Weyerhaeuser Grande Prairie
2011 – 2021 DFMP

Landscape Assessment
FMA #6900016

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1 Introduction

This Landscape Assessment provides a “snapshot” in time of Forest Management Unit (FMU) G16. The Forest Management Plan uses background knowledge about the uses, values and forest conditions in the area. This knowledge provides the current status of resources including traditional land use, ecological, administrative boundaries and local communities. This assessment was used in the development of the preferred forest management strategy (PFMS) and to validate existing forest management goals. It also provides reference materials to assess the success of the PFMS its achievements towards the goals and objectives.

The current conditions of all relevant components in this assessment are presented using text, tables, and maps.

The parameters needed for responsible decision-making are defined in the Values, Objectives, Indicators, and Targets (VOITs) section. Specific targets developed ensure the goals and objectives of the plan are measured to achieve resource sustainability.

2 Administrative Boundaries

2.1 Forest Management Agreement and Defined Forest Area

Weyerhaeuser Grande Prairie DFMP covers a total Defined Forest Area (DFA) of 1,142,924ha located between the 54th and 56th parallels in west central Alberta (Figure 2-1). The DFA is comprised of a Forest Management Agreement (FMA# 6900016) area of 1,117,070ha and an additional 25,854ha of non-FMA area. The FMA is divided into two disjointed spatial locations, the smaller "Saddle Hills" area to the north of the city of Grande Prairie and the larger main portion to the south of the city.

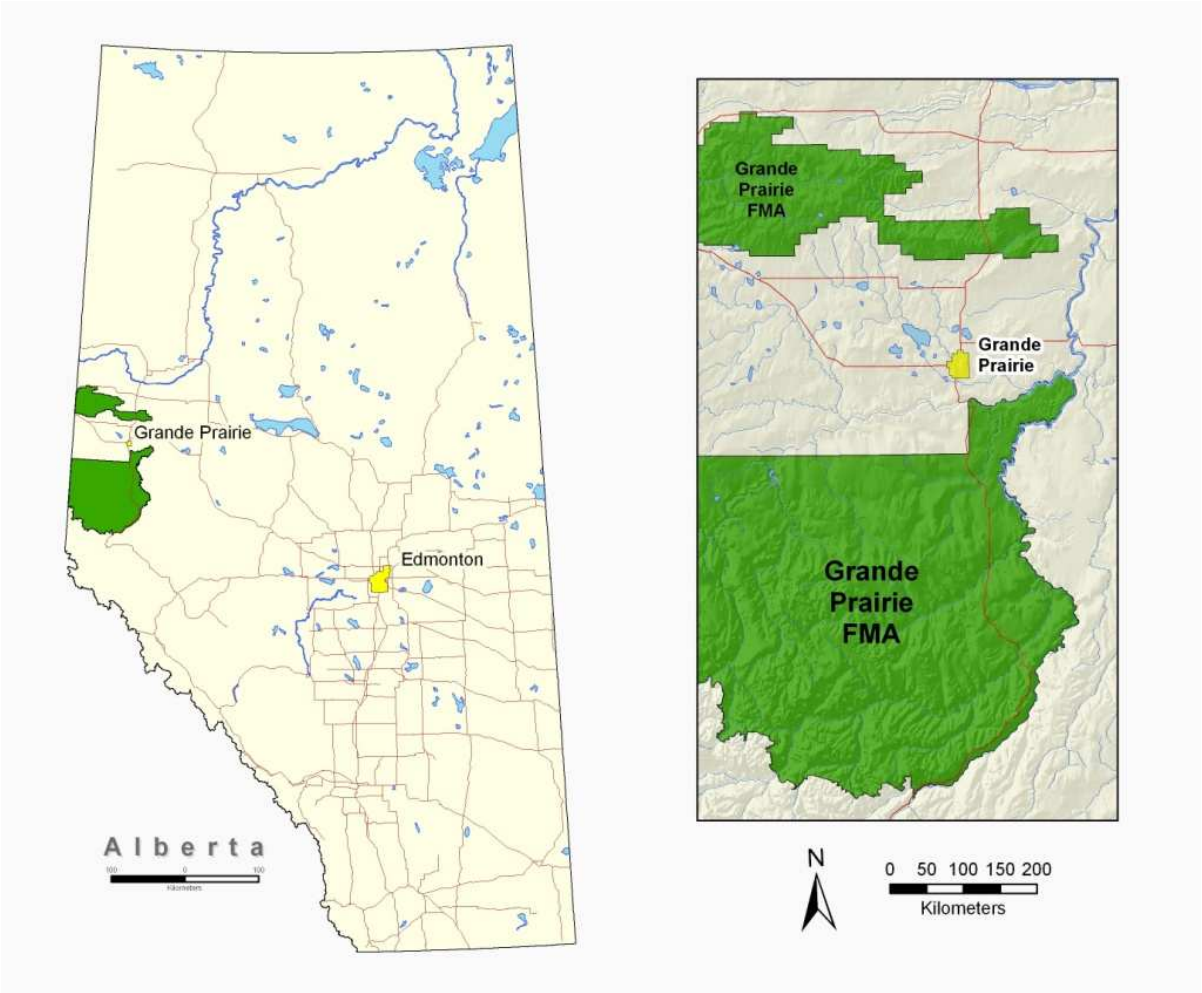


Figure 2-1 Defined Forest Area

2.2 Municipal Districts and Counties

Most of the FMA area's Southern block is located in Municipal District of Greenview No. 16. Most of the Northern block of the FMA area is located in Saddle Hills County. Figure 2-2 summarizes municipal districts surrounding the DFA.

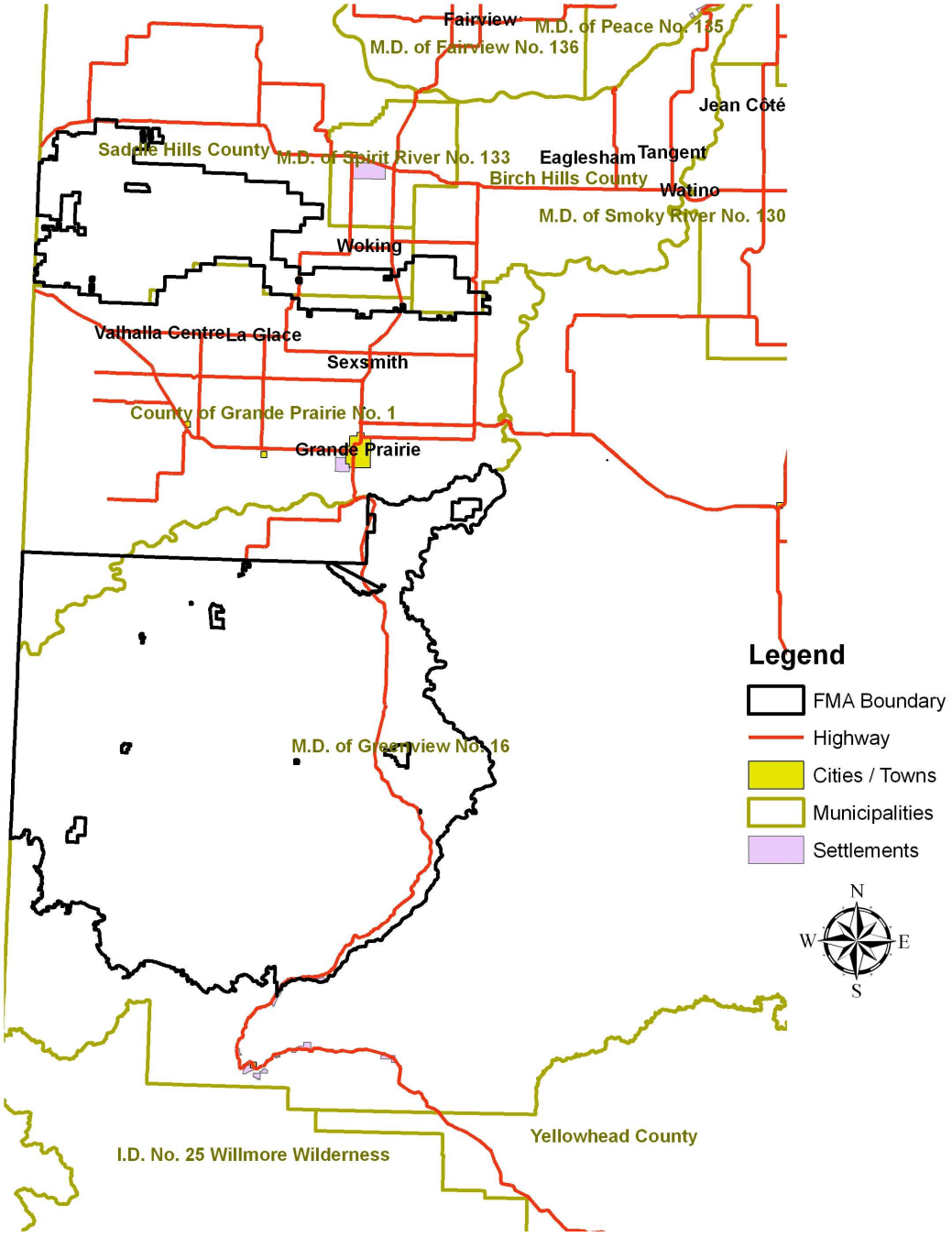


Figure 2-2 Municipal Districts (M.D.) Surrounding DFA

2.3 Indian Reservations / Aboriginal Communities

2.3.1 Aseniwuche Winewak Nation

Aseniwuche Winewak Nation of Canada has been involved with Weyerhaeuser's forest resource planning. Aseniwuche Winewak Nation's current land holdings are a remnant of our Traditional Lands that partially are enclosed by DFA. The land holding agreements that exist today are unique in Alberta, possibly in Canada. When the Town of Grande Cache was built, our People did not have clear Constitutional Status. The Province simply described the People as "Original Native Settlers," and organized us into four Cooperative Associations and two Enterprises to hold six small parcels of land.

The six Aboriginal communities in the Grande Cache area are: Muskeg Seepee Cooperative, Susa Creek Cooperative, Grand Cache Lake Enterprise (Kamisak Development), Victor Lake Cooperative, Joachim Enterprise, and Wanyandie Cooperative (East and West). The seven parcels together total 4,150 acres. The land is held communally by members with either an elected Board of Directors or Managing Director. Each Cooperative and Enterprise holds a fee simple title to the parcels of land and has the legal authority to manage its own affairs. The land arrangement's unusual structure has resulted in many of the problems we face today. In a modern economy, wealth is tied to equity, usually in the form of personal property. However, our lands are held communally, not by individuals, so cannot be used as equity. Yet, if we do not hold the land communally it reverts back automatically to the Province, putting our claim to the land in immediate peril.

The DFA stakeholders could have a different approach dealing with aboriginal consultation and historical resources from one currently adapted by Weyerhaeuser. Whatever approach may be selected by a stakeholder, it must meet the requirements of the Alberta Aboriginal Consultation Guidelines and the Historical Resources Act.

Traditional Land Map with Current Land Map insets are provided in Figure 2-3 and Figure 2-4.

Source: http://www.aseniwuche.com/our_land/current_land.html

Figure 2-3 Aseniwuche Winewak Current Land Map

Figure 2-4 Aseniwuche Winewak Traditional Land Map

2.3.2 Horse Lake First Nation – Treaty 8 Hythe, Alberta

Horse Lake First Nation has two reservations. Horse Lake No. 152B is located 60 kilometres northwest of Grande Prairie (Figure 2-5); Clear Hills No. 152C is located 56 kilometres northwest of Fairview (Figure 2-6). Traditional lands include portions of the Grande Prairie FMA.

Horse Lake First Nation has an approximate population of 943 members with 428 living on the Horse Lake reserves and 515 living elsewhere. Facilities and services located on the Horse Lake Reserve include: band administration office, health centre, school, fire hall, recreation centre, water and sewage treatment. Clear Hills Development Corp. (formerly Clear Hills Construction) is the business arm of Horse Lake First Nation. The Horse Lake First Nation Industry Relations Corporation (HLFN IRC) serves as industrial relations/resource consultation and community engagement/traditional use liaison. They are a member of Western Cree Tribal Council with Duncan's First Nation and Sturgeon Lake Cree Nation.

Source: http://www.aboriginalcanada.gc.ca/acp/community/site.nsf/eng/fn449.html

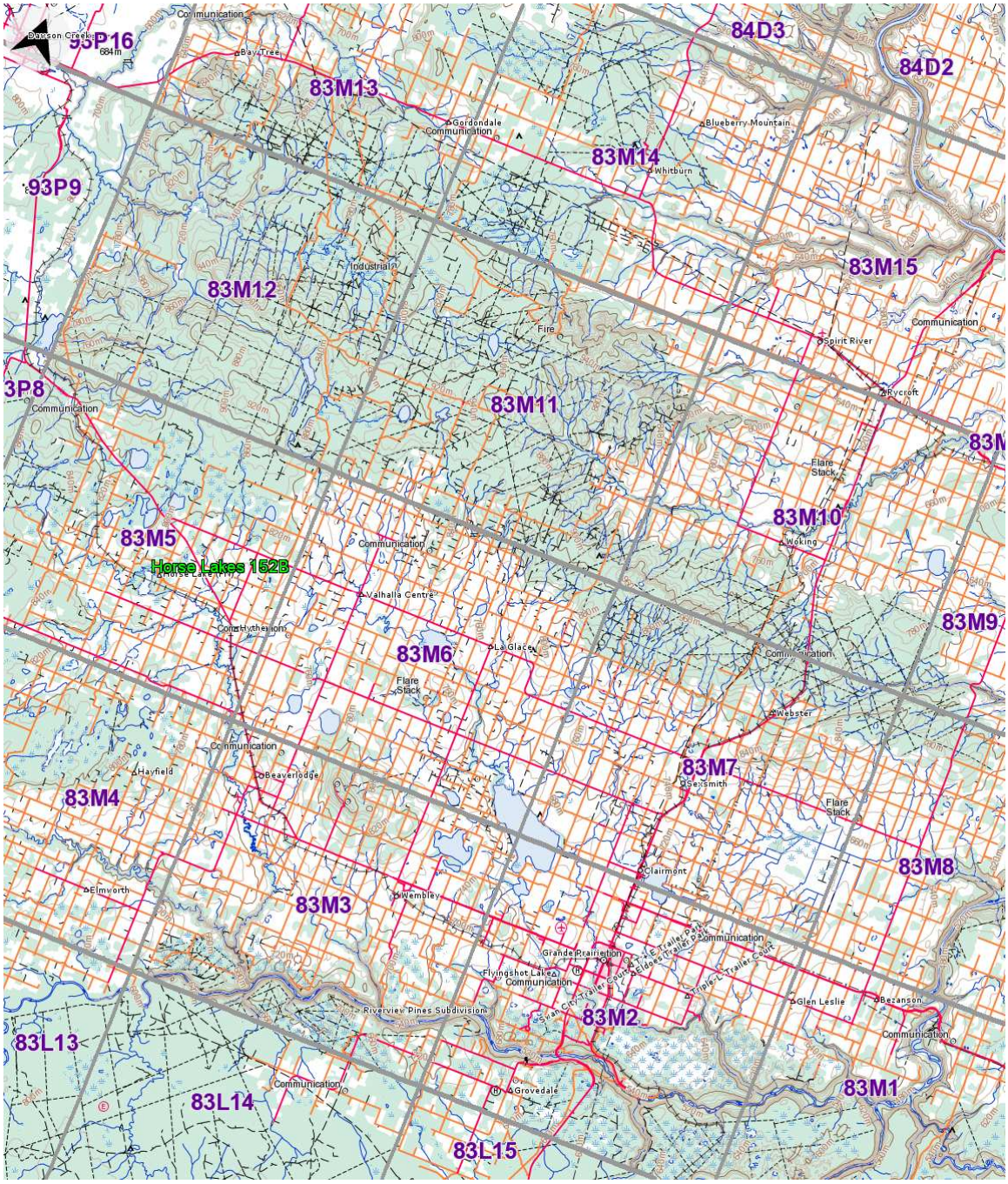


Figure 2-5 Horse Lake First Nation – Horse Lake No. 152B Reservation

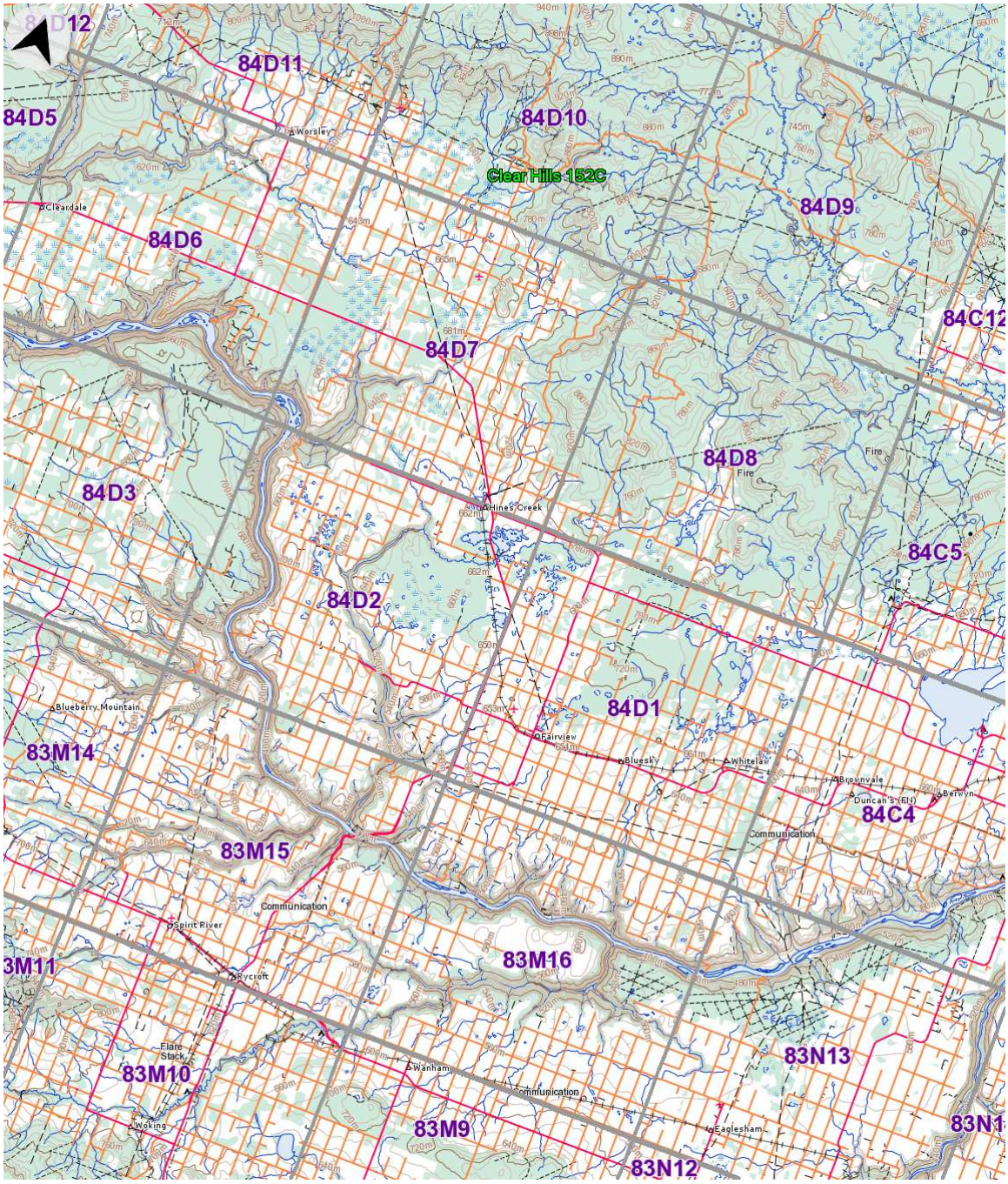


Figure 2-6 Horse Lake First Nation – Clear Hills No. 152C Reservation

2.4 Forest Management Units / Compartments / Sub-units

The five Forest Management Units (FMUs) that made up the Weyerhaeuser Grande Prairie FMA (G01P, G03P, G04P, G06P, and G07P) have been amalgamated into one, referred to as FMU G16.

Figure 2-7 summarizes Weyerhaeuser Grande Prairie Timber Supply Cost zones.

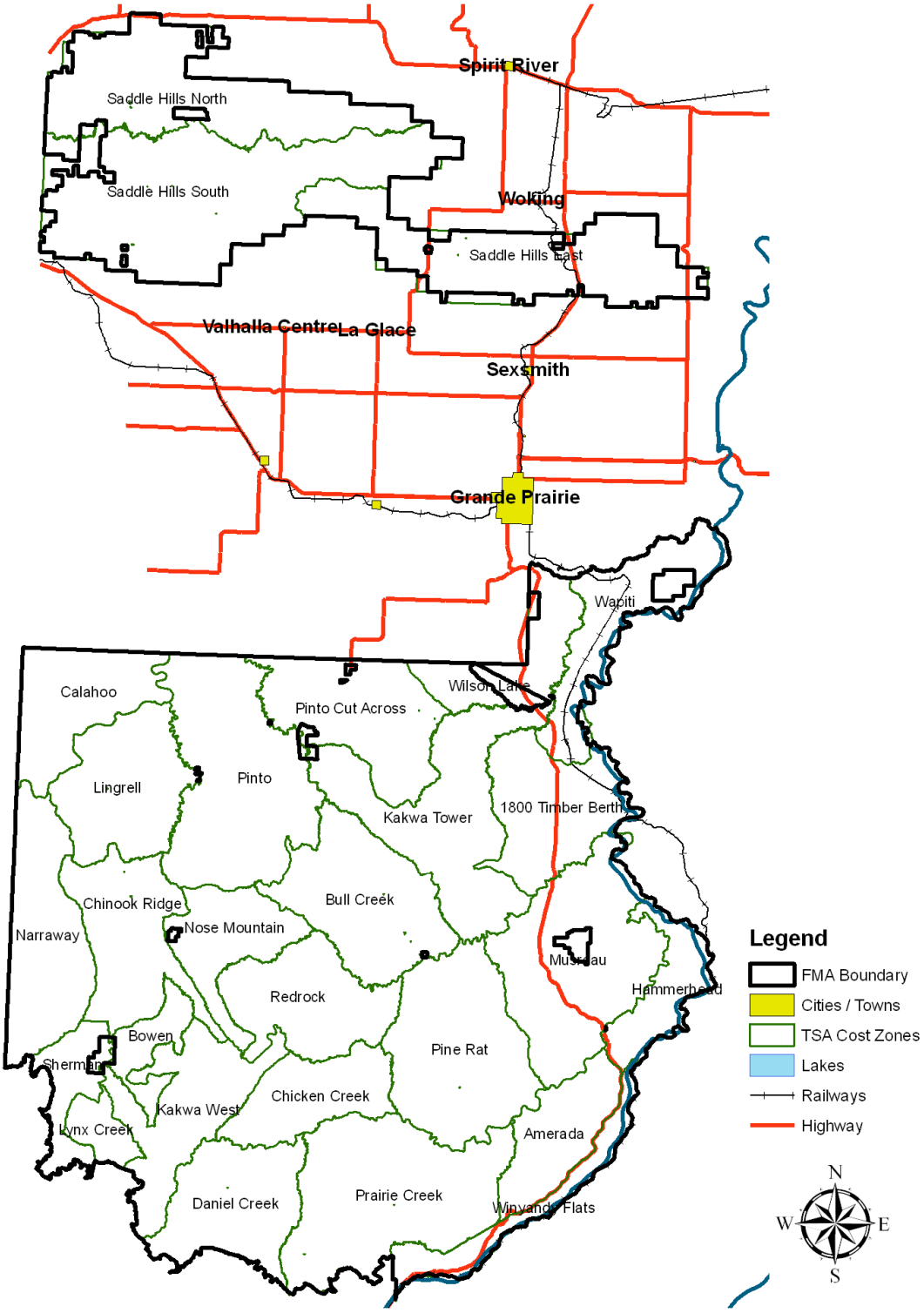


Figure 2-7 Weyerhaeuser Grande Prairie TSA Cost Zones

2.5 Natural Subregions

Natural subregions are ecological units characterized by vegetation, climate, elevation and latitudinal or physiographic differences[1]. The Weyerhaeuser DFA contains seven subregions with two (lower and upper foothills) making up 70% of the area (Table 2-1). Subalpine and central mixed wood make up a further 25%. Figure 2-8 shows the geographic distribution of the subregions on the DFA.

Table 2-1 Area by Natural Subregion

Natural Subregion	Area (Ha)	Percent
Alpine	46	0.0%
Subalpine	144,489	12.6%
Montane	7,521	0.7%
Central Mixedwood	135,668	11.9%
Dry Mixedwood	56,139	4.9%
Lower Foothills	548,085	48.0%
Upper Foothills	250,976	22.0%
Total	1,142,924	100.0%

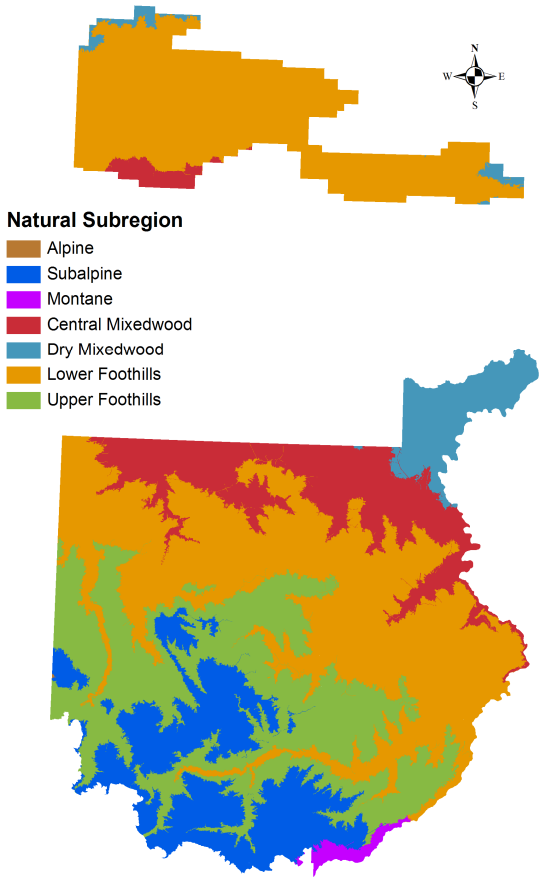


Figure 2-8 Natural Subregions

[1] Natural Regions Committee 2006. Natural Regions and Subregions of Alberta. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852.

