P14 2009-2018
Forest Management Plan

Chapter 2:
Comprehensive Description
of the DFA

December 15, 2009

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1. Introduction

This chapter describes the Defined Forest Management Area (DFA) for the P14 Forest Management Unit's (FMU) 2009–2018 Forest Management Plan (FMP). The components addressed within this chapter include administrative boundaries, physical conditions, forest landscape patterns and structure, forest landscape disturbance and succession, landscape fire assessment and land use.

In 1999, an extensive assessment of the FMUs in northwestern Alberta was completed; this assessment included the current P14 FMU (or the P14 DFA, for the purpose of the FMP). This assessment, "A Physical, Biological, and Land-Use Synopsis of the Boreal Forest's Natural Regions of Northwest Alberta", September 1999, prepared by J. Brad Stelfox, of Forem Consulting Ltd. and Bob Wynes, of Daishowa-Marubeni International Ltd., is referenced extensively throughout this chapter, as many of the sections contained within the chapter were specifically addressed in this document.

2. Administrative Boundaries

2.1 Forest Management Agreements

There is no Forest Management Agreement (FMA) on the P14 Defined Forest Area (DFA). Alberta Sustainable Resource Development (SRD) assumes the forest management responsibilities that would normally reside with FMA tenure holder.

2.2 Defined Forest Area (DFA)

The Defined Forest Area (DFA) associated with the 2009 – 2018 Forest Management Plan (FMP) is the P14 Forest Management Unit (FMU) boundary, totalling 127,331 ha (Figure 1). The DFA is located adjacent to the White Zone (that designated for agricultural purposes, as opposed to forestry).

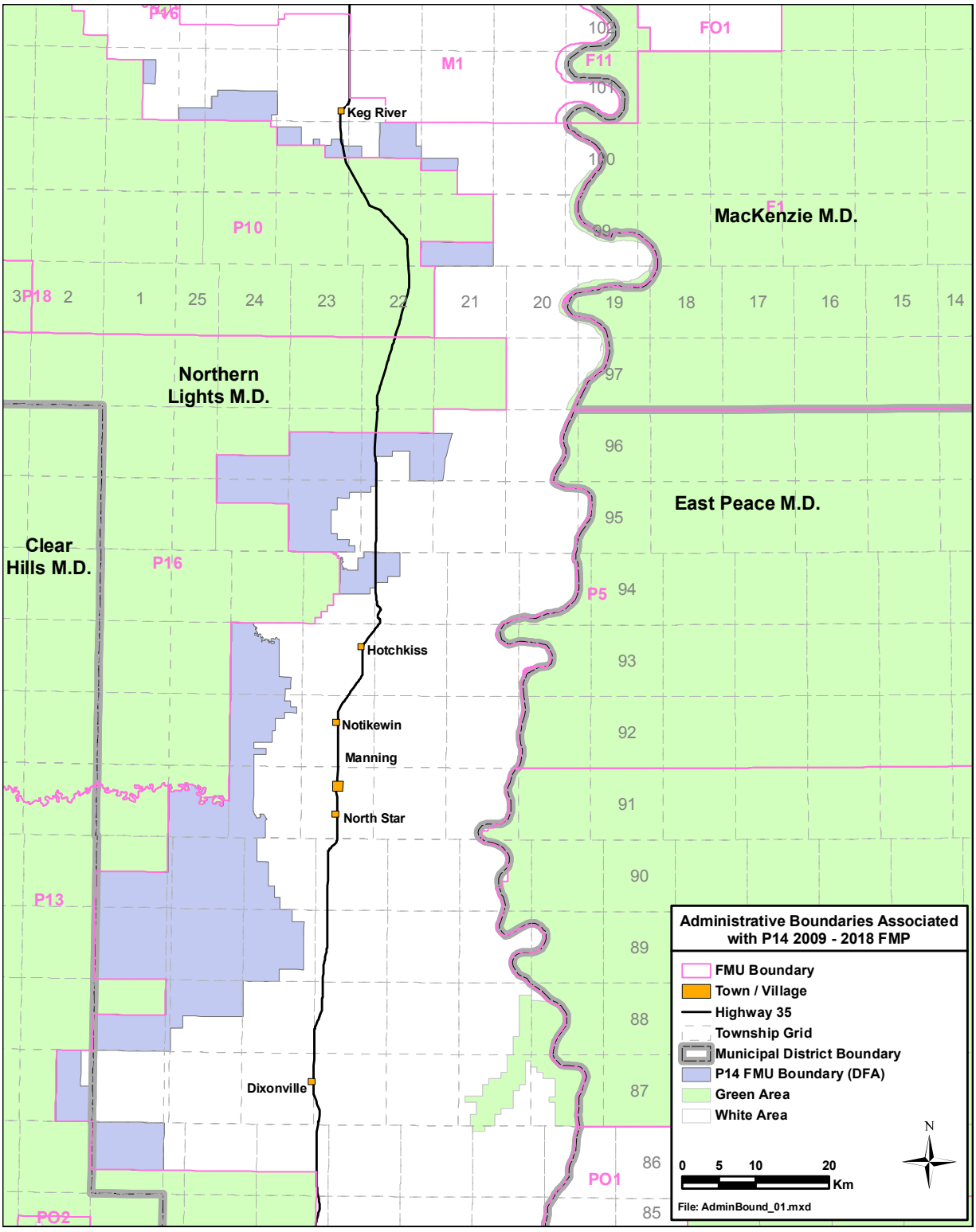


Figure 1. P14 Forest Management Unit boundary in relation to the Green Area, other FMUs and Municipal Districts.

2.3 Forest Management Units, Sustained Yield Units and Compartments

The 2009 – 2018 FMP DFA consists of the P14 FMU, which also happens to be the entire Sustained Yield Unit. The DFA is divided into 13 geographically separated pieces, which are not formally named or managed as separate units (Figure 1).

2.4 Natural Subregions

The P14 DFA is comprised of the following Natural Subregions (the area in each and the percent of the total DFA area is defined):

- Central Mixedwood – CMW (1,274 ha – 1%)
- Dry Mixedwood - DMW (49,831 ha – 39%)
- Lower Boreal Highlands – LBH (76,265 ha – 60%)

The Natural Subregions within the DFA are illustrated in Figure 2.

Information on each of these Natural Subregions can be found under the section Natural Subregions in Chapter 3, Biota and Ecological Communities of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

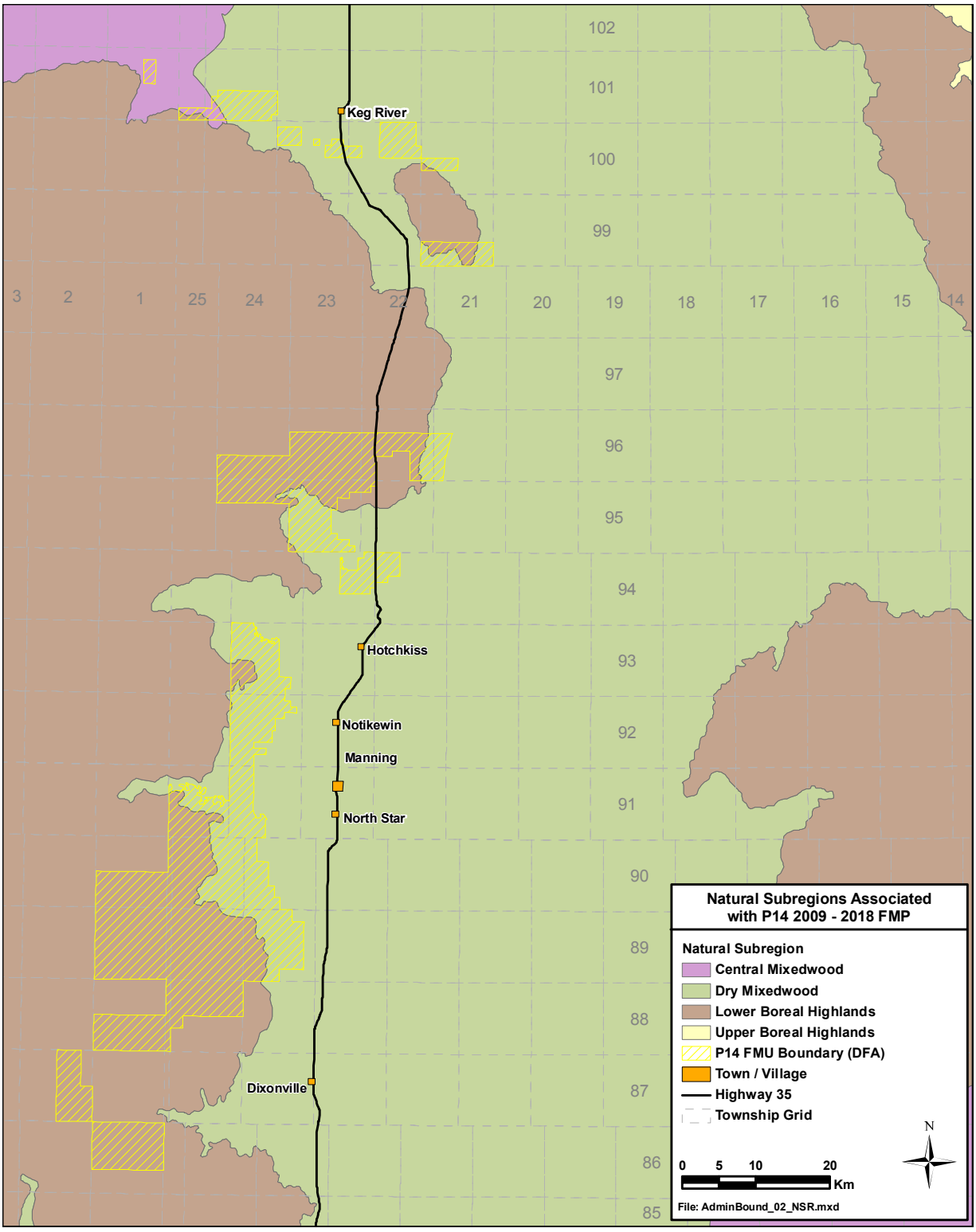


Figure 2. Distribution of Natural Subregions within the P14 DFA.

2.5 Municipal Districts / Counties

The DFA is situated primarily within the Northern Lights municipal district, with a small portion residing in the Clear Hills municipal district (Figure 1).

2.6 Federal Government Lands

There are no Federal Government lands within the DFA.

2.7 Indian Reservations

There are no Indian Reservations within or adjacent to the DFA. The Paddle Prairie Metis Settlement is located just north of the northern areas of the DFA.

2.8 Protected Areas and Parks

There are no protected areas or parks in the DFA.

2.9 Forest Protection Area

The DFA is entirely contained within the Peace Forest Protection Area.

3. Physical Conditions

The physical conditions of northwest Alberta, including the DFA, have been extensively assessed and summarized as part of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999). The following defines where within this documentation each of the physical condition attributes can be found.

3.1 Topography

Information on the topography within, and surrounding, the DFA can be found under the section Geological Features in Chapter 2, Physical Features of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

3.2 Soils and Landforms

Information on the soils and landforms within, and surrounding, the DFA can be found under the section Geological Features in Chapter 2, Physical Features of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

3.3 Hydrography

Information on the hydography within, and surrounding, the DFA can be found under the section Hydrology and Water Resources in Chapter 2, Physical Features of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

3.4 Climate

Information on the climate within, and surrounding, the DFA can be found under the section Climate in Chapter 2, Physical Features of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

4. Forest Landscape Pattern and Structure

4.1 Forest Species and Cover Groups

The species composition on the P14 DFA is summarized by Broad Cover Group (BCG) and Strata (species strata) in Table 1. Strata are described within Chapter 4: Forecasting and the PFMS. The distribution of the strata is illustrated in Figure 3, while the distribution of the BCGs is illustrated in Figure 4.

Table 1. Broad Cover Group and Species Strata on the DFA.

