2.0 Landscape Assessment

2.0 Landscape Assessment

This Landscape Assessment provides a "snapshot" in time of Forest Management Unit (FMU) E8. The Forest Management Plan uses background knowledge about the uses, values and forest conditions in the area. This knowledge provides the current status of the resources as well as geographical, ecological and administrative boundaries and communities. This assessment is used in the development of the preferred forest management scenario and to establish forest management goals. It also provides a measuring device to assess the success of the planned preferred forest management strategy its achievements towards these goals and objectives. Annex 5 of the *Alberta Forest Management Planning Standard* aided the development of this assessment.

The current conditions of all relevant components in this assessment will be presented through 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 met to achieve resource sustainability.

2.0.1 Administrative Boundaries

Defined Forest Area

Forest Management Unit E8 is located in the Foothills of the Canadian Rockies in Alberta. It encompasses 219 657.34 hectares and is bordered on the south by Willmore Wilderness Park and West Fraser's FMA. ANC Timber Ltd.'s FMA is to the east, G15, the FMA belonging to the Canadian Forest Products Ltd. is to the north and FMU E10 is located west of E8. Alberta Provincial Highway 40 runs east-west through the management unit. The Town of Grande Cache is just west of the FMU border.

The majority of the management unit falls within the Foothills Forest Area but there is a small portion to the north managed by the Smoky Forest Area. Canadian Forest Products in Grande Prairie is the FMA holder of this section and is responsible for the forest management planning. The boundary and management agreements are illustrated in Figure 1.

The Municipal District of Greenview No. 16 is the sole Municipal District in the E8 Management Unit. There are no Federal Government Lands within E8 (Figure 2).

There are six Cooperatives located in E8. These Cooperatives have a representative organized society, the Aseniwuche Winewak Nation (AWN). They are the only Cooperatives set up in the Province to address Native land issues. These Cooperatives include Grande Cache Lake (Kamisak), Susa Creek, Joachim Enterprise, Victor Lake, Muskeg-Seepee, Wanyandie Flats East, and Wanyandie Flats West (Figure 3).

In 1973, land was granted to the Cooperatives. These Cooperatives hold the title to the land on which they reside though this grant. However, they cannot convey an interest in the land without permission from the Crown. The intent was to ensure that the land could not be sold and the land will revert back to the Crown if the Cooperatives cease to exist. If a Cooperative wishes to sell the land, the Province has the first right of refusal. This land can also only be leased to an outside party through an Order in Council approval.

