzie Sustainable Land Use and Resource Plan

1.0 Introduction

This report provides background information used during the preparation of old growth management areas (OGMAs), within the Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson; Gillis/ Klawli; Parsnip; Twenty Mile; Gaffney/Manson River; Misinchinka-Tudyah B, and Kennedy landscape units (henceforth collectively called the 'planning area'). 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 can be found in the Resource Management Zone Direction (chapter 8) of the Mackenzie Land and Resource Management Plan (LRMP).

Strategic Land and Resource Planning (SLRP) is being undertaken in high priority areas of the province, and was an important component of the *Forest Practices Code* (FPC) which allowed legal establishment of objectives to address landscape level biodiversity values. This importance is carried over to the *Forest and Range Practices Act* and the *Land Amendment Act* and *Land Use Objectives 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'.

SLRP 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.

Prior to the 2008 Non-spatial biodiversity order, the Mackenzie Forest District had completed draft Landscape Unit (LU) boundaries and established Biodiversity Emphasis Options (BEO) in accordance with the direction provided by government. There are 44 LUs within the Mackenzie Forest District. Several LUs have been grouped together due to their small size and the difficulties posed in achieving targets in those small LUs. These are referred to as landscape unit groups, of which there are 37. This report outlines the SLRP planning process and objectives for the Mackenzie area, which includes 7 LUs in the southern part of the Forest District. (See Table 1 for LU names and BEOs and Figure 1 for LU group boundaries).

Delineation of OGMAs was undertaken by the Integrated Land Management Bureau (ILMB) with information provided by Ministry of Forests (MOF) and Ministry of Environment (MOE) staff. Input from licensees, government agencies, First Nations and other levels of government has been solicited and considered during this process.

Advertising for public review and comment will be used to garner further local area knowledge and input. It is important to note that during public consultation, comments are sought regarding

the location of OGMAs and the establishment of legal objectives rather than the content of this report. First Nations consultation was conducted in a separate process during the development of locating spatial OGMAs.

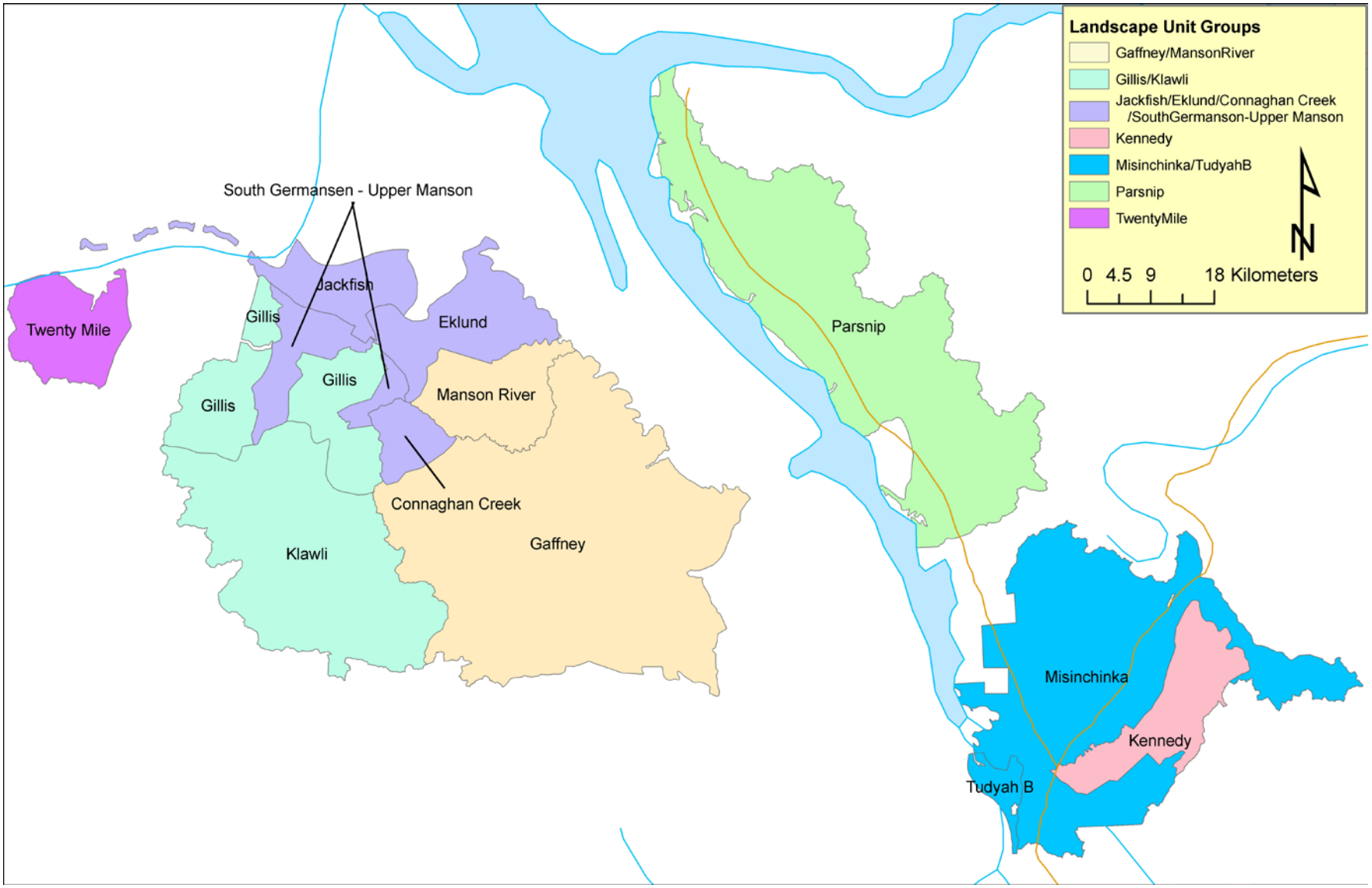
Once made legal, the distribution of OGMAs will be reviewed periodically by ILMB or the relevant agency to ensure their ecological suitability through time.

As stated in the original document: "A summary of all public comments and recommendations and the action considered for these shall be included in an appendix once the advertising period has concluded." These comments and recommendations are included in Appendix 7 of this document.

Table 1. Landscape Units and Biodiversity Emphasis Options within the Plan

Landscape Unit/Group	**Biodiversity Emphasis Option (BEO)**
Gaffney / Manson River	Low
Gillis/Klawli	Intermediate
Parsnip	Intermediate
Twenty Mile	Intermediate
Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson	High
Kennedy	High
Misinchinka-Tudyah B	Low

Figure 1. Spatial location of 7 Landscape Unit Groups for Phase 1 OGMA development in the Mackenzie Forest District.



2.0 Business Case / Purpose

The plan area consists of 7 landscape units/groups located throughout the southern portion of the Mackenzie Forest District. The community of Mackenzie is supported through 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) because of increasing pressures on the land base resulting from Mountain Pine Beetle movement in the area, concern for Caribou survival and potential habitat loss, as well as industrial pressures on the land base related to mining activities.

Mackenzie's serene location in the Northern Rocky Mountain Trench, two hours north of Prince George, provides strategic access to a resource planning area larger than Vancouver Island. Excellent air, ground, rail, and marine transportation links are the methods of access to a hotbed of mining potential, forestry operations, and adventure tourism opportunity. While Mackenzie's economy is primarily dependent on the forest industry, local companies have also benefited from servicing the mining exploration and development sector (City of Mackenzie, 2006). Given the potential for growth of populations in this area and the resulting pressures on the land base for settlement infrastructure in conjunction with the increase in recreational use, it is important for managers to examine the probable land use impacts and plan for these where possible.

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

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

The seven landscape units and groups have many similar reasons for being a priority for biodiversity planning:

- Forest harvesting pressure in landscapes that have limited old growth attributes;
- Immediate harvesting required to deal with forest health issues;
- Many of the same ecological characteristics;
- Increased land use pressure from multiple resource users;
- Increased interest from commercial tenures;
- Pressure on the land base resulting from other agency initiatives such as Ungulate Winter Range, and
- Potential for winter recreation conflicts.
- Desire for certainty for First Nations values.