		Area and Proportion of Gross DFA Landbase	
BCG	**Strata**	**(ha)**	**(%)**
D	Dec	47,649	37%
	Du	16,674	13%
D Total		64,323	51%
DC	DC	9,062	7%
DC Total		9,062	7%
CD	CD	5,216	4%
CD Total		5,216	4%
C	Pl	758	1%
	Sb	15,886	12%
	Sw	13,574	11%
	Lt	36	0%
C Total		30,254	24%
	NF	18,476	15%
Total		127,331	100%

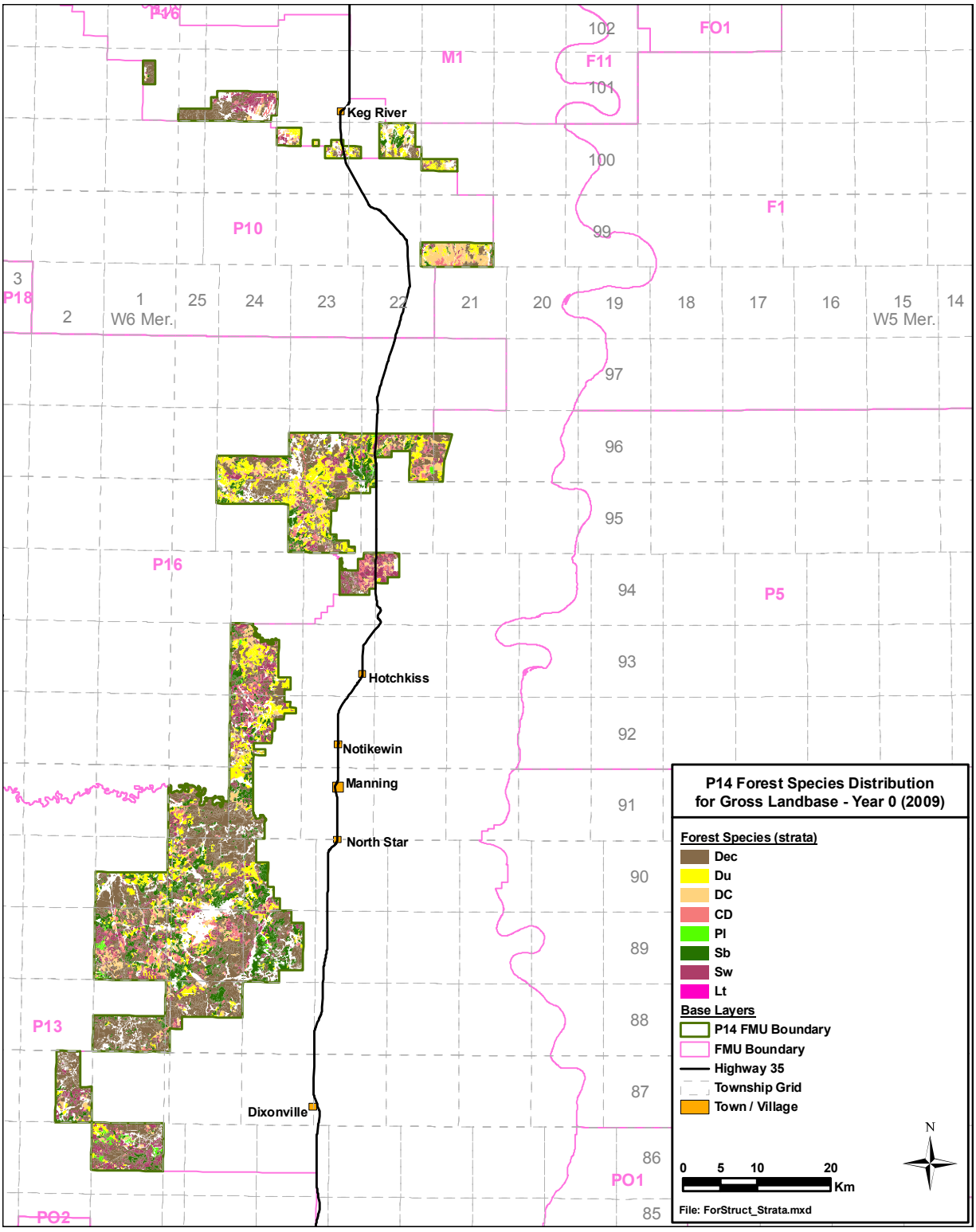


Figure 3. Strata (species strata) distribution on the DFA.

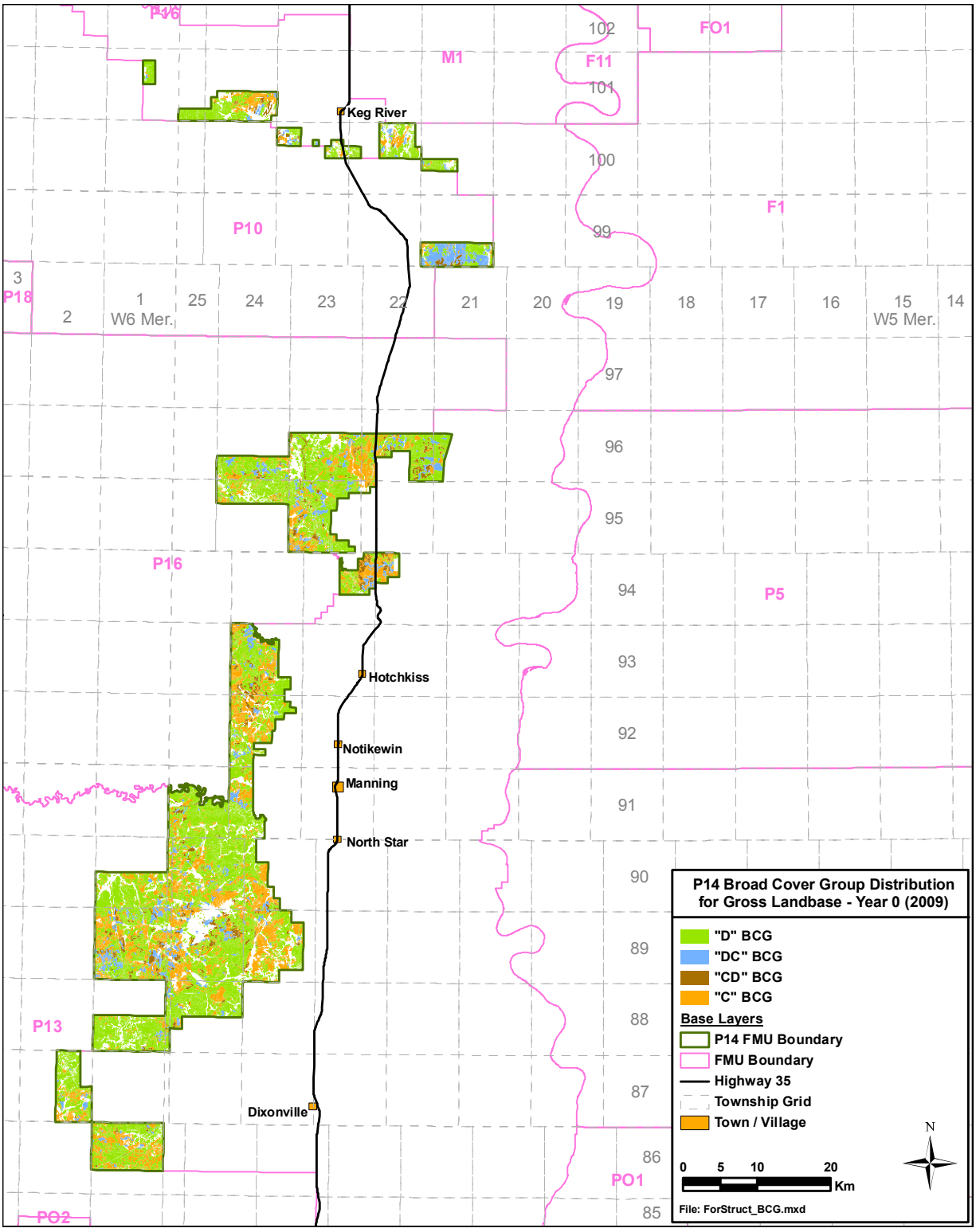


Figure 4. Broad Cover Group distribution on the DFA.

4.2 Forest Age Classes

The forest age class on the P14 DFA is summarized by area and percent area in Table 2 and Table 3 respectively. The forest age class distribution on the DFA is illustrated in Figure 5.

Table 2. Area age class distribution on DFA by BCG and Strata.

		Area (ha) of Forest Landbase by Age Class (years)					
BCG	**Strata**	**>0 & <=30**	**>30 & <=60**	**>60 & <=90**	**>90 & <=120**	**>120 & <=150**	**>150**
D	Dec	3,724	3,731	27,169	11,355	1,538	132
	Du	87	1,155	9,633	4,893	906	0
D Total		3,811	4,886	36,802	16,248	2,444	132
DC	DC	1,319	552	3,273	3,317	602	0
DC Total		1,319	552	3,273	3,317	602	0
CD	CD	1,516	376	1,154	1,854	277	38
CD Total		1,516	376	1,154	1,854	277	38
C	Pl	47	70	278	231	102	30
	Sb	434	2,510	8,988	3,223	547	184
	Sw	1,098	542	3,707	4,445	2,421	1,361
	Lt	-	-	-	18	17	-
C Total		1,579	3,122	12,973	7,918	3,088	1,575
Total		8,224	8,936	54,202	29,336	6,412	1,746

Table 3. Percent area age class distribution on DFA by BCG and Strata.

		Area (ha) of Forest Landbase by Age Class (%)					
BCG	**Strata**	**>0 & <=30**	**>30 & <=60**	**>60 & <=90**	**>90 & <=120**	**>120 & <=150**	**>150**
D	Dec	3.4%	3.4%	25.0%	10.4%	1.4%	0.1%
	Du	0.1%	1.1%	8.8%	4.5%	0.8%	0.0%
D Total		3.5%	4.5%	33.8%	14.9%	2.2%	0.1%
DC	DC	1.2%	0.5%	3.0%	3.0%	0.6%	0.0%
DC Total		1.2%	0.5%	3.0%	3.0%	0.6%	0.0%
CD	CD	1.4%	0.3%	1.1%	1.7%	0.3%	0.0%
CD Total		1.4%	0.3%	1.1%	1.7%	0.3%	0.0%
C	Pl	0.0%	0.1%	0.3%	0.2%	0.1%	0.0%
	Sb	0.4%	2.3%	8.3%	3.0%	0.5%	0.2%
	Sw	1.0%	0.5%	3.4%	4.1%	2.2%	1.3%
	Lt	-	-	-	0.0%	0.0%	-
C Total		1.5%	2.9%	11.9%	7.3%	2.8%	1.4%
Total		7.6%	8.2%	49.8%	26.9%	5.9%	1.6%