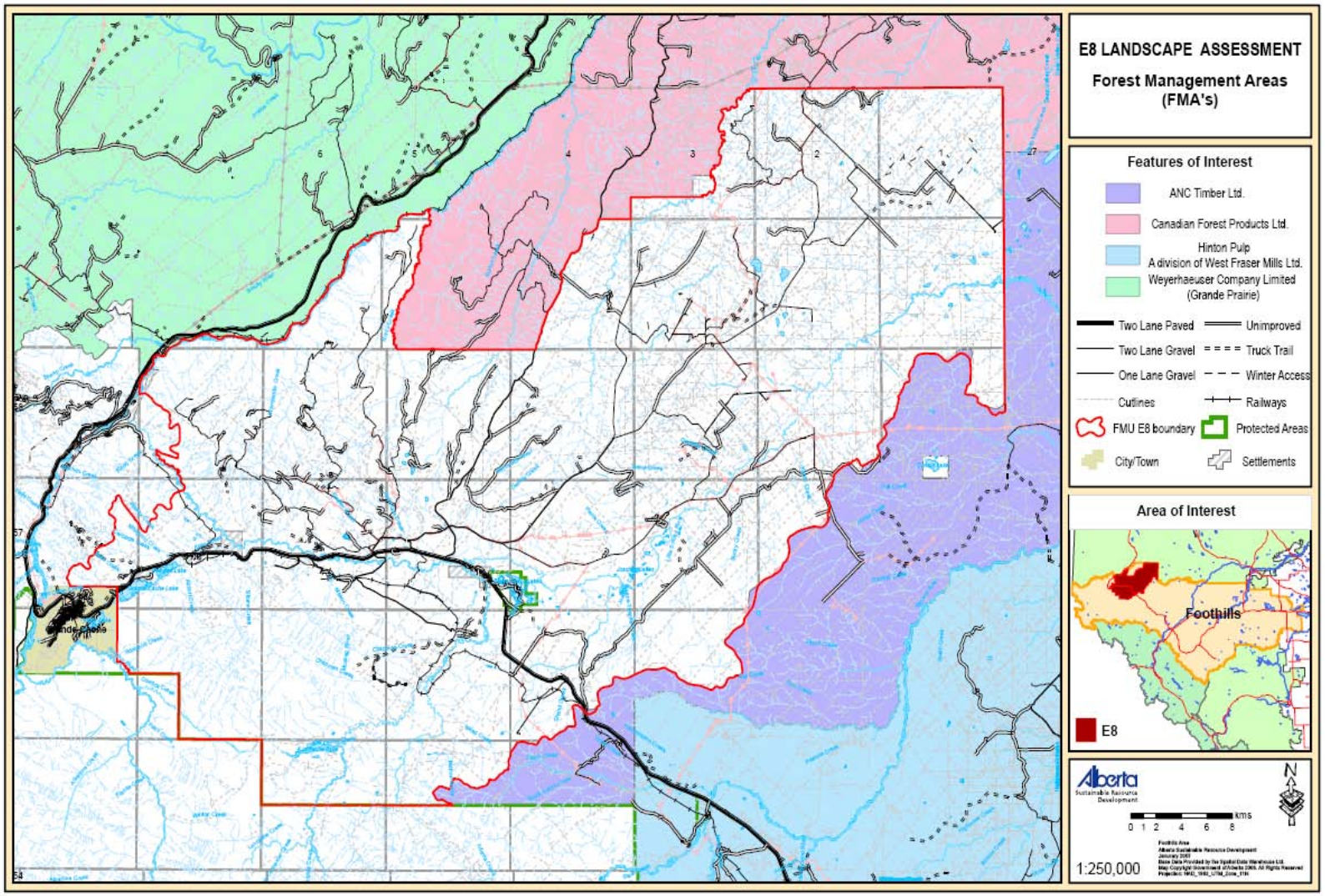


Figure 1: Forest Management Agreements Areas surrounding E8

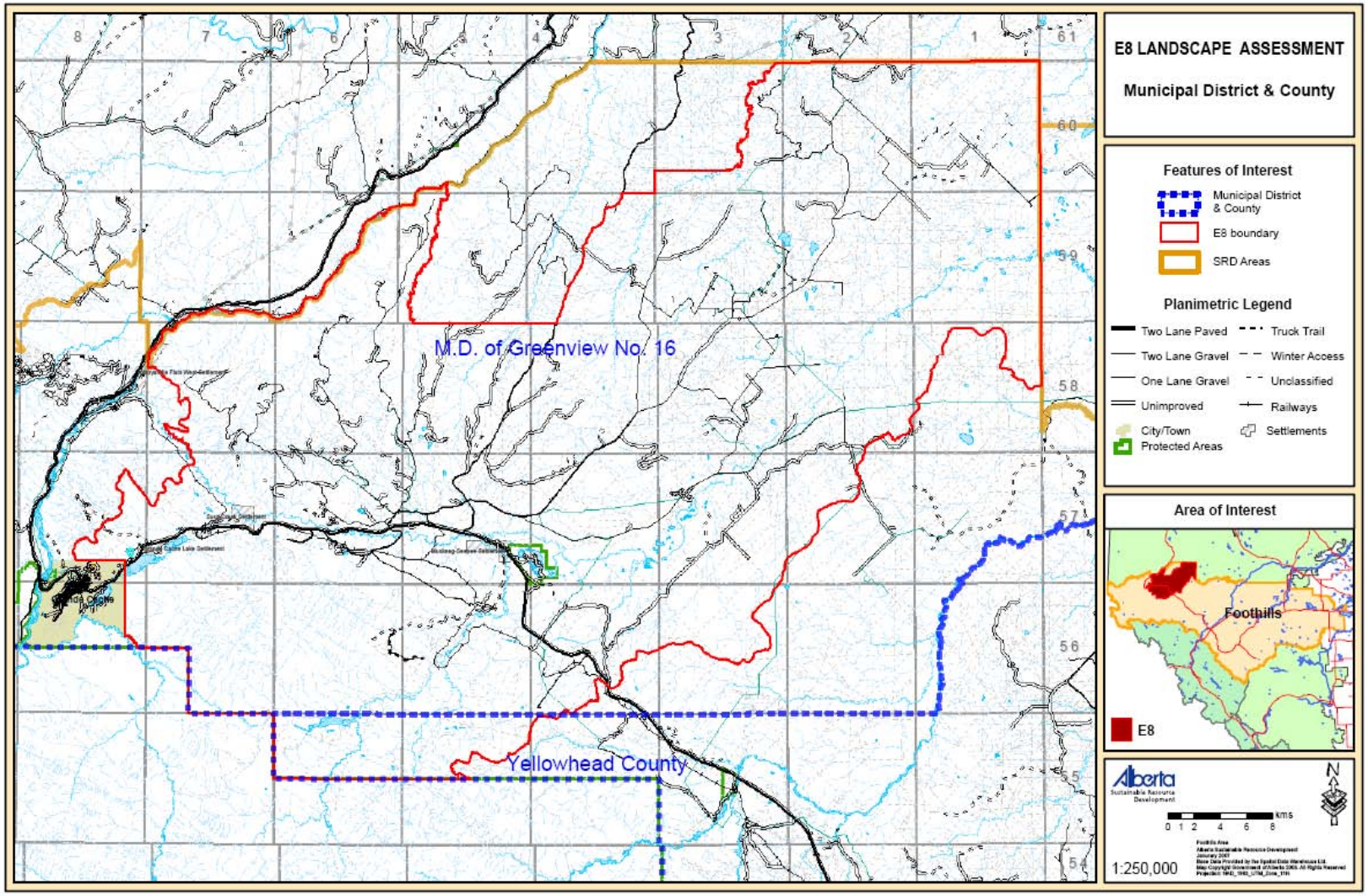


Figure 2: Municipal District of Greenview No. 16.

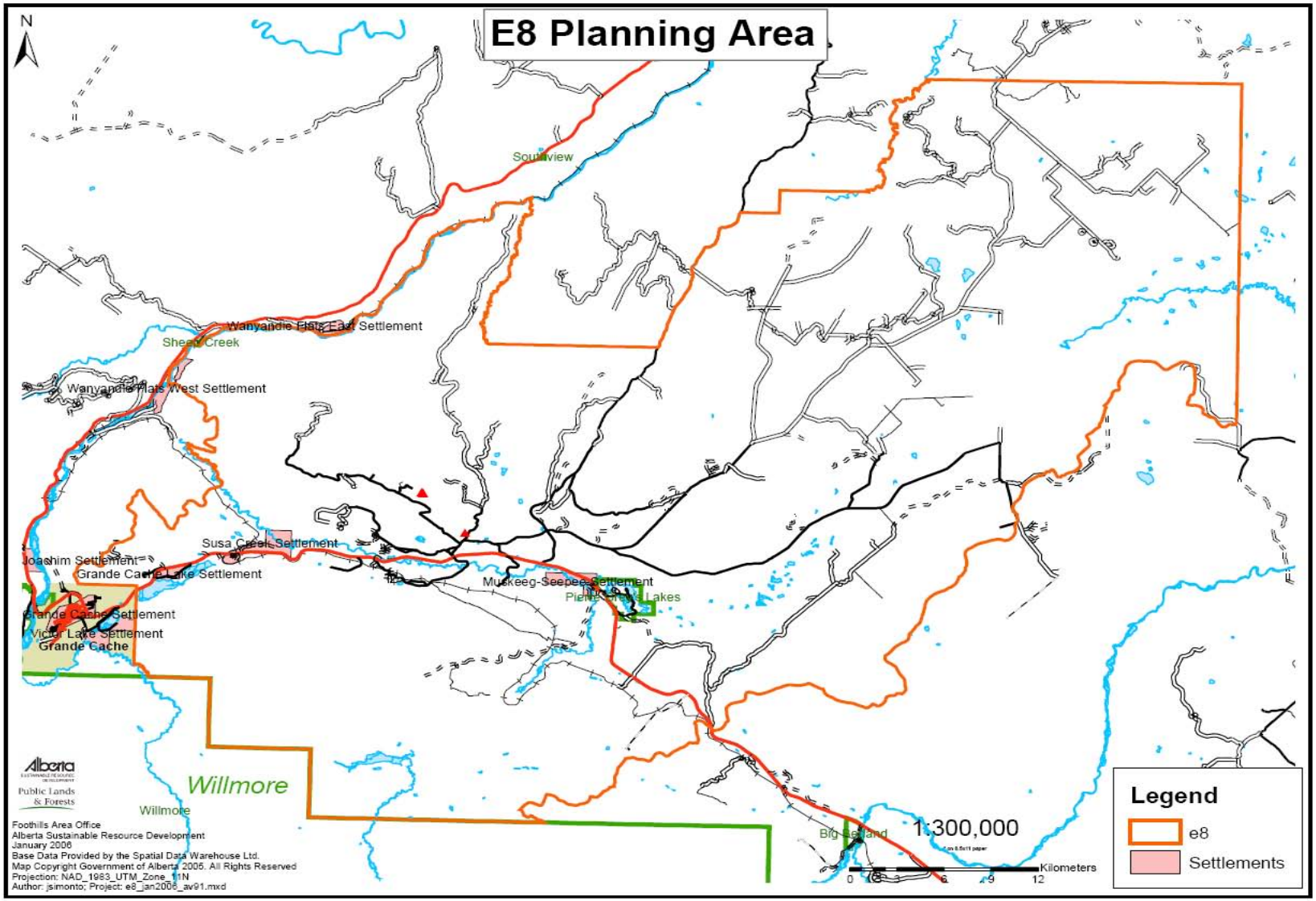


Figure 3: Location of Cooperatives in E8

2.0.2 Compartments

The E8 Forest Management Unit is divided into six operational compartments. Boundaries follow easily-distinguishable landscape features such as watercourses, and major roads. Haul routes and access were considered when determining the boundaries so as to streamline operational planning. These are shown on Figure 4.