3.0 Summary of Benefits and Impacts

Within the context of the Integrated Land Management Bureau and SLRP, the underlying purpose of the establishment of OGMAs is to help produce greater certainty for other resource uses and yield increased economic and social benefits while maintaining environmental values.

3.1 Benefits and Impacts of Old Growth Management Areas

The benefits and impacts of the establishment of OGMAs in Gaffney / Manson River; Gillis / Klawli; Parsnip; Twenty Mile; Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson; Kennedy and Misinchinka-Tudyah B Landscape units provide 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 and assists with forest certification commitments;
- Improved certainty for one aspect of biodiversity for a landscape on the brink of significant harvesting due to Mountain Pine Beetle;
- Provides opportunity for recreation and tourism based activity in the area surrounding Mackenzie;
- Contribution toward a landscape level ecosystem network for movement of genetic diversity across the landscape;
- No short term impact to the timber supply of the Mackenzie Timber Supply Area (TSA); very small mid and long term impact to the timber supply;
- Impact on the timber harvesting land base (THLB) of 31,439 hectares or 8.3%
- 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 Forest and Range Practises Act and provide direction to any operational plans covered by the Forest Practices Code Act. The operational plans must be consistent with these objectives.

The Regional Executive Director of the Integrated Land Management Bureau establishes the land use objectives under section 93.4 of the Land Act. The Objectives are intended to guide other Statutory Decision Makers, such as the District Manager of Ministry of Forests, when reviewing or approving operational plans.

OGMAs and OGMA objectives apply only to provincial forest lands.

4.1 Old Growth Management Areas

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 some minimum requirement for interior forest conditions. The impact of edge effect should also be considered.

While Park and Crown forest lands outside of provincial forest may contribute to old seral representation, LU objectives do not apply to these areas. Ministry of Environment 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.

Where LU/LU groups do not contain adequate old growth to meet target levels, or where the impact on the THLB is considered to be too great, recruitment of younger aged stands will be used to fill the gap to reach the target percentages.

5.0 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 Northern Long-eared Myotis. These are all red or blue listed species in the plan area. Each LU contains varying amounts of wildlife habitat from which to build

on for ecosystem management. The declared ungulate winter range established under the Government Action Regulations and FRPA 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 the establishment of riparian reserve zones will contribute to ecosystem integrity. The habitat provided by these various processes, in conjunction with OGMAs, provides the fundamental "backbone" for maintaining a functioning ecosystem.

An important part of the planning exercise was to ensure that these separate processes complemented each other. Larger patches of old growth provides core areas and smaller patches across the landscape allow greater opportunity to improve connectivity. 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 and the dispersal and genetic flow of these species.

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. In the current situation where insect levels are epidemic, allowing OGMAs to die and recover by allowing natural seral processes to occur will be acceptable where there is not adequate representation of alternate tree species to find replacement OGMAs for the dead ones.

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, community watersheds or declared Ungulate Winter Range, was also considered in the selection of OGMAs when they occur. 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 activities 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) or Forest Stewardship Plans (FSPs) were excluded from candidate OGMAs following direction outlined in the *Landscape Unit Planning Guide*. Licensees have reviewed the maps as part of the process and are identifying future harvesting opportunities so that timber supply impacts can be reduced wherever possible.

Licensees identified areas where forest health issues for beetle management will require harvesting in the short term. These areas were determined to be unsuitable for OGMAs unless there was a previous conservation designation or significant ecological reason for retention or where there is a large component of pine across the landscape.

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 cannot 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 Mackenzie Forest District area total OGMA attributes. Appendices 1 through 7 detail OGMA attributes specific to each LU or LU group.

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.

Table 2 OGMA requirements for Mackenzie Phase 1 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
Group 2[1]	153,951	31	19,694	19,773	52.7	10,433	47.2	9,340
Group 3[2]	92,025	29	18,658	18,671	67	12,508	33.1	6,163
Group 4[3]	131,684	23	14,965	13,514	29.2	3,887	70.8	9,627
Group 5[4]	71,998	11	6,752	6,779	45.6	3,119	54.3	3,680
Group 7[5]	25,205	6	3,597	3,612	27.2	983	72.8	2,629
Total	**474,863**	**100**	**63,666**	**62,349**	**49.6**	**30,930**	**50.4**	**31,439**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
2-Group 3-**ESSFwc3** (Engelmann Spruce Subalpine Fir wet cold Cariboo variant), **ESSFwk2** (Engelmann Spruce Subalpine Fir wet cool Misinchinka-Tudyah B variant)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)
5-Group 7 **BWBSdk1 coniferous** (Boreal White and Black Spruce dry cool Stikine variant)

Table 3 Timber harvesting land base information for Mackenzie Phase 1 Planning Area

BEC variant	Crown Forested Land base	Timber Harvesting Land base (before OGMAs)	OGMAs in THLB		Remaining THLB	
	Ha	Ha	% of BEC	Ha	% of BEC	Ha
Group 2[1]	153,951	133,476	7	9,340	93	124,136
Group 3[2]	92,025	50,661	12.2	6,163	87.8	44,498
Group 4[3]	131,684	113,026	8.5	9,627	91.5	103,399
Group 5[4]	71,998	60,181	6.1	3,680	93.9	56,501
Group 7[5]	25,205	19,476	13.5	2,629	86.5	16,847
Total of THLB	**474,863**	**376,820**	**8.3**	**31,439**	**91.7**	**345,381**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) ESSFmv2 (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), ESSFmv3 (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), SWBmk (Spruce Willow Birch moist cool)
2-Group 3-**ESSFwc3** (Engelmann Spruce Subalpine Fir wet cold Cariboo variant), **ESSFwk2** (Engelmann Spruce Subalpine Fir wet cool Misinchinka-Tudyah B variant)
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4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)
5-Group 7 **BWBSdk1 coniferous** (Boreal White and Black Spruce dry cool Stikine variant)

5.4 Monitoring and Review: The Integrated Land Management Bureau 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 if an existing mandate allows.

The OGMAs in higher elevations are anticipated to be stable for a significant period of time. The 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 are mapped at a range between 1:20,000 and 1:60,000 scale depending on the size of the Landscape Unit.

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 OGMAs, these and other elements may be fully considered in future Sustainable Land Use Planning.

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

The Mackenzie LRMP was approved in November 2000. Within that plan there are relevant sections to consider and guide OGMA establishment.

The intent of managing for biodiversity is based on the assumption that the more that managed ecosystems resemble ecosystems established through natural processes, the greater the probability that all native species and ecological processes will be maintained. The intent is to maintain in perpetuity all native species across their historic ranges.

Conservation of biodiversity depends on a coordinated strategy that includes:

- A system of protected areas at the regional scale;
- Provision for a variety of habitats and habitat connectivity at the landscape scale; and
- Management practices that provide important ecosystem attributes at the stand scale.

A relevant objective is to "manage for natural biological diversity by maintaining functioning and representative ecosystems across the Plan Area". Related strategies are:

- "Link important habitats to establish or maintain connectivity in naturally occurring patterns across the landscape, recognizing that these links may vary over time, should not have a timber supply impact and must be accomplished through the strategic location of old growth management areas, partial cutting strategies and planning the distribution of cut blocks", and
- "Assign biodiversity emphasis options, in accordance with existing policy and regulation, for each landscape unit consistent with LRMP direction."

Also within the Mackenzie LRMP, a relevant objective is to "maintain or enhance rare or uncommon ecosystems and plant species." Related strategies are:

- "Identify and manage to conserve, threatened and endangered (red-listed) and vulnerable (blue-listed) ecosystems and plant species"; and
- "Except as required to conserve them, minimize the use of vegetation control near rare or uncommon ecosystems or plants."