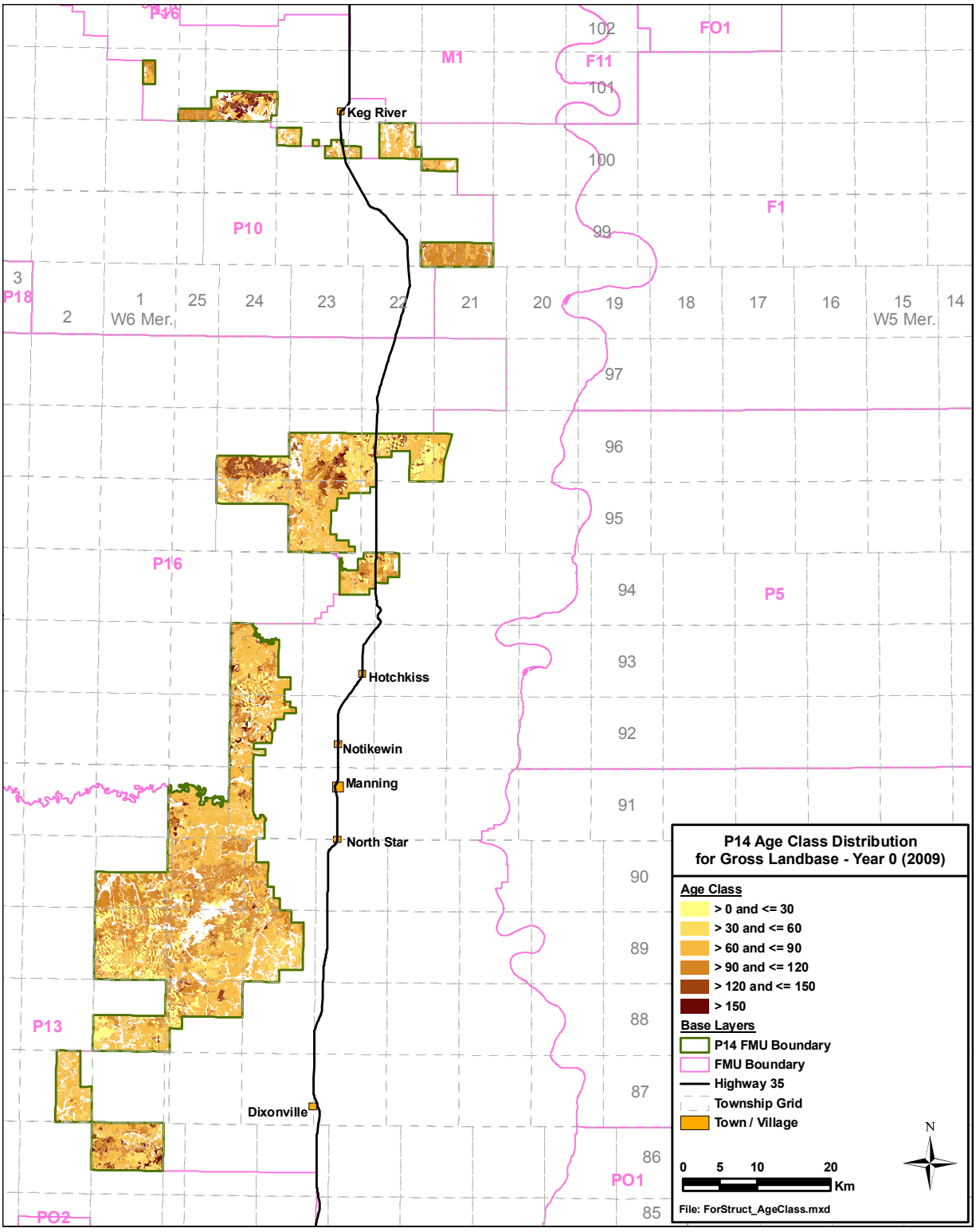


Figure 5. Age class distribution on the DFA.

4.3 Seral Stages

The seral stage composition on the P14 DFA is summarized in Table 4. Seral stages are described within Chapter 4: Forecasting and the PFMS. The distribution of the seral stages is illustrated in Figure 6.

Table 4. Seral Stages on the DFA.

	Area and Proportion of Gross DFA Landbase	
Seral Stage	(ha)	(%)
Regen	5,238	4%
Young	27,635	22%
Mature	57,523	45%
Old	18,460	14%
Undefined	18,476	15%
Total	127,331	100%

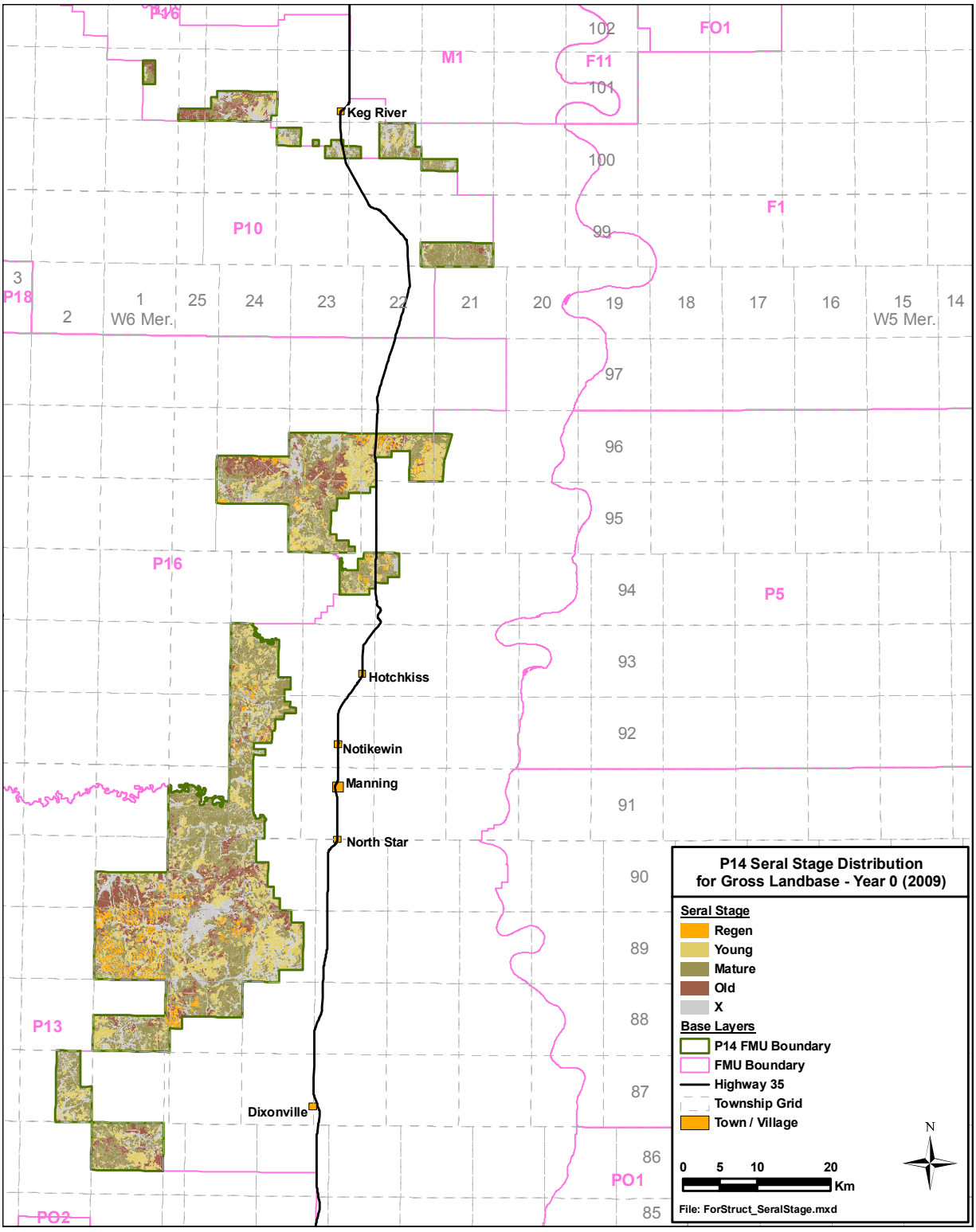


Figure 6. Seral Stage distribution on the DFA.

4.4 Forest Patches

The forest opening patch size class distribution on the P14 DFA is summarized in Table 5. The opening patch size classes are described within Chapter 4: Forecasting and the PFMS. The distribution of the opening patches, by size class, is illustrated in Figure 7.

Table 5. Opening patch area by size class on the DFA.

> 0 and < 2 ha		>= 2 and < 200 ha		>= 200 and < 500 ha		>= 500 ha		Total Patch Area
(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)
54	1.0%	4,963	94.7%	221	4.2%	0	0.0%	5,238

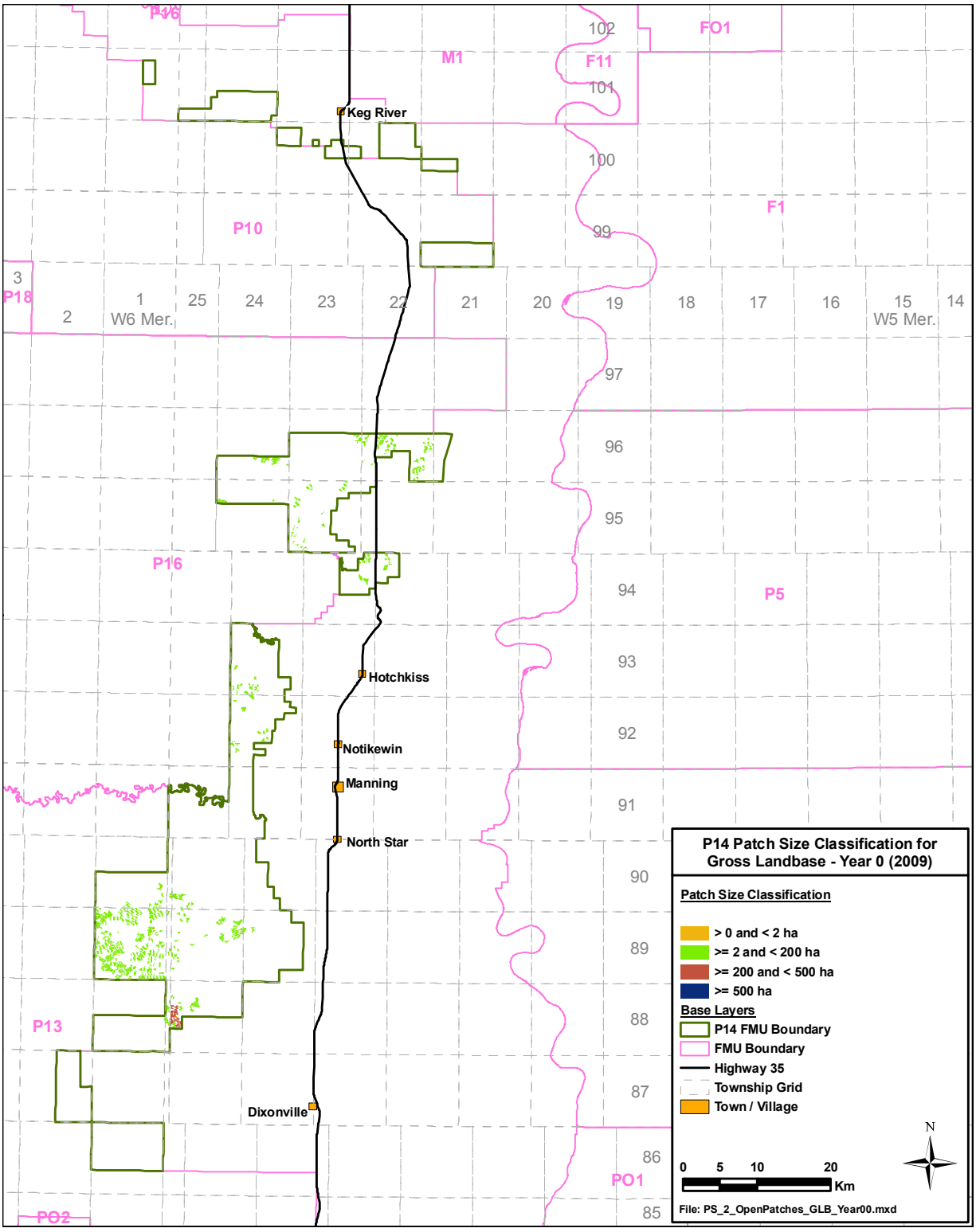


Figure 7. Opening patch size class distribution on DFA.

4.5 Spatial and Temporal Variability of Cover Types and Seral Stages

The Broad Cover Group (BCG) and species strata seral stage area and percent area distribution is summarized in Table 6 and Table 7 respectively. Strata and seral stages are described in Chapter 4: Forecasting and the PFMS.

Table 6. Broad Cover Group and species strata seral stage area distribution on the DFA.