2.5.1 Lower Foothills

Lower Foothills subregion makes up 48% of the DFA and is the predominant subregion in the Saddle Hills area. It is characterised by rolling till covered plateaus that are forested by mesic, closed canopy mixed stands of aspen, lodgepole pine, white spruce and balsam poplar. Key features include:

- Mean annual temperature is 1.8°C and mean annual precipitation is 588mm.
- The most diverse forests in Alberta in terms of forest types and tree species. Transition from aspen and white spruce dominated boreal mixedwood forests to the lodgepole pine dominated upper foothills subregion.

2.5.2 Upper Foothills

Upper Foothills subregion comprises around 22% of the DFA. It is characterised by closed canopy conifer stands of lodgepole pine, black spruce and white spruce on rolling to steeply sloping terrain. Key features include:

- Mean annual temperature is 1.3°C and mean annual precipitation is 632mm.
- Even-aged fire origin lodgepole pine stands, often with a black spruce understory, are typical of this subregion. White spruce stands may occur along river valleys and on lower slopes.

2.5.3 Central Mixedwood

12% of the DFA falls within this subregion. It is characterised by vast expanses of upland forests and wetlands on level to gently undulating plains with short, warm summers and long, cold winters. It is the largest natural subregion in Alberta. Key features include:

- Mean annual temperature is 0.2°C and mean annual precipitation is 478mm.
- Aspen dominated deciduous stands, aspen\white spruce forests, white spruce and jack pine stands are typical of upland areas in this subregion.

2.5.4 Subalpine

Subalpine subregion comprises about 13% of the DFA. It occurs at high elevations and is characterized by short cool summers and high winter snowfalls. Key features include:

- Mean annual temperature is -0.1°C and mean annual precipitation is 755mm.
- Lower regions are characterized by closed fire origin lodgepole pine forests with Engelmann spruce and subalpine fir.

2.6 Protected Areas and Parks

There are no provincial parks within the FMA area. Figure 2-9 represents the FMA Area in relation to the provincial parks, Trumpeter Swan protected areas, and recreation leases.

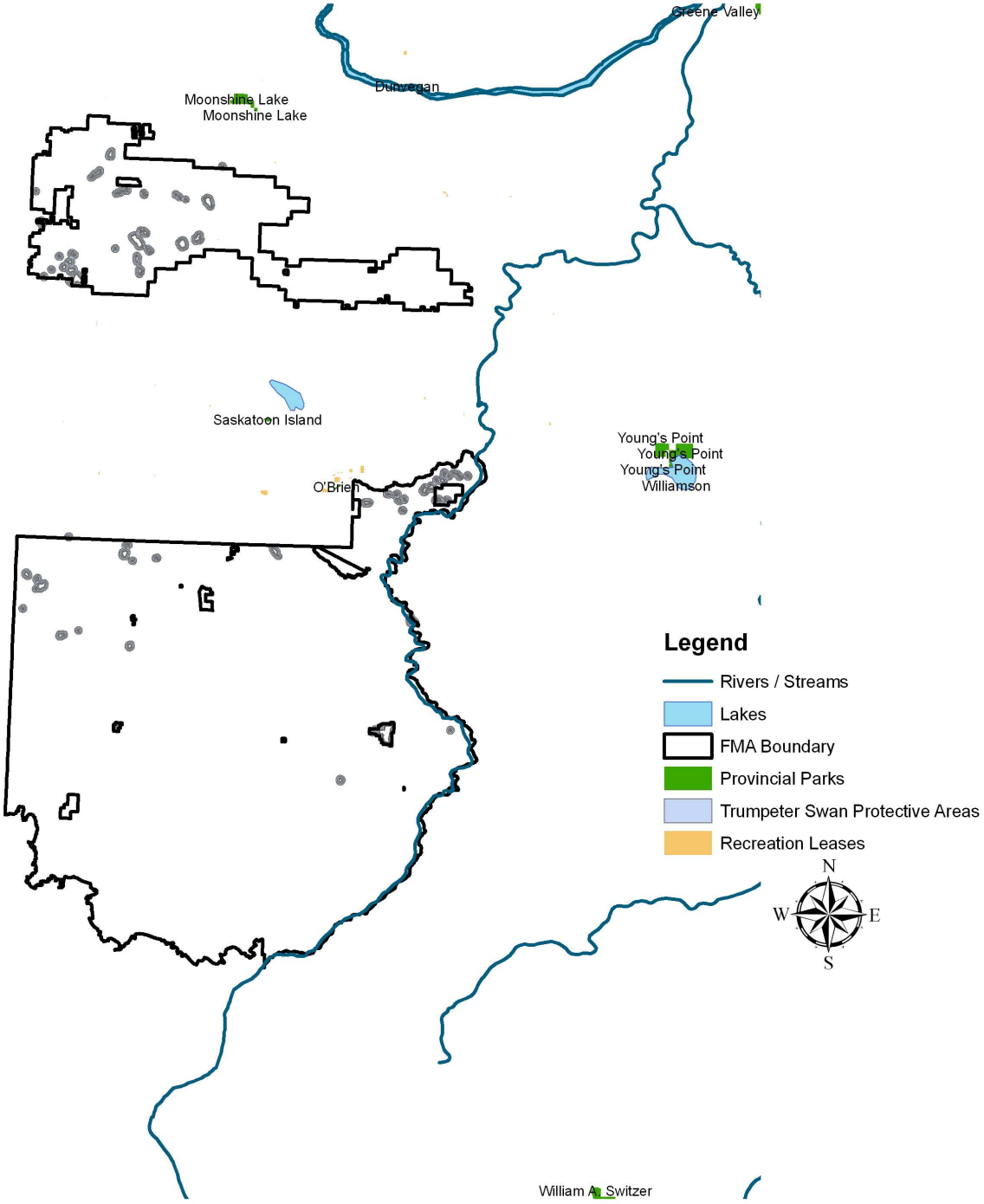


Figure 2-9 FMA Area in Relation to Provincial Parks, Trumpeter Swan Protected Areas, and Recreation Leases

2.7 Wildfire Management Areas

Alberta SRD Wildfire Management Branch has prepared FireSmart Management and Wildfire Threat Assessment for the FMA area (ASRD WMB 2011). Wildfire management areas and strategies are summarized in Section 6.

3 Physical Conditions

3.1 Topography

The southernmost part of the FMA borders the Rocky Mountains with elevations up to 1,750m at the highest points (Figure 3-1 and Figure 3-2). That provides many challenges for forestry operations in these areas.

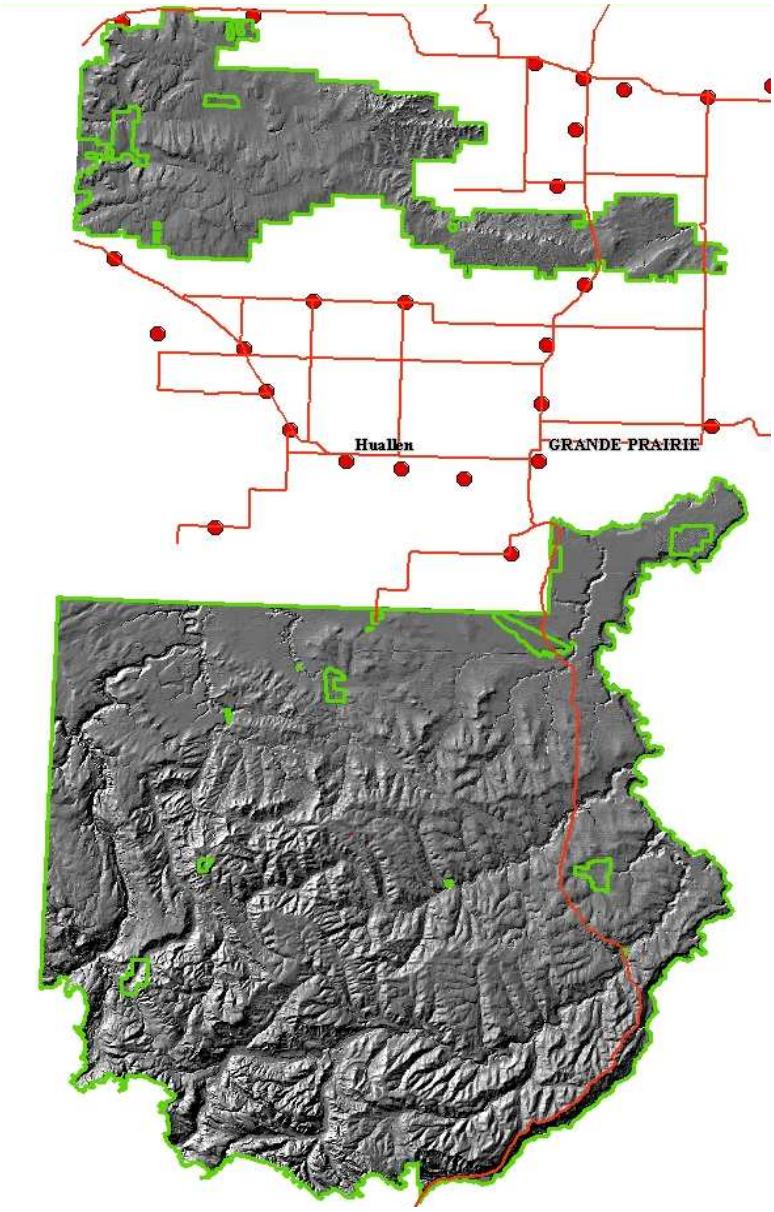


Figure 3-1 Topography of the FMA Area

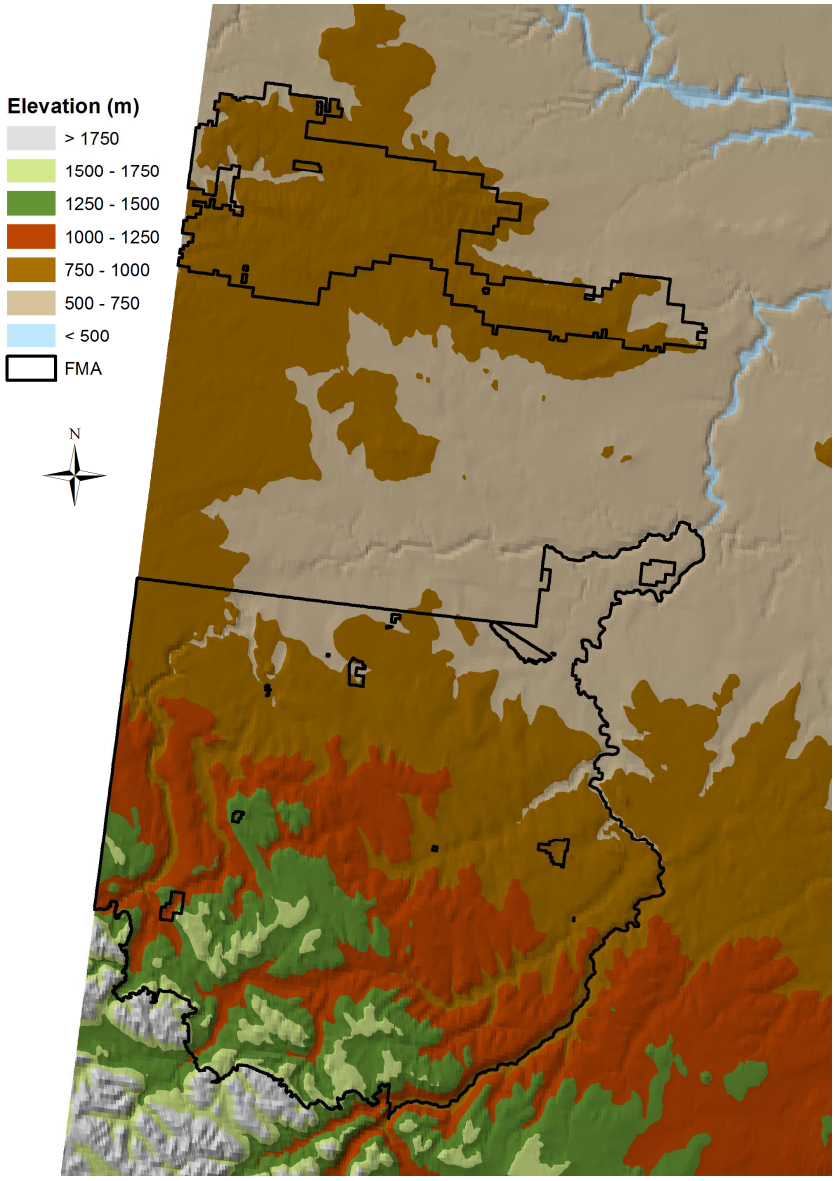


Figure 3-2 Surface Topography and Elevation

3.2 Soils and Landforms

3.2.1 Geology

Major geologic formations found within the DFA include the Wapiti (lower), predominately in the Saddle Hills area, the Wapiti (upper), Scollard, Brazeau, Alberta and Paskapoo formations in the southern area. These formations date back to the Late Cretaceous and Early Tertiary periods. Figure 3-3 and Figure 3-4 show the geographic locations of the geological periods and formations on the DFA.

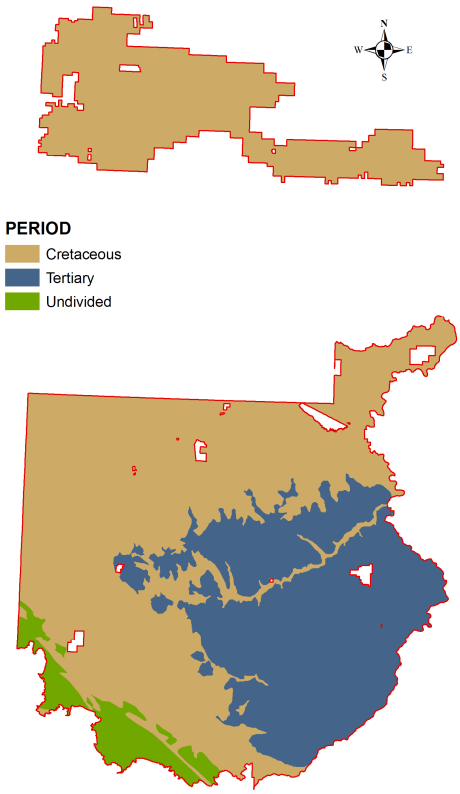


Figure 3-3 Geological Periods

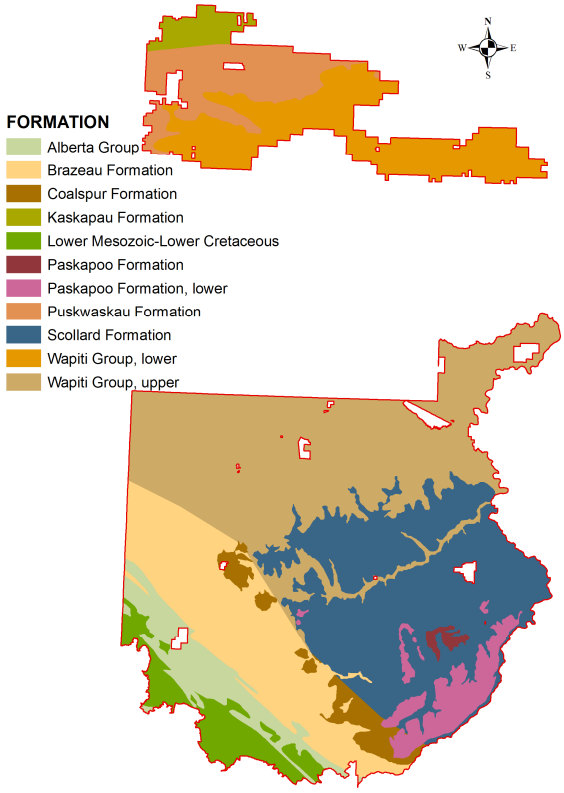


Figure 3-4 Geological Formations

Source: Alberta Geological Survey. http://www.ags.gov.ab.ca/GIS/download_gis.htm

3.2.2 Soils

Gray luvisolic soils (Figure 3-5) dominate the FMA area, particularly in the lower and upper foothills regions of the FMA. The entire Saddle hills area is predominately Gray luvisolic. At higher elevations on the southern part of the FMA Brunisolic (Brunisolic gray luvisolic, Dystic brunisolic and Eutric brunisolic) subgroups are found. Figure 3-6 shows the distribution of the main soil groups on the FMA.

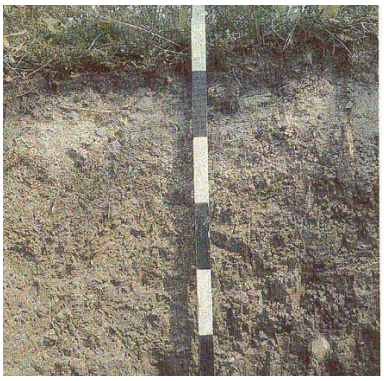


Figure 3-5 Orthic Gray Luvisol

(Source: Canadian System of Soil Classification, 3rd ed, http://sis.agr.gc.ca/cansis/taxa/cssc3/chpt03.html#outline)

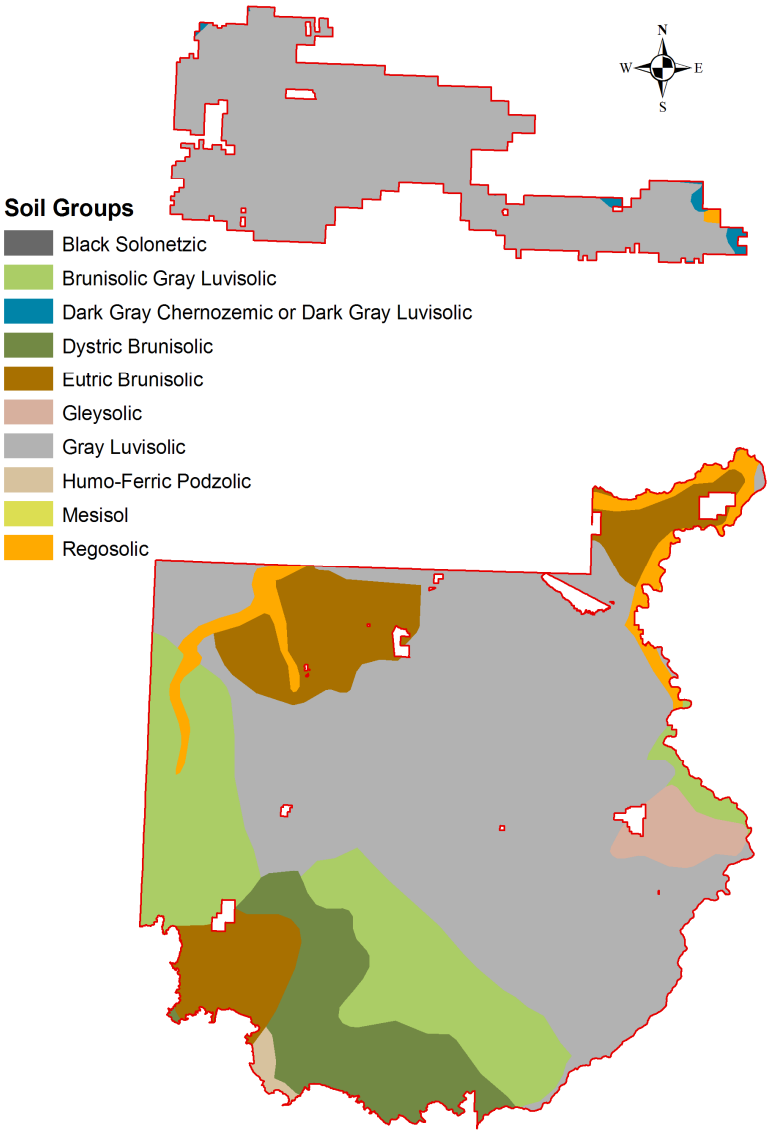


Figure 3-6 Soil Groups on the FMA[2]

3.3 Hydrography

The FMA is located within the Peace River Drainage Basin of Alberta (Figure 3-7). The Saddle Hills area is drained by the Saddle River which flows eastward to the Smoky River and the Pouce Coupe River which flows to the west. The main block is drained by the Wapiti River, the Mountain Creeks, Cutbank River and the Kakwa River, which are all tributaries of the Smoky River. The Smoky River forms the eastern boundary of the larger southern block of the FMA.

Figure 3-8 shows the major rivers relative to the FMA.

[2] Source: Soil Landscapes of Canada version 2.2. (National Soil Database). http://sis.agr.gc.ca/cansis/taxa/cssc3/intro.html

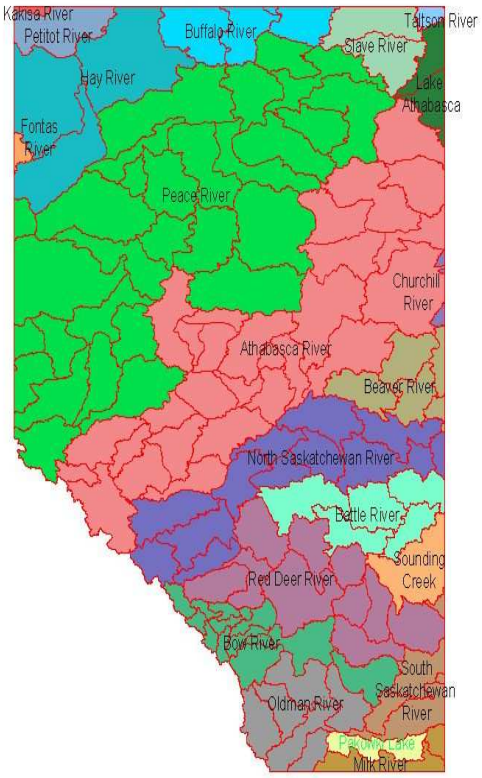


Figure 3-7 Drainage Basins of Alberta[3]

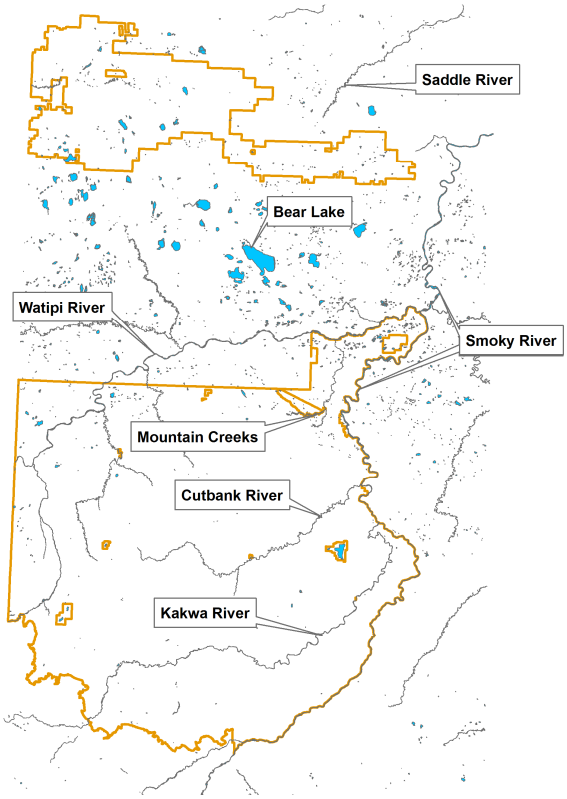


Figure 3-8 Major Rivers and Lakes around the DFA

3.3.1 Watersheds

In the FMA area 305 unique watersheds have been identified; they could be aggregated into 19 base level watersheds. Figure 3-9 shows location of the unique watersheds in the context of the FMA area and major highways and cities / towns.

[3] Source: http://www.srd.alberta.ca/MapsFormsPublications/Maps/ResourceDataProductCatalogue/images/drain_basins.jpg

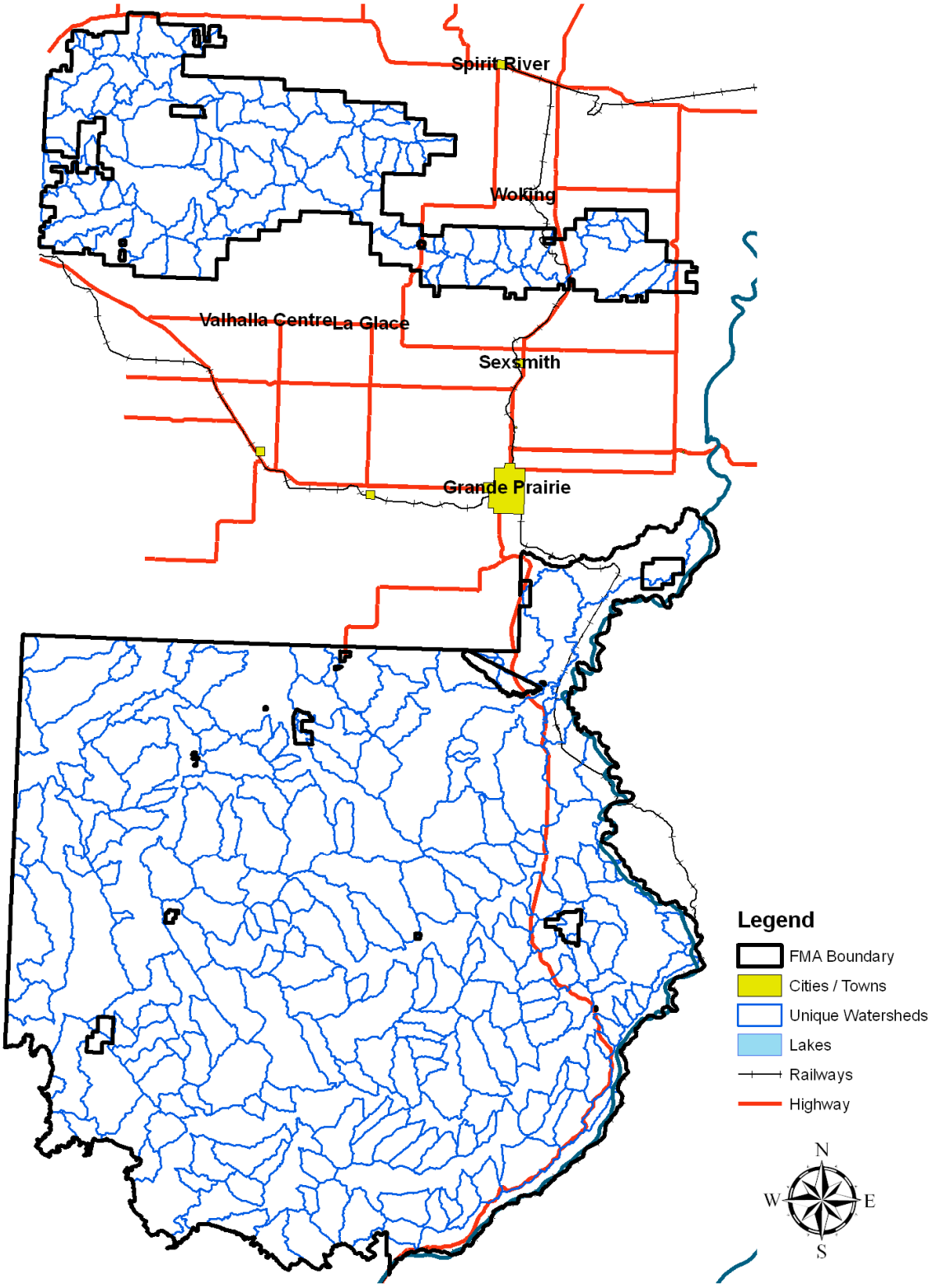


Figure 3-9 Weyerhaeuser Grande Prairie Base level and Unique Watersheds

3.4 Climate

Several factors influence the climate of any one location, including variations in solar radiation due to latitude, major terrain features, pressure and wind systems, distance from major water bodies and other local features. The prevailing climate of Weyerhaeuser's FMA can be characterized as cool summers (15°C) and moderate to cold winters (-12°C)[4]. Average annual precipitation for the FMA is 483 mm with minimum and maximum values of 416 and 638 mm. The average annual precipitation for the southern part of the FMA and Saddle Hills are similar at 495mm and 488mm respectively[5].