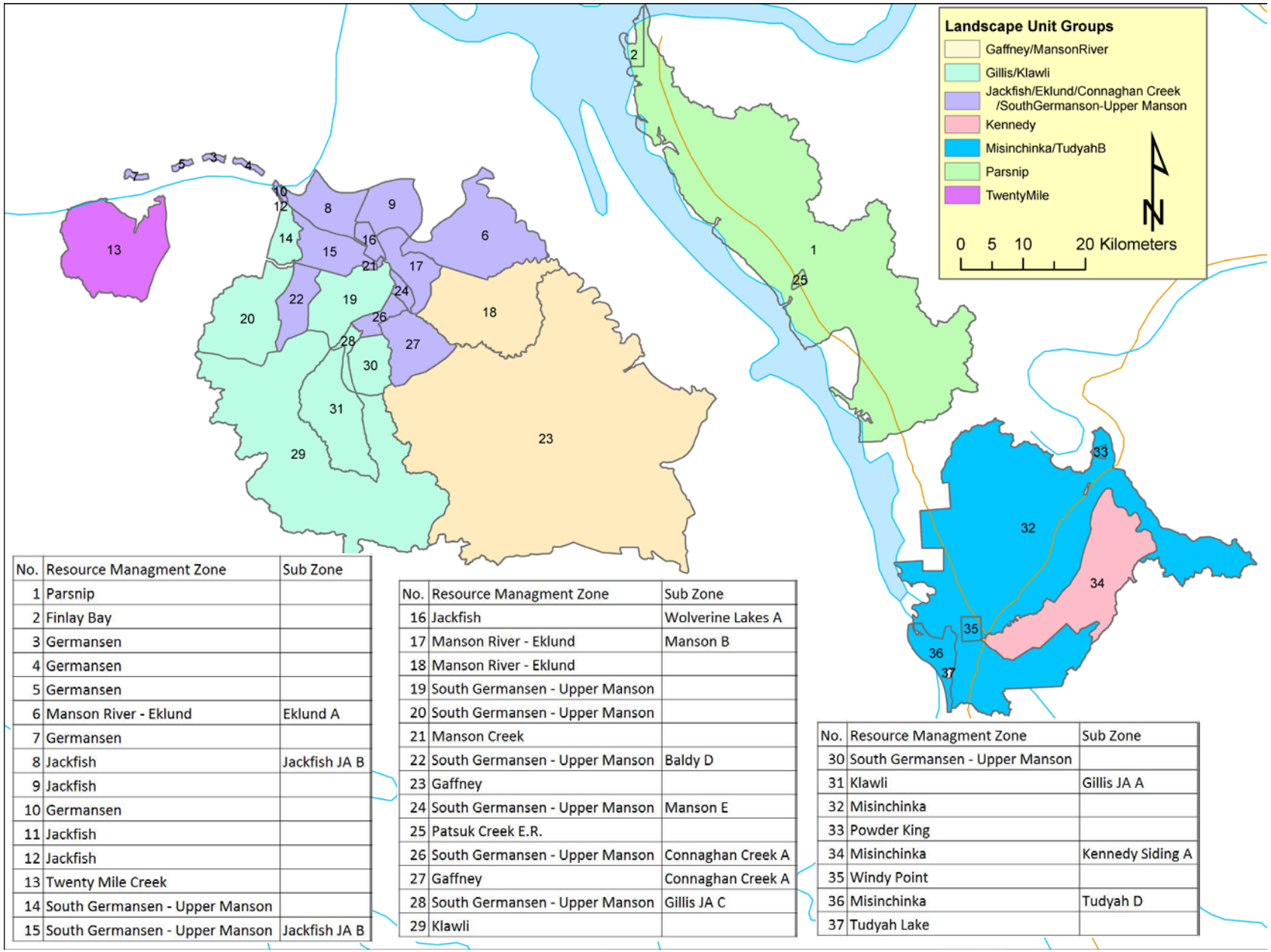
The LUs are within several Resource Management Zones (RMZs), as identified in the LRMP (See Table 4 and Figure 2). They include: Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson; Gillis/ Klawli; Parsnip; Twenty Mile, Gaffney/Manson River, Kennedy, and Misinchinka-Tudyah B landscape units.

Table 4 Landscape unit alignment with Mackenzie LRMP's resource management zones.

Landscape Unit[1]	RMZ category	RMZ or Subzone name (RMZ/Subzone number)
Jackfish	Special Resource Management	Jackfish RMZ (32); Jackfish JA Subzone (32A); Wolverine Lakes Subzone (32A);
	Settlement Zone	Omineca Settlement Corridor (Germansen)
Eklund	Special Resource Management	Eklund Subzone (33A); Manson Subzone 33B
Connaghan Creek	Special Resource Management	Connaghan Creek Subzone (35C)
South Germanson- Upper Manson	Special Resource Management	Jackfish JA Subzone 31(B); Baldy Subzone (31D); Manson Subzone (31E); Connaghan Subzone (31A)
	Settlement Zone	Manson Creek Settlement Corridor
Gillis	General Resource Management	South Germansen- Upper Manson RMZ(31); Gillis JA Subzone (31C)
Klawli	General Resource Management	Klawli RMZ (34); Gillis JA Subzone (34A)
Gaffney	Enhanced Resource Management	Gaffney RMZ (35)
Manson River	Enhanced Resource Management	Manson River-Eklund RMZ (33)
Misinchinka	Enhanced Resource Management	Misinchinka RMZ(40)
	Settlement Zone	Windy Point Powder King
Twenty Mile	General Resource Management	Twenty Mile Creek RMZ (29)
Parsnip [2]	General Resource Management	Parsnip RMZ(38)
	Settlement Zone	Finlay Bay
Kennedy	Special Resource Management	Kennedy Siding JA Subzone (40A)

1- Landscape units are organized into groups separated by an empty line.
2- Parsnip also contains Patsuk Creek Ecological Reserve

Figure 2. Landscape unit groups and RMZ's for Phase 1 OGMA planning in the Mackenzie Forest District



No.	Resource Managment Zone	Sub Zone
1	Parsnip	
2	Finlay Bay	
3	Germansen	
4	Germansen	
5	Germansen	
6	Manson River - Eklund	Eklund A
7	Germansen	
8	Jackfish	Jackfish JA B
9	Jackfish	
10	Germansen	
11	Jackfish	
12	Jackfish	
13	Twenty Mile Creek	
14	South Germansen - Upper Manson	
15	South Germansen - Upper Manson	Jackfish JA B

No.	Resource Managment Zone	Sub Zone
16	Jackfish	Wolverine Lakes A
17	Manson River - Eklund	Manson B
18	Manson River - Eklund	
19	South Germansen - Upper Manson	
20	South Germansen - Upper Manson	
21	Manson Creek	
22	South Germansen - Upper Manson	Baldy D
23	Gaffney	
24	South Germansen - Upper Manson	Manson E
25	Patsuk Creek E.R.	
26	South Germansen - Upper Manson	Connaghan Creek A
27	Gaffney	Connaghan Creek A
28	South Germansen - Upper Manson	Gillis JA C
29	Klawli	

No.	Resource Managment Zone	Sub Zone
30	South Germansen - Upper Manson	
31	Klawli	Gillis JA A
32	Misinchinka	
33	Powder King	
34	Misinchinka	Kennedy Siding A
35	Windy Point	
36	Misinchinka	Tudyah D
37	Tudyah Lake	

Appendix 1–Gaffney/Manson River Landscape Unit Group

1.0 Gaffney/Manson River Landscape Unit Description

The Gaffney/Manson River landscape unit group is comprised of the Manson River LU which is 47,380 hectares in size and Gaffney LU which is 160,384 hectares in size. The Manson River LU is found in the Wolverine Range and stretches north from the Manson River to Eklund Creek. The Gaffney LU includes the area from the Manson River south to the Nation River and from the Wolverine Range west to Mount Gillis, Porcupine Mountain and Sylvester Mountain.