		BCG and Strata Area of Forest Landbase by Seral Stage (ha)					
BCG	Strata	Regen	Young	Mature	Old	Non-Forest	Total
D	Dec	1,863	5,592	28,972	11,222	-	47,649
	Du	13	1,229	10,900	4,532	-	16,674
D Total		1,876	6,821	39,872	15,754	-	64,323
DC	DC	1,021	2,374	5,024	643	-	9,062
DC Total		1,021	2,374	5,024	643	-	9,062
CD	CD	1,221	1,113	2,360	522	-	5,216
CD Total		1,221	1,113	2,360	522	-	5,216
C	Pl	47	153	427	132	-	758
	Sb	240	12,099	3,499	48	-	15,886
	Sw	833	5,075	6,305	1,361	-	13,574
	Lt	-	-	36	-	-	36
C Total		1,120	17,327	10,267	1,541	-	30,254
NF	NF	-	-	-	-	18,476	18,476
NF Total		-	-	-	-	18,476	18,476
Total		5,238	27,635	57,523	18,460	18,476	127,331

Table 7. Broad Cover Group and species strata seral stage percent area distribution on the DFA.

		BCG and Strata Area of Forest Landbase by Seral Stage (%)					
BCG	Strata	Regen	Young	Mature	Old	Non-Forest	Total
D	Dec	1.5%	4.4%	22.8%	8.8%	-	37.4%
	Du	0.0%	1.0%	8.6%	3.6%	-	13.1%
D Total		1.5%	5.4%	31.3%	12.4%	-	50.5%
DC	DC	0.8%	1.9%	3.9%	0.5%	-	7.1%
DC Total		0.8%	1.9%	3.9%	0.5%	-	7.1%
CD	CD	1.0%	0.9%	1.9%	0.4%	-	4.1%
CD Total		1.0%	0.9%	1.9%	0.4%	-	4.1%
C	Pl	0.0%	0.1%	0.3%	0.1%	-	0.6%
	Sb	0.2%	9.5%	2.7%	0.0%	-	12.5%
	Sw	0.7%	4.0%	5.0%	1.1%	-	10.7%
	Lt	-	-	0.0%	-	-	0.0%
C Total		0.9%	13.6%	8.1%	1.2%	-	23.8%
NF	NF	-	-	-	-	14.5%	14.5%
NF Total		-	-	-	-	14.5%	14.5%
Total		4.1%	21.7%	45.2%	14.5%	14.5%	100.0%

5. Forest Landscape Disturbance & Succession

5.1 Inherent Disturbance Regime

The primary natural disturbance regime of the P14 DFA, is wildfire. A detailed description of the fire regime associated with the DFA can be found within Section 7, Fire Regime Analysis.

5.2 Insects and Diseases

Information on significant insects within, and surrounding, the DFA can be found under the section Insects of Economic Interest to the Forest Sector in Chapter 3, Biota and Ecological Communities of the document "A Physical, Biological, and Land-Use Synopsis of the Boreal Forest's Natural Regions of Northwest Alberta" (Stelfox and Wynes, 1999).

In the last three years, the presence of mountain pine beetle has become more prevalent on the DFA, and is expected to pose significant challenges to the Alberta forest industry, as it has within British Columbia. The DFA does not have an over-abundance of pine stands, but as part of the Preferred Forest Management Scenario, the pine stands have been prioritized for harvest (refer to Chapter 4: Forecasting and the PFMS).

5.3 Invasive Exotic Species

There are no known invasive exotic species within or surrounding the DFA. Due to the extent of industrial activities and the movement of machinery to the DFA from other areas, there is an inherent risk that invasive plant species could be introduced to the DFA.

5.4 Forest Successional Trajectories

Information on forest successional trajectories within, and surrounding, the DFA can be found in Chapter 4, Forest Structure and Dynamics, of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

5.5 Timber Harvesting

Information on timber harvesting within, and surrounding, the DFA can be found in Chapter 8, The Forestry Sector, of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

5.6 Forest Industry Access

Due to the fragmented nature of the DFA, fine textured soils and cost considerations, forest industry access is achieved primarily through the use of winter roads. The current network of permanent roads as well as those that will be used to serve as access for the forest industry are identified in Appendix V: P14 Long Term Road Plan.

5.7 Industrial Development

The primary developmental activities within and surrounding the DFA are those associated with agriculture and the petrochemical sectors.

Information on the agricultural activities within and surrounding the DFA can be found in Chapter 7, The Arrival of Euro-Canadian Homesteader and the Emergence of an Agricultural Sector, of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

Information on the petrochemical development activities within and surrounding the DFA can be found in Chapter 9, The Petrochemical Sector, of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

5.8 Monitoring Sites

Information on monitoring sites and research initiatives within, and surrounding, the DFA can be found in Chapter 11, Adaptive Management and Research, of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

6. Wildfire Threat Assessment

The Wildfire Threat Assessment Model (WTA Model) provides an analysis of what influence the preferred forest management strategy will have in achieving wildland fire management objectives on both the current and future forest states in the FMU.

The WTA Model is a spatial model used to rate the susceptibility of an area to the negative impact of wildfires. The WTA Model is an ArcGIS application which combines several data layers into one layer representing the final wildfire threat rating. Each of the underlying layers is weighted according to pre-determined parameters (Figure 8).

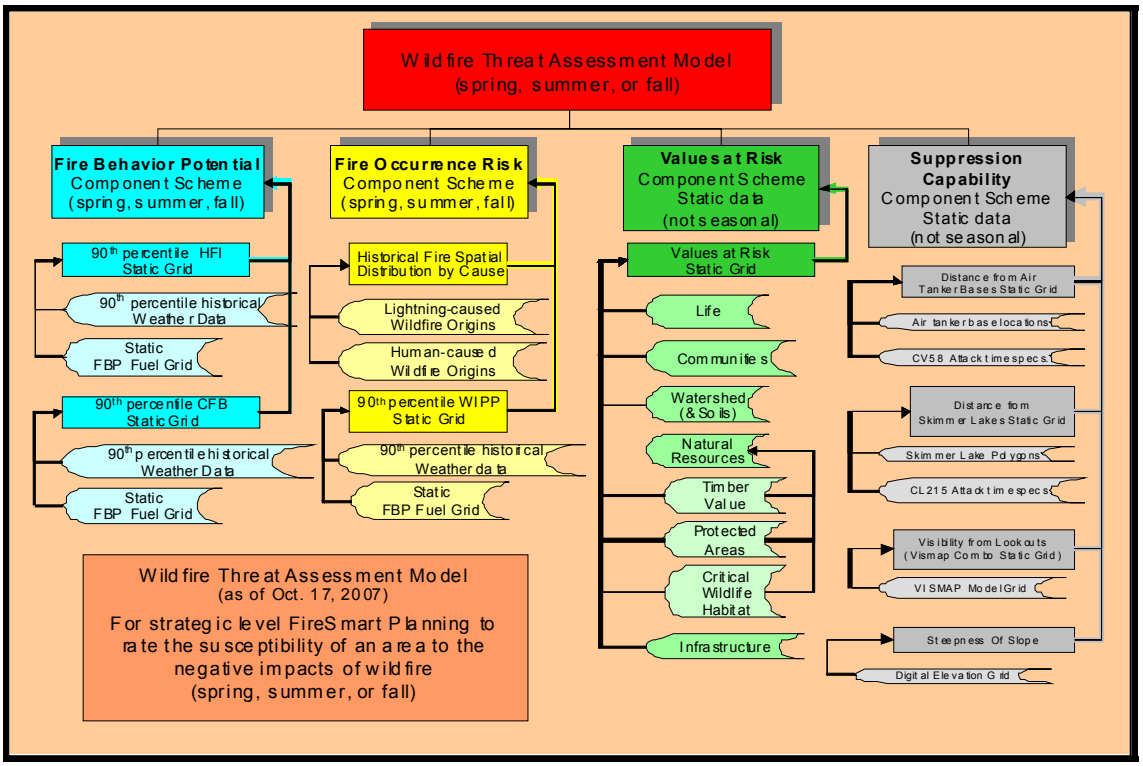


Figure 8. Wildfire threat model schematics.

The FireSmart objective for the preferred forest management strategy is to reduce the overall wildfire threat potential within the FMU through:

- Reducing the fire behaviour potential
- Reducing the fire occurrence risk
- Reducing fire exposure to values at risk
- Enhancing wildfire suppression capability

6.1 Wildfire Threat Analysis – Wildfire Threat Rating and Fire Behaviour Potential

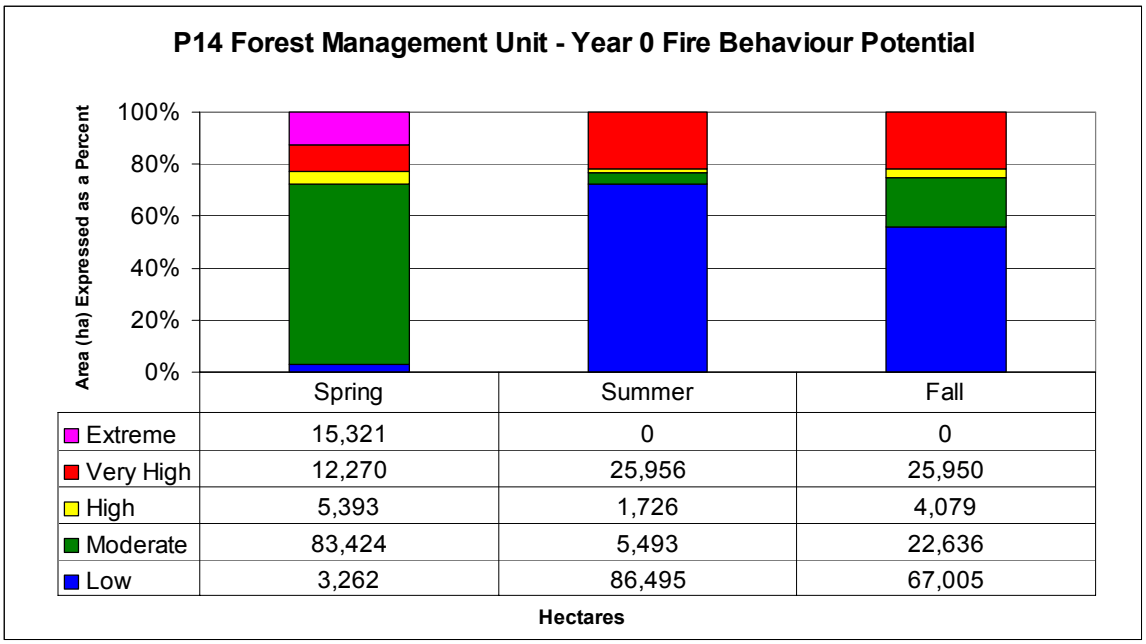
The wildfire threat analysis for P14 focused on the spring season as it is the season in which the greatest current fire behaviour potential and wildfire threat rating occurred (Figure 9 and Figure 10).

Assessment of what influence the preferred forest management strategy will have on the wildfire threat potential within the FMU required an analysis of how the spatial harvest sequence would contribute to a percent reduction in fire behaviour potential. The analysis indicated how much area of high, very high, and extreme rated forest structure will be removed from the landbase.

The current four-step process described in Annex 3 of the *Alberta Forest Management Planning Standard* was used to forecast the relationship between harvest sequence and fire behaviour potential.