Smoky

The Smoky compartment is found in the NW portion of E8. It is bordered by the Smoky River to the North and the Muskeg River to the South. The western boundary is the E8/E10 FMU, and the Eastern boundary is formed by two major creeks one of which is Norris Creek. Comprised mostly by aspen, the topography is rolling with areas of steep terrain.

Muskeg

This compartment is bordered by the Muskeg River to the north and east, and the Willmore Wilderness Park is found to the south and west. The Muskeg compartment has seen little industrial development, although oil and gas and timber harvesting activity are on the rise at this time. A La Peche Lake and the Muskeg River Valley are significant features on the landscape. Woodland Caribou and Bull Trout are found throughout the Muskeg compartment. Lodgepole pine is the dominant species in this compartment. The topography is rolling with some steep terrain in the western portion of the compartment. Significant cultural features such as Mt. Louie and McDonald Flats are also found.

Bolton

This compartment is bordered by the Simonette River on the East, two major creeks to the west and the Canfor FMA boundary to the north. The Little Smoky River and the Pierre Greys Lakes Provincial Park form the southern boundary. This compartment has had a significant amount of historic timber harvesting activity and contains a well developed access network. Bisecting the Bolton Compartment is the Trunk Road. The terrain is flatter than the two compartments to the west. As well, the headwaters of the Simonette River are found in this compartment.

Huckleberry

The Huckleberry compartment forms much of the southern portion of E8. It is bordered by the ANC Timber Ltd.'s FMA on the south, Willmore Wilderness Park to the west, the Little Smoky River to the north and an unnamed creek to the east. This compartment contains a portion of the A La Peche and Little Smoky Caribou herd range. The terrain is relatively flat and is comprised mainly of pine forests dotted by black spruce bogs. Pierre Greys Lakes is a significant feature of this compartment as is the Little Smoky River. Oil and Gas development has been the major industrial activity in the Huckleberry compartment whereas timber harvesting has not occurred on a significant scale. In addition, Highway 40 bisects this compartment.

Simonette

This Compartment is bordered by the Simonette River to the West, the Little Smoky to the south, and two major creeks to the east. Canfor's FMA forms the north boundary. The terrain is relatively flat. Timber harvesting and oil and gas development comprise most of the industrial activity in the compartment. A well developed access network has been developed due to historic timber harvesting and oil and gas activity. The Ghost and Simonette haul roads provide access to this area. The Ghost Lakes and Joachim Lakes are significant features of the Simonette compartment.

Deep Valley

This is the furthest compartment from the FFP wood processing facility and is located in the north eastern part of E8. The north and east boundaries are formed by the Canfor and ANC Timber Ltd. FMA's. The western boundary is comprised of the Simonette and Huckleberry compartments. Deep Valley is the largest compartment in the E8 FMU. Its terrain is relatively flat and has reasonable access. Timber harvesting and oil and gas are the two main industrial activities. A key feature to this compartment is the Little Smoky River.

2.0.3 Parks and Protected Areas

There are numerous parks and protected areas in and adjacent to E8. Tourism, Parks, Recreation and Culture is the ministry that manages parks and protected areas in Alberta.

Willmore Wilderness Park encompasses 459,671 hectares of land south of E8. This park was established under its own legislation in April 1959. Its intent is to preserve and protect natural heritage and provide opportunities for backcountry recreation. Pierre Grey's Lakes Provincial Recreation Area is on the east side of E8 and is 633 hectares. In this area, there are 5 lakes and one campground. Sheep Creek Provincial Recreation Area encompasses 10.5 hectares to the northwest of E8. It is situated on the north side of the Smoky River and south side of Sheep Creek. Provincial Recreation Areas support outdoor recreation and tourism; they often provide access to lakes, rivers, reservoirs and adjacent Crown land.