The Manson River LU is mountainous with several small forested valleys where as the part of the Manson Plateau that is found in the Gaffney LU is characterized by relatively flat topography with many small streams, lakes and wetlands.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity: Wildlife values in the Gaffney LU are moderate; similarly in the Manson River LU wildlife values are moderate, except for some areas of high value caribou calving habitat. The known occurrences of red and blue listed and regionally significant species in the Gaffney/Manson River landscape unit group include grizzly bear, fisher, wolverine, wolf, moose, and caribou.

Fisheries values in the Gaffney/Manson River landscape unit group are moderate. Red and blue listed fish species include bull trout. The Manson River once contained large numbers of Arctic grayling, but recent surveys indicate that the species is no longer present in this system. Lake trout, rainbow trout and kokanee are found in the Manson Lakes. Many small lakes support good populations of rainbow trout.

2.2 Timber Resources: Timber values are particularly high in the Gaffney LU due to the relatively large proportion of the timber harvesting land base, large supply of maturing volume, above average mean annual increments, and thus large contributions to the annual allowable cut.

Timber values are high in the Manson River LU due to the large proportion of timber harvesting land base and volume of mature timber. This LU is also a substantial contributor to the annual allowable cut.

Table 1. Age distribution of forests within the Gaffney/Manson River Landscape Unit.

Age	% of Crown Forested Landbase
1-60	14
61-100	18
101-140	23
141-250	38
250+	6

2.3 First Nations: The Gaffney/Manson River landscape unit group is located in the traditional territory of the Tsay Keh Dene, the McLeod Lake Indian Band, the Takla Lake First Nations as well as Nak'azdli First Nations Band. It is in the asserted territory of the Halfway River First Nations and the West Moberly First Nations as well.

The establishment of these biodiversity elements are not anticipated to have a significant impact on any of the First Nations identified in the area. Old growth management area establishment will not limit treaty negotiations or settlements.

In the Manson River LU there is a First Nations traditional trade and travel route which runs along Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson Creek from Wolverine Lakes to the Omineca River.

2.4 Mining and Mineral Exploration: High and moderate mineral potential is found in the western two thirds of the Gaffney LU with 11 mineral occurrences and mineral tenures. The Gaffney LU is rated low for oil and gas potential.

High known mineral potential occurs in the western portion of the Manson River LU. There are six mineral occurrences including a niobium-zirconium-rare earth element deposit and placer tenure along the Manson River.

2.5 Recreation: Recreation values in the Gaffney LU are moderate at Porcupine, Gaffney, Finger, Skunk, and Manson Lakes and generally low throughout the remainder of the LU.

Recreation values in the Manson River LU are high at the Manson Lakes and the historic Manson Creek area, and moderate at the Wolverine Lakes.

2.6 Trapping and Guiding: Trapping and guiding tenures overlap this LU group. OGMAs are not anticipated to impact these tenures. If necessary, it is intended that trappers would be able to build trap line cabins within OGMAs. The trapper would be expected to minimize site disturbance and minimize impact to old growth attributes.

3.0 Gaffney/Manson River Landscape Unit Objectives

Legal objectives established under the Strategic Landscape Unit Plan are within the jurisdiction of the Land Use Objective Regulations.

The Gaffney/Manson River LU group was ranked as a Low biodiversity emphasis option through the Mackenzie LRMP Working Group for the Omineca-Peace Interagency Management Committee around 2000. This Low designation along with the BEC variant determines the percentage of the Crown forested land base that will be designated as OGMA. Table 2. outlines the total amount of OMGAs required in each variant, and from which Crown forest category (i.e., Non contributing-NC; Timber Harvesting Land Base-THLB.) 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 Gaffney/Manson River LU group map (Map 2) visually shows their distribution.

Table 2. Old growth management area (OGMA) requirements, Gaffney/Manson River Landscape Unit.

Group	BEC Variant	Crown Forested Landbase		Full OGMA Target	Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
		Ha	%	Ha	Ha	%	Ha	%	Ha
2	See 1 below	79,868	9	7188	7,209	22	3,588	23	3,621
4	See 3 below	76,301	11	8393	8,353	13	2,157	39	6,196
5	See 4 below	5,712	9	514	530	1	171	2	359
Total		**161,881**		**16,095**	**16,092**	**36**	**5,916**	**64**	**10,176**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)

Table 3. Timber harvesting land base information by BEC variant, Gaffney/Manson River Landscape Unit.

Group	BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
		Ha	Ha	%	Ha	%	Ha
2	See 1 below	79,868	57,127	6	3,621	94	53,506
4	See 3 below	76,301	64,406	10	6,196	90	58,210
5	See 4 below	5,712	5,086	7	359	93	4,727
Total		**161,881**	**126,619**	**8.3**	**10,176**	**91.7**	**115,531**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)

4.0 Gaffney-Manson River OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Gaffney-Manson River LU group, there is a lack of non-contributing landbase so most of the old growth targets cannot be met within the non-contributing land base. In total, 10,176 ha of OGMA are identified in the THLB to meet old growth retention targets. The estimated impact to short term timber supply is minimal due to placement of OGMAs in areas experiencing other constraints (i.e. UWR, adjacency issues, etc.) or where timber harvesting is operationally challenging. 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 Gaffney-Manson River LU group, there may have been 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 Mackenzie Phase 1 planning area, there are six natural disturbance units. In this portion of the forest district, the NDU is the Omineca.

Appendix 2– Gillis/Klawli Landscape Unit Group

1.0 Gillis/Klawli Landscape Unit Description

The Gillis/Klawli Landscape Unit Group is 116,760 hectares. The Klawli LU is 79,797 hectares and the Gillis LU is 36,967 hectares. The LU group is found in the Omineca Mountains south and east of Germansen Lake. The northern half of the LU group contains two high elevation forested valleys, the upper Manson River and the South Germansen River. The southern half includes the watershed of Klawli River above Klawli Lake and the upper part of the Sylvester Creek watershed. The southern half is part of the Manson Plateau and is characterised by relatively flat topology with many small streams, lakes and wetlands.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity: Wildlife values are moderate, except high for caribou. The known occurrences of red and blue listed and regionally significant species include grizzly bear, fisher, wolverine, wolf, moose, and caribou.

Fisheries values are low to moderate. Red and blue listed fish species include bull trout and Arctic grayling. In the southern portion of the landscape unit group, several lakes support good populations of rainbow trout.

2.2 Timber Resources: Timber values are high throughout the landscape unit group. There is a large portion of operable timber harvesting landbase with mature volume of predominately lodgepole pine on terrain suitable to summer operations.

Table 1. Age distribution of forests within the Gillis/Klawli Landscape Unit Group.

Age	% of Crown Forested Landbase
1-60	5
61-100	6
101-140	33
141-250	44
250+	12

2.3 First Nations: The Gills/Klawli LU group is located within the traditional territory of the Tsay Keh Dene, the Takla Lake First Nations, and the Nak'azdli First Nations Band. It is also the asserted territory of the Halfway River First Nations, West Moberly First Nations, and the McLeod Lake Indian Band.

The establishment of these biodiversity elements are not anticipated to have a significant impact on any of the First Nations identified in the area. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration: There are high to moderate known mineral potential throughout the zone with mineral occurrences, mineral tenures and placer mines. The landscape unit group is rated low for oil and gas potential.

2.5 Recreation: Recreation values are moderate to high in the Gillis portion of the landscape unit group. The area is known for its historical significance related to trapping, the fur trade, and historical travel routes.

In the Klawli LU, the historic Baldy Mountain Trail is rated as a high recreation value. It lies parallel to Sylvester Creek and transects the landscape unit group in a northerly direction to Baldy Mountain and the Slate Creek area near Manson Creek. Additionally, wilderness recreation values are high at Klawli and Tsaydachi Lakes. Recreation values are generally low throughout the rest of the landscape unit group.

2.6 Trapping and Guiding: Trapping and guiding tenures overlap this LU group. OGMAs are not anticipated to impact these tenures. If necessary, it is intended that trappers would be able to build trap line cabins within OGMAs. The trapper would be expected to minimize site disturbance and minimize impact to old growth attributes.