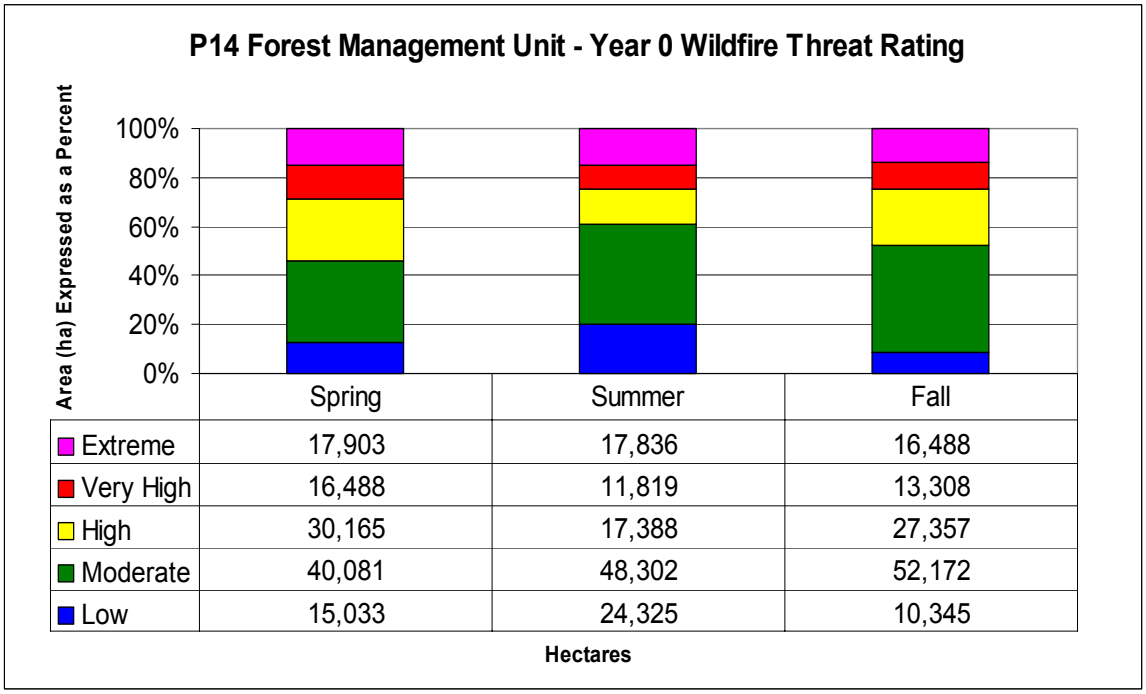
The Wildfire Threat Assessment – Fire Behaviour Potential was completed for the FMU using the WTA Model. This output uses forest fuel types, head fire intensity at the 90th percentile and crown fraction burn predictions as inputs. Fire Behaviour Potential was run for the current forest state (referred to as year 0). The model was then run incorporating the spatial harvest sequence to forecast fire behaviour potential at years 10, 20, and 50 (Figure 11, Table 8).

The Wildfire Threat Assessment-Wildfire Threat Rating was also completed. This output utilizes fire behaviour potential, fire occurrence risk, values at risk and suppression capability as inputs to determine the overall wildfire threat rating. This process was completed for the current forest state and then run incorporating the spatial harvest sequence to forecast future wildfire threat at years 10, 20, and 50 (Figure 12, Table 9).



	Spring	Summer	Fall
Extreme	15,321	0	0
Very High	12,270	25,956	25,950
High	5,393	1,726	4,079
Moderate	83,424	5,493	22,636
Low	3,262	86,495	67,005

Figure 9. Seasonal fire behaviour potential for the P14 FMU at year zero.



	Spring	Summer	Fall
Extreme	17,903	17,836	16,488
Very High	16,488	11,819	13,308
High	30,165	17,388	27,357
Moderate	40,081	48,302	52,172
Low	15,033	24,325	10,345

Figure 10. Seasonal wildfire threat rating for the P14 FMU at year zero.

As previously mentioned, spring was the season with both the greatest Fire Behaviour Potential and Wildfire Threat Rating. It was season on which the three other time slices were run.

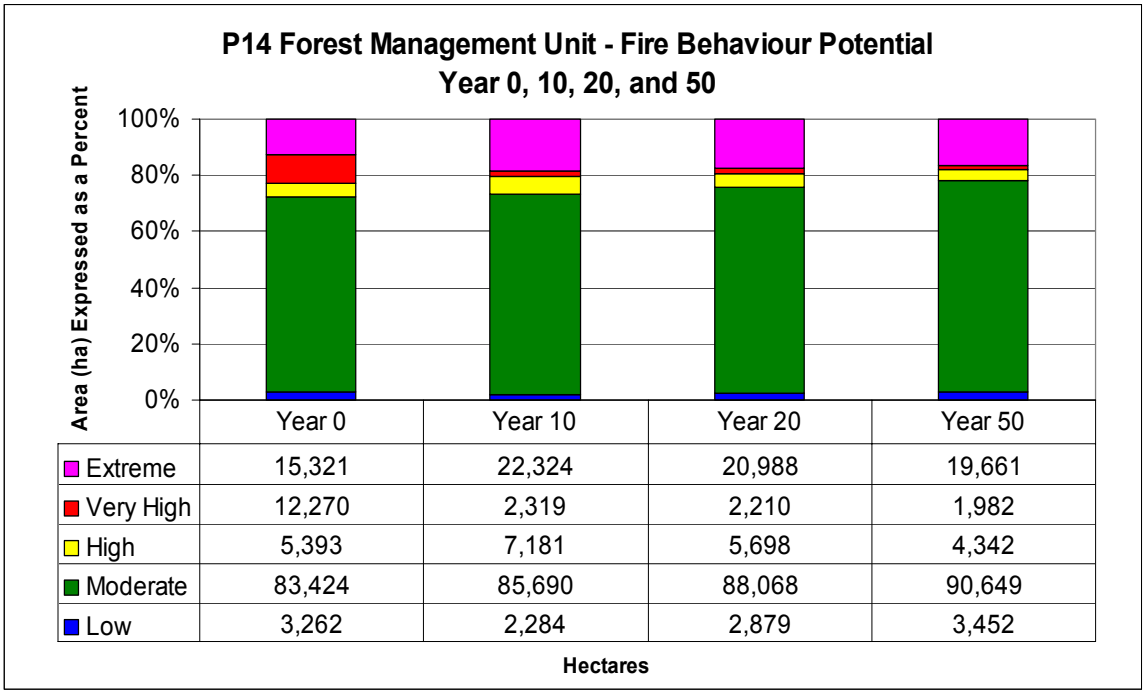


Figure 11. P14 FMU fire behaviour potential at the different time slices.

The extreme category of fire behaviour peaked at 7,003 hectares in year 10. It gradually decreased at the year 20 and 50 time slices. There was a significant decrease in the very high fire behaviour potential at the different time slices. The spring season is influenced by fire behaviour associated with cured grass fuel types. This value is significantly reduced once the grass reaches green-up in the summer (Figure 9).

The harvest sequence analyzed included harvest disturbances to 50 years. This resulted in a greater fire behaviour value at year 50 compared an analysis of a 20 year harvest sequence where all of the harvest disturbances would have transitioned out of grass fuel types into fuel types which would provide lower fire behaviour potential at year 50.

Table 8. Percent of the FMU in the different fire behaviour potential classes at each time slice.

Fire Behaviour Potential Class	Current	Year 10	Year 20	Year 50
Low	3%	2%	2%	3%
Moderate	65%	66%	70%	71%
High	4%	6%	4%	3%
Very High	10%	2%	2%	2%
Extreme	12%	18%	16%	15%
Non-Fuel	6%	6%	6%	6%

The percent fire behaviour at the different time slices resulted in a decrease of four percent in the combined high, very high, and extreme categories from the current forest state to year 20. From the current forest state to year 50, there was a decrease of six percent in the combined high to extreme categories.

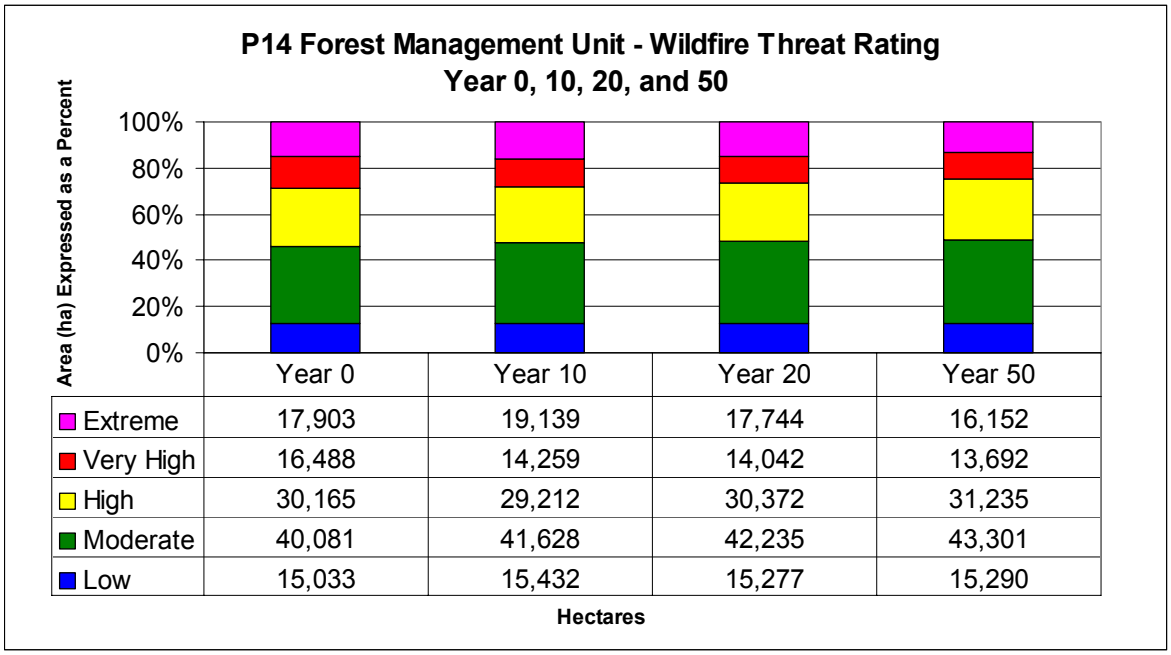


Figure 12. P14 FMU wildfire threat rating at the different time slices.

The extreme wildfire threat rating peaked at year 10 and then decreased at year 20 and 50. The very high rating gradually decreased at each of the four time slices. The extreme rating peaked at year 10 and then decreased at year 20 and year 50.

Table 9. Percent of the FMU in the different wildfire threat classes at each time slice.

Wildfire Threat Rating	Current	Year 10	Year 20	Year 50
Low	12%	12%	12%	12%
Moderate	31%	33%	33%	33%
High	24%	23%	24%	25%
Very High	13%	11%	11%	11%
Extreme	14%	15%	14%	13%
Non-Fuel	6%	6%	6%	6%

The percent wildfire threat rating from the combined high, very high, and extreme categories decreased from 51 percent at the current forest state to 49 percent at years 10, 20, and 50. The decrease was only two percent but when interpreted as hectares instead of percent, there was a gradual decrease from 64,556 hectares at the current forest state to 62,610 hectares at year 10. This value decreased to 62,158 hectares at year 20 and 61,079 hectares at year 50.

When examining both fire behaviour potential and wildfire threat rating, it is important to look at the location where harvest disturbances are placed on the landscape. Disturbances should be strategically placed to reduce problematic forest fuels, protect communities, increase probability of fire containment and align with FireSmart landscape strategies.

6.2 Fire Occurrence Risk

Fire occurrence risk is based on the historical fire occurrence and wildfire ignition probability at the 90th percentile.

The fire occurrence risk for the P14 FMU is low to moderate with a small pocket of high fire occurrence in the northern part of the FMU (Figure 13). Much of the area associated with moderate fire occurrence occurs in grass and boreal spruce fuel types. While fire occurrence has traditionally been low to moderate, the potential for large fires to occur in the spring in deciduous and mixedwood fuels should not be overlooked.

6.3 Overall Values at Risk

The P14 FMU has an extreme impact rating to values at risk from wildfire (Figure 14). The values at risk are based on human life, communities, watershed and soils, natural resources, and infrastructure. The proximity of the FMU to settled areas, a major transportation corridor and allocated timber has resulted in the extreme rating.

6.4 Wildfire Suppression Capability

Suppression capability is based on the distance from air tanker bases, distance from skimmer lakes, visibility from lookouts and the steepness of slopes. The suppression capability does not factor in road access and the distance from man-up bases. Given that the P14 FMU has good road access, and is in close proximity to the Manning Air Tanker Base and Fire Base, the suppression capability is essentially greater than what is represented in Figure 15.