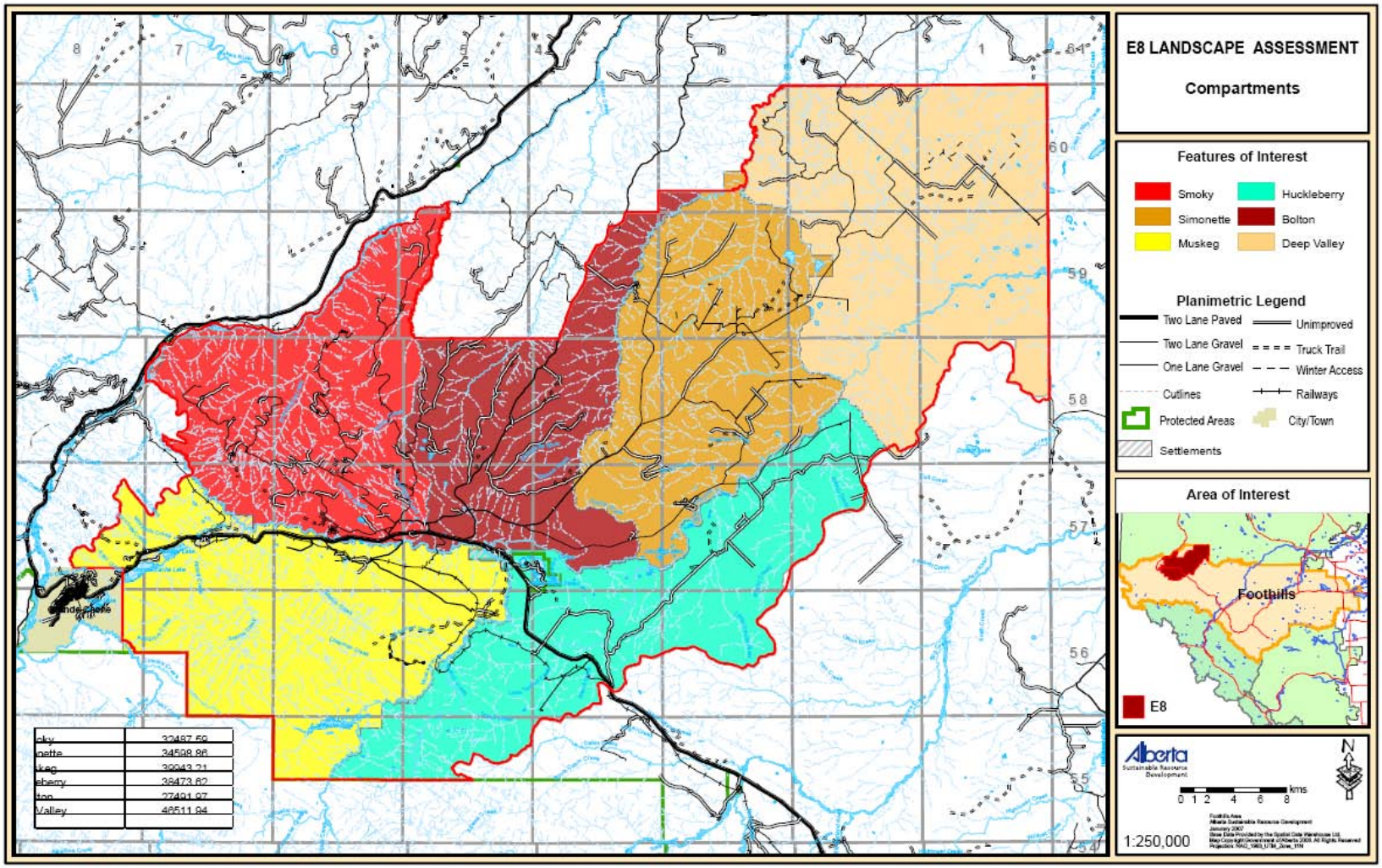


Figure 4: Foothills Forest Products Compartment Areas.

2.0.4 Wildfire Management Areas

The E8 forest management unit falls entirely into the Foothills Wildfire Management Area (Figure 5). Wildfire Management and operations are administered out of the Edson office and associated field offices as required.

2.0.5 Topography

The forest management unit E8 is located in the Foothills of the Rocky Mountains. Illustrated in Figure 6, is the surface topography using a digital elevation model (DEM). This wide variety of terrain attributes result in a challenge for industry development, for instance the operational challenges to forest management. As previously mentioned, the terrain ranges from flat plains to steep mountains.

2.0.6 Watersheds

The Forestry Corp. completed a watershed generation exercise for E8 in March 2007. This was the first step in the larger process of evaluating the potential hydrological impacts of harvesting in E8.

The resulting Terrain Analysis System (TAS) was used to provide a single comprehensive package to generate stream networks and watersheds (Figure7). This model provided watersheds grouped on the basis of stream order and size, and identified appropriate 3rd order watersheds. The majority of the basins range between 8 000 and 20 000 hectares. Detailed information on the watershed generation exercise can be found in Appendix A of the FMP.

A hydrological assessment was completed on June 2, 2008 for the E8 FMP. The "Hydrologic Assessment of Spatial Harvest Plan for Forest Management Unit E8, Near Grande Cache Alberta" is located in Section 15 of this FMP.

2.0.7 Climate

Two Climatic Regions are located in E8 according to the Provincial dataset for Ecological Land Classification. These are the Alpine-Cordilleran and the Subalpine-Cordilleran (Figure 8). More information on climate in E8 can be found in the Natural Subregion section of the Landscape Description.

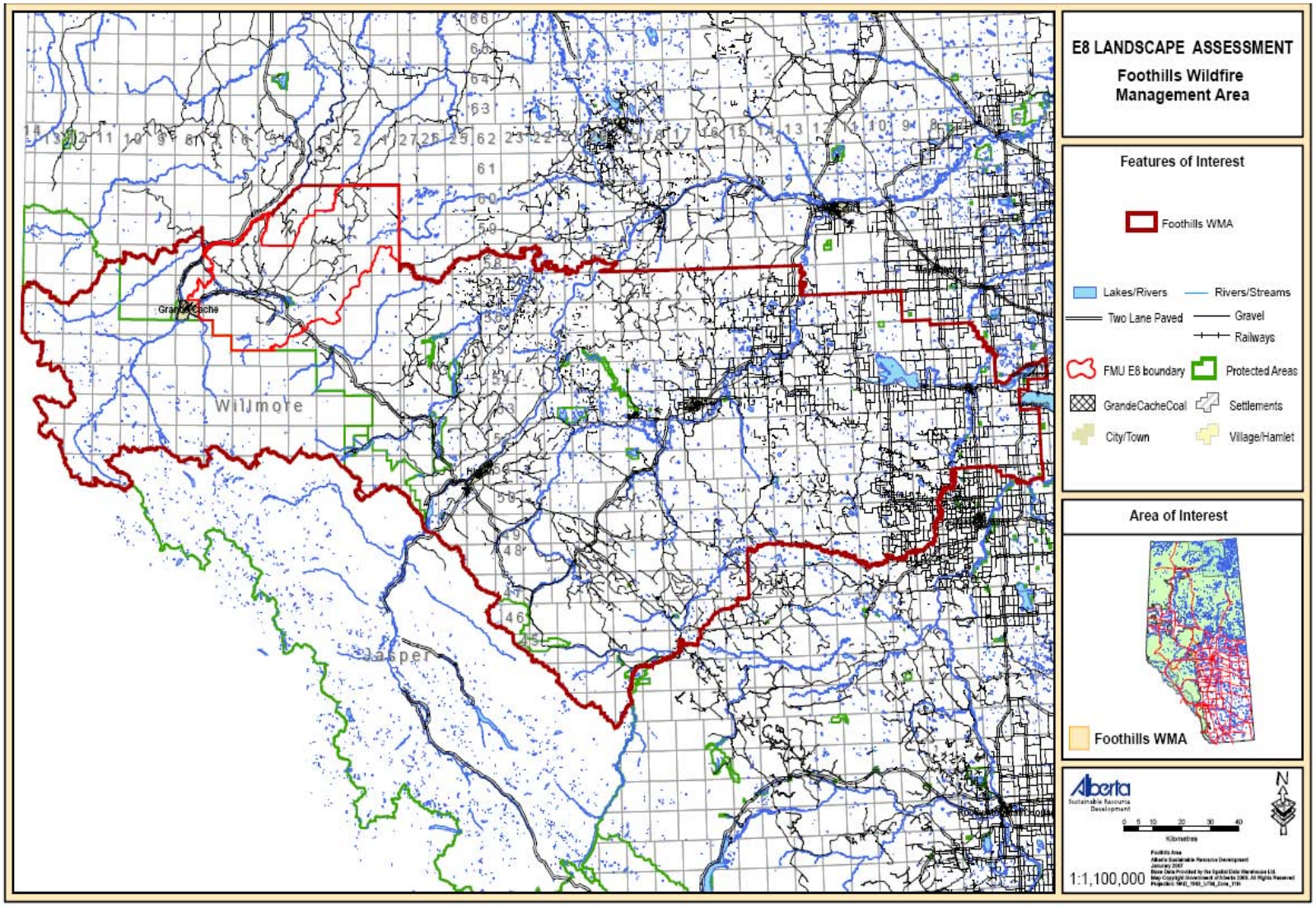


Figure 5: Wildfire Management Units in E8.