3.0 Gillis/Klawli Landscape Unit Group Objectives

The Gillis/Klawli LU group was ranked as an Intermediate biodiversity emphasis option through the Mackenzie Forest District Landscape Unit Planning Strategy in 2000. This Intermediate designation along with the BEC variant determines the percentage of the Crown forested land base that will be designated as OGMA. Table 2.outlines the total amount of OMGA required in each variant, and from which Crown forest category (i.e., Non contributing-NC; Timber Harvesting Land Base-THLB). 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 Gillis/Klawli LU group map (Map 4) visually shows their distribution.

Table 2. Old growth management area (OGMA) requirements, Gillis/Klawli Landscape Unit Group.

Group	BEC Variant	Crown Forested Landbase		Full OGMA Target	Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
		Ha	%	Ha	Ha	%	Ha	%	Ha
2	See 1 below	80,054	9	7,205	7,238	40	3,754	37	3,484
4	See 3 below	13,894	11	1,528	1,528	5	458	11	1,070
7	See 5 below	5,504	11	605	635	1	136	5	499
Total		**99,452**		**9,338**	**9,401**	**46**	**4,348**	**53**	**5,053**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
5-Group 7 **BWBSdk1 coniferous** (Boreal White and Black Spruce dry cool Stikine variant)

Table 3. Timber harvesting land base information by BEC variant, Gillis/Klawli Landscape Unit Group.

Group	BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
		Ha	Ha	%	Ha	%	Ha
2	See 1 below	80,054	52,212	7	3,484	93	48,728
4	See 3 below	13,894	10,708	10	1,070	90	9,638
7	See 5 below	5,504	4,291	12	499	88	3,792
Total		**99,452**	**67,211**	**8**	**5,053**	**92**	**62,158**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
5-Group 7 **BWBSdk1 coniferous** (Boreal White and Black Spruce dry cool Stikine variant)

4.0 Gillis/Klawli River OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Gillis/Klawli landscape unit group there is a lack of non-contributing landbase so most of the old growth targets cannot be met within the non-contributing land base. In total, 5,053 ha of OGMA are identified in the THLB to meet old growth retention targets. The estimated impact to short term timber supply is minimal due to placement of OGMAs in areas experiencing other constraints (i.e. UWR, adjacency issues, etc.) or where timber harvesting is operationally challenging. 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 Gillis/Klawli LU group, there may have been 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 Mackenzie South planning area, there are six natural disturbance units. In this portion of the forest district, the NDU is the Omineca.

Appendix 3– Parsnip Landscape Unit

1.0 Parsnip Landscape Unit Description

The Parsnip LU occupies 126,096 hectares of the Rocky Mountain Trench east of Williston Reservoir and the western slopes of the Misinchinka Ranges from the Peace Arm south to the town of Mackenzie. The western part of this zone is characterized by relatively flat topography with many small streams, lakes and wetlands. The eastern part is more mountainous with several small forested valleys cutting into the mountains.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity

Wildlife values are moderate in this LU, with high value grizzly bear habitat in the eastern portion. There are some areas of high habitat value for moose and one high value caribou area. The known occurrences of red and blue listed and regionally significant species include peregrine falcon, American Bittern, grizzly bear, fisher, wolverine, northern goshawk, wolf, moose, elk, caribou, mule deer, and whitetail deer.

Tutu Bay and Mugaha marsh are important waterfowl areas. Mugaha marsh is one of the designated Canadian migration monitoring stations for songbirds and has been designated as a Sensitive Area.

Fisheries values are moderate. Red and blue listed species include Arctic grayling and bull trout. Several lakes support good populations of rainbow trout.

2.2 Timber Resources:

The forests in this LU include coniferous and deciduous species while predominately spruce/balsam types occur on areas suitable to winter operations in the side valleys. This timber is of high value due to good site index and relatively large volumes of mature timber in close proximity to the mills.

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

Age	% of Crown Forested Landbase
1-60	8
61-100	14
101-140	23
141-250	51
250+	4

2.3 First Nations: The Parsnip LU is located within the traditional territory of the McLeod Lake Indian Band and the asserted territory of the Halfway River First Nations, and the West Moberly First Nations.

The establishment of these biodiversity elements are not anticipated to have a significant impact on any of the First Nations identified in the area. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration:

The majority of this LU has high mineral value. There are two mineral occurrences including a known deposit of iron. The entire LU has high gas potential.

2.5 Recreation:

Recreation values are high due to the wide variety of opportunities for the residents of Mackenzie (for example, Chichouyeniley, Mugaha and Tony Creeks). Many small lakes and streams provide good fishing, camping, hiking, skiing, snowmobiling, wildlife viewing and hunting opportunities.

2.6 Trapping and Guiding: 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 Parsnip Landscape Unit Objectives

The Parsnip LU was ranked as an Intermediate biodiversity emphasis option and contains three BEC variant groups. Table 2. outlines the total amount of OMGA required in each variant, and from which Crown forest category (i.e., Non contributing-NC; Timber Harvesting Land Base-THLB). 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 Parsnip LU map (Map 6) visually shows their distribution.

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

Group	BEC Variant	Crown Forested Landbase		Full OGMA Target	Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
		Ha	%	Ha	Ha	%	Ha	%	Ha
3	See 2 below	47,704	19	9,064	9,075	41	5,176	32	3,899
4	See 3 below	18,967	11	2,086	1,013	1	67	8	946
5	See 4 below	24,578	9	2,212	2,188	9	1,056	9	1,132
Total		**91,249**		**13,362**	**12,276**	**51**	**6,299**	**49**	**5,977**

2-Group 3-**ESSFwc3** (Engelmann Spruce Subalpine Fir wet cold Cariboo variant), **ESSFwk2** (Engelmann Spruce Subalpine Fir wet cool Misinchinka-Tudyah B variant)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)

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

Group	BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
		Ha	Ha	%	Ha	%	Ha
3	See 2 below	47,704	29,275	13	3,899	87	25,376
4	See 3 below	18,967	16,968	6	946	94	16,022
5	See 4 below	24,578	19,644	6	1,132	94	18,512
Total		**91,249**	**65,887**	**8**	**5,977**	**92**	**59,910**

2-Group 3-**ESSFwc3** (Engelmann Spruce Subalpine Fir wet cold Cariboo variant), **ESSFwk2** (Engelmann Spruce Subalpine Fir wet cool Misinchinka-Tudyah B variant)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)

4.0 Parsnip OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Parsnip LU group, most of the old growth targets are met within the non-contributing land base. In total, 5,977 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. UWR, adjacency issues, 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 Parsnip LU group, there may have been 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 Mackenzie South planning area, there are six natural disturbance units. In this portion of the forest district, the NDU includes the McGregor Plateau, Moist Interior, Omineca, and Wet Mountain.

Appendix 4–Twenty Mile Landscape Unit

1.0 Twenty Mile Landscape Unit Description

The Twenty Mile LU occupies 21,106 hectares and is found in the Omineca Mountains west of Germansen Lake and south of the Omineca River. It contains a single broad flat forested valley and surrounding low mountains.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity: Wildlife values are moderate, except for caribou with moderate to high values. The known occurrences of red and blue listed and regionally significant species include grizzly bear, wolverine, wolf, moose, and caribou.

Fisheries values are low. Red and blue listed species include bull trout.

2.2 Timber Resources: Timber values are high due to the large proportion of standing volume of lodgepole pine in summer operating areas.

Table 1. Age distribution of forests within the Twenty Mile Landscape Unit.

Age	% of Crown Forested Landbase
1-60	0
61-100	4
101-140	29
141-250	63
250+	5

2.3 First Nations: The Twenty Mile Creek LU is located within the traditional territory of the Takla Lake First Nations, the Nak'azdli First Nations Band and the asserted territory of the West Moberly and Halfway River First Nations.

The establishment of these biodiversity elements are not anticipated to have a significant impact on any of the First Nations identified in the area. Old growth management area establishment will not limit treaty negotiations or settlements

2.4 Mining and Mineral Exploration: High mineral potential occurs in the area with one past producer of placer gold and several placer tenures.