The isolines on Figure 3-10 shows annual precipitation in the south block of the FMA increases with elevation from 400-475mm on the north eastern boundary to 550-600mm on the south western edge of the FMA. Elevation along this gradient ranges from 500-1800 m. Precipitation in the Saddle Hills ranged from a maximum of 500 mm at the height of land to 475-400 along its lower slopes. Maximum observed average annual precipitation in the Saddle Hills is 492 mm and varies between 441 and 463 mm to the north and south of the area.

[4] Interpretive Based Ecological Classification for Weyerhaeuser's Grande Prairie FMA Area. November 2007. Report prepared by GreenLink Forestry Inc.
[5] Water Yield and Precipitation Inputs for ECA-AB Analysis. Grand Prairie Forest Management Area. August 30, 2007. Report prepared by Watertight Solutions.

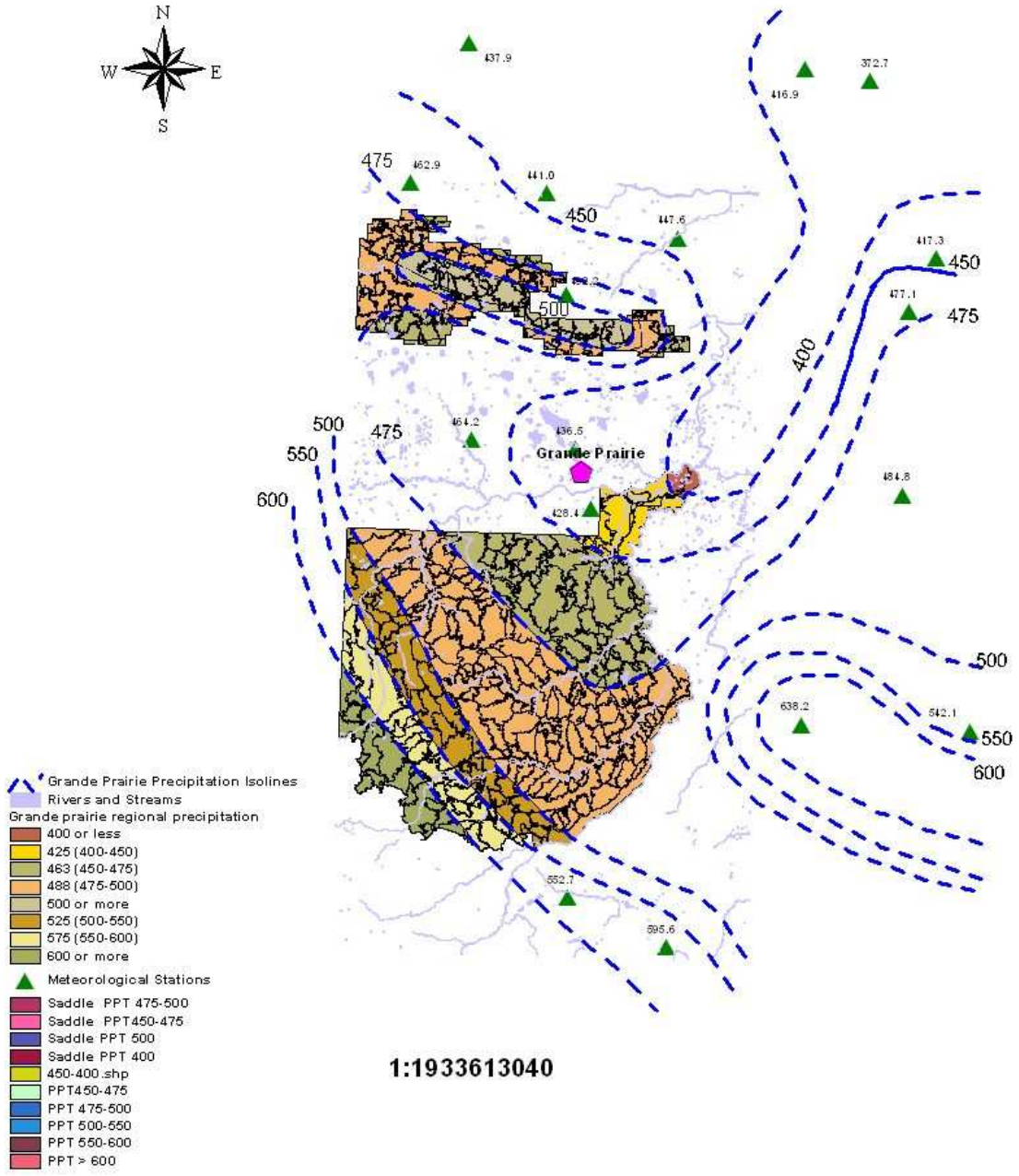


Figure 3-10 Annual Precipitation Isolines in the vicinity of the DFA

(Source: Watertight Solutions)

4 Forest Landscape Pattern and Structure

The structure and pattern of the forest landscape is influenced by many interacting factors such as climate, elevation, slope, aspect, soil properties and physical disturbances, both natural and anthropogenic. This section provides a current snapshot of the DFA forest landscape in terms of species composition, forest cover types, age class distribution, seral classes and forest patches.

As part of the DFMP development the DFA area was subject to a net land base determination process in order to categorize the area into non-forested and productive and non-productive, such as riparian buffers, protected areas and dispositions, forested areas. Table 4-1 provides a summary of the net land base determination. Further information on the net down process is available in Section 7 of the Land Base Assignment document.

Table 4-1 Gross and Net Land Base Areas (Ha)

	Saddle Hills	Main Block	Total
Gross Area	223,443	919,481	1,142,924
less Non-forested areas	-16,386	-37,641	-54,027
Gross Forested Area	207,057	881,840	1,088,897
less Dispositions	-13,777	-36,468	-50,245
less Buffers	-9,656	-66,391	-76,047
less Subjective deletions	-16,836	-83,633	-100,469
Net Productive Land Base	166,788	695,348	862,136

In this section the gross forested area will be used to report on the DFA forest landscape pattern and structure.

4.1 Forest Species

Table 4-2 shows the area by leading species, based on Alberta Vegetation Inventory (AVI), on the forested area. Aspen (AW) and white spruce (SW) are the dominant species found in the northern portion of the FMA (Saddle Hills) while coniferous species, particularly lodgepole pine (PL) and white spruce are predominant in the southern part of the FMA. Other species found in lesser quantities on the DFA include the coniferous species black spruce (BS), Engelmann spruce (SE), tamarack larch (LT), balsam fir (BF), alpine fir (FA) and deciduous species black poplar (PB) and white birch (BW).

Figure 4-1shows the percentage of the total area by species while Figure 4-2 shows the geographic distribution of the species on the DFA.

Table 4-2 Area by Species on the Forested Land Base

Species	Saddle Hills		Main Block		Total	
	Ha	%	Ha	%	Ha	%
AW	111,257	53.7%	184,349	20.9%	295,605	27.1%
BW	975	0.5%	4,332	0.5%	5,307	0.5%
PB	7,067	3.4%	15,875	1.8%	22,942	2.1%
FA		0.0%	41	0.0%	41	0.0%
FB	11	0.0%	5,609	0.6%	5,620	0.5%
LT	1,396	0.7%	12,730	1.4%	14,126	1.3%
PL	8,281	4.0%	350,180	39.7%	358,462	32.9%
SB	13,652	6.6%	61,175	6.9%	74,827	6.9%
SE		0.0%	24,990	2.8%	24,990	2.3%
SW	56,885	27.5%	209,118	23.7%	266,003	24.4%
Unknown	7,533	3.6%	13,442	1.5%	20,975	1.9%
Total	207,057	100.0%	881,840	100.0%	1,088,897	100.0%

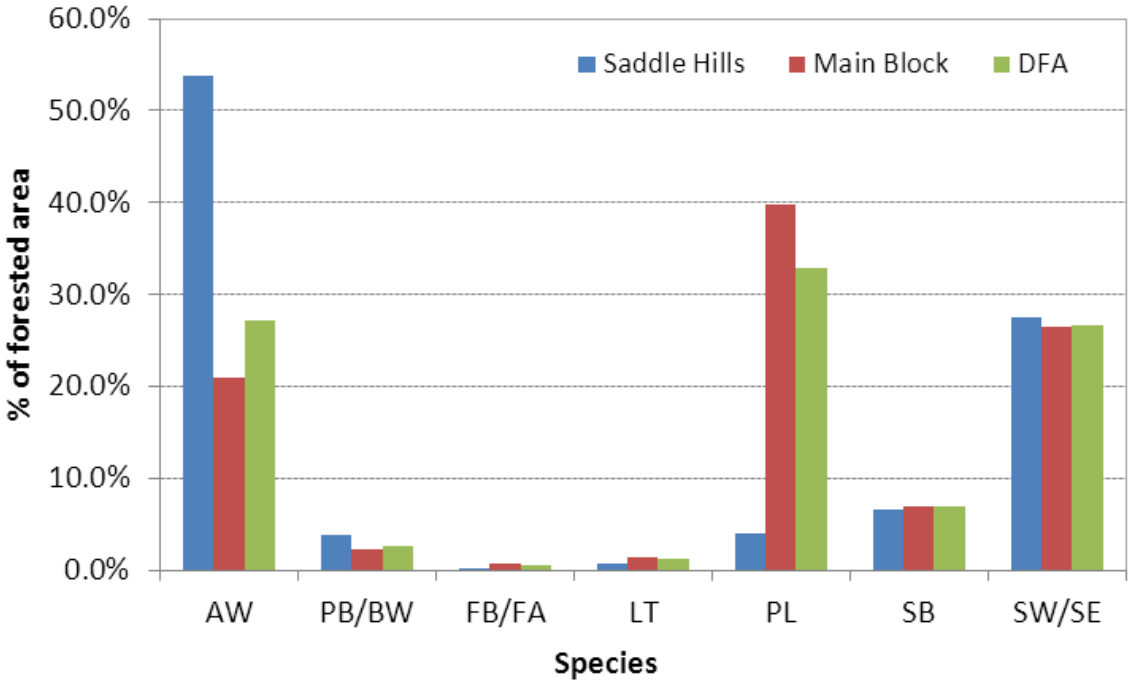


Figure 4-1 Percentage of Forested Area by Leading Species

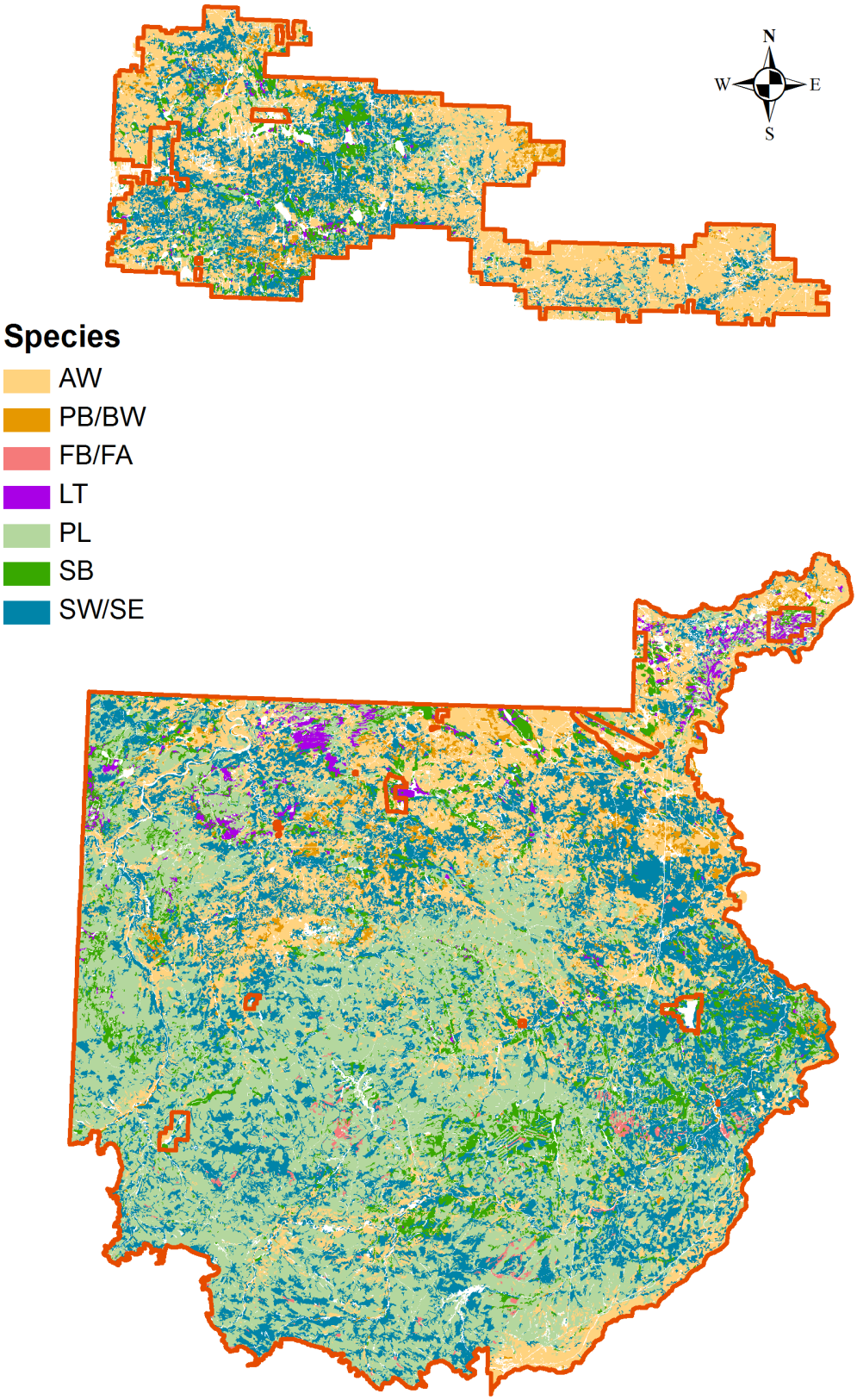


Figure 4-2 DFA Species Distribution

4.2 Forest Cover Types

Forest stands are classified into cover types or broad cover groups (BCG) based on the predominant specie or species in the stand. The four main groups are CX (pure coniferous), CD (conifer leading mixedwood), DC (deciduous leading mixedwood) and DX (pure deciduous). The process for determining the stand BCG is explained in Section 3.5 of the Land Base Assignment document.

Pure coniferous stands are the dominant cover type on the DFA with 59% (Table 4-3) of the forested area comprised of this type. There is, however, a distinct difference between the northern Saddle Hills area which is made up of predominately DX stands (54%) and the southern part which is dominated by CX stands (66%).

Table 4-3 Forested Area by Broad Cover Group (BCG)

BCG	Saddle Hills		Main Block		Total	
	Ha	%	Ha	%	Ha	%
DX	112,463	54.3%	158,026	17.9%	270,489	24.8%
DC	18,639	9.0%	85,399	9.7%	104,038	9.6%
CD	9,864	4.8%	43,470	4.9%	53,335	4.9%
CX	58,558	28.3%	581,503	65.9%	640,061	58.8%
Unknown	7,533	3.6%	13,442	1.5%	20,975	1.9%
Total	207,057	100.0%	881,840	100.0%	1,088,897	100.0%

Figure 4-3 shows the percentage of the total area by BCG graphically while Figure 4-4 shows the geographic distribution of the BCGs on the DFA.

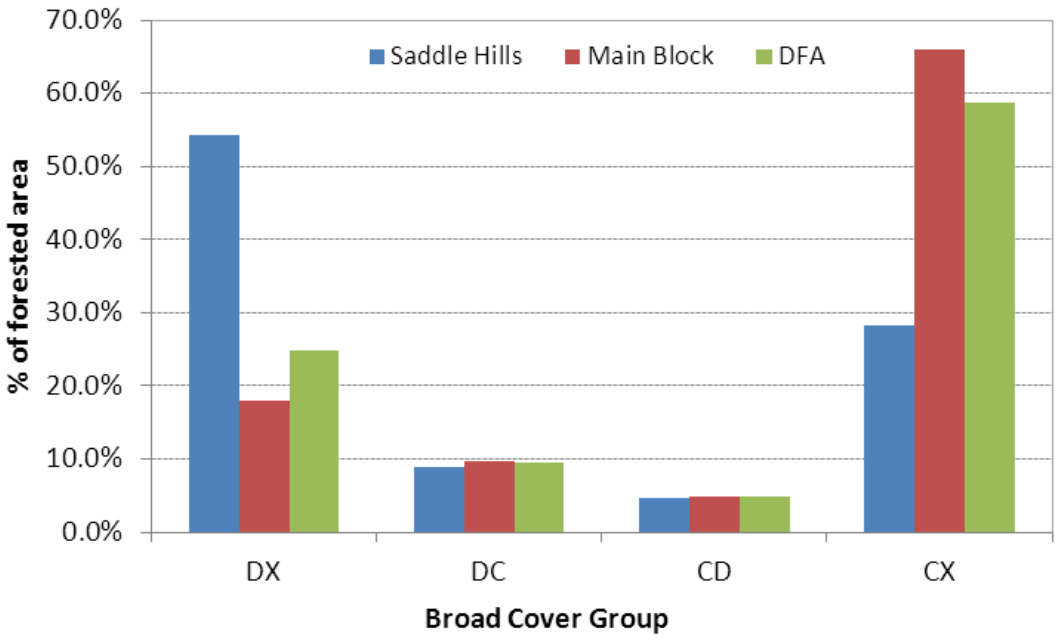


Figure 4-3 Percentage of Forested Area by BCG

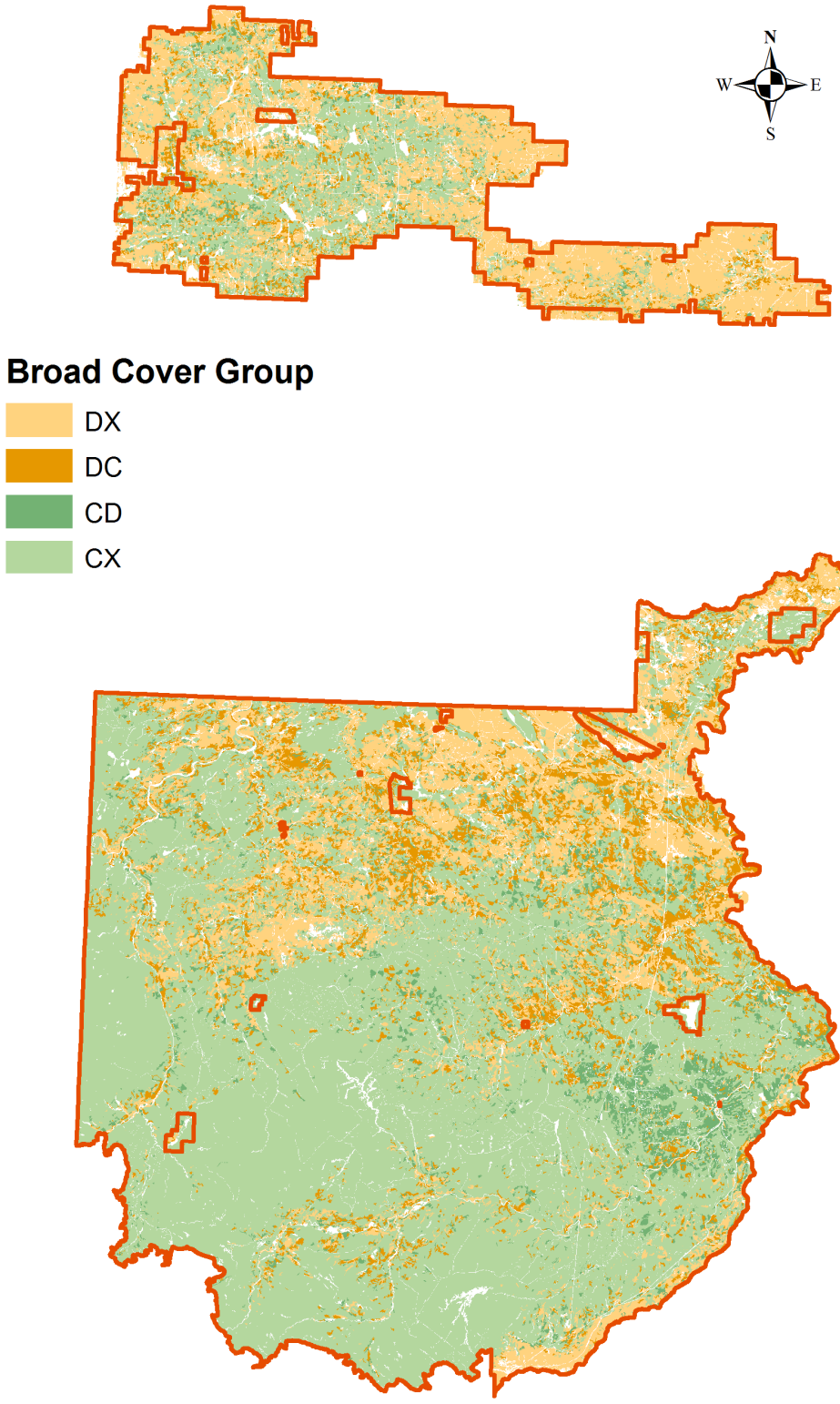


Figure 4-4 Broad Cover Group

4.3 Forest age-classes

A good understanding of stand age is fundamentally important to forest management and planning as it is critical to modelling future wood supply. The current age-class distribution based on 20 year intervals is presented in Table 4-4. The majority of the forested area falls within the 60 to 120 year range (66% in Saddle Hills, 59% in the main block and 60% overall).

Table 4-4 Forested Area by Age-class

Age Class	Saddle Hills		Main Block		Total	
Years	Ha	%	Ha	%	Ha	%
0 - 19	24,218	11.7%	120,463	13.7%	144,681	13.3%
20 - 39	13,255	6.4%	72,457	8.2%	85,712	7.9%
40 - 59	23,000	11.1%	44,268	5.0%	67,268	6.2%
60 - 79	51,706	25.0%	115,033	13.0%	166,740	15.3%
80 - 99	51,291	24.8%	159,574	18.1%	210,865	19.4%
100 - 119	33,912	16.4%	241,711	27.4%	275,624	25.3%
120 - 139	4,910	2.4%	65,907	7.5%	70,816	6.5%
140 - 159	4,321	2.1%	39,628	4.5%	43,950	4.0%
160 - 179	430	0.2%	10,487	1.2%	10,917	1.0%
180 - 199	0	0.0%	6,728	0.8%	6,728	0.6%
200 - 219	14	0.0%	4,599	0.5%	4,613	0.4%
220 - 239	0	0.0%	405	0.0%	405	0.0%
240 - 259	0	0.0%	380	0.0%	380	0.0%
260 - 279	0	0.0%	195	0.0%	195	0.0%
280 - 299	0	0.0%	4	0.0%	4	0.0%
Total	207,057	100.0%	881,840	100.0%	1,088,897	100.0%

Figure 4-5 shows the percentage of the total area by age-class graphically while Figure 4-7 shows the geographic distribution by age-class on the DFA.