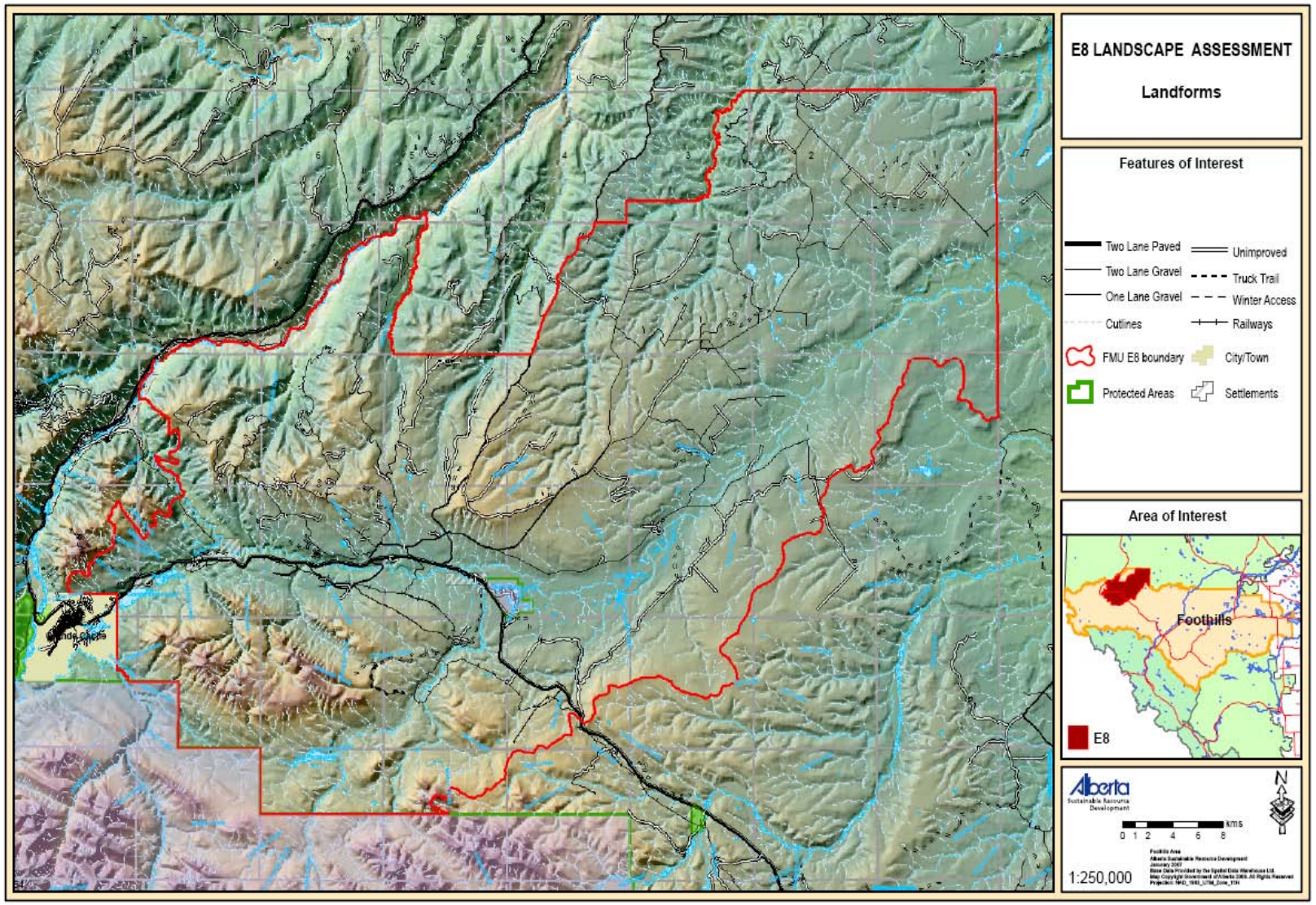


Figure 6: Surface Topography in E8.