2.5 Recreation: Recreation values are generally low to moderate. There is some potential for recreational gold panning and camping areas. A geological interest is the sponge reef located at Eaglenest Mountain.

2.6 Trapping and Guiding: 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 Twenty Mile Landscape Unit Objectives

The Twenty Mile LU was ranked as an Intermediate biodiversity emphasis option and contains two BEC variant groups. Table 2. outlines the total amount of OMGA required in each variant, and from which Crown forest category (i.e., Non contributing-NC; Timber Harvesting Land Base-THLB). 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 Twenty Mile LU map (Map 7) visually shows their distribution.

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

Group	BEC Variant	Crown Forested Landbase		Full OGMA Target	Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
		Ha	%	Ha	Ha	%	Ha	%	Ha
2	See 1 below	12,457	9	1121	1,115	37	422	63	699
7	See 5 below	2,313	11	353	283	50	142	50	141
Total		**14,770**		**1474**	**1,398**	**40**	**564**	**60**	**840**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
5-Group 7 **BWBSdk1 coniferous** (Boreal White and Black Spruce dry cool Stikine variant)

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

Group	BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
		Ha	Ha	%	Ha	%	Ha
2	See 1 below	12,457	6,548	11	699	89	5,849
7	See 5 below	2,313	2,323	5	141	95	2,206
Total		**14,770**	**8,871**	**9**	**840**	**91**	**8,055**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
5-Group 7 **BWBSdk1 coniferous** (Boreal White and Black Spruce dry cool Stikine variant)

4.0 Twenty Mile OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Twenty Mile LU, there is a lack of suitable non-contributing land base so most of the old growth targets could not be met within the non-contributing land base. In total, 840 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. UWR, adjacency issues, 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 Twenty Mile LU group, there may have been 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 Mackenzie South planning area, there are six natural disturbance units. In this portion of the forest district, the NDU is the Omineca.

Appendix 5–Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson Landscape Unit Group

1.0 Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson Landscape Unit Group Description

The Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson LU group occupies 67,454 hectares from the base of the Rocky Mountain trench east of South Germansen River and south-east of Omineca River south to Connaghan Creek. This area is characterized by relatively flat topography in the east and mountainous topography in the north- and south-east. Most of the LU is forested.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity

Wildlife values are moderate; with areas of high or very high value for caribou, caribou travel corridors and calving habitat. The known occurrences of red and blue listed and regionally significant species include: grizzly bear, fisher, wolverine, wolf, moose, mountain goat, caribou and martin.

Fisheries values are low to moderate. Red and blue listed fish species include bull trout. The Wolverine Lakes have moderate fisheries values and a population of mussels. The Manson Lakes support a good population of rainbow trout, kokanee, and some lake trout. Additionally the Manson River used to contain large numbers of Arctic grayling; however recent surveys indicate the species is no longer present.

2.2 Timber Resources

Timber values are less of a focus in most of this landscape unit group but are high in the areas adjacent to the south Germansen River. Predominant lodgepole pine stands provide good summer operating areas. The Manson River/Eklund portion also has high timber values duel to the larger proportion of timber harvesting land base and volume of mature timber.

Table 1. Age distribution of forests within the Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson Landscape Unit Group.

Age	% of Crown Forested Landbase
1-60	4
61-100	5
101-140	49
141-250	38
250+	4

2.3 First Nations

This LU is located within the traditional territory of the Tsay Key Dene, the Takla Lake First Nations, the Nak'azdli First Nations Band, the McLeod Lake Indian Band as well as the asserted territory of the West Moberly and Halfway River First Nations. First Nations traditional trade and travel routes run from Wolverine Lakes down Jackfish Creek to the Omineca River. There is also a historical, cultural and education trail along Skeleton Creek that should be maintained. There are cultural, archaeological and traditional sites of interest in this LU group.

The establishment of these biodiversity elements are not anticipated to have a significant impact on any of the First Nations identified in the area. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration

There is a high mineral potential for Industrial Minerals (magnesite, white calcium carbonate, limestone, silica, dimension stone, gypsum, and sulphur, construction aggregate and crushed rock) in the South Germansen/Upper Manson portion of the LU group. Additionally there is high Metallic Mineral (copper, molybdenum, zinc, lead, silver, gold, aluminum, nickel, platinum, palladium, tungsten) potential in the LU group as well as a niobium-zirconium-rare earth element deposit.

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 may be relocated.

2.5 Recreation

Recreation values are moderate to high because of a combination of historical events related to the Omineca Gold Rush, fur trade and First Nations activities in this area. Values are moderate at the Wolverine Lakes and high at Manson Lakes and the Historic Manson Creek area.

This area is known for its historical significance (trapping, fur trade, travel routes) for example the Hudson Bay Store at Manson Creek, Baldy Trail (a historical wagon route) and the First Nations traditional travel route that runs along Jackfish Creek from Wolverine Lakes to the Omineca River.

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

OGMAs are not anticipated to impact the tenures located in the LU group. 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 Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson Landscape Unit Group Objectives

The Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson LU group was ranked as an Intermediate biodiversity emphasis option and contains four BEC variant groups. Table 2 outlines the total amount of OMGA required in each variant, and from which Crown forest category (i.e., Non contributing-NC; Timber Harvesting Land Base-THLB). 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 Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson LU group map (Map 1) visually shows their distribution.

Table 2. Old growth management area (OGMA) requirements, Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson Landscape Unit Group.

Group	BEC Variant	Crown Forested Landbase		Full OGMA Target	Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
		Ha	%	Ha	Ha	%	Ha	%	Ha
2	See 1 below	32,155	13	4,180	4,211	35	2,651	20	1,560
4	See 3 below	5,105	16	816	546	2	162	5	384
5	See 4 below	1,283	13	166	172	1	47	2	125
7	See 5 below	16,488	16	2,638	2,694	7	522	28	2,172
Total		**55,031**		**7,800**	**7,623**	**45**	**3,382**	**55**	**4,241**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)
5-Group 7 **BWBSdk1 coniferous** (Boreal White and Black Spruce dry cool Stikine variant)

Table 3. Timber harvesting land base information by BEC variant, Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson Landscape Unit Group.

Group	BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
		Ha	Ha	%	Ha	%	Ha
2	See 1 below	32,155	17,589	9	1,560	91	16,029
4	See 3 below	5,105	4,102	9	384	91	3,718
5	See 4 below	1,283	1,119	11	125	89	994
7	See 5 below	16,488	12,862	17	2,172	83	10,690
Total		**55,031**	**35,672**		**4,241**		**31,431**

1-Group 2: ESSFmc (Engelmann Spruce Subalpine Fir moist cold) **ESSFmv2** (Engelmann Spruce Subalpine Fir moist very cold Bullmoose variant), **ESSFmv3** (Engelmann Spruce Subalpine Fir moist very cold Omineca variant), **SWBmk** (Spruce Willow Birch moist cool)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)
5-Group 7 **BWBSdk1 coniferous** (Boreal White and Black Spruce dry cool Stikine variant)

4.0 Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson/South Germansen OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson LU group, there is a lack of suitable non-contributing land base so most of the old growth targets could not be met within the non-contributing land base. In total, 4,241 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. UWR, adjacency issues, 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 Connaghan Creek-Eklund-Jackfish-South Germansen-Upper Manson LU group, there may have been 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 Mackenzie South planning area, there are six natural disturbance units. In this portion of the forest district, the NDU is the Omineca.

Appendix 6– Misinchinka-Tudyah B Landscape Unit Group

1.0 Misinchinka-Tudyah B Landscape Unit Description

The Misinchinka-Tudyah B landscape unit group is 130,748 hectares. The Misinchinka-Tudyah B LU group occupies the Rocky Mountain Trench east and south of Williston Reservoir and the western slopes of the Misinchinka-Tudyah B Ranges from Mackenzie south to the Mackenzie Forest District boundary. The western part of the Misinchinka-Tudyah B landscape unit group is characterized by relatively flat topography with many small streams, lakes and wetlands. The eastern part is more mountainous with several small forested valleys cutting into the mountains.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity: Wildlife values in the Misinchinka-Tudyah B LU are moderate to high. The known occurrences of red and blue listed and regionally significant species include American bittern, surf scoter, grizzly bear, fisher, wolverine, northern goshawk, wolf, moose, caribou, mule deer, and whitetail deer.