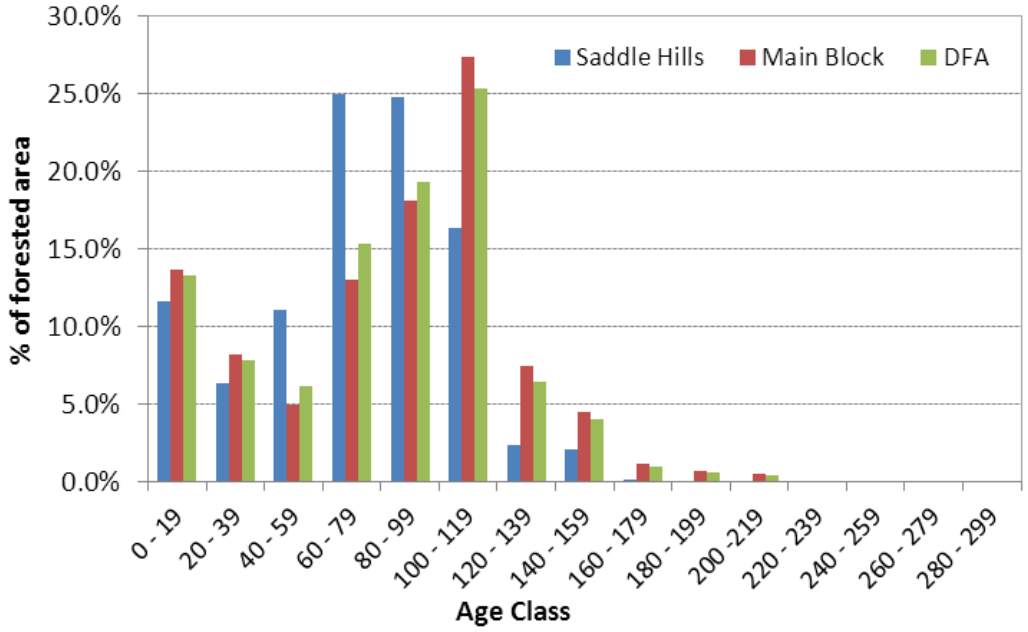


Figure 4-5 Percentage of Forested Area by Age-class

Table 4-5 Age-class Distribution by Broad Cover Group

Seral Stage	Broad Cover Group					Total
	CX	CD	DC	DX	Other	
0 - 19	95,771	999	474	26,658	20,778	144,681
20 - 39	48,400	19,427	6,537	11,154	194	85,712
40 - 59	12,343	2,542	27,935	24,448	0	67,268
60 - 79	52,642	5,942	38,376	69,779	1	166,740
80 - 99	98,333	6,394	17,965	88,172	1	210,865
100 - 119	201,357	13,470	11,954	48,842	0	275,624
120 - 139	66,099	2,682	671	1,365	0	70,816
140 - 159	42,239	1,576	85	51	0	43,950
160 - 179	10,629	246	41	2	0	10,917
180 - 199	6,691	34	0	3	0	6,728
200 -219	4,575	24	0	14	0	4,613
220 - 239	405	0	0	0	0	405
240 - 259	380	0	0	0	0	380
260 - 279	195	0	0	0	0	195
280 - 299	4	0	0	0	0	4
Total	640,061	53,335	104,038	270,489	20,975	1,088,897

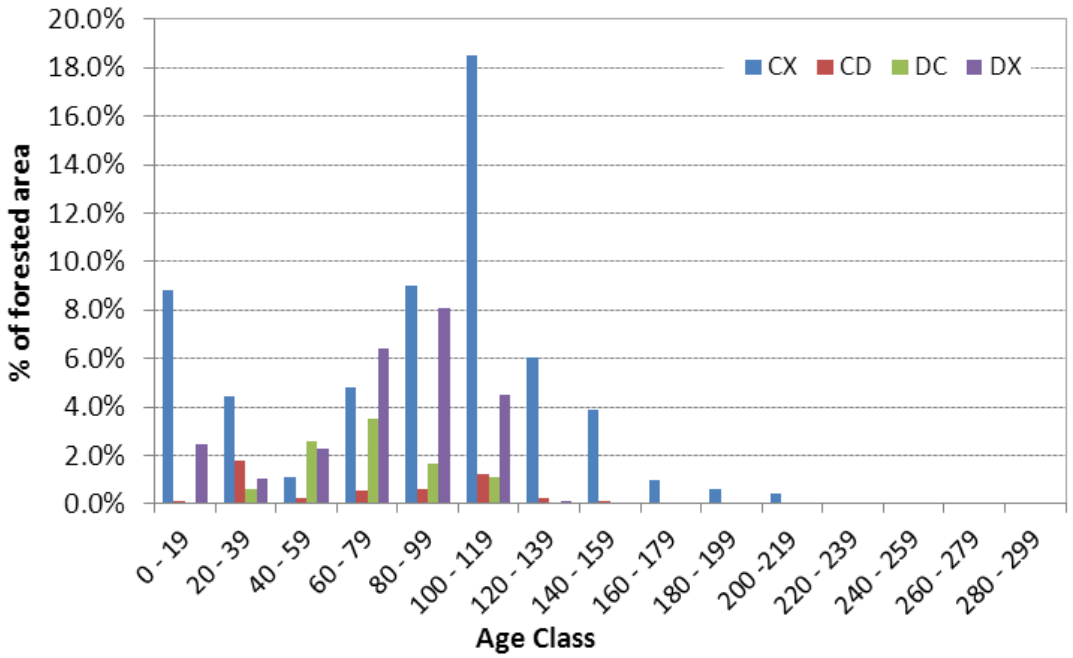


Figure 4-6 Age-class Distribution by Broad Cover Group

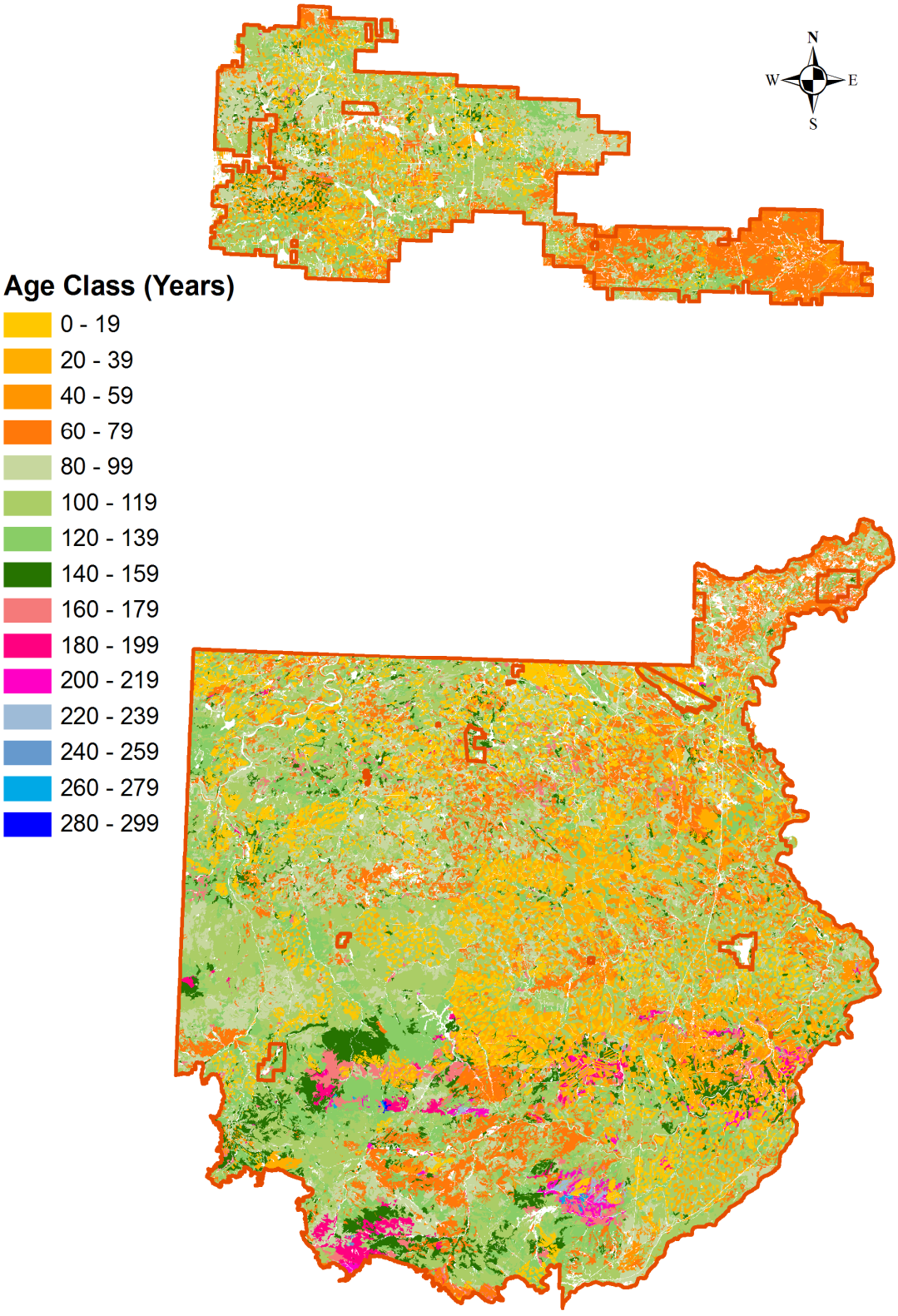


Figure 4-7 Age-class Distribution

4.4 Seral Stages

Seral stages refer to stages in forest succession. The *Alberta Forest Management Planning Standard*[6] defines seral stages as "a series of plant community conditions that develop during ecological succession from a major disturbance to the climax age". Common classification criteria for seral stages include age and species.

Six seral stages are defined based on Natural Subregion, leading species and age. The stages are *Initiation* (age 0 to 10), *Exclusion* (age 11 to 40), *Immature* (age 41 to 80), *Late* (age 81 to 120), *Very Late* (age 121 to 140) and *Over Mature* (age 141+). Table 4-6 summarises the area by seral stage for the DFA.

Table 4-6 Forested Area by Seral Stage

Seral Stage	Saddle Hills		Main Block		Total	
	Ha	%	Ha	%	Ha	%
Initiation	16,498	8.0%	70,604	8.0%	87,102	8.0%
Exclusion	20,975	10.1%	122,316	13.9%	143,292	13.2%
Immature	74,706	36.1%	159,302	18.1%	234,008	21.5%
Late	85,203	41.1%	401,286	45.5%	486,489	44.7%
Very Late	4,910	2.4%	65,907	7.5%	70,816	6.5%
Over Mature	4,766	2.3%	62,426	7.1%	67,191	6.2%
Total	207,057	100.0%	881,840	100.0%	1,088,897	100.0%

Figure 4-8 shows the percentage of the total area by seral stage graphically while Figure 4-9 shows the geographic distribution by seral stage on the DFA.

[6] Alberta Forest Management Planning Standard. Alberta Sustainable Resource Development. Version 4.1. April 2006.

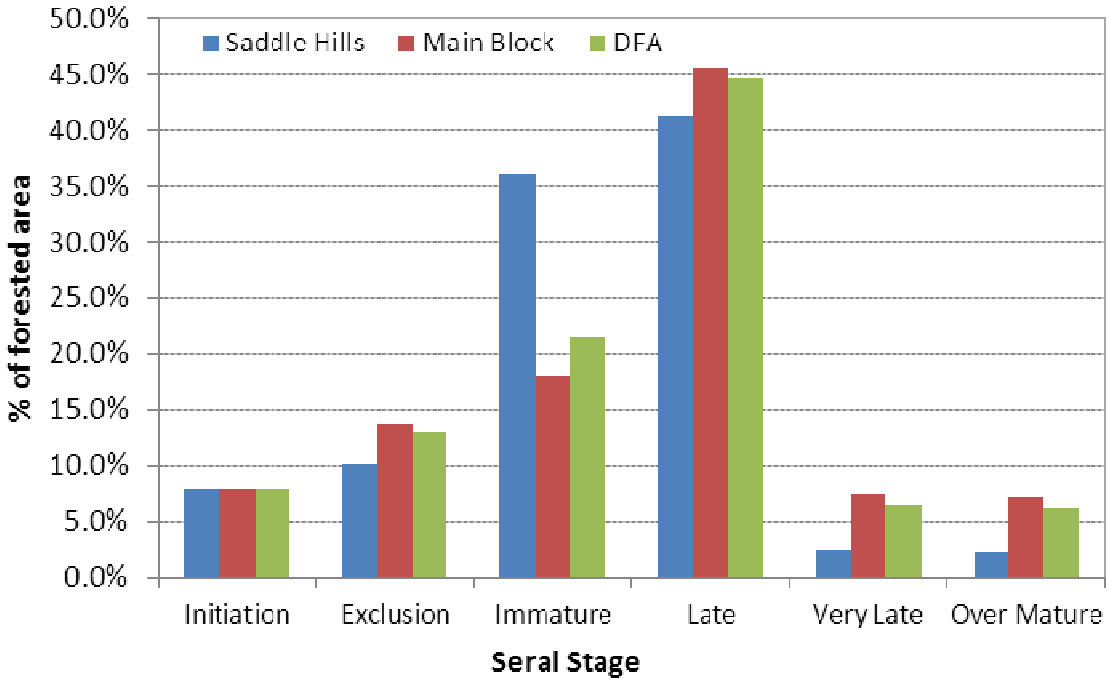


Figure 4-8 Percentage of Forested Area by Seral Stage

Table 4-7 Seral stage by broad cover group

Seral Stage	Broad Cover Group					Total
	CX	CD	DC	DX	Other	
Initiation	50,829	13	2	17,618	18,640	87,102
Exclusion	93,342	20,414	7,009	20,195	2,332	143,292
Immature	64,984	8,483	66,311	94,227	1	234,008
Late	299,690	19,864	29,919	137,014	1	486,489
Very Late	66,099	2,682	671	1,365	0	70,816
Over Mature	65,117	1,879	125	70	0	67,191
Total	640,061	53,335	104,038	270,489	20,975	1,088,897

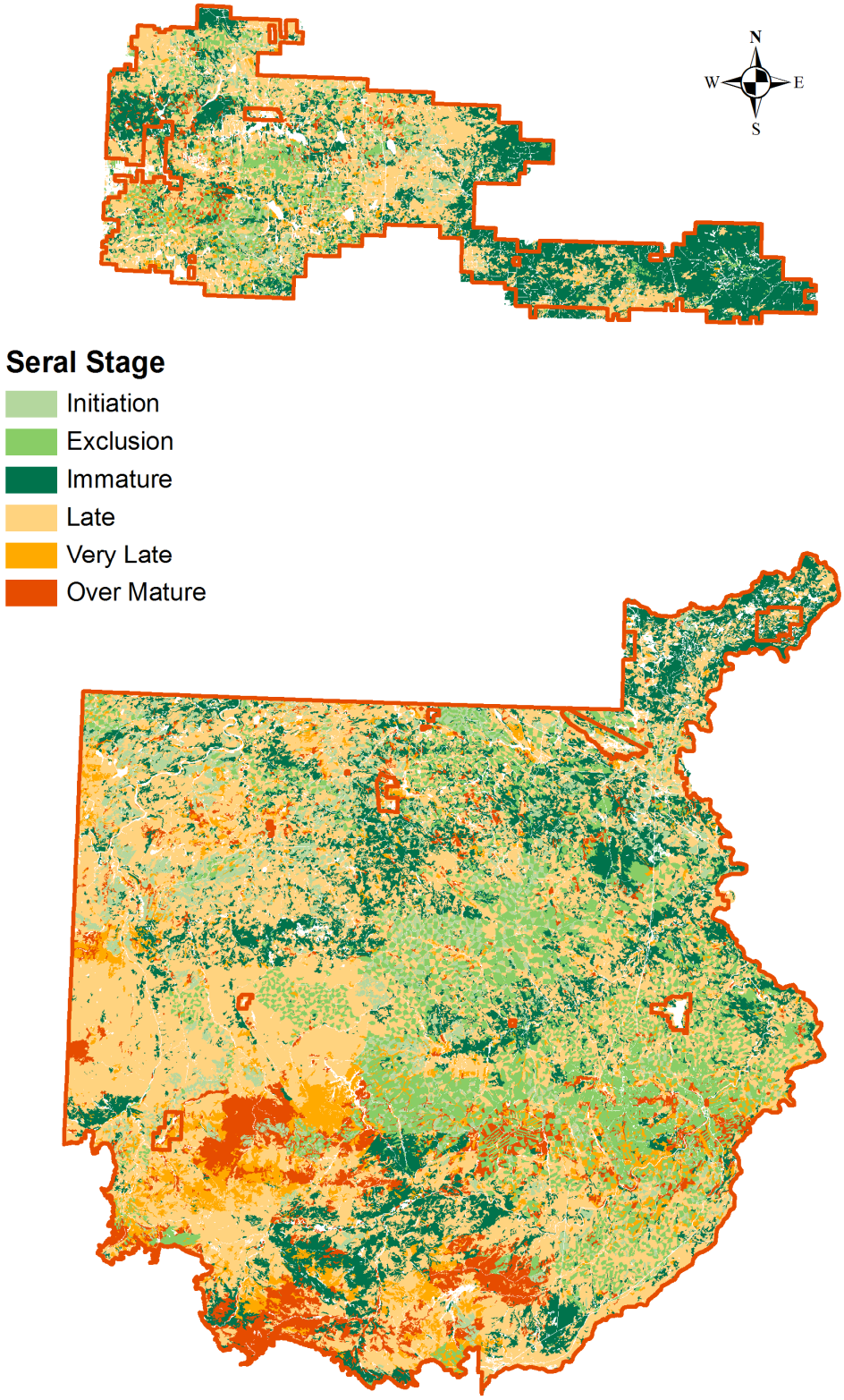


Figure 4-9 Seral Stage Distribution

4.5 Forest Patches

4.5.1 Interior Old Forest

An analysis was completed for the FMA in order to determine the amount of interior old forest (IOF) by broad cover group. Interior forest is defined as a forested area greater than 100ha in size located beyond the edge effect buffer zone bordering the forest edge. A common age definition for all cover classes was used to prevent breaking up forest patches that have a common origin date. Table 4-8 shows the current interior old forest area by cover group. Figure 4-10 shows the distribution of the interior forest on the FMA.

Table 4-8 Area of Old Interior Forests

Cover Group	Ha
DX	189
DC	207
CD	551
CX-Pl	30,317
CX-Sw	26,539
CX-Sb	5,468
Total	63,270
Number of Patches	123
Average Patch Area	514

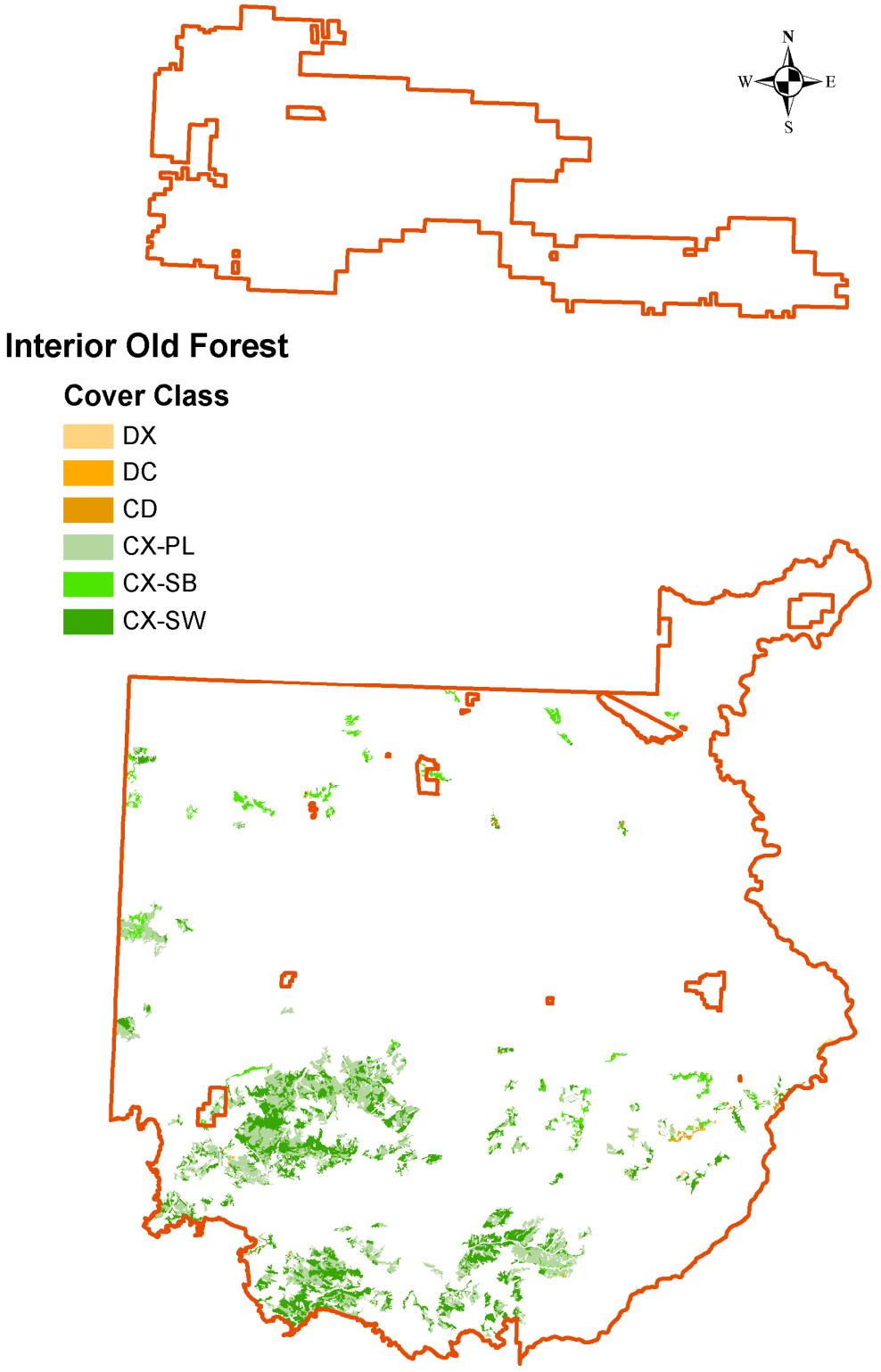


Figure 4-10 Interior Old Forest

4.5.2 Forest Patch Size

A forest patch is defined as a stand of forest in the same seral stage which is not split by a linear feature greater than 8m wide. Linear features in this definition included roads, pipelines, power lines, and rivers; seismic lines were excluded. Table 4-9 shows the current area by patch size class for the DFA. Table 4-2 (VOITS section) shows the change in patch size distribution over time, at years 0, 10, and 50. Figure 4-11 shows the patch size distribution on the DFA.

Table 4-9 Forest Patch Size Distribution

Patch Size	Saddle Hills		Main Block		Total	
(Ha)	Ha	%	Ha	%	Ha	%
0 - 10	18,398	9.1%	47,400	5.4%	65,797	6.1%
10 - 40	35,215	17.5%	113,879	13.0%	149,095	13.9%
40 - 100	26,429	13.1%	115,810	13.3%	142,238	13.2%
100 - 500	40,562	20.2%	193,926	22.2%	234,488	21.8%
500 +	80,469	40.0%	402,100	46.1%	482,568	44.9%
Total	201,072	100.0%	873,114	100.0%	1,074,186	100.0%

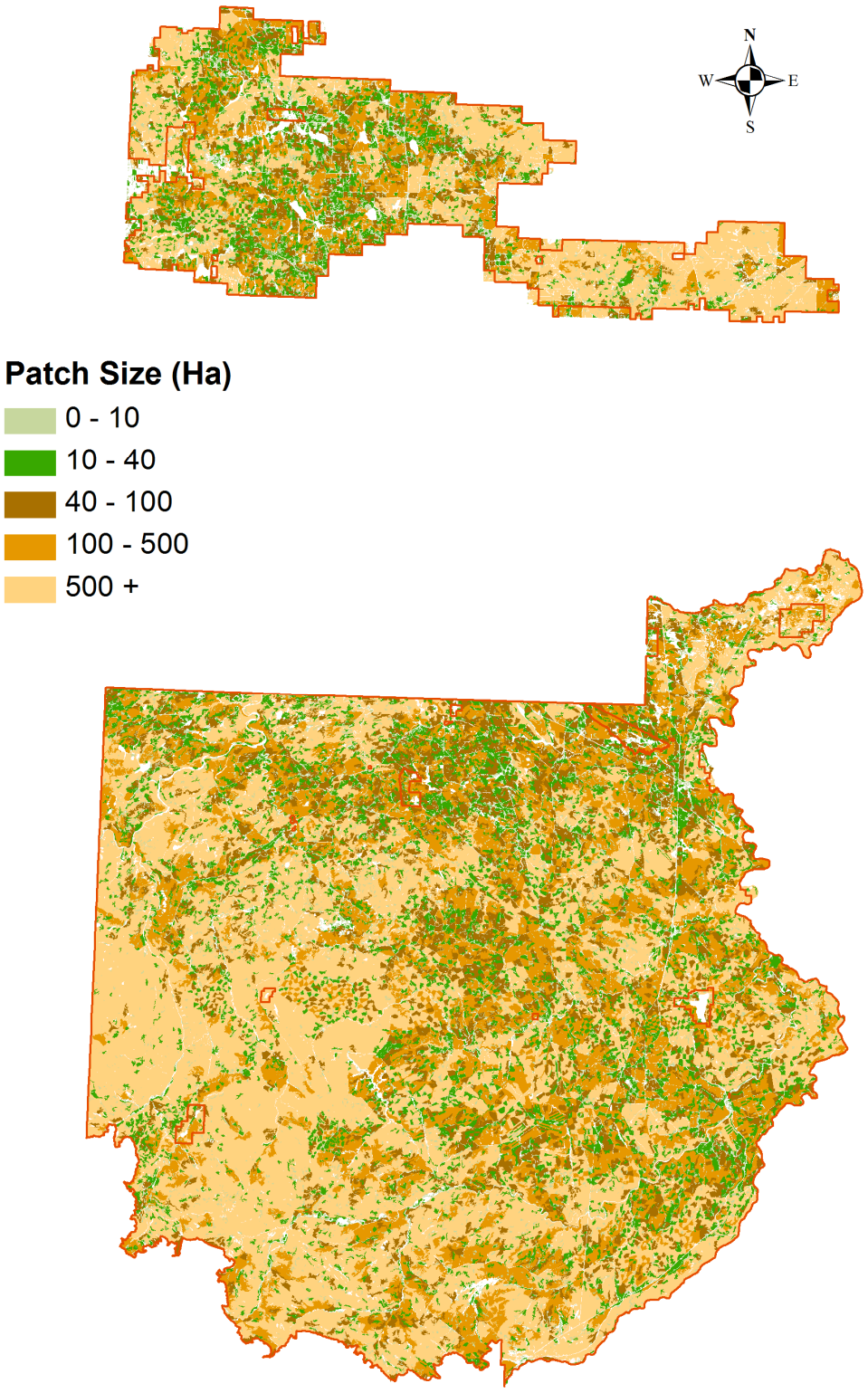


Figure 4-11 Forest Patch Size Distribution

5 Forest Landscape Disturbance and Succession

5.1 Inherent Disturbance Regime

Historically, fire has been the primary cause of natural disturbance in the region. In 1930's, 1940's and the 1960's large fires occurred adjacent to and within the DFA. The last major fire was Hat Mountain fire in 1982; its area was approximately 3,000 ha.

Fire disturbance is covered in more detail in Section 6.

5.2 Insects and Diseases

5.2.1 Insects

Insects which are potentially significant on the DFA but are not currently at levels that would pose a high threat include:

1. Spruce budworm (*Choristoneura fumiferana*);
2. Spruce sawfly (*Pikonema alaskensis, Pikonema dimmockii*);
3. Root collar weevil (*Hylobium warreni*);
4. Terminal weevils (*Pissodes strobi; Pissodes terminalis*);
5. Forest tent caterpillar (*Malacosoma disstria*);
6. Large aspen tortrix (*Choristoneura conflictana*);
7. Poplar borer (*Saperda calcarata*);
8. Bruce spanworm (*Operopthera bruceata*); and
9. Mountain pine beetle (*Dendroctonus ponderosae*)

Mountain pine beetle (*Dendroctonus ponderosae Hopkins*) (MPB) has possessed the biggest threat to the forest inventory over the last few years.

In flights of mountain pine beetle from British Columbia occurred in 2006 and 2009. Aerial survey results conducted in the fall of 2010 by Alberta sustainable Resource Development indicated a total of 43,435 red tree locations on the FMA, with total of 1.038 million red trees. Over 1 million of these red trees were located in the Saddle Hills and the north half of the "main block". Recent history suggest beetle populations in these areas show moderate to high success in over wintering and have annual red to green ratios above 1.

Figure 5-1 shows MPB SSI CF classification distribution on the DFA.