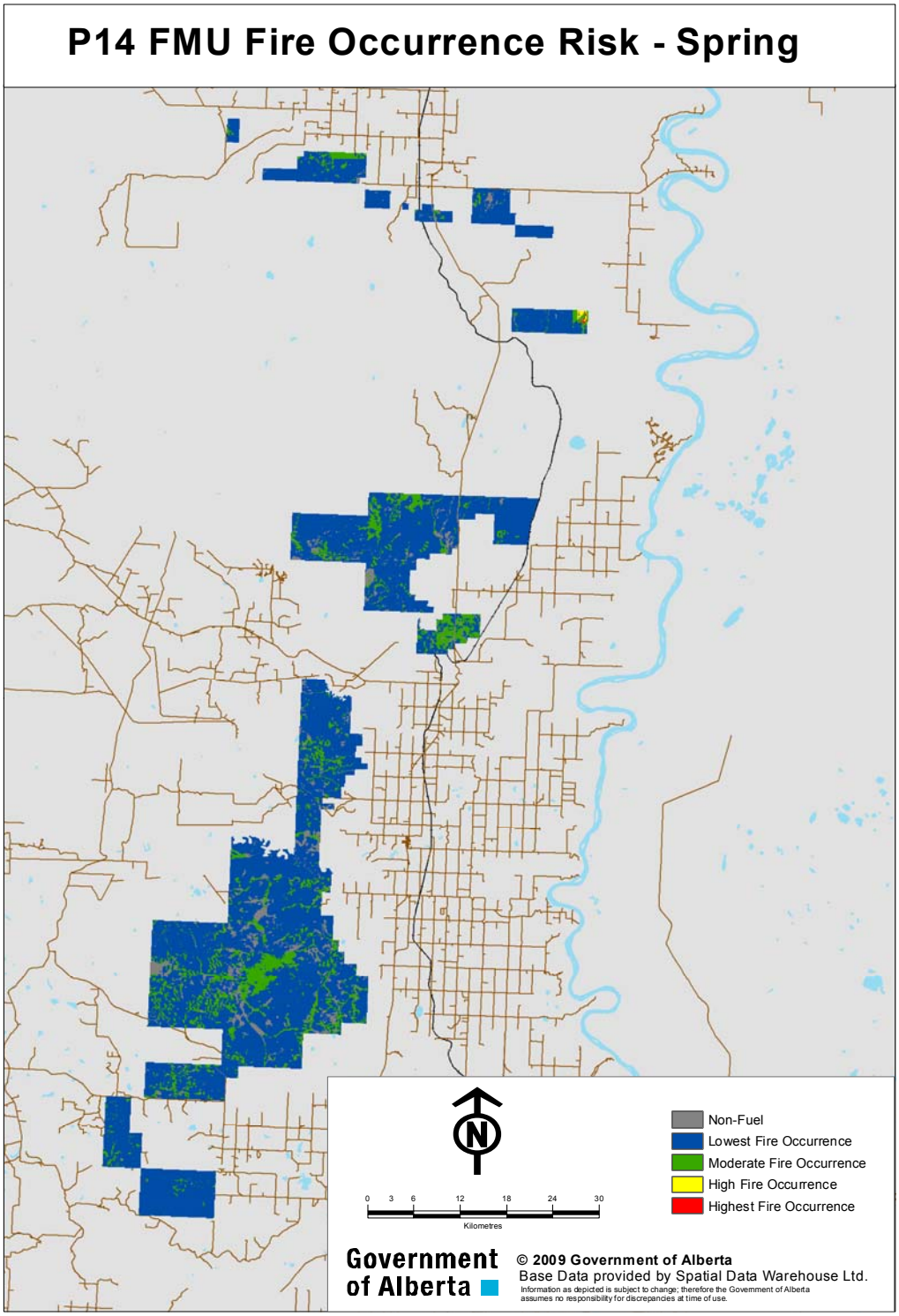


Figure 13. Spring fire occurrence risk in the P14 FMU.

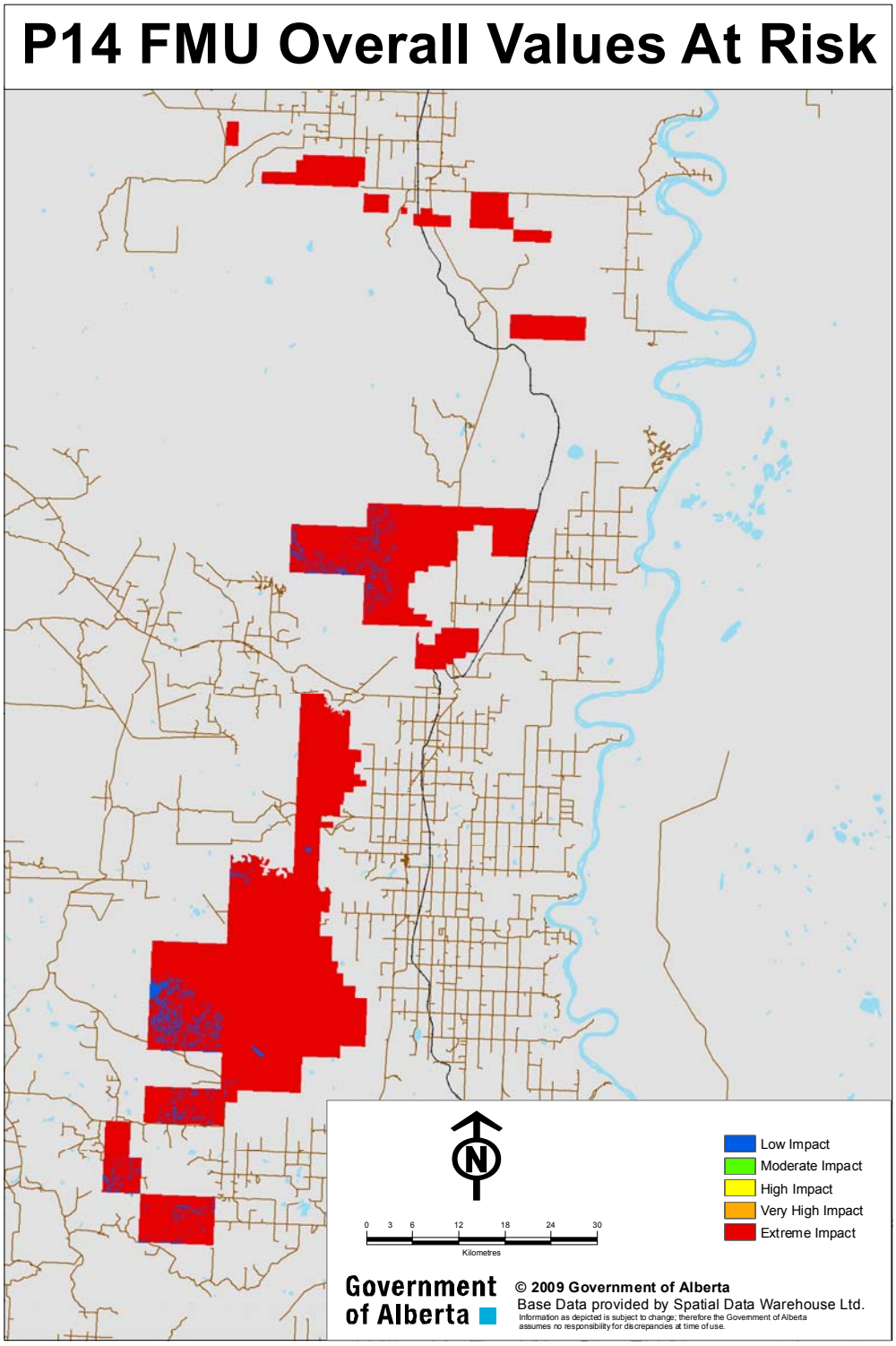


Figure 14. P14 FMU Values at risk.

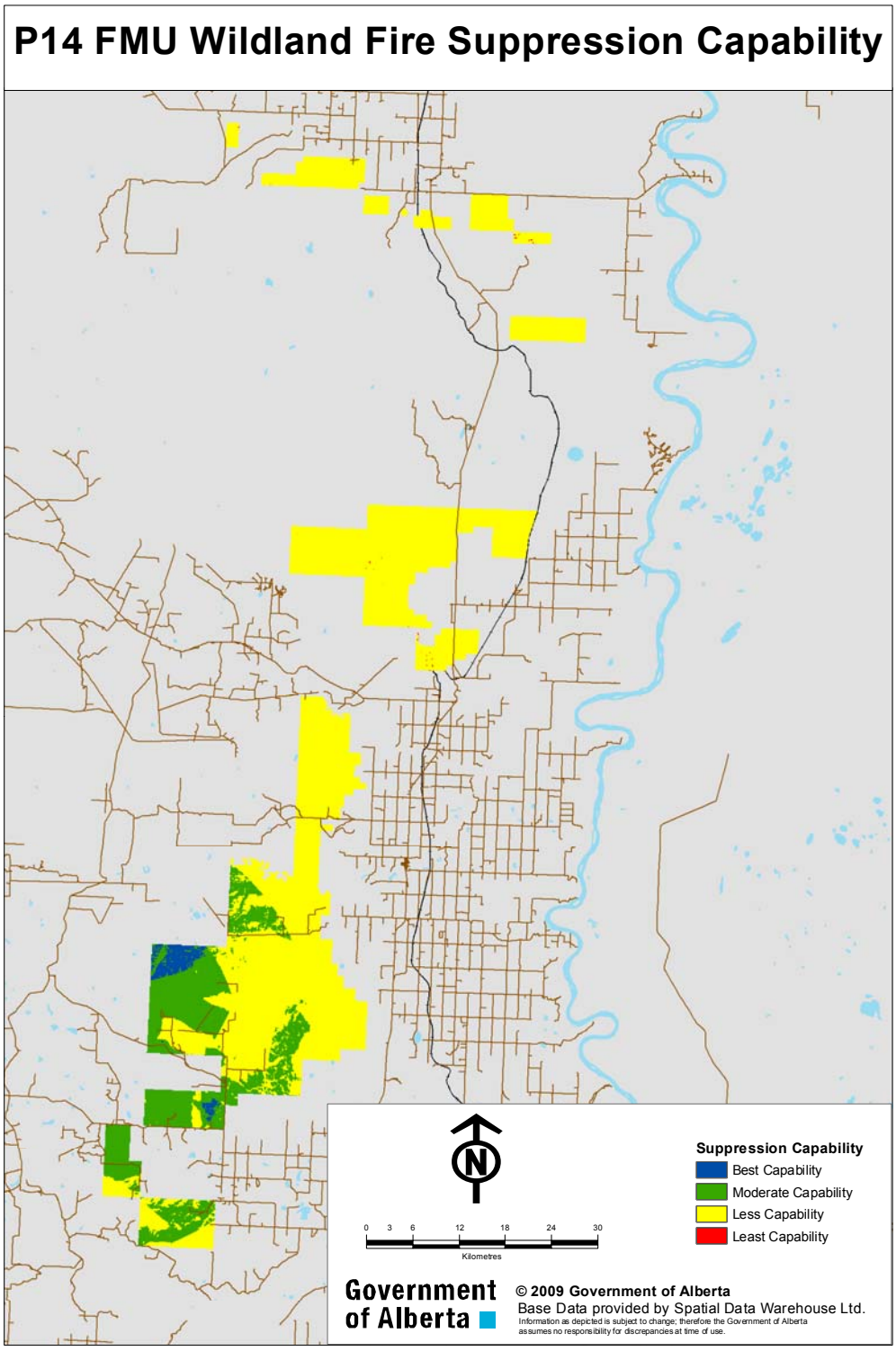


Figure 15. Wildland fire suppression capability for the P14 FMU.

7. Fire Regime Analysis

A fire regime analysis of northwestern Alberta was prepared by Stelfox and Wynes in 1999 for Daishowa-Maruebeni International Ltd. This study was based on an analysis of provincial records. The data from this study along with the *Alberta Wildfire Regime Analysis* prepared by Tymstra et al. in 2005 were used in the completion of this section of the P14 Forest Management Plan.

The P14 FMU is situated in the Boreal Highlands, Dry Mixedwood, and Central Mixedwood natural subregions (Figure 17). The Boreal Highlands natural subregion is classified as having a fire regime of infrequent, lightning-caused, large wildfires (Tymstra et al. 2005).