Fisheries values are moderate, except high in the Parsnip and Pack rivers. Red and blue listed fish species include Arctic grayling and blue trout. Several lakes support good populations of rainbow trout. A few lakes support introduced brook trout. Large numbers of Lake Whitefish spawn in the Pack River in late fall.

2.2 Timber Resources: Timber values in the Misinchinka-Tudyah B LU are high due to large volumes of mature in predominately winter operating areas close to the mills in Mackenzie.

Table 1. Age distribution of forests within the Misinchinka-Tudyah B Landscape Unit Group.

Age	% of Crown Forested Landbase
1-60	13
61-100	15
101-140	13
141-250	55
250+	5

2.3 First Nations: The Misinchinka-Tudyah B/Parsnip landscape unit group is located within the traditional territory of the McLeod Lake Indian Band, and the asserted territory of the West Moberly Band, Halfway River, and the Takla Lake First Nations.

The establishment of these biodiversity elements are not anticipated to have a significant impact on any of the First Nations identified in the area. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration: High mineral potential occurs in the northern and southern parts of the Misinchinka-Tudyah B LU with three mineral occurrences including 2 known industrial mineral deposits and mineral tenure.

The entire zone has high gas potential. There is significant infrastructure located within the zone consisting of gas and oil pipelines, electrical transmission lines and an electric substation.

2.5 Recreation: Recreation values in the Misinchinka-Tudyah B LU group are high for a wide variety of activities in close proximity to Mackenzie and the Highways 39 and 97. This zone has particularly good opportunities for snowmobiling and skiing.

The management intent for the Tudyah B portion of the LU group is to manage it for scenic and recreation values given the lake complex that occupies this area.

2.6 Trapping and Guiding: 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 Misinchinka-Tudyah B Landscape Unit Objectives

The Misinchinka portion was ranked as a Low biodiversity emphasis option and the Tudyah B was ranked as an Intermediate BEO. This Low/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)[i]. 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 Misinchinka-Tudyah B LU map (Map 5) visually shows their distribution.

Table 2. Old growth management area (OGMA) requirements, Misinchinka-Tudyah B Landscape Unit Group.

Group	BEC Variant	Crown Forested Landbase		Full OGMA Target	Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
		Ha	%	Ha	Ha	%	Ha	%	Ha
3	See 2 below	31,283	19	5,944	5,963	41	4,532	13	1,431
4	See 3 below	19,177	11	2,109	2,028	9	1,030	9	998
5	See 4 below	34,893	9	3,140	3,140	13	1,482	15	1,658
Total		**85,353**		**11,193**	**11,131**	**63**	**7,044**	**37**	**4,087**

2-Group 3-**ESSFwc3** (Engelmann Spruce Subalpine Fir wet cold Cariboo variant), **ESSFwk2** (Engelmann Spruce Subalpine Fir wet cool Misinchinka-Tudyah B variant)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)

Table 3. Timber harvesting land base information by BEC variant, Misinchinka-Tudyah B Landscape Unit Group.

Group	BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
		Ha	Ha	%	Ha	%	Ha
3	See 2 below	31,283	14,471	10	1,431	90	13,040
4	See 3 below	19,177	16,662	6	998	94	15,664
5	See 4 below	34,893	29,583	6	1,658	94	27,925
		85,353	**60,716**		**4,087**		**56,629**

2-Group 3-**ESSFwc3** (Engelmann Spruce Subalpine Fir wet cold Cariboo variant), **ESSFwk2** (Engelmann Spruce Subalpine Fir wet cool Misinchinka-Tudyah B variant)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)

4.0 Misinchinka-Tudyah B OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Misinchinka-Tudyah B LU group, most of the old growth targets are met within the non-contributing land base. In total, 4,087 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. UWR, adjacency issues, 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 Misinchinka-Tudyah B LU group, there may have been 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 Mackenzie South planning area, there are six natural disturbance units. In this portion of the forest district, the NDU includes the McGregor Plateau, Moist Interior, and the Wet Mountain.

Appendix7– Kennedy Landscape Unit

1.0 Kennedy Landscape Unit Description

The Kennedy Landscape Unit is 24,347 hectares. This LU is a subzone of the Misinchinka Resource Management Zone identified in the Mackenzie LRMP. It occurs in the Rocky Mountain Trench east and south of Williston Reservoir and the western slopes of the Misinchinka Ranges between Misinchinka LU and the Mackenzie Forest District boundary. The south western part is characterized by a relatively flat topography while the eastern part is more mountainous.

2.0 Significant Resource Values

2.1 Fish, Wildlife and Biodiversity: Wildlife values are high with specific focus on Caribou. The LRMP specifically designated this area for management and perpetuation of caribou and caribou habitat.

Fisheries values are moderate. Red and blue listed fish species include Arctic grayling and bull trout. Several lakes support good populations of rainbow trout. A few lakes support introduced brook trout. Large numbers of Lake Whitefish spawn in the Pack river in late fall

2.2 Timber Resources: Timber values are high due to large volumes of mature timber in predominately winter operating areas close to the mills in Mackenzie.

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

Age	% of Crown Forested Landbase
1-60	4
61-100	21
101-140	7
141-250	59
250+	9

2.3 First Nations: This LU is located within the traditional territory of the McLeod Lake Indian Band and the asserted territory of the Halfway River and West Moberly First Nations.

The establishment of these biodiversity elements are not anticipated to have a significant impact on any of the First Nations identified in the area. Old growth management area establishment will not limit treaty negotiations or settlements.

2.4 Mining and Mineral Exploration: There is high mineral potential. The entire area has high gas potential. There is significant infrastructure located within the zone consisting of gas and oil pipelines, electric transmission lines and an electric substation.

2.5 Recreation: Recreation values are high for a wide variety of activities in close proximity to Mackenzie and the Highways 39 and 97. This zone has particularly good opportunities for snowmobiling and skiing.

2.6 Trapping and Guiding: 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 Kennedy Landscape Unit Objectives

The Kennedy LU was ranked as a High biodiversity emphasis option and contains three BEC variant groups. Table 2 outlines the total amount of OMGAs required and drafted in each variant group. Both Table 2 and 3 provide information on how the draft OGMA's are distributed amongst Crown forest category (i.e., Non contributing-NC; Timber Harvesting Land Base-THLB).

To ensure that landscape level biodiversity values were represented across the landscape, OGMAs were established to the target in each BEC variant. The attached Kennedy LU map (Map 3) visually shows their distribution.

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

Group	BEC Variant	Crown Forested Landbase		Full OGMA Target	Draft OGMAs	OGMAs in Non-Contributing (NC)		OGMAs in Contributing (THLB)	
		Ha	%	Ha	Ha	%	Ha	%	Ha
3	See 2 below	13,038	28	3,650	3,631	63	2,796	19	835
4	See 3 below	239	13	31	46	0.3	13	0.7	33
5	See 4 below	5,533	13	719	765	8	358	9	407
Total		**18,810**		**4,400**	**4,442**	**71.3**	**3,167**	**28.7**	**1,275**

2-Group 3-**ESSFwc3** (Engelmann Spruce Subalpine Fir wet cold Cariboo variant), **ESSFwk2** (Engelmann Spruce Subalpine Fir wet cool Misinchinka-Tudyah B variant)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)

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

Group	BEC Variant	Crown Forested Landbase	Timber Harvesting Land Base (Before OGMA)	OGMAs in Contributing (THLB)		THLB Remaining	
		Ha	Ha	%	Ha	%	Ha
3	See 2 below	13,038	6,916	12	835	88	6,081
4	See 3 below	239	181	18	33	82	148
5	See 4 below	5,533	4,750	9	407	91	4,343
Total		**18,810**	**11,847**		**1,275**		**10,572**

2-Group 3-**ESSFwc3** (Engelmann Spruce Subalpine Fir wet cold Cariboo variant), **ESSFwk2** (Engelmann Spruce Subalpine Fir wet cool Misinchinka-Tudyah B variant)
3-Group 4- **SBSmk1** (Sub-Boreal Spruce moist cool Mossvale variant), **SBSmk2** (Sub-Boreal Spruce moist cool Williston variant), **SBSwk1** (Sub-Boreal Spruce wet cool Willow variant)
4-Group 5-**SBSvk** (Sub-Boreal Spruce very wet cool), **SBSwk2** (Sub-Boreal Spruce wet cool Findlay-Peace variant)

4.0 Kennedy OGMA Planning Results

4.1 Timber Harvesting Land Base Impact: In the Kennedy, most of the old growth targets are met within the non-contributing land base. In total, 1,275 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. UWR, adjacency issues, 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 Kennedy LU, there may have been 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 Mackenzie South planning area, there are six natural disturbance units. In this portion of the forest district, the NDU includes the McGregor Plateau, and the Wet Mountain.