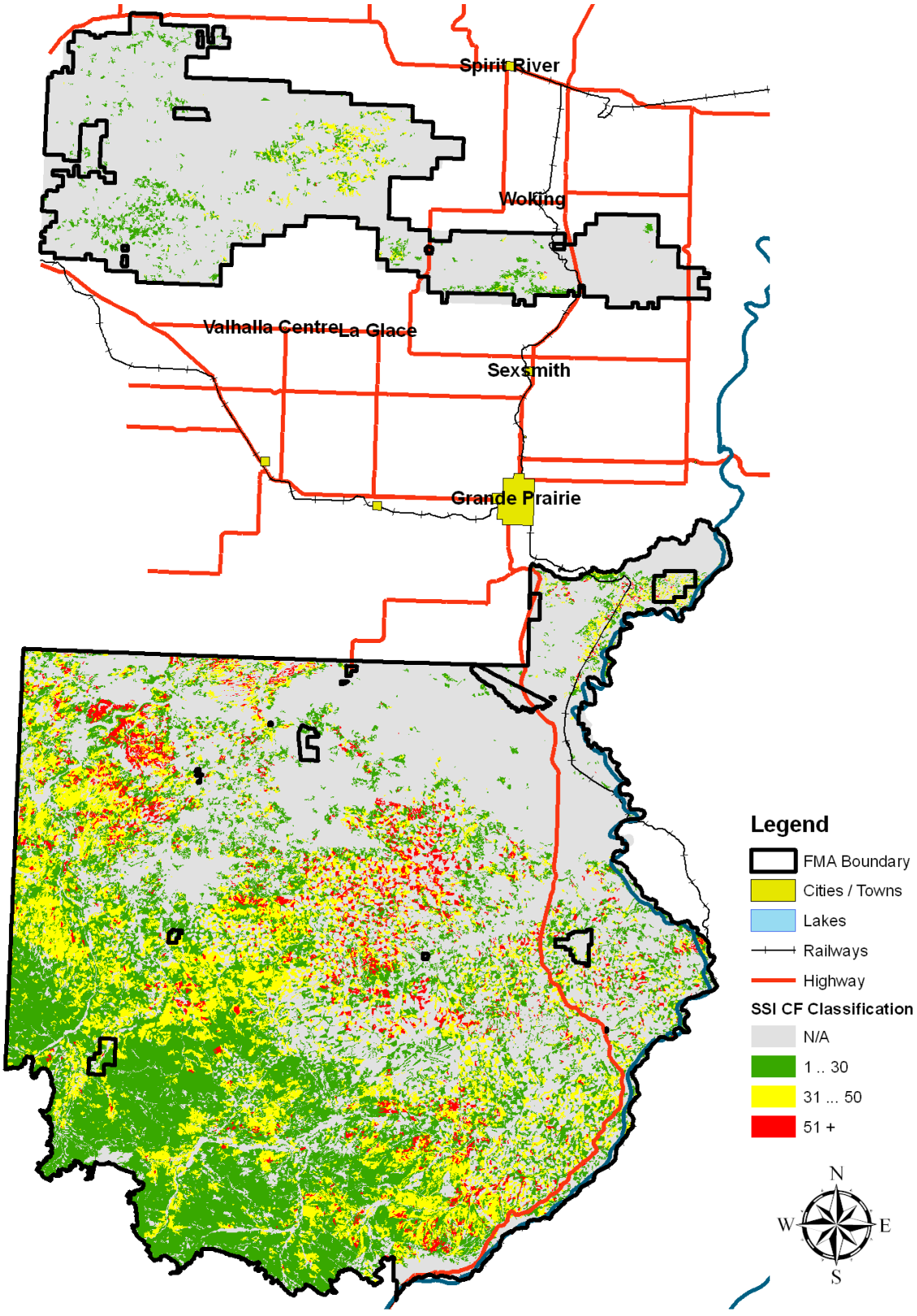


Figure 5-1 MPB SSI CF Classification

5.2.2 Diseases

Diseases which are potentially significant on the DFA but are not currently at levels that would pose a high threat include:

1. Western gall rust (*Endocronartium harnessii*); and
2. Armillaria root rot (*Armillaria spp.*).

5.3 Invasive Exotic Species

Invasive plants are classified as either restricted, noxious or nuisance weeds. Noxious weeds from a management standpoint are a priority to control; they are mainly non-native plants. Section 31 (b) of the Weed Control Act requires owners and occupants of land to control as often as necessary all noxious weeds located on the land to prevent the spread, growth, ripening or scattering of the noxious weeds. Forest disposition holders are expected to assist in managing weeds on their respective dispositions.

Aside from meeting legal requirements, controlling noxious weeds is important from an ecological viewpoint. These plants may out-compete and occupy sites that were previously occupied by naturally occurring native species and alter the natural vegetation cover.

On the DFA, noxious weeds are most commonly found along road right-of-ways and newly constructed roads where exposed mineral soil provides an opportunity for the weed to germinate and grow. Seeds of noxious weeds may be transported inadvertently into the DFA on heavy equipment, and vehicles that have been working in areas of the province that are infested with these species.

The Municipal District of Greenview No 16 and the County of Saddle Hills serve weed control notices for sites they identify that require control efforts within portions of the DFA. The MD of Greenview also regulates the status of noxious weeds present on the DFA, and determines the extent of control for specific weeds of concern. The MD has upgraded scentless chamomile from noxious to restricted status.

The presence of noxious weeds has not been built into the long range forecast. If noxious weed populations warrant further management the companies will participate in a co-operative weed management group convened and coordinated by SRD. The purpose of this group will be to develop weed management plans that will address at a minimum inventory and control measures. This plan could potentially be implemented through the companies AOP's.

5.4 Timber Harvesting

Weyerhaeuser has a Forest Management Agreement (FMA) with the province of Alberta on the entire DFA. Under the terms of the FMA, Weyerhaeuser shall "follow sound forestry practices with the purpose of achieving and maintaining a perpetual sustained timber yield from the productive forest land, while not diminishing the productivity of the land". The company is also given the right to grow, cut and remove coniferous and deciduous timber from the FMA area. Weyerhaeuser operates a Kraft Pulp Mill and Sawmill in Grande Prairie.

Ainsworth holds a Deciduous Timber Allocation (DTA) on the entire DFA; the DTA permits Ainsworth to harvest deciduous timber on the DTA area. Ainsworth operates an Oriented Strand Board (OSB) plant in Grande Prairie.

Tolko holds a Deciduous Timber Allocation (DTA) in the Saddle Hills of 80,000m3 deciduous per year. Tolko operates OSB plants in High Prairie and Slave Lake.

All companies practicing forestry are required to be in compliance with Alberta legislation and regulations. Weyerhaeuser respects the legal rights and responsibilities of all other parties on the DFA that are not part of the registration process, e.g., trappers, guide outfitters, range licensees, small timber operators.

Table 5-1 and Figure 5-2 summarize recent harvest distribution on the DFA.

Table 5-1 Recent Harvest Distribution on the DFA

Land Base	Area (ha)	Percent
Non-Harvestable Land Base	301,471	26.4%
Harvestable	841,460	73.6
Not Harvested	570,959	50.0%
Historical Harvests	207,345	18.1%
Planned Harvests	63,156	5.5%
Total DFA	1,142,931	100%

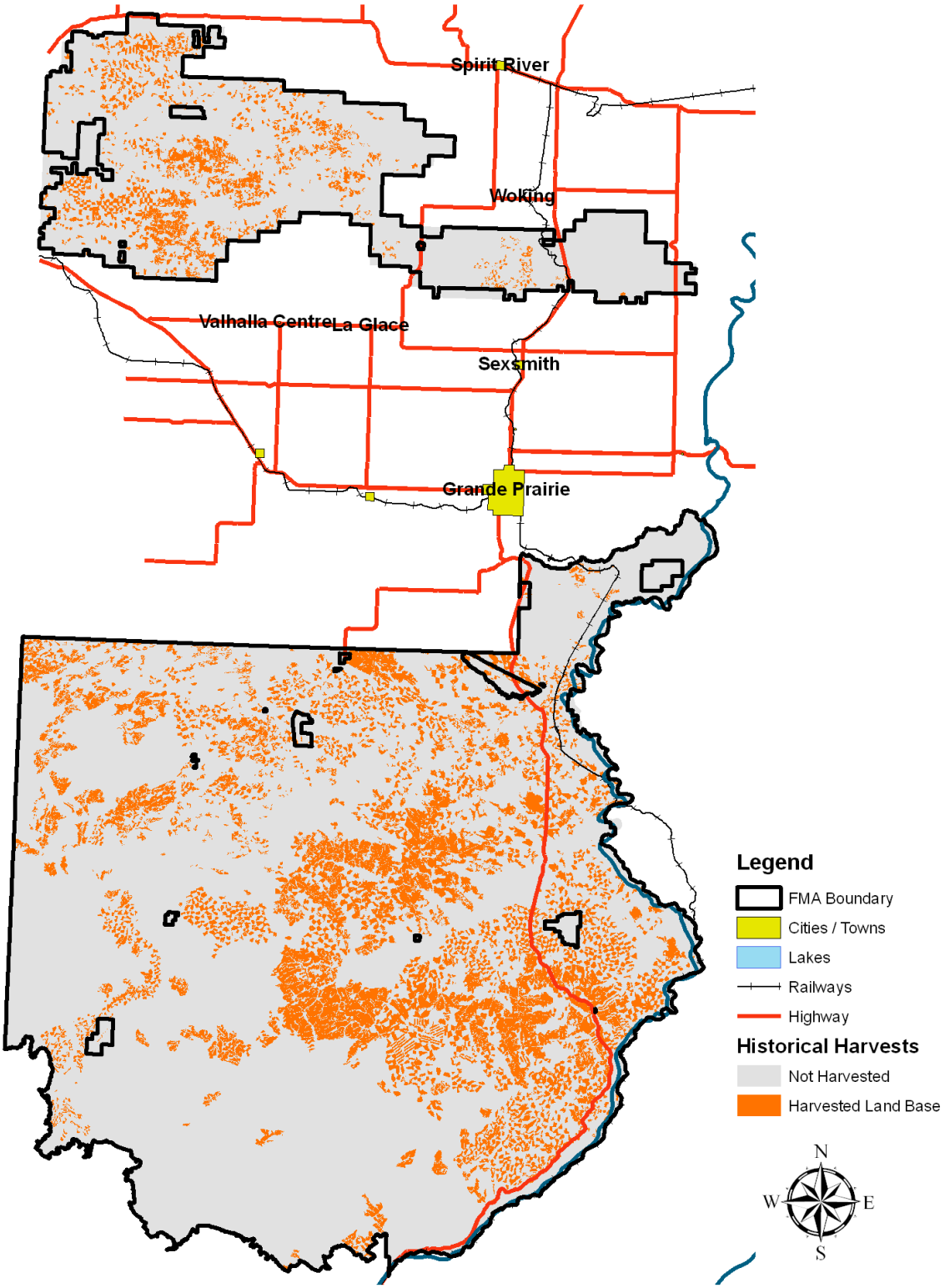


Figure 5-2 Recent Harvest Distribution on the DFA

5.5 Forest Industry Access

There is increasing coordination between industrial users to reach agreements concerning common access on the DFA. An example of this is the Kakwa – Copton integrated access plan development by Weyerhaeuser, SRD and the energy sector. Weyerhaeuser is also a member of the Foothills Land Management Forum; a cooperative group comprised of energy sector companies and forest product companies working together to minimize the industrial footprint on the landscape.

5.6 Industrial Development

Weyerhaeuser Grande Prairie FMA area and DFA are subject to a significant oil and gas exploration activities. While the development activities are rather cyclical and tend to be proprietary in nature, they leave a lasting impact on the entire land base. Figure 5-3 summarizes seismic lines on the DFA.

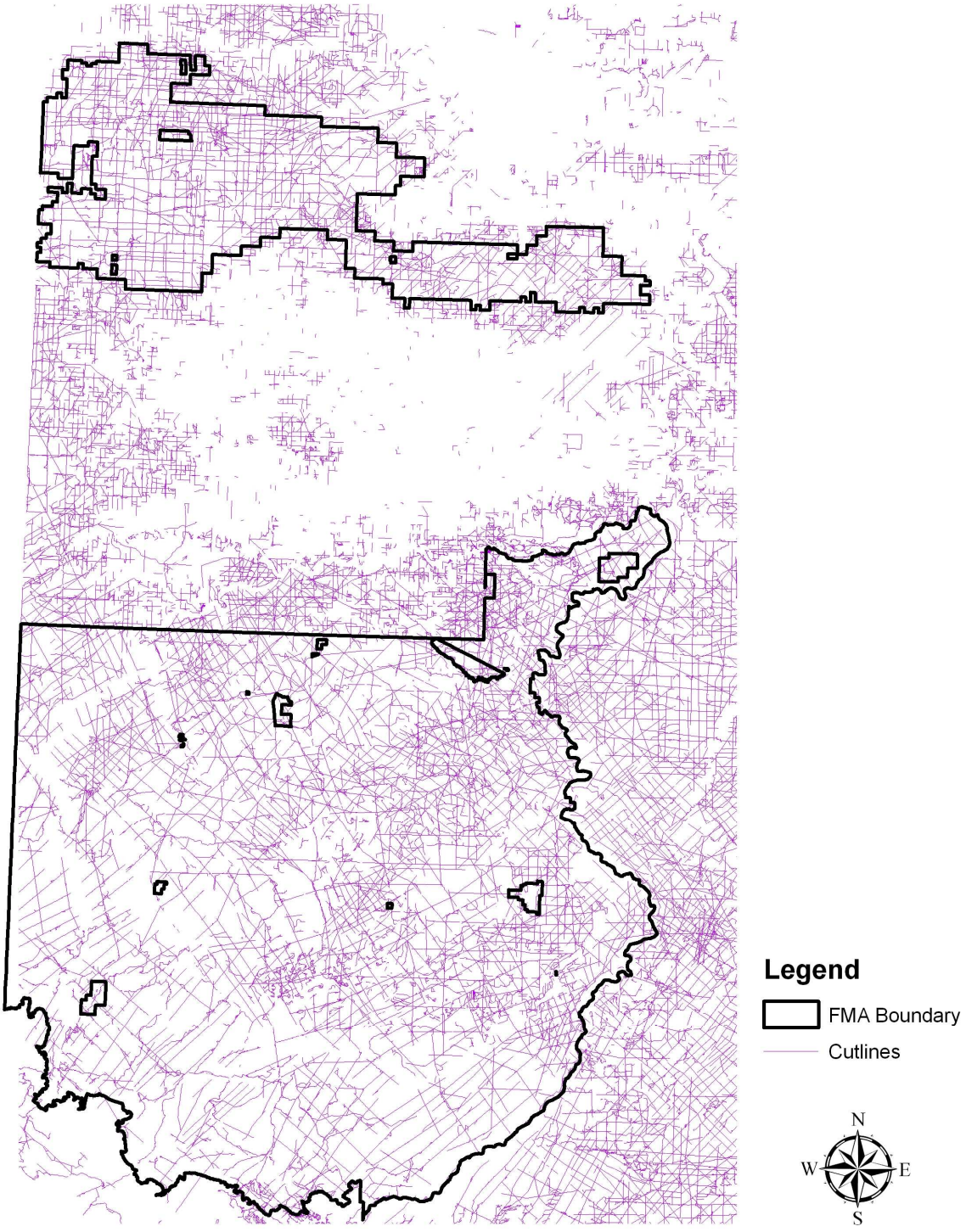


Figure 5-3 Seismic Line Inventory

5.7 Monitoring Sites

Company, ASRD, and DIDs datasets were reviewed to identify monitoring sites. A series of Permanent Sample Plots (both natural and managed) as well as Industrial Sample Plots were identified within the DFA and surrounding areas. Figure 5-4 summarizes all monitoring sites.

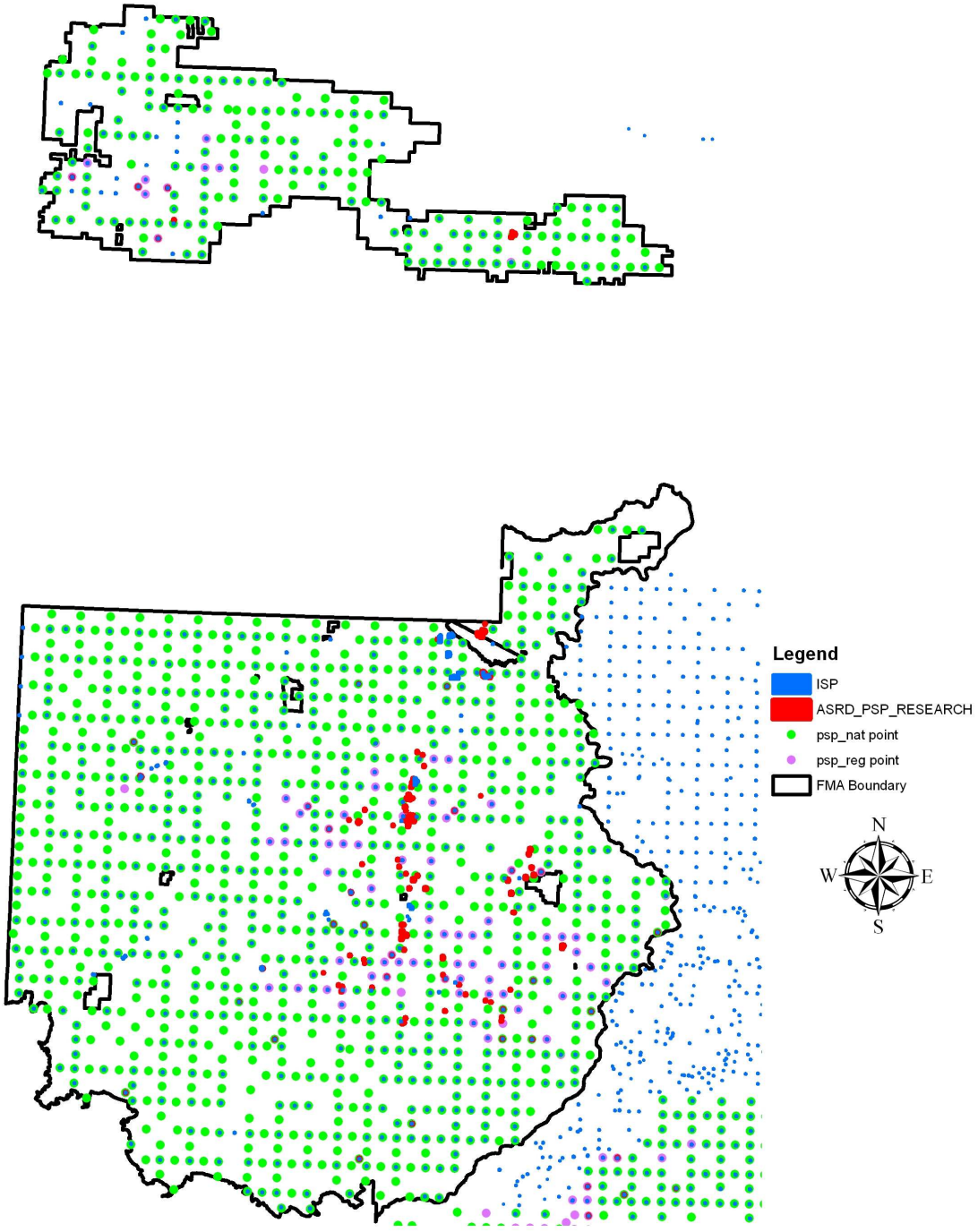


Figure 5-4 Monitoring Sites – Permanent Research and Monitoring Plots

6 Landscape Fire Assessment

Wildfire threat assessment and fire regime analysis are covered in detail in a separate report prepared by the Alberta Sustainable Resource Development's Wildfire Management Branch[7]. Section 2 of this report summarized current landscape fire assessment.

According to this report, the two most common Canadian Forest Fire Behaviour Prediction (FBP) fuel types occurring in the FMA are C2 – Boreal Spruce and D1 – Aspen (Figure 6-1). There is also a large percentage of C3 - Mature Pine located throughout the FMA.

[7] FireSmart Management and Wildfire Threat Assessment. Alberta Sustainable Resource Development. Wildfire Management Branch. April 2011.

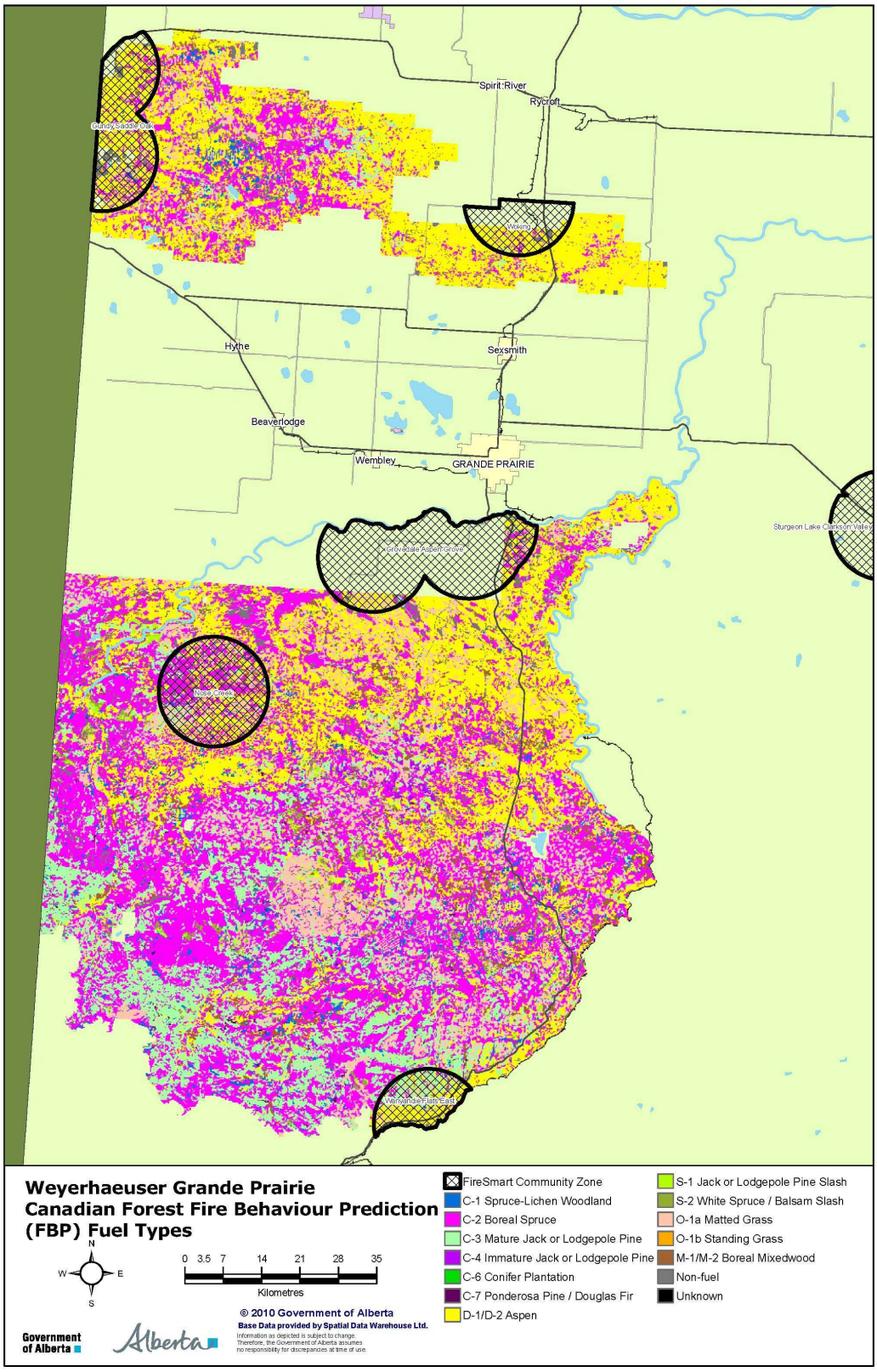


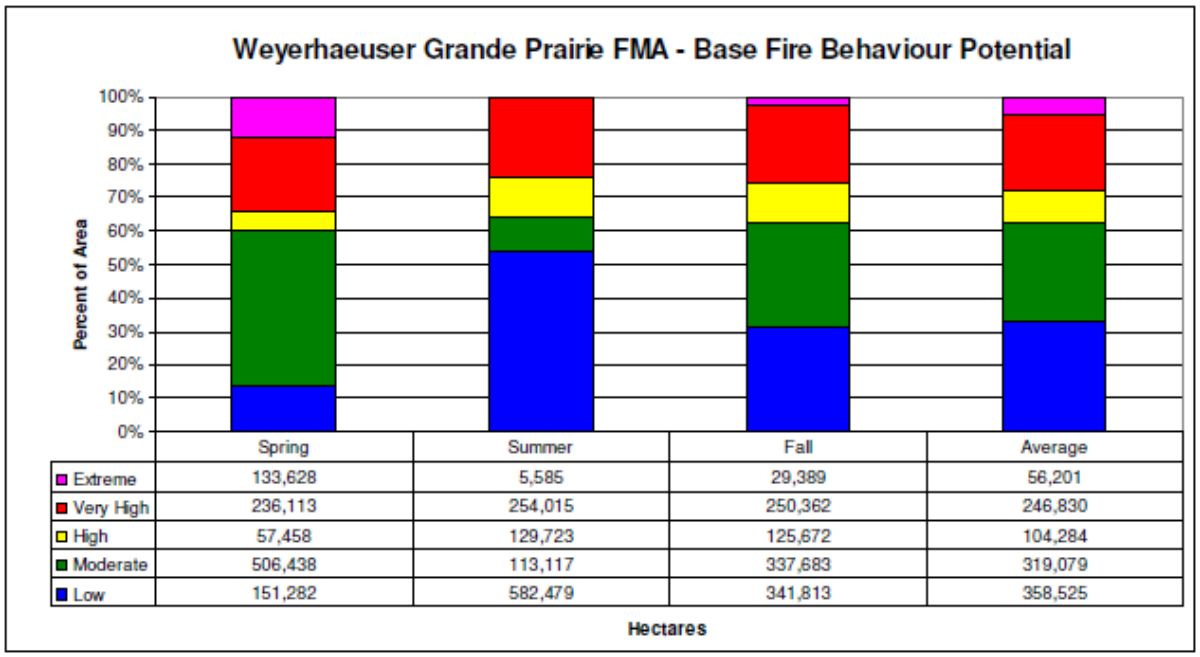
Figure 6-1 Fire Behaviour Prediction Fuel Types

6.1 Wildfire Threat Assessment

The Wildfire Threat Assessment Model (WTA Model) was used to analyse the influence the preferred forest management strategy will have in achieving wild land fire management objectives on both the current and future forest states in the FMA.

6.1.1 Fire Behaviour Potential

The wildfire threat analysis completed for the FMA indicates that spring is the season in which the greatest fire behaviour potential occurs (Figure 6-2).



	Spring	Summer	Fall	Average
Extreme	133,628	5,585	29,389	56,201
Very High	236,113	254,015	250,362	246,830
High	57,458	129,723	125,672	104,284
Moderate	506,438	113,117	337,683	319,079
Low	151,282	582,479	341,813	358,525

Figure 6-2 Seasonal Fire Behaviour Potential for the FMA at the Current Forest State

Figure 6-3 how the fire behaviour potential is distributed across the landscape for the current forest state.