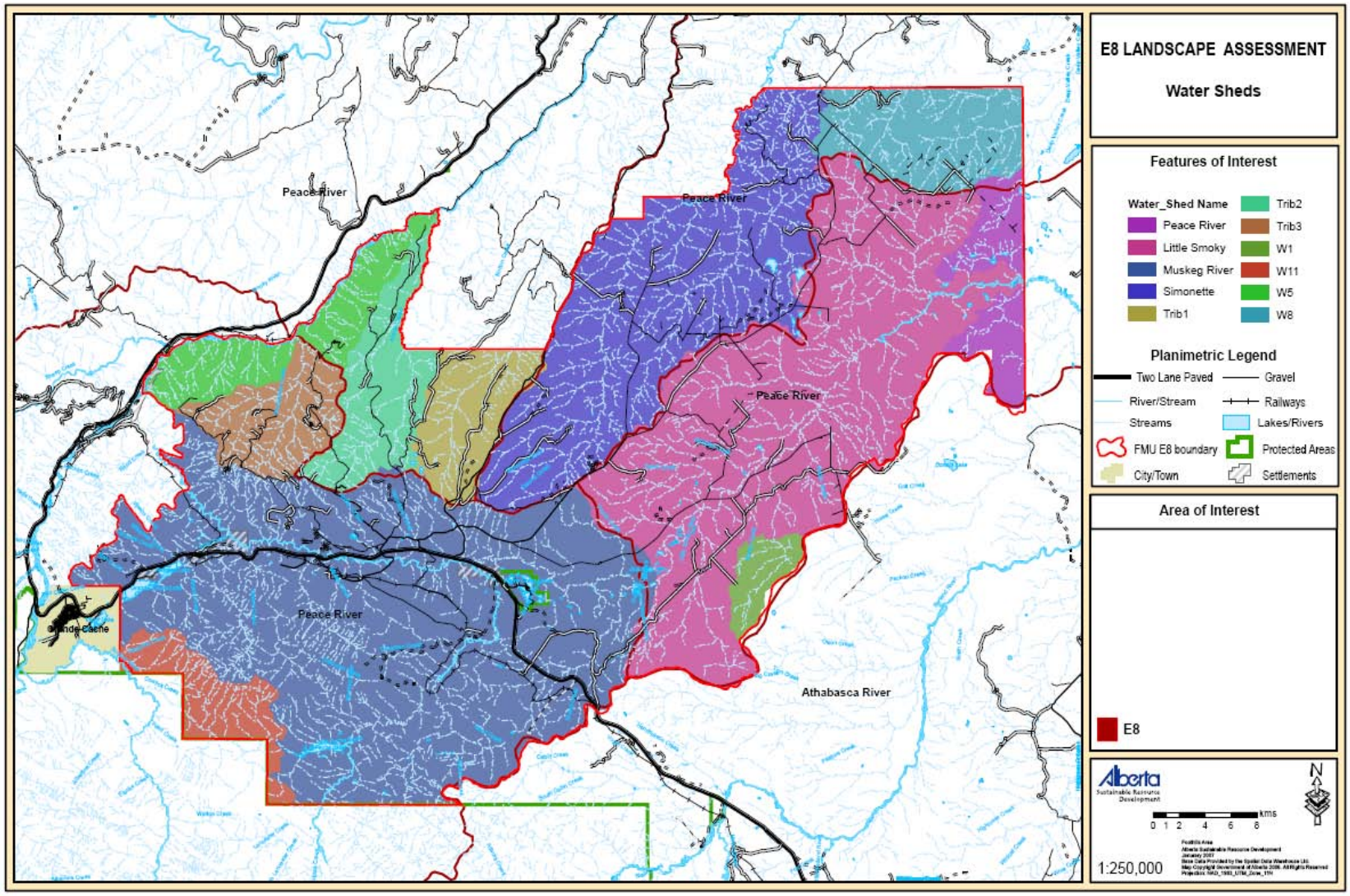


Figure 7: Watersheds in E8.

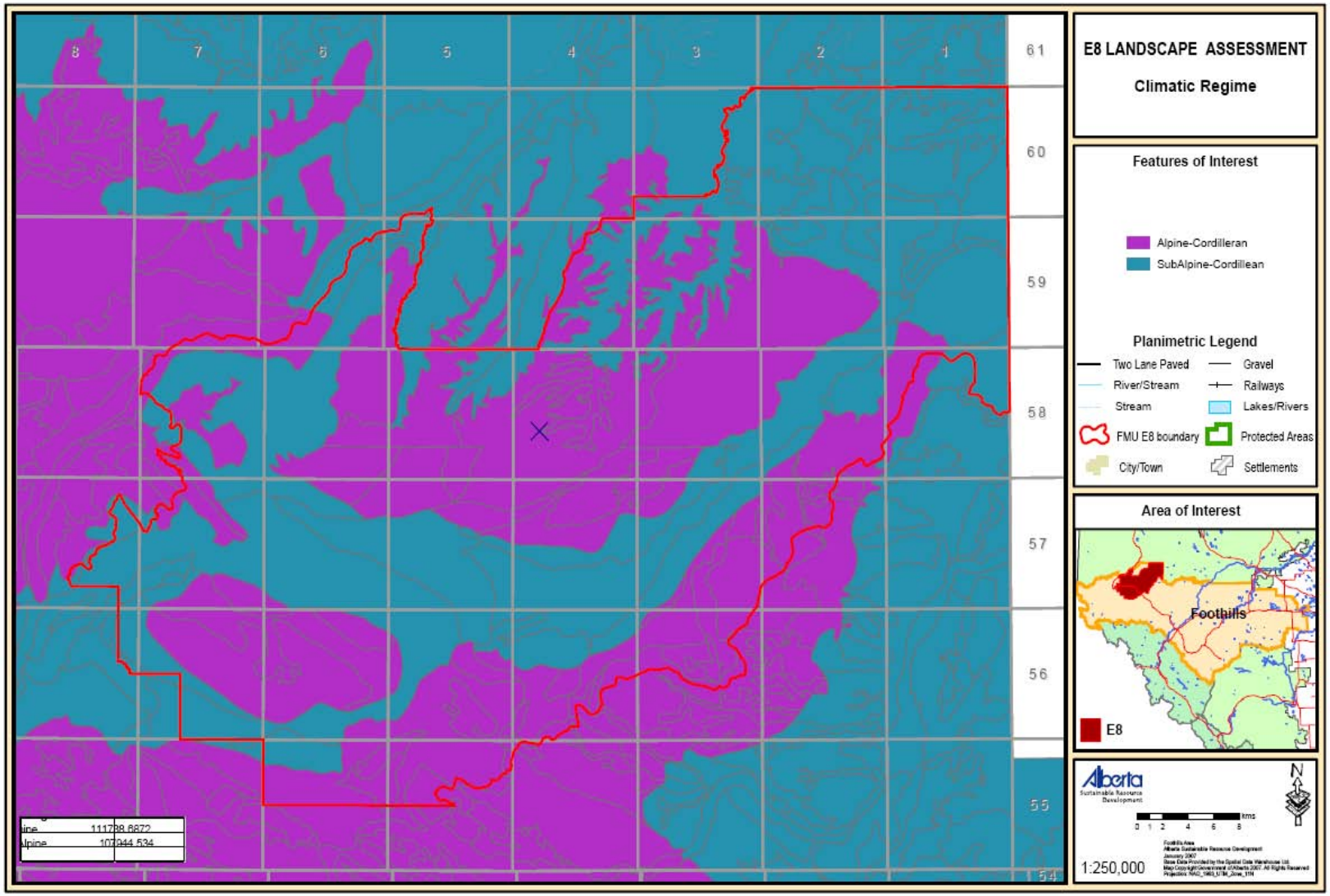


Figure 8: Climatic Regions in E8.

2.0.8 Soils

Six types of soils are found in E8. These include Copton, Felton, Hanlan, Jarvis, Nosehill, Simonette, Tomhill and Wildhay (Figure 9). This information was collected from Agriculture Canada's soils database. Further information on soil composition in E8 can be found in the Natural Subregion section of the Landscape Description.

2.0.9 Glacial History

The historical glacial deposit information is illustrated in Figure 10.