The Dry Mixedwood natural subregion contains the greatest amount of human development of any of the subregions in the Boreal Forest natural region (Tymstra et al. 2005). As a result, this subregion is prone to human-caused fires. The area impacted by wildfires in this area tends to be disproportionately small due to effective detection and suppression (Tymstra et al. 2005). The area of P14 which occurs in the Dry Mixedwood subregion is along a major transportation corridor and is adjacent to settlement areas. The proximity of these anthropogenic features to the area of this natural subregion in the P14 FMU likely contributes to both the number of human-caused fires and quick suppression due to road access.

A small portion of the FMU is located in the Central Mixedwood subregion (Figure 17). This area is characterized by trembling aspen and white spruce forest cover types. The wildfire regime in this subregion is characterized by frequent small fires and infrequent large fires (Tymstra et al. 2005). Human caused fire occurrence peaks in May as aspen and mixedwood stands typically do not reach green-up until the end of the month (Tymstra et al. 2005).

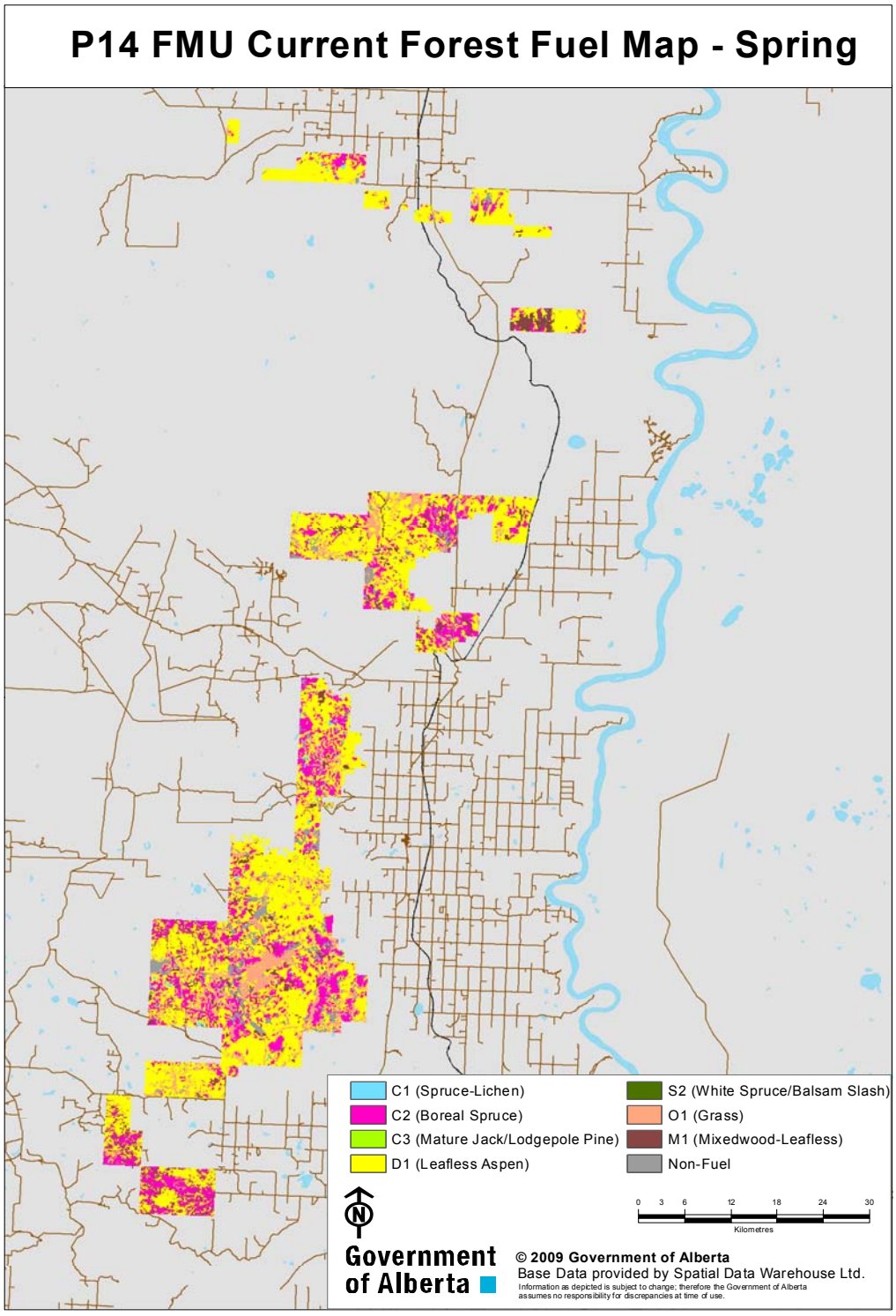


Figure 16. Canadian Forest Fire Behaviour Prediction (FBP) fuel types within the P14 FMU.

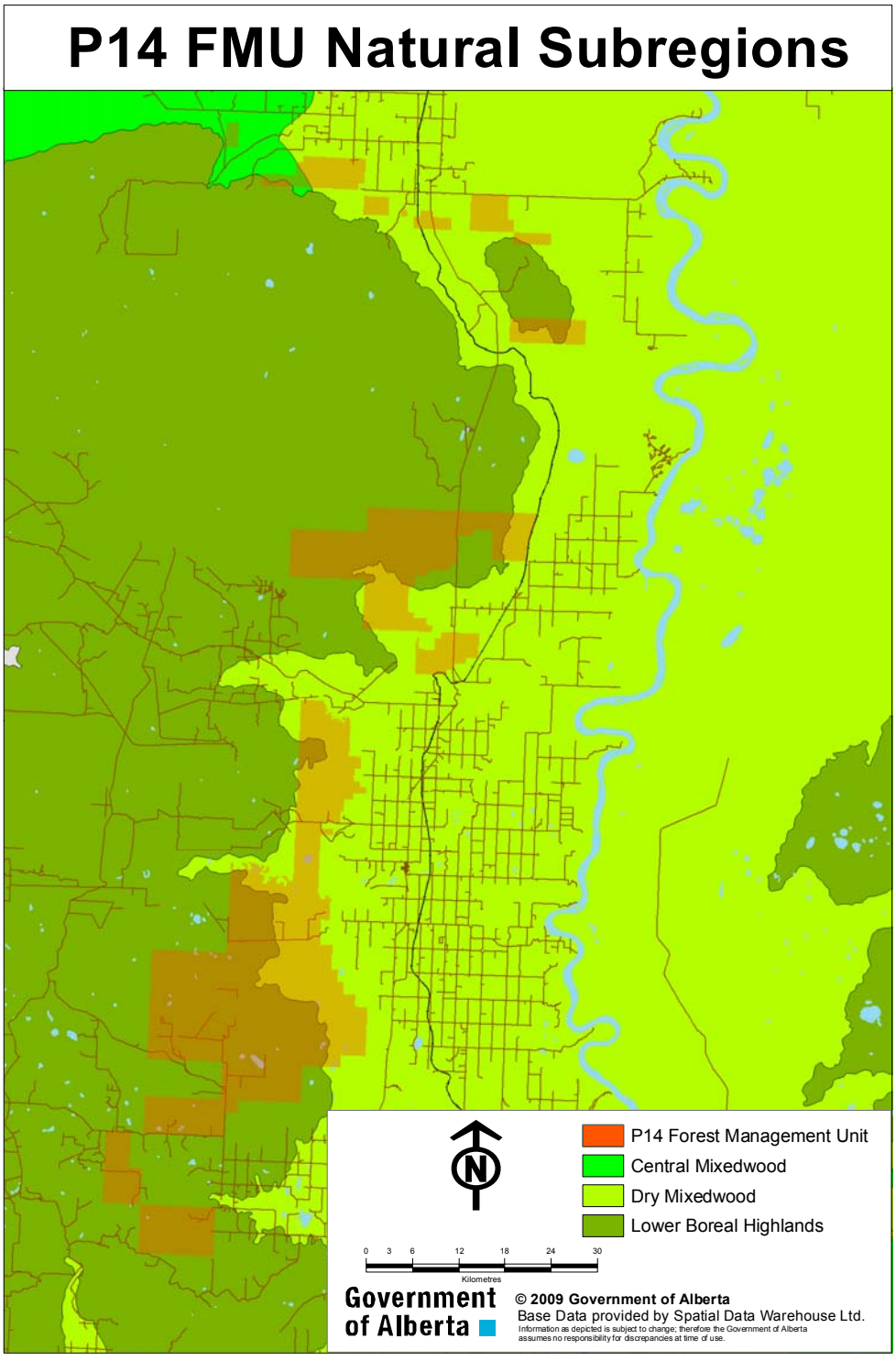


Figure 17. Natural subregions located within the P14 FMU.

7.1 Fire Frequency and Seasonal Patterns

Stelfox and Wynes (1999) determined "The fire frequency peaked in July for spruce, mixedwood, and muskeg cover types, in May for grass and deciduous fires and in June in pine communities." Stelfox and Wynes (1999) also found the "composition of fuel types (at the point of fire origin) appeared to be an important determinant of average fire size. In order of decreasing fire size, the ranking was black spruce, mixedwood, immature pine, grass, mature pine, deciduous, slash, white spruce, lichen, and treed muskeg."

The P14 FMU contains a significant number of black spruce and mixedwood stands. Few pine stands are present in the FMU. The FMU is dominated by deciduous stands creating a significant spring fire hazard until deciduous leaf-out.

7.2 Fire Size and Historical Fires (Greater Than 40 Hectares)

Tymstra et al. (2005) reported the average provincial fire size for the Boreal Highlands subregion and the Dry Mixedwood subregion to be 719 ha and 36.2 ha respectively (Table 10). The area burned in the Boreal Highlands is disproportionately high due to fuel continuity, black spruce stand flammability and fewer values at risk (Tymstra et al. 2005). Due to fire suppression and the values in and adjacent to the P14 FMU, fires in the area have traditionally remained small since the 1960's. See Figure 18 for the historic location of large fires which occurred within and near the P14 FMU.

The 1940's were the decade in which a large percentage of the FMU burned. In 1942, a fire consumed 2894 ha of the FMU. Between 1945 and 1949, approximately 15,000 hectares of the FMU burned. In the 1950's, a very large fire burned through the northern portion of the FMU.

In 1985, 86.5 ha of the FMU burned due to a human-caused fire. In 1993, 2140 ha of the FMU burned from a lightning-caused fire.

Lightning caused an 846 ha fire on the perimeter of the FMU in 2000. A 70.6 ha fire was caused by lightning on the boundary of the FMU in 2006. Both of these fires burned a portion of the FMU and the adjacent forest.

Human influence in and adjacent to the P14 FMU has had an effect on wildfire size. Decades of effective fire suppression due to the values at risk in and adjacent to the FMU has resulted in very few class "E" (greater than 200 ha) fires.

7.3 Fire Intensity

Stelfox and Wynes (1999) determined that "forest types which underwent more intense fires created larger future stands than the cover types which experienced less intense fires." For example, larger stands resulted from fires which occurred in black spruce fuels compared to aspen fuels. Stelfox and Wynes. (1999) also summarized "Fires vary in intensity, with black spruce and pine forest types experiencing greater levels of tree mortality than do stands dominated by aspen or white spruce."

7.4 Fire Type

Black spruce fuels accounted for the greatest percent frequency of crown fires in the northwest area of Alberta (Figure 19). White spruce fuels and mixedwood fuels accounted for the greatest frequency of ground fires. Treed muskeg, pine, and black spruce fuel types had similar percent frequencies for surface fires.

Black spruce also accounted for the greatest percent of area burned by crown fires followed by pine and white spruce (Figure 20). Deciduous fuels accounted for the greatest percent of area burned by surface fires. White spruce and deciduous fuels were associated with the greatest percent of area burned by ground fires.