6.1.2 Fire Occurrence Risk

The fire occurrence risk for the FMA is generally low to moderate throughout the spring, summer, and fall seasons. Much of the area associated with moderate to high fire occurrence is near communities or locations frequently used for recreational activities. While fire occurrence has traditionally been low to moderate, the potential for large fires to occur in the FMA should not be overlooked.

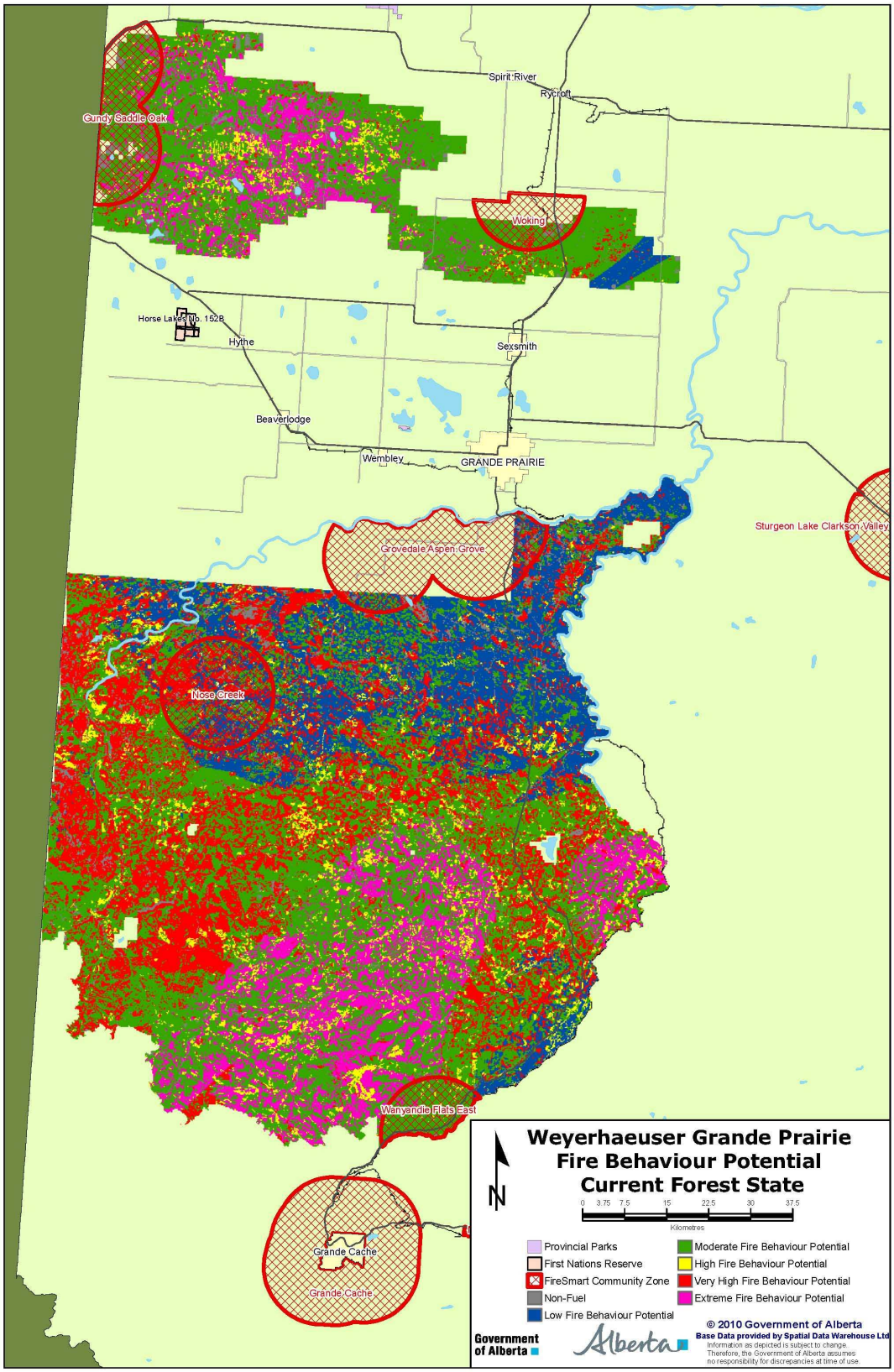


Figure 6-3 Fire Behaviour Potential for the FMA at the Current Forest State

6.1.3 Values at Risk

The highest value at risk is the people and community of Nose Creek which is surrounded by the FMA. In addition to the forest being of paramount importance to the aboriginal communities for a variety of reasons, it has a direct impact on sustainable harvest volumes, habitat available for some species, and the amount of carbon that is released into the atmosphere.

6.2 Fire Regime Analysis

6.2.1 Fire Season

Fires occurrence is highest in the spring/summer months, from May to August. Human caused fires tend to peak in May while lightening caused fires are most prevalent later in the summer.

6.2.2 Fire and Severity

FireSmart report summarized fire regimes and fire severity assessment on the DFA. The Weyerhaeuser Company Ltd. Grande Prairie FMA is located in the Lower Foothills NSR Upper Foothills NSR, Central Mixedwood NSR, Dry Mixedwood NSR, Montane NSR, Sub-Alpine NSR, and the Alpine NSR. Provided results are largely based on Tymstra[8] report.

The Lower Foothills NSR occupies approximately 48 percent of the FMA. In this NSR, human-caused fires peak in May with lightning caused wildfires peaking later in the summer. Overall, the fire regime is considered to be one of frequent medium-sized fires.

The Upper Foothills NSR has a similar wildfire regime to the Lower Foothills NSR. The main difference is that the Upper Foothills NSR experiences more lightning caused wildfires. The peak fire season is from May to August in which frequent medium sized lightning caused wildfires occur. This NSR occupies approximately 22 percent of the FMA.

The Central Mixedwood Natural Subregion is characterized by white spruce and trembling aspen forest cover types. The wildfire regime in this NSR is predominantly frequent small fires and infrequent large fires. Human caused fire occurrence peaks in May as aspen and mixedwood stands typically do not reach green-up until the end of the month. The Central Mixedwood NSR occurs in approximately 12 percent of the Weyerhaeuser Company Ltd. Grande Prairie FMA.

The Dry Mixedwood NSR occupies approximately four percent of the FMA. Provincially, the area burned in this NSR is quite small due to prompt detection and suppression. This NSR is characterized by small and frequent human-caused fires.

The Montane NSR occupies a very small portion of the FMA. This NSR has a regime of frequent and small human-caused fires. Fire occurrence peaks in spring.

[8] Tymstra, C., D. Wang, and M-P. Rogeau. 2005. Alberta wildfire regime analysis. Alberta Sustainable Resource Development, Forest Protection Division, Wildfire Policy and Business Planning Branch. Wildfire Science and Technology Report PFFC-01-05.

The Sub-Alpine Natural Subregion occupies approximately 12 percent of the FMA. This NSR is conifer dominated. The fire regime consists of infrequent small fires and very infrequent large wildfires. The majority of wildfires in the Subalpine NSR occur in summer with a peak area burned in August.

6.2.3 Fire Size and Burn Probability

The general fire regime is one of frequent small to medium sized fires and infrequent large fires. Historically, the 1930's, 1940's and the 1960's were the decades in which large fires occurred adjacent to and within the FMA.

Future burn probability could be assessed based on a review of historical fire occurrences. Figure 6-4 summarizes historical large fire (200 ha and greater in size) locations on the DFA.

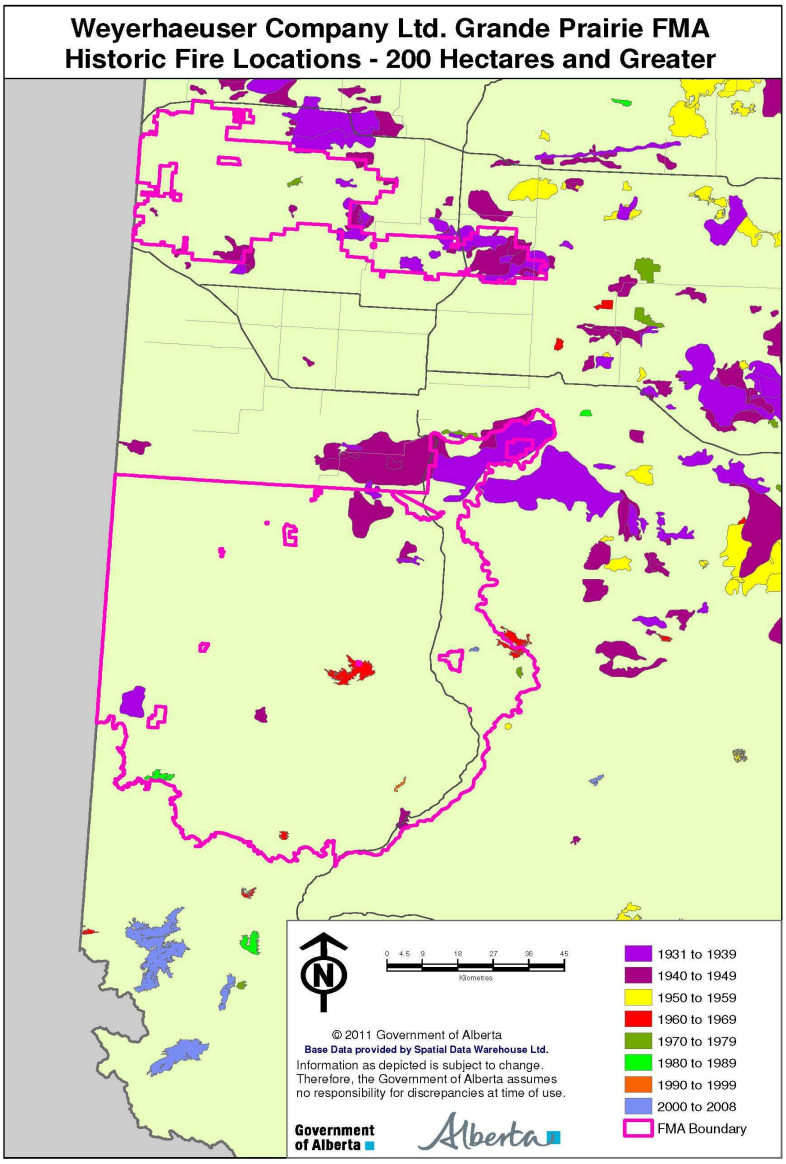


Figure 6-4 Historic Fire Locations – 200 ha and Greater

6.2.4 Fire Frequency

A number of studies and various methodologies have been used to determine the fire cycle in the Natural Subregions found in the Weyerhaeuser Company Ltd. Grande Prairie FMA area. Fire cycles from the different studies provided ranges from 80 years to 300 years for the Subalpine NSR and 45 years to 476 years for the Central Mixedwood NSR.

One such analysis was based on roll back analysis; its results suggested to place the fire cycle for the Subalpine NSR in the 80 year to 100 year range and in the 45 to 50 year range for the Central Mixedwood. The roll back method was used by Andison[9] to determine the fire cycle in the Lower Foothills NSR and Upper Foothills NSR. The fire cycle was determined to be 52 years for the Lower Foothills NSR and 61 years for the Upper Foothills NSR. Provincially, Tymstra et al. (2005) used the wildfire size and frequency distribution method and determined the fire cycle to be 475 years for the Lower Foothills and 627 years for the Upper Foothills. The later method reflects a regime with human influenced wildfires.

The effect of fire suppression has resulted high estimates for the fire cycles in the Montane and Dry Mixedwood Natural Subregions. Both regions have fire cycles well over 1000 years due to human influence. It should be noted that the fire cycle values were for studies completed in different areas of the province—the values are not specific to locations in the Weyerhaeuser Company Ltd. Grande Prairie FMA.

[9] Andison, D. 2000. Landscape-level fire activity on foothills and mountain landscapes of Alberta. Alberta Foothills Disturbance Ecology Research Series, Report No. 2. Foothills Model Forest, Hinton, Alberta.

7 Land Use

7.1 Timber

Although some level of timber harvesting has historically occurred on the DFA, large scale forest operations was initiated with the signing of a Forest Management Agreement in 1969 between Alberta and Procter & Gamble. The Grande Prairie Pulp Mill was built in 1972; harvesting from the DFA to provide fibre flow to the pulp mill commenced the following year. In 1980 the Lumber Mill construction was completed and production began. In 1992 Weyerhaeuser purchased the Pulp Mill, Lumber Mill and Forestlands operations from Procter & Gamble. Map of harvest history is provided in Section 5.4 Figure 5-2.

Ainsworth was awarded a Deciduous Timber allocation in 1995 and Tolko a deciduous allocation commenced on May 1, 2004.

7.2 Trapping

Trapping has a long history in the DFA; currently it is managed by ASRD using registered Fur Management Areas. Figure 7-1 summarizes boundaries of Fur Management Units on the DFA.

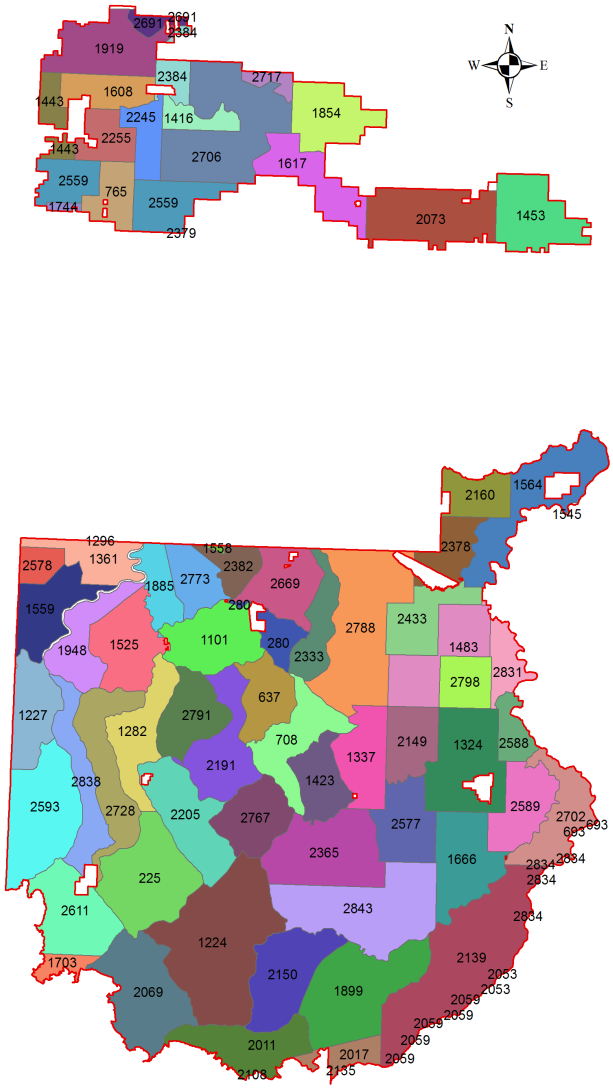


Figure 7-1 Registered Fur Management Areas

7.3 Grazing

There are many grazing dispositions surrounding DFA including forest grazing leases, grazing leases, grazing permits, and provincial grazing reserves. Not all dispositions occur in the FMA area. Figure 7-2 provides spatial overview of various grazing dispositions surrounding the DFA.

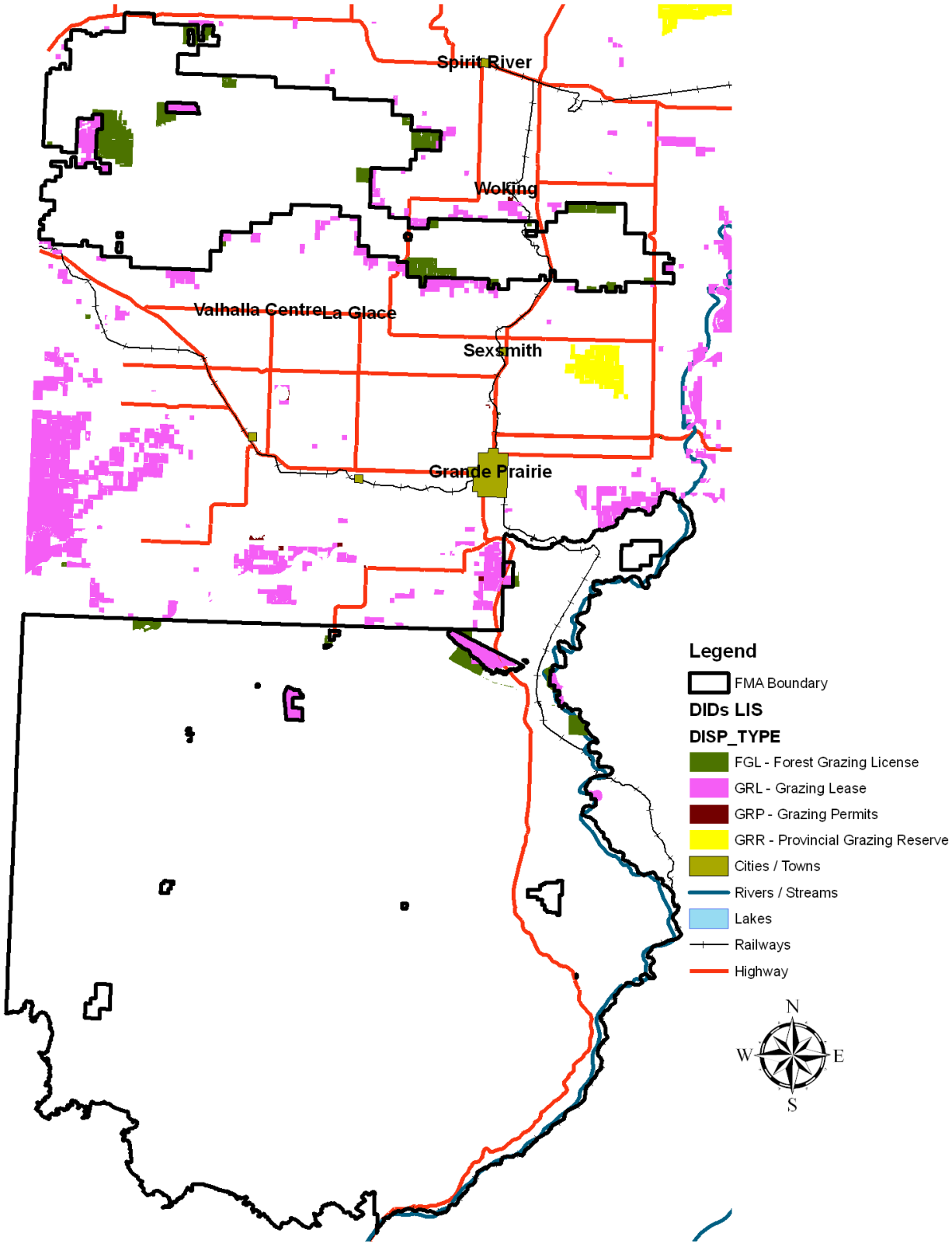


Figure 7-2 Grazing Dispositions Surrounding DFA

7.4 Oil and Gas Industry

Alberta's Digital Integrated Disposition (DIDs) from AltaLIS was used to identify industrial footprint in the DFA and surrounding areas. DIDs Application shapefile were used to summarize the various natural resource based industry requirements for land use. Figure 7-3 summarizes industrial dispositions in the DFA.

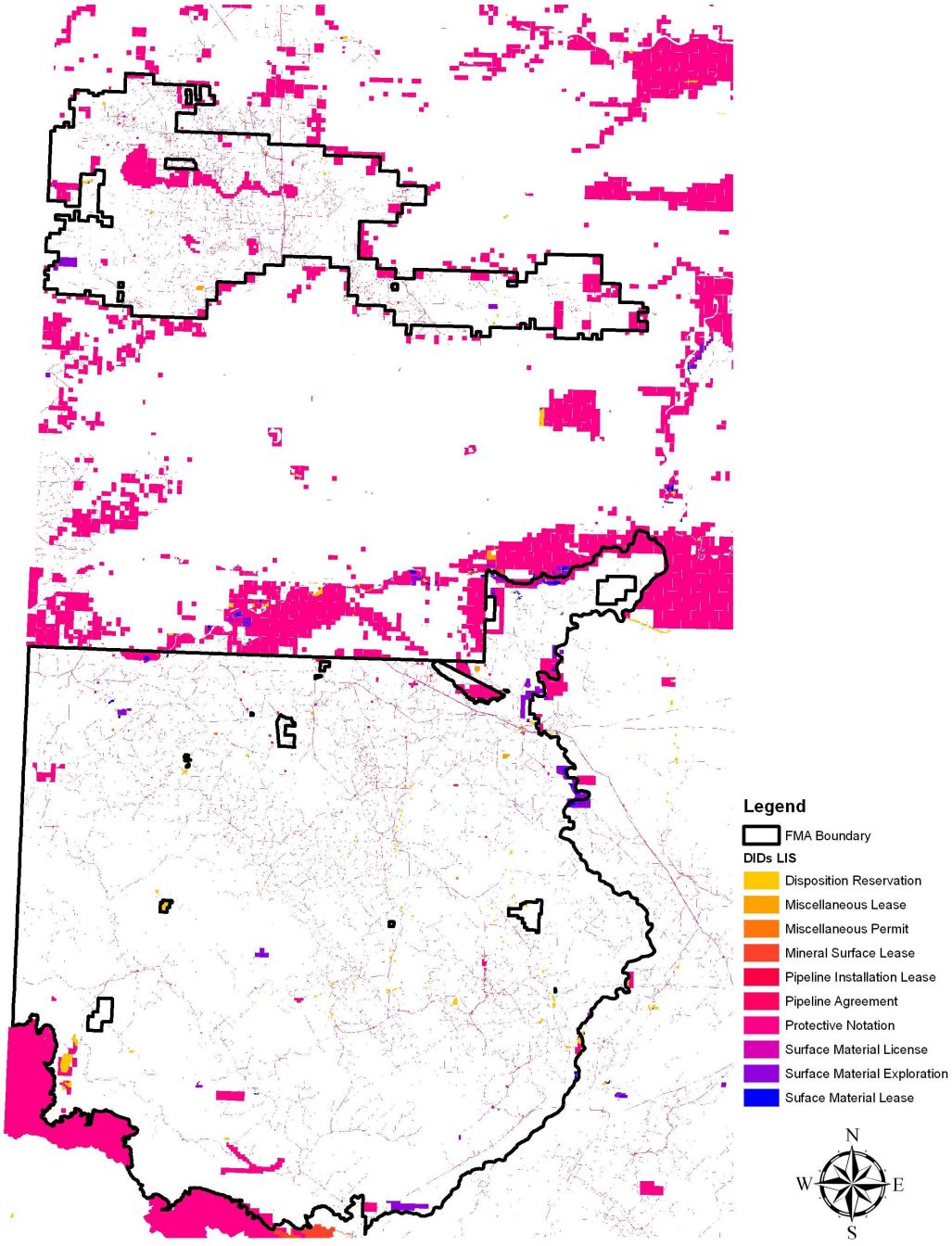


Figure 7-3 Industrial Land Use Dispositions in DFA and Surrounding Areas

7.5 Recreation

There are several formal recreation areas in and adjacent to the DFA:

1. Spring Lake;
2. Hill Top Lake;
3. Musreau Lake;
4. Torrens Falls Hiking Trail; and
5. Two Lakes.

Several of these areas, such as Musreau Lake and Two Lakes, have a disposition associated with them and excluded from the FMA area.

During the development of the 1989 DFMP, Weyerhaeuser voluntarily withdrew large areas (total of 37,236 hectares) from the G3 and G6 Management Units adjacent to the Wild Kakwa Wilderness Recreation Area. Prior to this, the provincial government, in 1975, removed 156,000 acres (approximately 63,130 hectares) from the original FMA area to create the Wild Kakwa Wilderness Recreation Area.

In addition to formal areas mentioned above, there are present many informal areas where the public recreates on the DFA.

7.6 Cultural and Historic Resources

All harvest plan preparation activities undergo review from cultural and historical resource perspective. Upcoming harvest plans (generally the next three years of harvest) are shared with AWN and HLFN to determine if Weyerhaeuser proposed plans could affect their respective critical sites. Sites in close proximity to sensitive sites are field checked with their representatives to determine if any changes are required to the submitted plans.

In order to meet the requirements of the Historical Resources Act, all AOP's and FHP's including new road construction are sent to a qualified archaeologist to be pre-screened for the potential impact on historical sites. The review determines which blocks or roads have the highest potential risk and then are field surveyed with recommended mitigation.

7.7 Visual Resources

Primary viewsheds are identified by the company using the viewshed analysis technique described in the 1999 Weyerhaeuser DFMP. Public input gathered at open houses, and public meetings is also considered. All harvest designs involve viewshed considerations. The most notable example of public input to a viewshed was the Sherman Meadows design which has been preceded by latest SHS.

The Mountain Pine Beetle Plan has relaxed the requirement for visual quality assessments, green-up and adjacency to meet the healthy pine strategy.

7.8 Fish and Wildlife Resources

7.8.1 Woodland Caribou Management

7.8.1.1 Background and Description

Woodland caribou are currently listed as a '*Threatened*' species under the Alberta Wildlife Act and the federal Species at Risk Act. In 2005, consistent with federal and provincial legislation, Alberta developed a Provincial Recovery Plan and established the Alberta Caribou Committee (ACC) to implement it. In 2008, the ACC, through its West Central Caribou Landscape Planning Team developed a more detailed West Central Recovery Plan. The recovery plan outlined several options and made various recommendations to the Governance Board of the ACC. The Governance Board adopted a great majority of that report, but submitted additional recommendations to the Deputy Minister of SRD. The recommendations are now under Government consideration. Under the federal Species at Risk process, a National Recovery Strategy for the Boreal woodland caribou has been completed. The Plan will be soon posted for public review. In addition, the federal scientific review committee is developing a process for identifying critical habitat.

Woodland caribou are strongly associated with large tracts of mature to old coniferous stands. In Alberta, two woodland caribou ecotypes are identified – 'mountain' and 'boreal', based on whether they are migratory or not. The migratory mountain ecotype of woodland caribou winters in large contiguous pine-spruce forests along the eastern slopes, but summers on high elevations sub-alpine and alpine ranges in Western Alberta and British Columbia.

Approximately 33% of the Weyerhaeuser Grande Prairie FMA (370,000 ha) provides winter habitat for three herds of mountain woodland caribou, the Red Rock Prairie Creek herd (approximately 300 animals), the Narraway herd (approximately 100 animals) and the animals in the Lingrell/Calahoo Caribou Range (numbers unknown). Outside the National Parks, the Weyerhaeuser GP FMA provides winter range to most of the mountain woodland caribou in Alberta.

Since the 1980s, Weyerhaeuser has been a leader in the work to integrate caribou habitat needs into forest management planning. In part of this work, the Company has maintained a long term caribou collaring and monitoring program in all caribou ranges within the FMA. The Company has worked to maintain a minimum number of caribou collars in ranges on the FMA and has used the collected data to inform and develop caribou plans. Weyerhaeuser has supplemented this monitoring program by supporting a significant amount of caribou research undertaken by institutions such as the University of Alberta and the ACC. Weyerhaeuser's current approach is still based on maintaining a dialogue with all stakeholders, and continuing to work closely with Alberta Government biologists, academics and environmental organizations to address respective interests and concerns. This is supplemented by a commitment to long term monitoring and research.