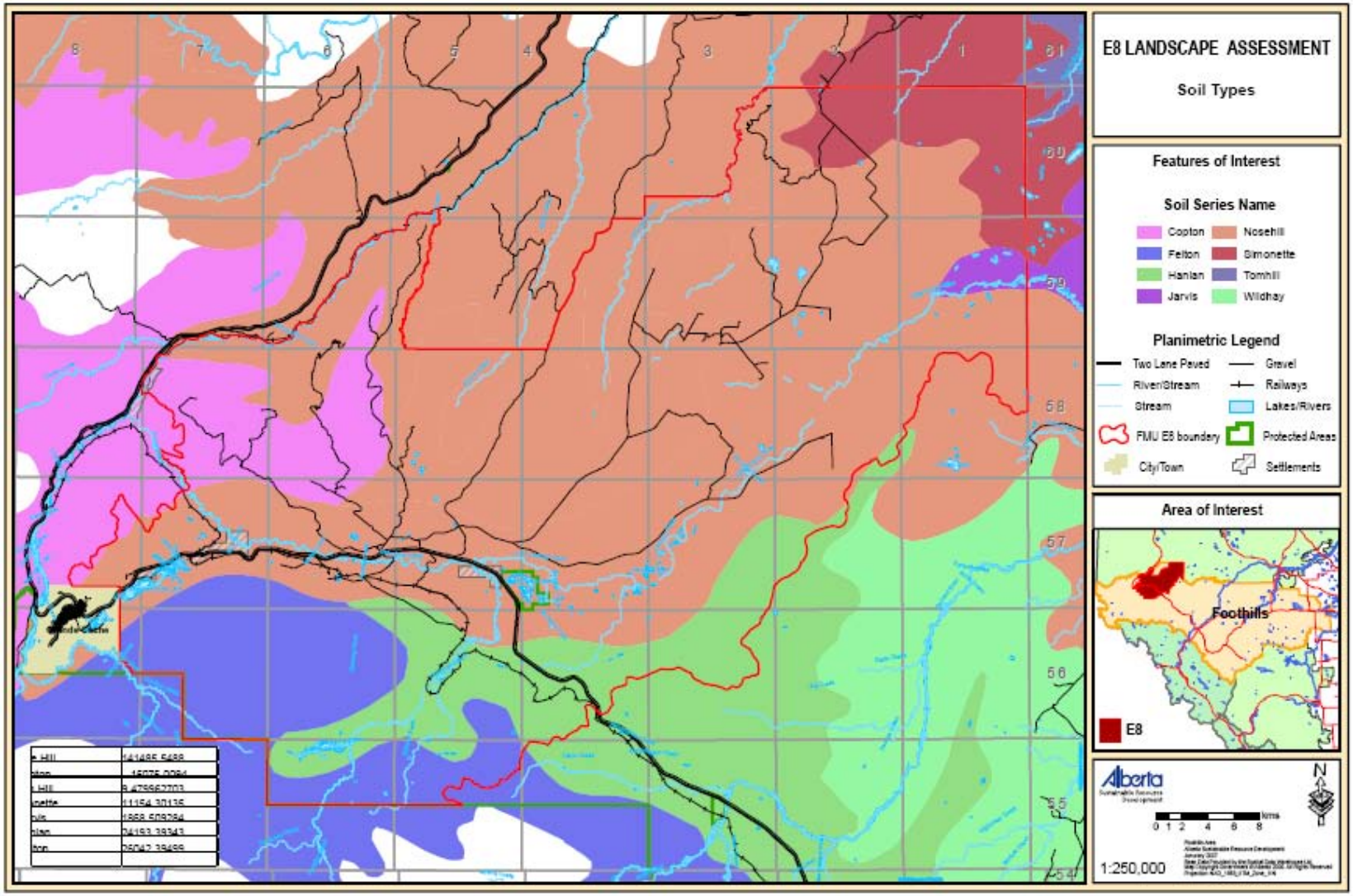


Figure 9: Soil Types in E8.

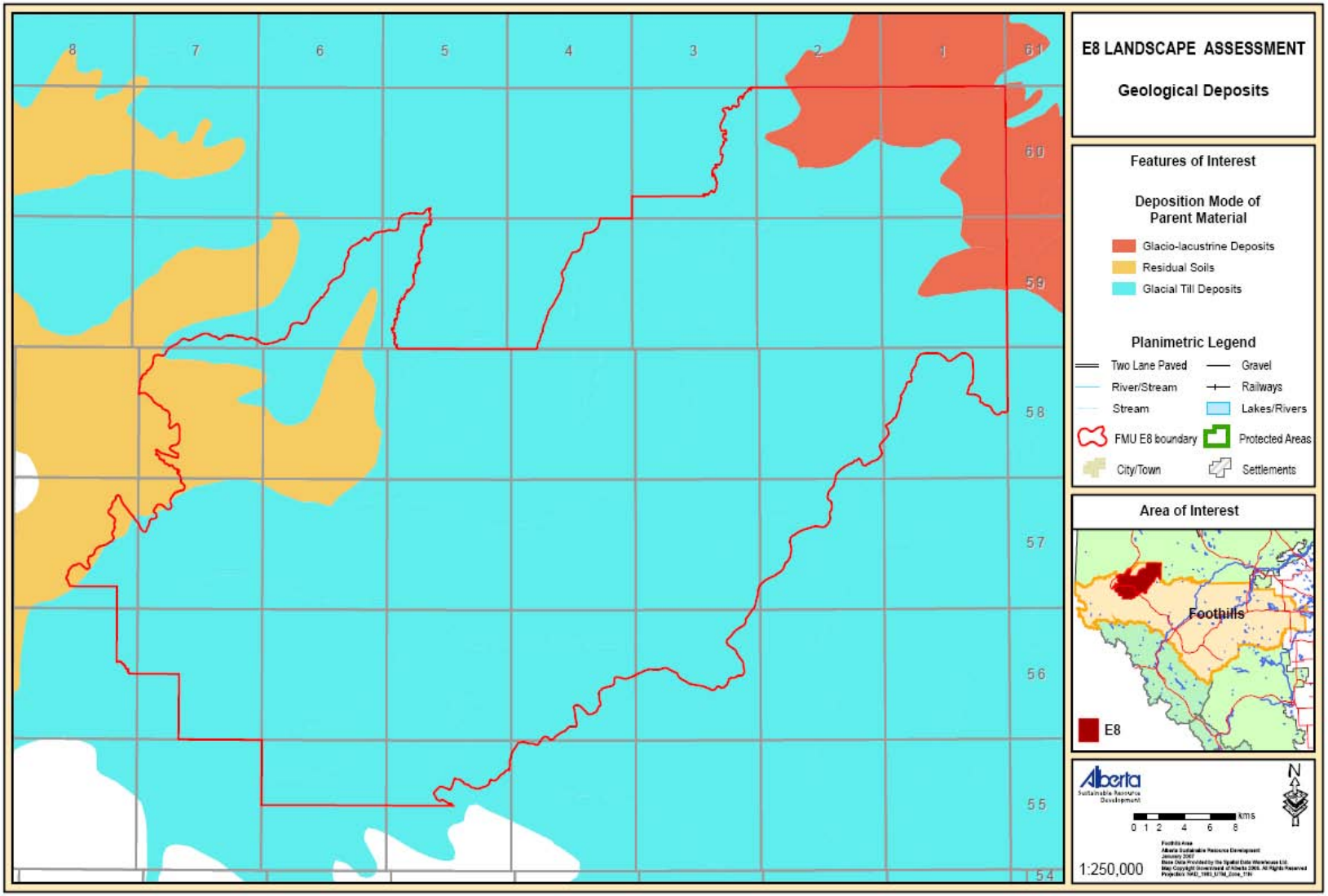
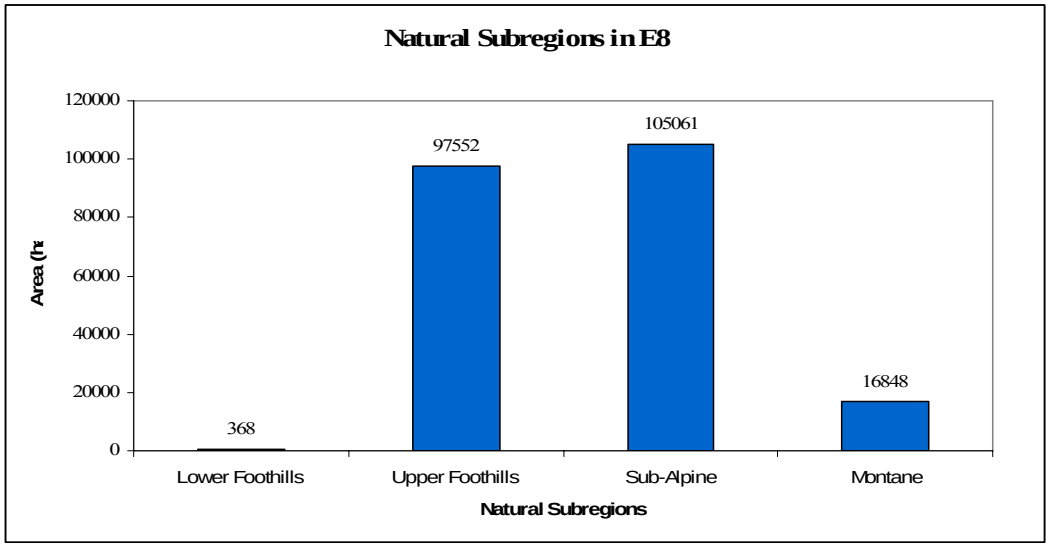