7.5 Fire Cycle

The DMI study (Table 10) reported the fire cycle for the Boreal Highlands natural subregion at 212 years, for the Dry Mixedwood natural subregion at 1,623 years, and for the Central Mixedwood at 288 years (Stelfox and Wynes 1999). Tymstra et al. (2005) reported the fire cycle for the Boreal Highlands natural subregion at 124 years, for the Dry Mixedwood natural subregion at 1,053 years, and for the Central Mixedwood at 226 years. The variation in these two studies may be attributed differences in scale (regional versus provincial) and different interpretation of data.

The long duration of the fire cycle for the Dry Mixedwood natural subregion can be attributed to human influence and successful fire suppression.

7.6 Recommendations - Fire Regime and P14 FMU

To best utilize the fire regime data and meet landscape objectives, the following recommendations should be considered in the management of the P14 FMU:

- Where possible, harvest disturbances should be located in the fuel types which are prone to burning that result in the largest fire size.

- To mimic wildland fire events, harvest disturbances size should be based on the most current fire regime data. Retention targets should be based on natural disturbance principles (both merchantable and non-merchantable timber retention) and the aggregation of harvest areas should be considered in order to emulate the disturbance size of large fires.

- Once the disturbance emulation model NEPTUNE is calibrated for NW Alberta, it should be run on the spatial harvest sequence designed for P14 and the results should be analysed to compare planned disturbance variation to the historic disturbances. Revisions to the spatial harvest sequence should then be considered if there is significant variance.

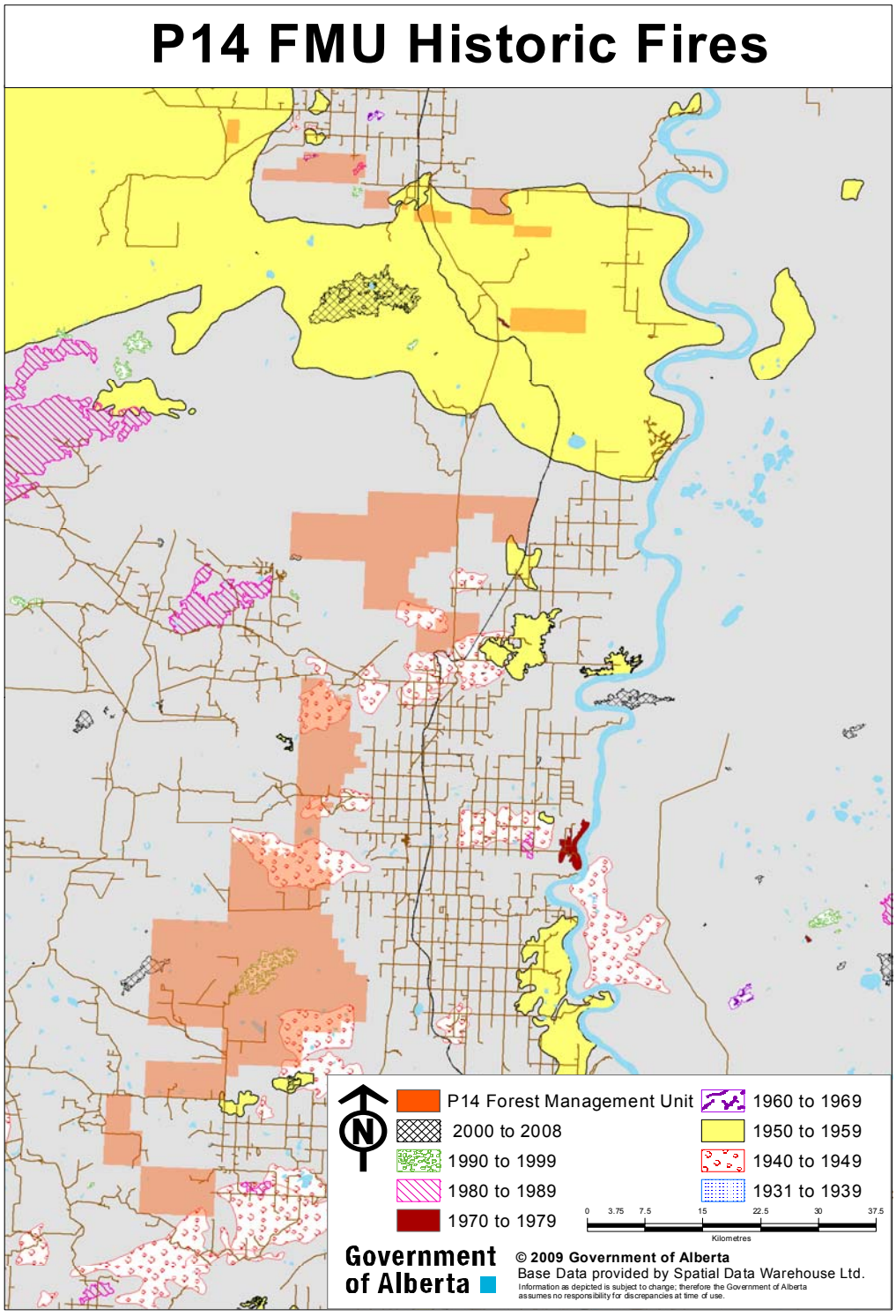


Figure 18. Historical large fires in and adjacent to the P14 FMU.

Table 10. Fire statistics for the three natural subregions in the P14 FMU. Data was adapted from Stelfox and Wynes. (1999) and Tymstra et al. (2005).

Subregion	DMI Study - Fire Cycle*	SRD Study- Fire Cycle#	Average Wildfires/10^6 ha/year#	Average Fire Size#	Main Fire Cause#
Boreal Highlands	212	124	22	719 ha	Lightning
Dry Mixedwood	1,623	1,053	118	36.2 ha	Human
Central Mixedwood	288	226	22	198	Lightning

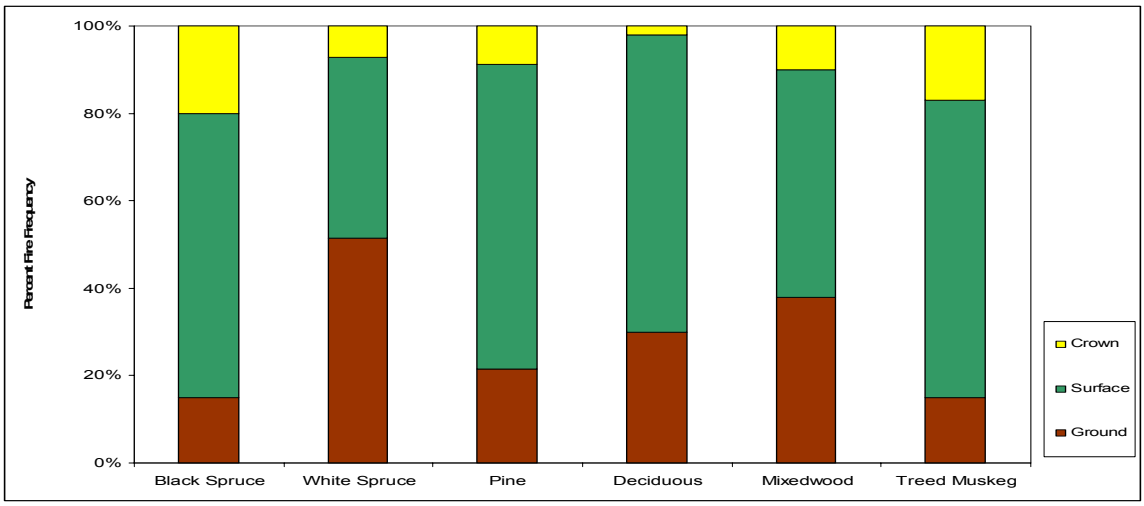


Figure 19. Frequency of the different fire types for each of the canopy fuel types. From Stelfox and Wynes 1999. Original data source: Alberta Sustainable Resource Development Fire Database.

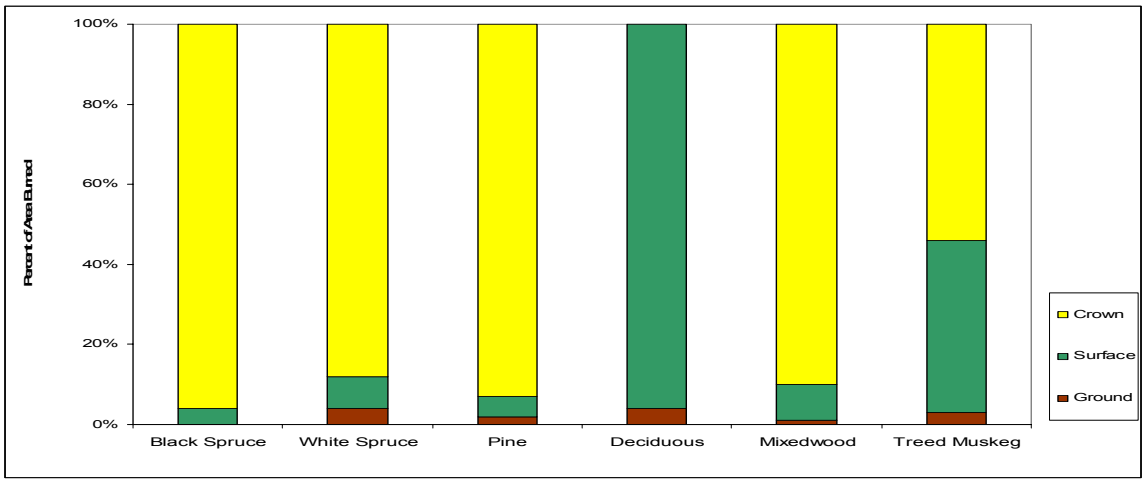


Figure 20. Area burned by different fire type and canopy layer fuel type. From Stelfox and Wynes 1999. Original data source: Alberta Sustainable Resource Development Fire Database.

8. Land Use

8.1 Timber

Timber production is the most prominent land use activity within the P14 DFA. The operators on the DFA are Boucher Bros. Lumber Ltd. and the Community Based Value Added Corporation. In addition, SRD manages the Community Timber Permit program that also has timber rights on the DFA. Detailed information on the timber operators, their tenures and volume allocations can be found in Chapter 1: Plan Development, Management Philosophy and Historical Summary.

8.2 Trapping

Information on trapping within, and surrounding, the DFA can be found under the section Fur Trapping Industry in Chapter 10, The Hunting, Fishing, and Trapping Sectors of the document "A Physical, Biological, and Land-Use Synopsis of the Boreal Forest's Natural Regions of Northwest Alberta" (Stelfox & Wynes, 1999).

8.3 Grazing

There are no grazing dispositions within the DFA.

8.4 Oil and Gas Industry

Information on the oil and gas industry, and its associated development within and surrounding the DFA can be found in Chapter 9, The Petrochemical Sector, of the document "A Physical, Biological, and Land-Use Synopsis of the Boreal Forest's Natural Regions of Northwest Alberta" (Stelfox & Wynes, 1999).

8.5 Recreation

The DFA does not offer significant potential for recreational opportunities.

8.6 Tourism

The DFA does not offer significant potential for tourism opportunities.

8.7 Outfitting

The DFA does not offer significant potential for outfitting opportunities.

8.8 Cultural Resources

No cultural resources assessment was completed for the P14 2009 – 2018 FMP.

8.9 Historical Resources

No historical resources assessment was completed for the P14 2009 – 2018 FMP.

8.10 Visual Resources

No high value visual resources were identified by any of the participants, or the public, in the preparation of the P14 2009 – 2018 FMP.

8.11 Fish and Wildlife Resources

Information on the fish and wildlife resources within, and surrounding, the DFA can be found in Chapter 3, Biota and Ecological Communities of the document “A Physical, Biological, and Land-Use Synopsis of the Boreal Forest’s Natural Regions of Northwest Alberta” (Stelfox and Wynes, 1999).

8.12 Government

There are no significant government land use undertakings on the DFA.

8.13 Protected Areas and Parks

There are no protected areas or parks within the DFA.

9. References

Stelfox, B.J. and B. Wynes. 1999. A physical, biological and land use synopsis of the boreal forest's natural regions of northwest Alberta. Daishowa-Maruebeni International Ltd., Peace River, AB.

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.