The Weyerhaeuser caribou management strategy includes a focus on maintaining large contiguous patches of habitat for caribou and retaining a larger amount of older forest than would be normally left (late rotation). These objectives are used in combination with the Company's 'In-Block Retention Strategy' that aims to leave standing timber in harvest blocks for ecological and biodiversity reasons. This management strategy was part of the Detailed Forest

Management Plan approved by the Alberta Government in 1999. In 2007, the Weyerhaeuser GP Mountain Pine Beetle Action Plan made a determined effort to minimize the impact of beetle control operations on caribou habitat.

In developing the caribou strategies for the 2011 DFMP, the caribou sub-committee recommended changes to caribou zone boundaries. The agreement included:

1. The outside boundary of Caribou Management Zone [CMZ] was modified based on available GPS data from collared animals.
2. Three caribou ranges within the CMZ: Lingrell (including Lingrell and Calahoo), Narraway and Red Rock (including Red Rock and Prairie Creek) versus the previously used high, medium and low zones in the 2007 MPB Plan.
3. Identification of important areas for caribou within the new ranges. These areas will be called: Lingrell A, Narraway A and Red Rock A. It was agreed that Lingrell A is different from Narraway and Red Rock A and could have different management strategies applied to them.
4. The area outside the A zones and within the CMZ outside boundary will be called B zones. Each of the A zones will have an associated B zone; Lingrell B, Narraway B and Red Rock B. The Narraway and Wapiti Rivers will be used to separate the B zones.

7.8.1.2 Caribou Management Zones - Short Term Strategy

Weyerhaeuser submitted a revised management plan in 2007 (Weyerhaeuser GP Mountain Pine Beetle Action Plan) that attempted to address caribou needs and included a spatial harvest sequence (SHS) that was scheduled to last until 2019. The 2007 SHS indicated minimal harvest activity within areas designated as “High” caribou habitat (as defined by Fish & Wildlife biologists in 2006 and shown in maps in the 2007 MPB plan). Although Weyerhaeuser will continue with the SHS outlined in the 2007 MPB Plan, some of these planned stands have been by-passed for areas thought to be more susceptible to MPB. As result, the company believes it is moving through the SHS faster than scheduled and were forced to schedule stands for harvest outside the existing SHS before 2019. Some of these newly scheduled areas will fall within the three caribou management zones.

The mountain pine beetle is still the dominant forest management consideration on the FMA and the company must continue to harvest highly susceptible pine stands in order to reduce losses to the insect. Generally speaking, the priority stands for harvesting are located at lower elevations, closer to Grande Prairie and are outside areas that have been rated as more important to caribou by SRD.

In addition, the 2007 Plan was guided by principles recommended in the West Central Recovery Plan such as:

1. Focuses on avoiding intact areas determined to be important to caribou at this time;
2. Takes place mainly in areas that have been fragmented by previous harvesting and energy sector activity; and
3. In areas of little or no harvest, activity is concentrated in large openings to minimize habitat fragmentation and to provide for future caribou habitat.

The company believed the appropriate strategy for the Lingrell CMZ is to aggressively manage the area to reduce pine beetle risk / losses and to set the area up as an area for future caribou habitat. Factors leading to this direction included:

1. From an MPB viewpoint:
    a. Larger than 12,000 hectares of pine stands with an SSI CF of 30 or greater;
    b. High densities of red trees in annual surveys despite level 1 control efforts;
    c. Surveys indicate a moderate to high success rate in MPB over-wintering survival in the area; and
    d. Estimates that pine in the area could become largely unmarketable within the next 5 years.

2. From a caribou viewpoint:
    a. Available GPS data indicates that this is not currently an area used by caribou; and
    b. The area has already been heavily impacted by energy sector development and past forest harvesting; the West Central Landscape Plan did not rank this area high in intactness.

7.8.1.3 Caribou Management Zones - Long Term Strategy

Weyerhaeuser worked with ASRD Fish & Wildlife biologists, ASRD Forest Management Branch and other key stakeholders to develop a long term caribou management strategy for inclusion in the 2011 Forest Management Plan. Two fundamental uncertainties need to be kept in mind when planning for future forest conditions with respect to caribou habitat:

1. There is a high level of uncertainty around how the mountain pine beetle situation will unfold and what the forest will actually look like in the future.
2. It is unknown to what extent MPB killed areas will be utilized in the long term by caribou as habitat.

In light of these and other uncertainties, the proposed plans are more “direction statements” based on what we know (assume) today and will need to be re visited as better information becomes available.

Main components of this caribou plan include:

1. Range Delineation
   Assumptions built into the land base net down are:

    a. There are 3 individual caribou ranges identified within the Grande Prairie FMA – Red Rock, Narraway and Lingrell; and
    b. Within each range, there are two zones, named A and B. Based on current telemetry and habitat data, there is recognition that within each range, zone A currently has a higher degree of caribou use than zone B. The area and boundaries associated with A and B could change over time as caribou use changes. It’s also important to note that the relative importance of zone A areas are not the same. For example based on current GPS data points (usage), field observations, and level of habitat intactness, it is clear that zone A in the Lingrell range is not as important for caribou today as the Redrock zone A.

2. Habitat Planning
Planning for caribou habitat within an FMA can be seen as trying to integrate two needs with conflicting requirements:

2.1. Caribou habitat requirements

a. Minimize early seral stage forests to minimize habitat conditions favourable to primary prey species such as moose and deer. An increase in these species is thought to result in an increase in wolves, which then prey on caribou as an alternate species. Weyerhaeuser has traditionally used 30 years as a definition of early seral stage which is consistent with the West Central Landscape Recovery Plan.
b. There is a need to maintain habitat greater than 30 years in large contiguous areas.
c. There is a need for a significant level of habitat over time that is greater than 80 years in large contiguous areas.
d. Must minimize access and lineal disturbance as these are believed to provide access pathways for wolves and increase predator efficiency.

2.2 Timber management / forest health requirements

a) Must manage to an optimum rotation age to maximize timber production; typically 90 – 120 years; and
b) Create a balance between the ecological need for over-mature forest and the risks associated with too much over-mature such as fire, insect and disease loss and wood quality issues associated with older stands.

The position that the Company is putting forth is to continue with limiting early seral stage (30 years and younger) in each range to 20% of or less of the productive conifer area (i.e., the 20/30 rule). This equates to an average of 0.67% of the land base in caribou zone being available for harvest each year (150 year rotation). The exception to this will be the Lingrell CMZ. Because the Lingrell area will have an increased level of harvesting in the first ten years of the plan, the amount of early seral stage forest after the first ten years of the plan will be greater than 20%. This will mean that re-entry into the Lingrell range is not expected within the first four periods, and will not be scheduled for harvest again until the amount of early seral stage forest is below 20%.

The impact of this constraint, to the AAC has been previously modeled and is estimated to be about 120,000 m^3 /year. From an age class structure viewpoint, limiting the annual average harvest to 0.67% of the net land base will theoretically result (after 150 years) in a forest that will have about 47% of its productive area in stands greater than 80 years of age (assuming no catastrophic losses to MPB, fire or other events).

SRD requested Weyerhaeuser to complete a sensitivity run using the 11/30 rule to look at the impacts on caribou / harvest relative to a more constrained landscape compared with the preferred scenario. An unconstrained caribou scenario was also completed. Refer to Section 10.3 in the DFMP report to review the relative impacts of each scenario.

3. Sequencing
A number of key criterion were taken into account when considering selection of harvest areas within caribou management zones:

1. Caribou usage based on telemetry collar info and current GPS data points
2. A review of currently fragmented areas
3. A review of identified intact areas
4. The estimate of MPB susceptibility /risk
5. Existing access
6. Age class distribution of the forested areas
7. Information available on current practices and strategies for caribou in British Columbia to account for cross-jurisdictional concerns for the Narraway and Lingrell ranges.

In part of the long term caribou management strategy in the Redrock and Narraway ranges, the Company identified requirement to have limited harvests in A zones to prevent a long term "halo effect". The halo effect was the result of heavy harvesting all around the perimeter of A zones with little or no harvesting within these zones. It has been suggested that the halo effect may have a detrimental impact on caribou over the long term. Limited harvests within the A zones were also determined as an important tool to address the long term age class issues within these zones. The forest age class distribution would be on track to be significantly skewed to an over-mature age class and, therefore, susceptible to the negative consequences associated with that scenario. In part of the discussion between SRD and Weyerhaeuser, a selected number of blocks were identified in Area A to ensure limited harvests. Avoiding automated Stanley™ selection of blocks, the blocks were manually selected to ensure intactness of habitats on the landscape.

Table 7-1 describes the agreed to hectares to be harvested in caribou zones by period beyond the 2007 MPB sequence. These hectares are assumed to be the correct as they are field verified numbers as opposed to the Woodstock outputs which were the result of a point-poly overlay process to bring in these hardwired blocks. Any operational changes will be confirmed with SRD and balance to these hectares.

Table 7-1 Agreed Harvest Activities in the CMZ

Caribou Management Zone (CMZ)	Area (ha)	Time Period
Lingrell	4,798	2009-2029
Narraway	969	2019-2029
Red Rock	3,343	2019-2029

In the short term, a ratio of about 1:2 will be used to schedule harvests in the zones A and B (i.e., after the MPB SHS is completed). Beyond the 4th period (20 years), spatial harvest sequencing in 2011 DFMP will not be constrained by A or B zones.

4. Operational considerations

Harvest area size and arrangement on the landscape

The intent of all harvesting in caribou ranges will be to create large contiguous patches of forest with the same approximate age class. In areas with a previous harvesting history of traditional size blocks and a two or three pass system, this means removing all or most of the remaining leave blocks. In some area it will be desirable to leave some reserve blocks as patches of late seral stage retention. In areas where there has been no history of harvesting, the company will utilize large block designs (up to 1,000

hectares). The density of these blocks on the landscape (i.e., how many big blocks in a given geographic area) will be determined on a case by case basis.

Access / Season of operations
The majority of the primary access routes to the locations identified in the proposed harvest areas within caribou management zones already exist. Access from primary access roads into the harvest blocks will utilize existing roads where possible. Roads constructed for the purpose of the Company's operations will be temporary in nature and constructed under AOP approval versus LOC and will be reclaimed after silviculture operations are complete. Adequate temporary summer access may still be required to ensure early start of harvest / haul operations during an operating season and to allow for silviculture access. Reliable temporary access allows operations to "get in and get out" of an operating area in the least number of years.

Silviculture considerations
The company will work to maintain or increase the amount of area reforested to pure conifer types currently present within caribou ranges. Areas reforested to mixed wood or pure deciduous types will remain the same or decrease. This will ensure that reforestation practices are not shifting the land base to yield groups that provide more favorable habitat for secondary prey species such as deer and moose.

In order to successfully implement the plan in its entirety, and as outlined above, the Company has made two key assumptions:

- The rate of spread of mountain pine beetle infestation on the FMA does not increase significantly and survival rates of MPB in the Red Rock / Prairie Creek and Narraway CMZ areas remain low with the Lingrell range being the exception, where MPB survival rates are already high.
- Direction from an approved West Central Caribou Recovery plan and a subsequent range implementation plans centers on minimizing and mitigating disturbance in the short term (next ten years) within areas that are relatively intact and continue to be important to caribou.

7.8.2 Mountain Pine Beetle Management

Section 5.2.1 summarizes MPB management implications on the DFA including a map of SSI CF rating.

7.8.3 Grizzly Bear Management

The grizzly bear (*Ursus arctos*) is currently listed federally as a species of *'Special Concern'* by COSEWIC (Committee on the Status of Endangered Wildlife in Canada). It is not officially designated as '*At Risk*' under the Alberta Wildlife Act and the Endangered Species Conservation Committee. However, it has recently recommended that the grizzly bear be listed as '*Threatened*'. Though without official designation, a provincial recovery plan for the grizzly bear was approved by the Alberta Government in 2008.

The Recovery Plan refers to "habitat" and "mortality risk" maps were developed by the Foothills Research Institute (FRI) grizzly bear Research Program as a way to evaluate impacts of

different activities on grizzly bear habitat. The maps were based on Resource Selection Functions models and describe areas of high habitat value for grizzly bears, areas of low mortality risk and areas considered to be safe harbours. These maps and associated data are intended to provide land managers with operational and strategic tools available for use in adjusting harvest designs and road density and alignment.

Over the past twelve years, the Foothills Research Institute's grizzly bear Program has made significant advances in improving the understanding of how grizzly bears use forested landscapes within Alberta. Some of this information has been used by Alberta SRD to delineate new grizzly bear management zones (core and secondary habitats) along the eastern slopes. Weyerhaeuser has been a significant supporter of this research since the inception of the program.

The FRI research has helped to identify grizzly bear population units within the province, which are further subdivided into grizzly bear Watershed Units (GBWU). These units are loosely based on major watersheds and are the approximate the size of an adult female grizzly bear home range (~ 700 km^2). Each GBWU is classified as being either Core or Secondary habitat for grizzly bears. Habitat value is determined through a combination of current landscape condition and GPS location data from collared grizzly bear and is expressed through a Resource Selection Function (RSF). An RSF can be considered as a surrogate for habitat quality. Other factors, such as mortality risk and safe harbour measures, are also included in the determination, and are driven by Open Route Density. The Core areas are areas considered to have higher value to grizzly bears, while the Secondary areas are considered to have lesser value to bears.

The Weyerhaeuser Grande Prairie FMA has significant area of both Core and Secondary habitat, with approximately 45% of the southern FMA designated as Core and 32% of the same area considered Secondary habitat (Figure 7-4).

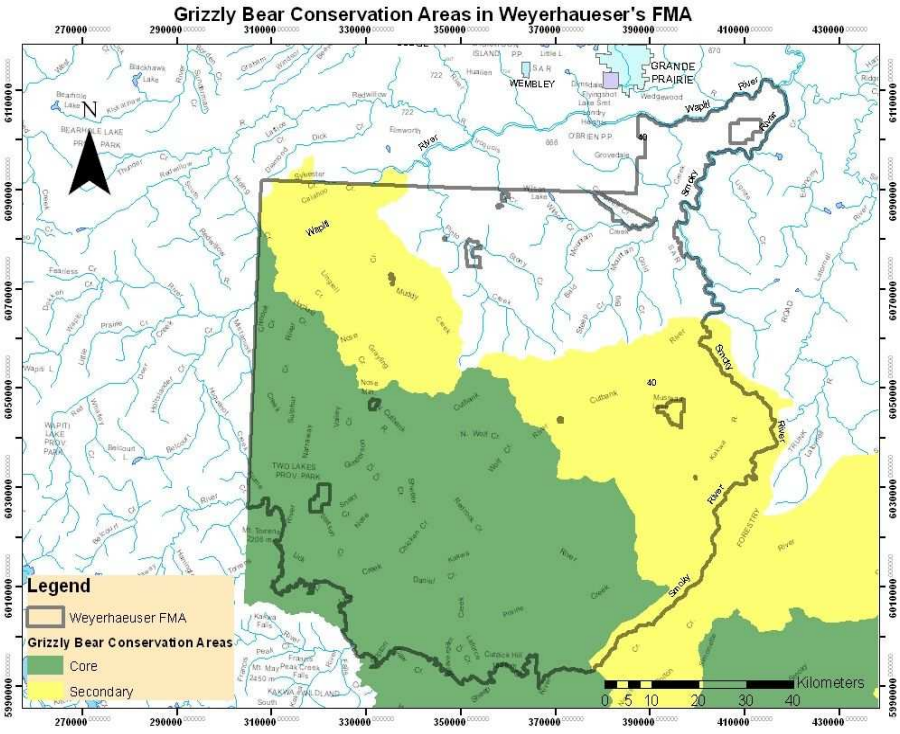


Figure 7-4 Grizzly Bear Core and Secondary Areas in WY Grande Prairie FMA

In order to determine where the key focus areas within the FMA might be, Alberta SRD provided outputs from their analysis of current and future conditions of the forest relative to grizzly bear use and habitat. Proposed developments were added to the model, which regenerated the RSF, Safe Harbour, Mortality Risk and Open Route Density values, and assessed the impact of the development on the baseline or current metrics. ASRD used a model developed by the Foothills Research Institute grizzly bear Research Program (FRIGRP) and provided output on the following four variables:

- Resource Selection Function

  Resource Selection Function (RSF) is a metric used to measure presence and amount of grizzly bear habitat and can be considered a surrogate for habitat quality. It provides a measure of probability of grizzly bear presence on the landscape. Research completed by the FRIGRP to validate RSF maps, shows a strong correlation between high RSF values and current grizzly bear distribution. The objectives, as laid out by SRD, are to maintain or increase maximum RSF values in core areas and to increase maximum RSF values in secondary areas.

- Mortality Risk

  Mortality risk represents areas where there is an increased probability of human caused mortality to grizzly bears. It is largely a function of open access and available habitat, and is developed in conjunction with amount of open route density. Objectives are to maintain or reduce mortality risk where possible.

- Safe Harbour

Safe harbour is a combination of good habitat and low mortality risk. Bears are attracted to the area by food resources but face a lower human related mortality risk. Objectives within GB range are to either maintain or increase safe harbour quantity.

- Open Route Density

  For the purposes of the modeling exercise, Open Route Density was defined as the total length of all open routes divided by the area of each GBWU. Research has shown a strong correlation between grizzly bear mortality rates and human access. Regulating human access within grizzly bear zones can reduce the risk of human-caused bear mortality. The grizzly bear Recovery Plan speaks to the need to measure human use and recommends Open Route Density as one way to do that. The target for Open Route Density in Core grizzly bear areas is 0.6 km/km^2 and 1.2 km/km^2 in Secondary areas.

The results of the model analysis illustrating the current and future values (at 10 years) for the four variables are shown in the attached tables and maps.

To ensure the continued existence of a viable population of grizzly bears on the Weyerhaeuser Grande Prairie FMA, it is important to reduce the overall amount of permanent access in prime grizzly bear habitat so to minimize bear mortality risk. With that in mind, Weyerhaeuser worked with SRD Fish and Wildlife staff to scope out some mitigation strategies to help address potential impacts to grizzly bear over time. These strategies are based on the assumption that there will be no new permanent roads built by the company over the term of the planned scenarios. The exception to this commitment would be LOC roads associated with activities such as gravel pits. There are currently no known plans to introduce new permanent roads and the company would work with ASRD to minimize impacts if this situation were to arise.

<u>Mitigation strategies specific to grizzly bear include:</u>

- Areas that show lower Safe Harbour values and/or approaching threshold road densities will be used as a basis for focusing joint industry discussions aimed at seeking opportunities for road management and scoping road reclamation options. These discussions will largely be carried out within the FLMF (Foothills Landscape Management Forum), of which Weyerhaeuser is a member.

- Areas on the map that show larger negative changes in Safe Harbour that overlap with other values (e.g., ungulate management zones) will be used to focus AOP road discussions. This will include the development of access plans during the final harvest plan stage in areas shown to be of high value to grizzly bear.

- At a cut block level, the Company will work to:
  - Maximize harvest design in areas of high value grizzly bear habitat to maximize forest interior habitat and minimize the amount of forest edge habitat;
  - Leave visual buffers around key habitats such as known dens; and
  - Plan and strategically place in-block retention to minimize line of site and maximize connectivity both inside the harvest block and outside.

It should be noted that these strategies are not meant to be limiting and Weyerhaeuser will continue to work with ASRD to address concerns related to grizzly bear and other wildlife over the life of the plan. It should also be noted that due to the structure of the current process, consideration can only be given to forest harvesting impacts on grizzly bear in this plan. There

are other issues, such as education, other industrial activity and human use restrictions; Weyerhaeuser has little or no control over and cannot be addressed here.