Appendix 8

Appendix 8 -Rationale for Old Growth Management Area's (OGMAs) in the Mackenzie Forest District March 2008 ILMB- Northern Region

Appendix 8

Rationale for Old Growth Management Area's (OGMAs) in the Mackenzie Forest District March, 2008 ILMB - Northern Region

During the process of OGMA delineation, ILMB considered many factors and would like to provide the following rationale.

OGMA Planning Considerations and Rationale for the Mackenzie Landscape Unit Planning process did not veer from accepted Provincial Policy. The following is a list of specific measures and criteria analyzed for consideration for each potential OGMA, in order to balance the maximization of old growth value while respecting impacts to timber supply.

A) Process and Mandate

Following the procedure and "rules based approach" of the Landscape Unit Planning Guidebook (1999), OGMAs were delineated in the following way:

1) OGMAs were placed in Non-contributing[1] (NC) areas that were spatially locatable on the landbase.
2) Recognition of the fact that an aspatial exercise will result in areas that are not spatially locatable, every effort to mitigate impacts to old Timber Harvesting Land Base[2] (THLB) was made through the capturing of mature NC whenever possible.
3) Where NC was insufficient for meeting the total OGMA targets, areas that are PC, or constrained for other reasons (i.e. visual quality, environmental sensitivity) within the THLB were considered to augment the area target.
4) THLB was considered as a "last resort" and those areas constrained for reasons listed above were considered first. Areas of rare old growth series, species or characteristics within the THLB, were only considered when absolutely necessary and in collaboration with the local licensees as per "OPERATIONAL CONSIDERATIONS" within the Landscape Unit Planning Guide, 1999 p.31.

[1] Non-Contributing (NC): the crown forested land base that does not contribute to AAC but does contribute to biodiversity objectives and targets. It includes parks, riparian reserves, inoperable forest and any other 100% net down areas and partial netdowns, such as environmentally sensitive areas as defined by the Timber Supply Review.
[2] Timber Harvesting Land Base (THLB): the area of the crown forested land base that is estimated to be economically and biologically available for harvesting and contributes to the AAC.

B) Implementation and Effectiveness

Consideration was given to many factors when delineating OGMAs, including the logistical problems associated with implementation and effectiveness monitoring of the objectives. Such considerations include:

- Locating OGMAs along locatable and natural features wherever possible in order to ease location 'on the ground'. Such features include; height of land or ridges, water features, roads, cutblock boundaries, and obvious changes in species and age composition.
- OGMAs included complete stands of timber to reduce operational uncertainty, and ease the process of mapping and locating OGMAs as well as maximise the "coarse filter" effectiveness of OGMAs for long-term old growth and biodiversity protection.

Old growth and biodiversity values were evaluated based on the following selection criteria:

Biological Criteria

- Old growth characteristics – age based definition, horizontal / vertical stand structure (CWD, snags etc.)
- Distribution on the landscape – connectivity between OGMAs, UWR, protected areas and parks
- High to low elevation connectivity – across valley connectivity
- Ability to maintain in an "undisturbed" condition for a foreseeable period of time
- Wildlife values – capability, suitability and probability
- Interior forest habitat – large intact patches with little influence from edge
- Proximity to biologically significant features:
    - large rivers – riparian corridors, red and blue listed species
    - avalanche tracts – grizzly bears, south facing slopes
    - rock bluffs – mountain goats, escape terrain
    - swamps – ungulate forage, movement, red and blue listed species
    - important spawning or rearing areas

- To achieve interior forest condition and large patches of old retention, mature NC was used before old PC or old THLB to amalgamate smaller 'slivers' of old NC.
- Wildlife habitat information available for identified red listed species was used to delineate OGMAs adjacent to or in close proximity to known critical habitats when possible.

C) Mitigation to THLB Impacts

The process of delineating OGMAs in the Mackenzie Forest District was completed under the current provincial policy by following the Forest Practices Code of British Columbia guidebook on Landscape Level Planning in conjunction with current legislation.

Under the *Forest Planning and Practices Regulation* of the *Forest and Range Practices Act* Section 9: Objectives set by government for wildlife and biodiversity — landscape level :

- "The objective set by government for wildlife and biodiversity at the landscape level is, without unduly reducing the supply of timber from British Columbia's forests and to the extent practicable, to design areas on which timber harvesting is to be carried out that resemble, both spatially and temporally, the patterns of natural disturbance that occur within the landscape."

Furthermore, under the *Land Use Objective Regulations* Section2 (2) states:
Before making a section 93.4 order establishing or significantly amending a land use objective, the minister must be satisfied that

a) The land use objective or amendment will
   (i) Provide for management and use of forest or range resources in a manner that has not otherwise been provided for under this regulation or another enactment, and
   (ii) Provide for an appropriate balance of social, economic and environmental benefits.

- Forest harvesting information was requested from each forest licensee. This information, combined with direct communication was used to avoid placement of OGMAs over proposed or approved developments (i.e. CAT. A blocks). NC landbase identified by licensees as having potential for harvesting was removed from OGMA designation and replaced with other suggested and suitable areas.
- Old growth stands associated with parks and protected areas, Environmentally Sensitive Areas, areas with operability problems and marginal economic value (ex. low productivity sites) have been incorporated into OGMAs or removed from the OGMA target.

Locating OGMAs, the following operational considerations were used to ensure placement would not restrict licensees' future activities:

Operational Criteria

- Utilization of "already constrained landbase" – riparian buffer, UWR, VQO, community watershed
- Constraints within the operating area
  - Slope steepness
  - High soil disturbance hazard
  - Green-up constraints
- Location of developed and future infrastructure (i.e. roads)
- Forest Development Plans – Category A Proposed / Approved, Category I

- Input and consultation with local licensees occurred for each LU. Changes were made based on the suggestions from those licensees whose familiarity with their chart area provided site specific knowledge.
- Potential road building and harvest activities were considered so that OGMA placement would not preclude or hinder timber access in areas currently undeveloped.
- Where placement occurred with the THLB, general agreement with licensees was achieved.

E) Area Based Impacts

The results reported in Table 2 and 3 for each LU group as part of the individual chapters in the Mackenzie Biodiversity Chapter of the Mackenzie Sustainable Land and Resource Plan can be interpreted by column number in the following way:

1) total crown forested land base by BEC variant in Hectares (Ha)
2) the full OGMA target in Ha and the percentage each BEC contributes to the full OGMA target
3) the area within the draft OGMAs in Ha by BEC variant
4) total NC area by BEC as per "Table 3.1. OGMA Targets (ha) Report" (LUPG, 1999, p.32) specifications.
5) Ha's of OGMA established within NC and the percent area by BEC variant of the total OGMA target
6) Ha's of OGMA established within THLB and the percent area by BEC variant of the total OGMA target

9.0 References

City of Mackenzie. 2006. Website http://www.district.mackenzie.bc.ca/

Government of British Columbia. 2000. Mackenzie Land and Resource Management Plan