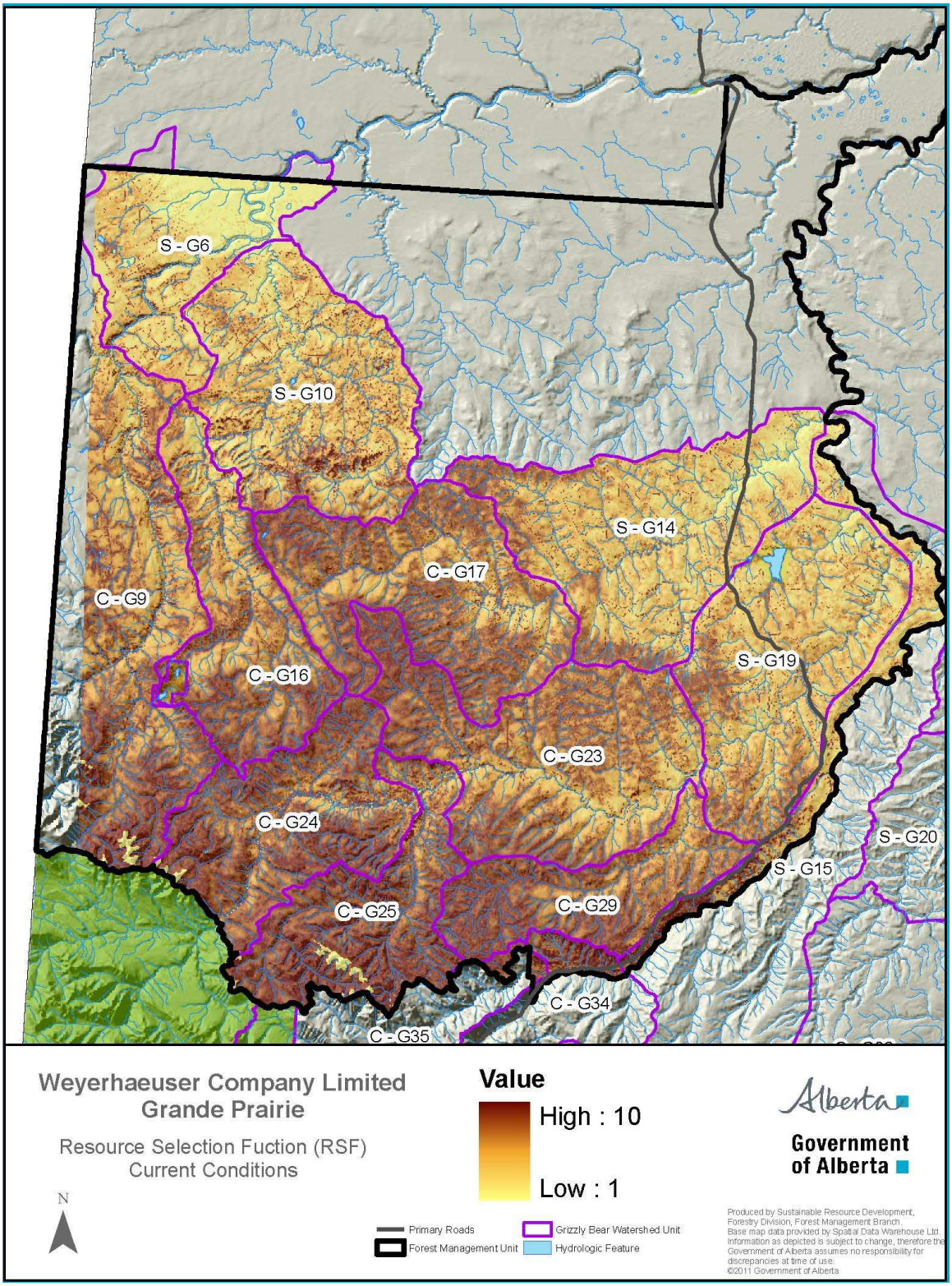


Figure 7-5 Grizzly Bear RSF Current Condition Assessment

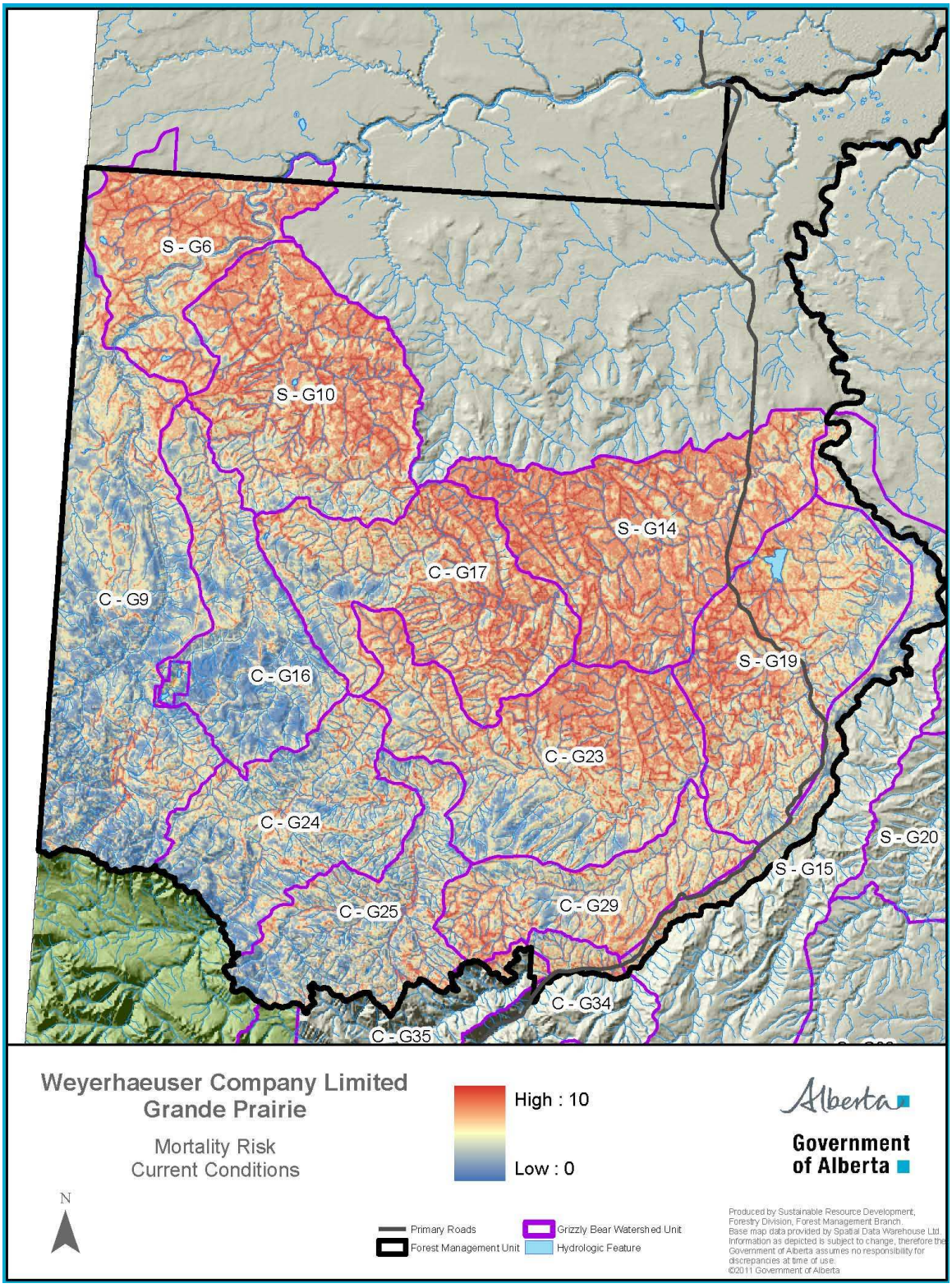


Figure 7-6 Grizzly Bear Mortality Rist Current Conditions Assessment

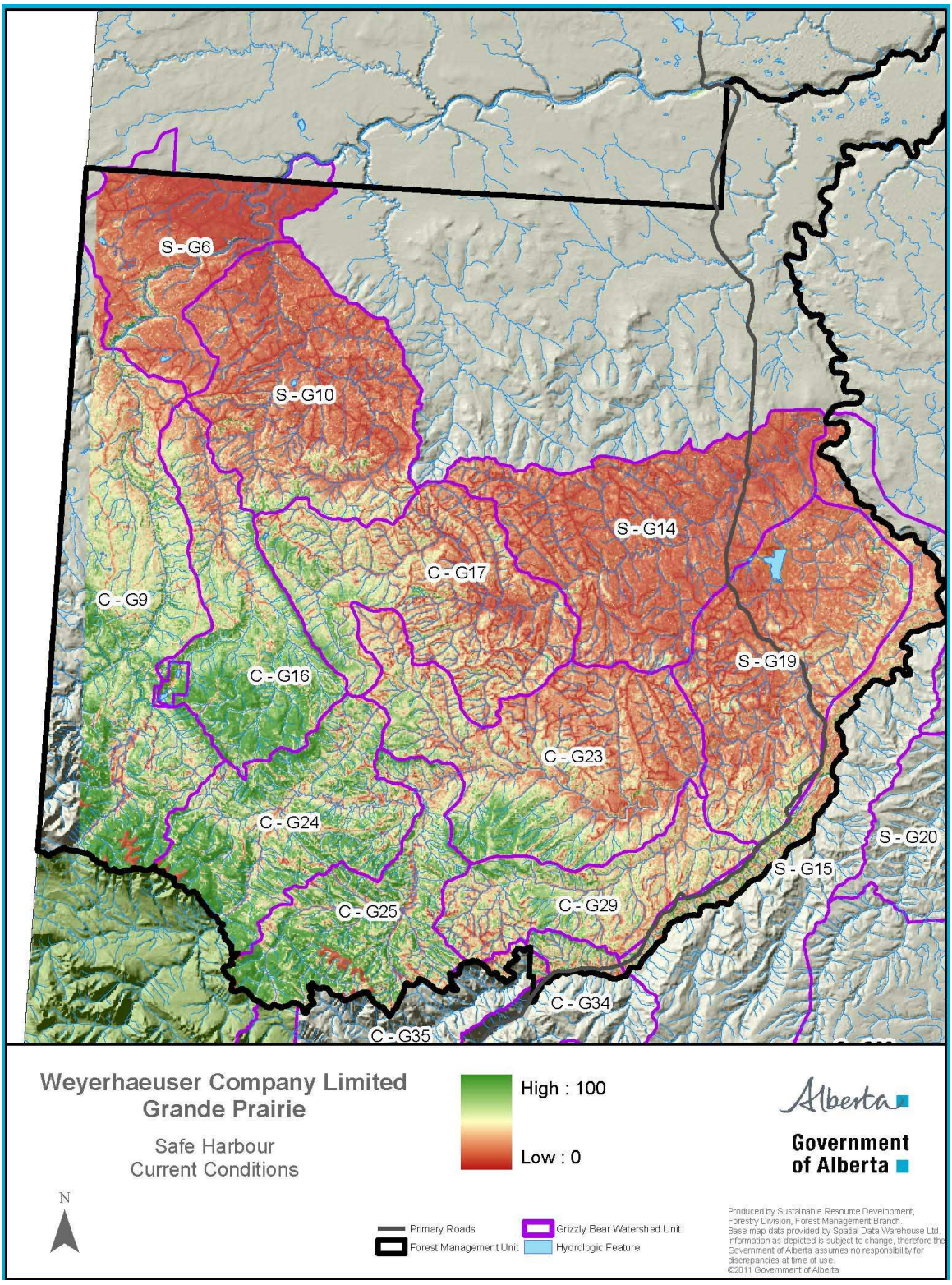


Figure 7-7 Grizzly Bear Safe Harbour Current Conditions Assessment

According to ASRD analysis, the southern portion of the FMU G16 currently has 0.41 km/km^2 (200.4 km of roads across 493.3 km^2). FMU G16 Core area is 507 km2, with assessed Mortality Risk of 4.16, RSF of 7.35, and Safe Harbour value of 42.22.

7.8.4 Forest Bird Species

Knowledge of the species present in a forest, and increases or decreases in their number, can provide an indication of the extent and condition of forest habitat and ecosystem health. Birds play important roles in ecosystems. They are the most diverse group of terrestrial vertebrates in the Boreal Forest. In the Boreal, birds have a large effect on invertebrate populations because many are insectivorous. For example, many studies have shown that birds help regulate Spruce Budworm (*Choristoneura fumiferana*). Birds occupy a variety of habitats and are often high on the food chain and can therefore be good environmental indicators. Birds are a good group to monitor because, unlike other wildlife groups, they are often easily detected provided they are surveyed using standardized protocols. Also, birds can be early indicators of environmental change because their ability to fly allows them to respond quickly when conditions change. Using birds as biodiversity indicators has been recognized by researchers and within the Sustainable Forest Management Network.

Forest songbird-focused breeding bird surveys were initiated by Weyerhaeuser in the Grande Prairie FMA during 2001. Since then, surveys have been conducted across the FMA every three years. A nocturnal and diurnal owl survey program was initiated in 2007. Owl stations were re-sampled in 2010 and will continue to be monitored by the company every three years. Survey designs used for songbird and owl surveys were modeled on standardized monitoring protocols which have been initiated in other jurisdictions in North America and around the world. This ensures that data collected in the Grande Prairie FMA are obtained using best practices and enables comparisons to be made between findings from the FMA with other surveys regionally, provincially, and continent-wide.

The three most common songbirds detected during the four iterations of breeding bird surveys were Yellow-rumped Warbler, White-throated Sparrow and Swainson's Thrush. Other common species included Lincoln's Sparrow, Chipping Sparrow, Dark-eyed Junco, Pine Siskin and Ruby-crowned Kinglet. There were no '*At Risk*' or '*May be at Risk*' species detected but sixteen '*Sensitive*' species were detected during point count surveys in 2010, including Bald Eagle, Baltimore Oriole, Black Tern, Black-backed Woodpecker, Black-throated Green Warbler, Brown Creeper, Canada Warbler, Cape May Warbler, Common Yellowthroat, Great Gray Owl, Least Flycatcher, Northern Goshawk, Northern Harrier, Osprey, Pileated Woodpecker and Western Tanager. All eight potential forest owl species were found within the Grande Prairie FMA during the owl monitoring program. Three 'Sensitive' species, barred owl, Great Gray Owl and Northern Pygmy Owl, were found across the FMA in low abundance. The most commonly detected owls were Northern Saw-whet Owl and Boreal Owl. During both songbird and owl monitoring programs incidental observations of non-target species were also documented such as trumpeter swan.

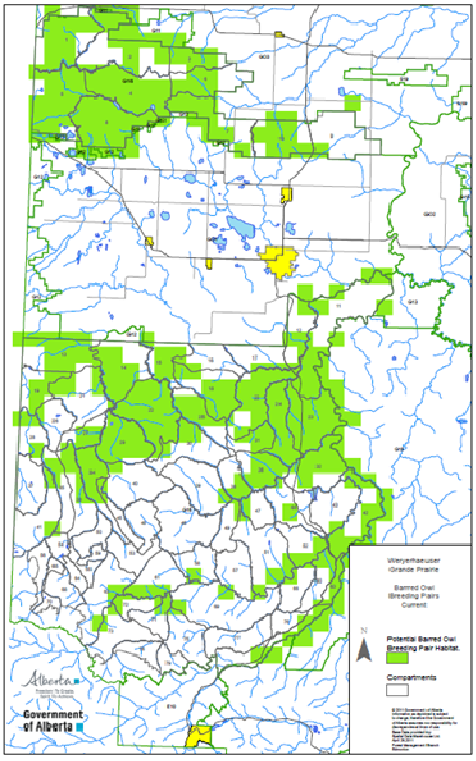
7.8.5 Barred Owl

The barred owl (*Strix varia*) is considered a 'sensitive' species in Alberta. These owls are relatively rare in the province; they are interior forest species requiring large blocks of mature

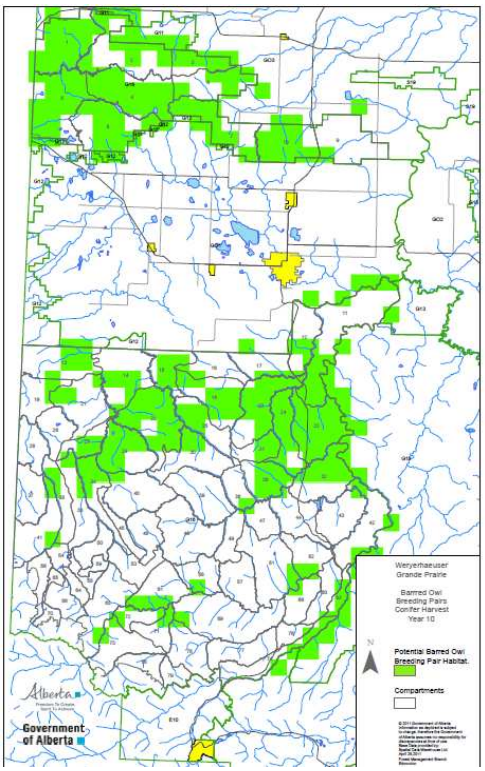
dense woodland. Barred owls have clumped breeding distributions because they nest in cavities of old, large diameter *Populus sp*. trees, and select old and/or mature mixedwood forests to fulfill life requisites. As such, barred owls were identified as indicators of old mixedwood forests across the western boreal forests.

As part of Weyerhaeuser's commitment to ensure that biodiversity is maintained in areas where they operate, owls are monitored within the Grande Prairie FMA using a standardized nocturnal owl survey protocol. These surveys, which were initiated in 2007, are conducted across the FMA every three years. Surveys have shown that barred owls are relatively common in the Grande Prairie FMA compared to other large-owl species such as Great Horned Owl, Great Gray Owl and Long-eared Owl. In the 2007 surveys, 27 barred owls were detected and 48 were found in 2010 surveys.

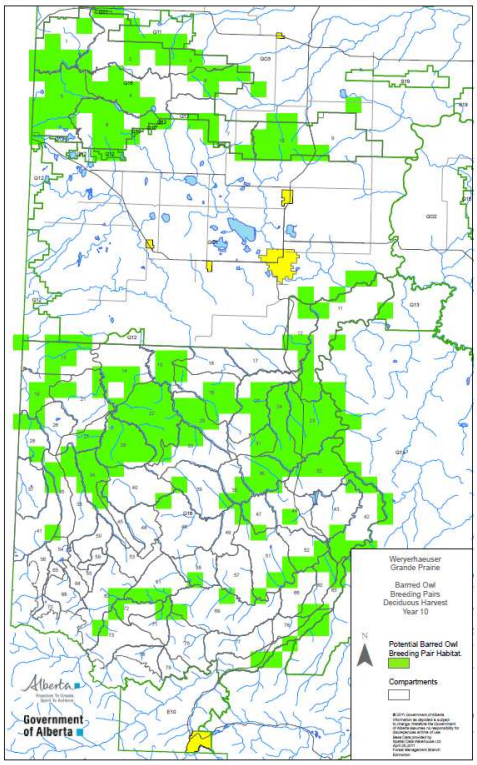
In addition to on-going long-term monitoring, Weyerhaeuser supports work which aims to evaluate the efficacy of existing models for predicting the presence of barred owl territories in northwestern Alberta and the ability of these habitat models to predict demographic success of barred owls within their territories. In support of the SRD directive that identifies barred owls as a coarse filter indicator species, Weyerhaeuser participated in the development of a habitat model that was specific to the Grande Prairie region. The models provided a series of outputs, including a Territory Map outlining potential barred owl Breeding Pair Habitat at the current time, and at year 10 of the SHS (Figure 7-8). The outputs provides a snapshot of areas within the FMA where there may be enough appropriate habitat to support a breeding pair of barred owls.



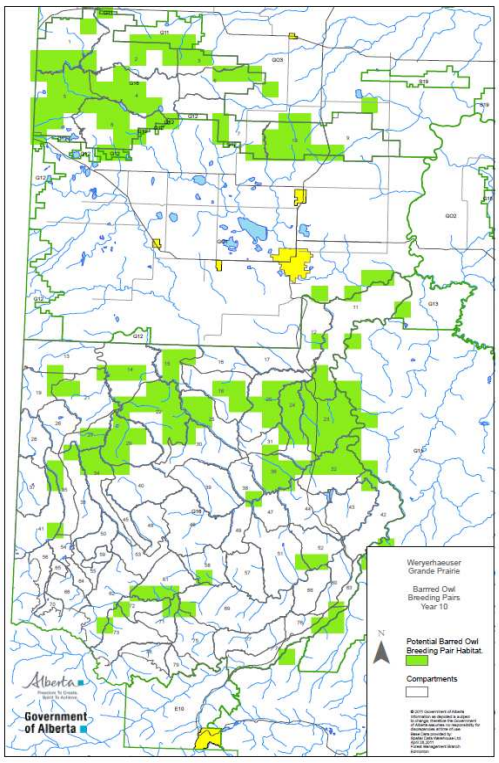
Barred Owl Breeding Pairs Current



Barred Owl Breeding Pairs Conifer Harvest - Year 10



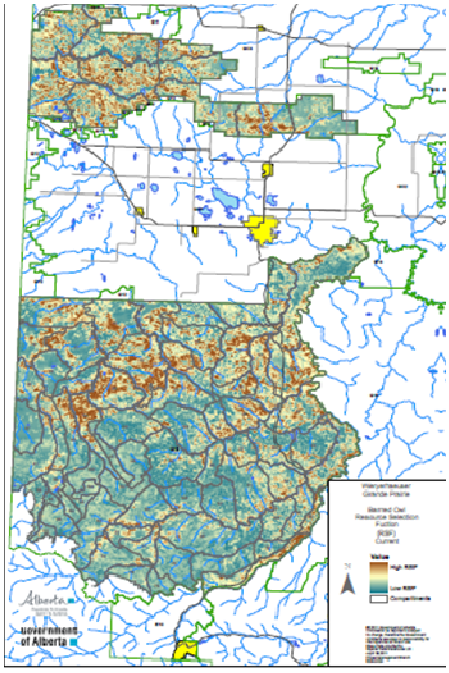
Barred Owl Breeding Pairs Deciduous Harvest - Year 10



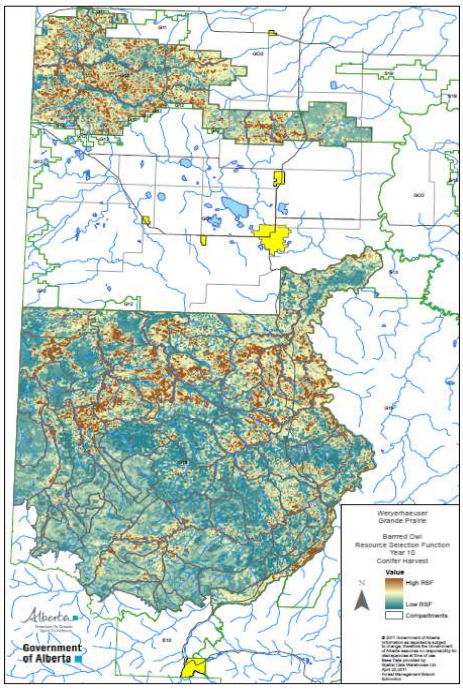
Barred Owl Breeding Pairs Combined Harvest - Year 10

Figure 7-8 Barred Owl Breeding Paris Analysis

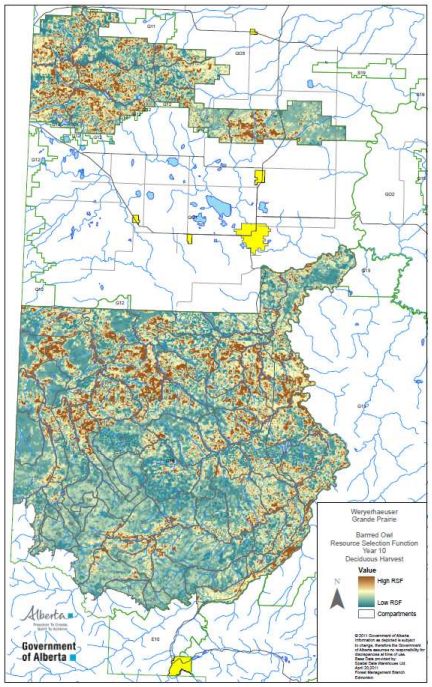
A second output of the model was a Resource Selection Function (RSF) map, also depicting results at current time and year 10 of the SHS (see figures 5 - 9). RSF maps give an indication of quality of habitat available. The combination of these two metrics provides a clearer picture of what the impact of forest harvesting may be on barred owl populations on the Weyerhaeuser FMA.



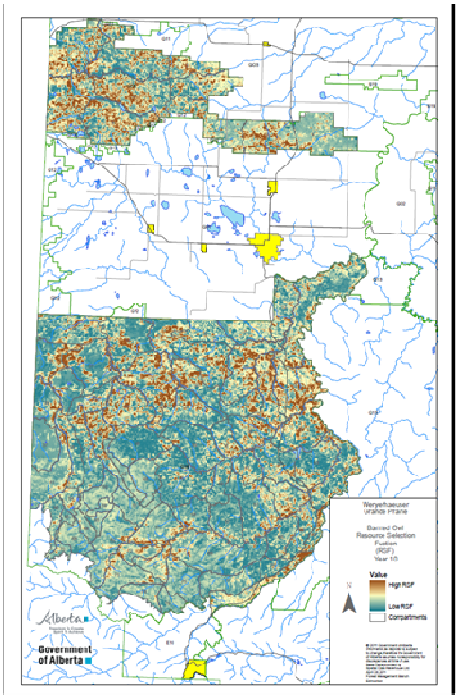
Barred Owl RSF Current



Barred Owl RSF Conifer Harvest - Year 10



Barred Owl RSF Deciduous Harvest - Year 10



Barred Owl RSF Combined Harvest - Year 10

Figure 7-9 Barred Owl RSF Analysis

The outputs provided by this analysis do show an impact to overall barred owl habitat on the landscape. However, both the scale of the output and the time frame of the analysis (10 years) make it difficult to provide very specific mitigation. Mitigation strategies will be employed on key areas identified using these outputs and in consultation with SRD staff.

These mitigation strategies include, but are not limited to:

- Where possible, design harvest areas in higher value barred owl habitat to increase the amount of forest interior and decrease the amount of forest edge.
- Adjust practices based on continuing Owl and songbird surveys to:
  - Retain visual and protective buffers around key habitat features, such as nests, identified during harvest design.
  - Incorporate more focused structure retention strategies in areas identified as high value barred owl habitat. This will include retention of additional structure (including snags and coarse woody material) adjacent to key habitats where appropriate and possible.
  - Review location of roads during final harvest plans and look for opportunities to avoid highly sensitive habitat.
- Continue Owl surveys and monitor long term presence/absence of barred owls within the WY FMA.

There is also an ongoing commitment from Weyerhaeuser to continue to gather information on barred owl and other focal species on the FMA. Weyerhaeuser will participate in a continual improvement process that includes ongoing discussions and consultation with SRD Fish & Wildlife staff to ensure company practices continue to meet biodiversity needs on the operating area.

7.8.6 Trumpeter Swan

The trumpeter swan (*Cygnus buccinator*), the largest native water fowl in North America, is a summer resident of the Parkland, Boreal Forest, and Foothills Natural Regions of Alberta. Trumpeter swans are typically found breeding in lakes and large wetlands in Alberta; breeding habitat is not associated with forest age or seral stage. They are currently designated as *'Threatened'* under the Alberta Wildlife Act. A number of identified trumpeter swan lakes have been identified on the FMA (Figure 7-10). Weyerhaeuser is guided by specific management strategies outlined in the Ground Rules. Some key requirements include:

- From April 1 to Sept. 30 - no harvesting, hauling, road building or scarification (including aerial herbicide) activity within 800 m of the edge of the woody vegetation adjacent to the identified trumpeter swan lakes or water bodies.

- No timber harvesting within 200 m of the edge of the woody vegetation adjacent to the identified trumpeter swan lakes or water bodies.

- No development of long-term infrastructure (roads and camps) within 500 m of the edge of the woody vegetation adjacent to the identified trumpeter swan water bodies. Only seasonal winter routes shall be permitted within the 500 m buffer and measures

shall be taken during the lifetime of this road to ensure the road is not active between April 1 and September.

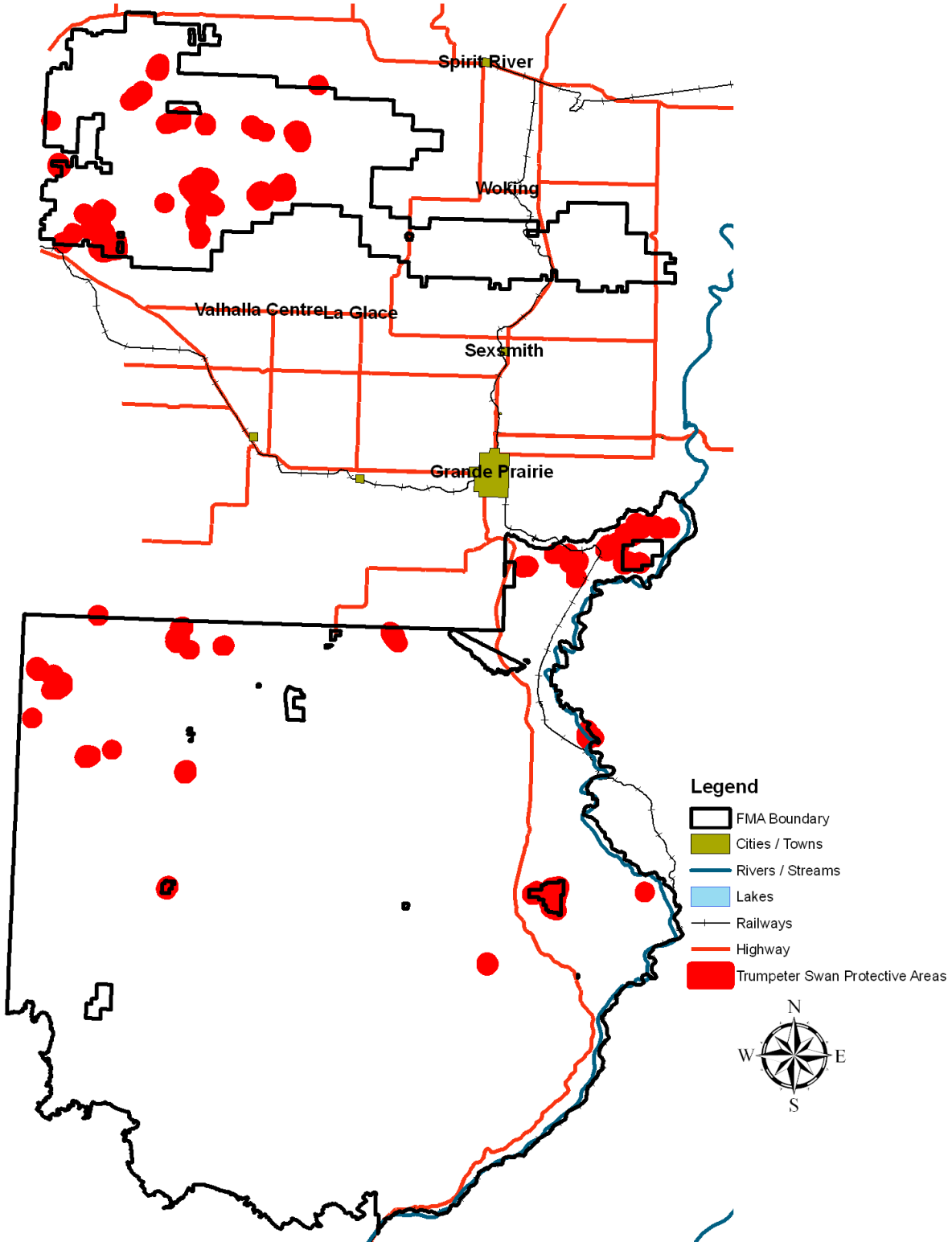


Figure 7-10 Trumpeter Swan Lakes and Buffers on the DFA

7.8.7 Bull Trout

The Bull trout *(Salvelinus confluentus)* is a freshwater salmonid found within the Rocky Mountain and Foothills Natural Regions and portions of the Peace River basin in the Boreal Forest Natural Region of Alberta. They are currently listed as a '*Species of Special Concern*' under the Alberta Wildlife Act. Bull trout are typically associated with clear water in large cold rivers, small rocky streams, and lakes in Alberta. Optimal Bull trout habitat is determined by water temperature regulation (i.e., shading), nutrient input (i.e., detritus and invertebrates), cover (i.e., coarse woody debris), and water quality (i.e., sediment loads). In Alberta, stream conditions preferred by trout are typically associated with mature/old forests.

Bull trout can be found in two major spawning beds on the Weyerhaeuser FMA, Lynx Creek and Copton Creek. The Company does have planned harvest to the north of these areas and typically does not operate in the vicinity of these spawning beds and is further guided by operating ground rules that are specific to Bull trout and their habitat. Weyerhaeuser is currently involved in two projects that have direct relevance to Bull trout. One is a research project at the Forest Research Institute (FRI) that is studying the effects of Mountain Pine Beetle (MPB) on the hydrology of impacted watersheds and their ability to recover. This Weyerhaeuser supported research project will provide a better understanding of what these impacts might be on Bull trout in affected areas. Another project with relevance to Bull trout is the continued development of a 'Fish Sustainability Index' by ASRD Fish & Wildlife biologists. Weyerhaeuser will continue to support the development of this tool and work with Fish & Wildlife biologists to incorporate results and best management practices into planning and harvesting activities throughout the life of the plan.

7.9 Protected Areas and Parks

Summary of provincial parks and protected areas is provided in Section 2.6.