Figure 10: Glacial Deposits in E8.

2.1 Natural Sub-Regions

A new Ecological Land Classification System was implemented in July 2005 in Alberta. This system provides area information about the vegetative, climatic and physiographic characteristics. The Natural Subregions of Alberta provides the descriptions of ecological conditions in Alberta which are taken into consideration when planning and conducting forest management activities. Information was collected from http://www.tpr.alberta.ca/parks/heritageinfocentre/naturalregions/default.aspx. There are 4 natural subregions found in E8 which include the Montane, Sub-alpine, the Upper Foothills and Lower Foothills. The characteristics of each region are summarized below. The included map (Figure 11) shows the distributions of these regions and Graph 1 illustrates the area in each region.



Graph 1: The Natural Subregions in hectares found in E8.

Montane

The Montane Natural Subregion makes up a small part of E8. This subregion is commonly found along major river valleys. In E8, it is located along the Smoky River and the Muskeg River. The Montane subregion represents one of the most diverse sub-regions in Alberta, partially due to its range in elevation (1000m to 1350m) and its broad range of annual precipitation (300 mm to 1280 mm). The average summer temperature in this area is approximately 12 degrees Celsius and the mean January temperature is –8 degrees Celsius. Chinooks are common and the area has many snow free days in the winter season. There are approximately 70 frost free days per year.

The most common soil types under the forested areas in this subregion are Brunisols and Luvisols, although soil types can be highly variable due to its diverse topography and climate. Chernozems, Brunisols and Regosols may also occur under grasslands.

Open forests and grasslands distinguish the vegetation in this region. The dominant tree species are lodgepole pine, Douglas fir, white spruce, limber pine and aspen.

Sub-Alpine

The Sub-Alpine Natural Subregion is situated between the Montane and Alpine subregions. The elevations in this area range from 1,350m to 2,000m and the mean annual winter temperatures range from –1 degree Celsius to 3 degrees Celsius with an average July temperature is approximately 9 degrees. The frost free periods is generally less than 30 days and below freezing temperatures occur every month of the year. The annual precipitation ranges from 460 mm to 1,400 mm. This region boasts more winter precipitation than any other subregion in Alberta.

Soil types vary in this subregion because of the diversity in parent materials and ecological conditions. The most common soil types are Brunisols and Luvisols, but Regosols, Cryosols, Podzols, Gleysols and Organics may also be found.

There are two main forest types in this region that distinguished by elevation. At lower elevations, closed canopy lodgepole pine forests characterize the forests while, Engelmann spruce and sub-alpine fir forests are found at higher elevations which are typically moister and less impacted by fire. Grasslands can be found on steep west and south facing slopes.

Upper Foothills

The Upper Foothills Natural Subregion occurs between the Lower Foothills and Sub-alpine subregions. The elevations range between 1,500m in southern Alberta and 1,000m in the northern part of the Province. The average summer temperature is between 10 to 12 degrees Celsius and winter temperatures average –6.0 degrees Celsius. The average annual precipitation for the Upper Foothills area is 540 mm, having the highest amount of summer precipitation of all the subregions.

Dominant soil types include; Brunisols, Luvisols and Gleysols while, Organics are found on wet sites.

Closed canopy lodgepole pine forests dominate this region. White and black spruce can also be found in mixed conifer or in pure spruce stands. Aspen is uncommon in this sub-region but it may be found on southern slopes where well-drained soils are present.

Lower Foothills

The Lower Foothills Subregion is found along the edge of the Rocky Mountains in the northern portion of E8. There is a small portion of E8 (368 ha) located in this subregion. The elevations range from 300m to 1,450m. Due to the geographic location of E8, the portion in this subregion is at the higher end of the elevational spectrum. The mean summer temperature ranges between 11 to 13 degrees Celsius. Winters are warmer than the Boreal Forest Subregions due to the lack of influence of cold Arctic air masses. The average annual precipitation ranges from 285 mm to 756 mm, averaging 465 mm.

Soils found in this subregion are mostly Luvisols and Brunisols. In poorly drained sites, Brunisols and Gleysols may be found. Organics are common in depression sites and Regosols are found in stream valleys and steeper slopes.

The dominant forest type in this subregion are mixed forests comprising of white spruce, black spruce, lodgepole pine, balsam fir, aspen, balsam poplar and paper birch. The forests in E8 mark the boundary between the Upper and Lower Foothills regions with the absence of the mixed coniferous-deciduous forests. Lodgepole pine forests occupy widespread portions of the upper regions in this area, especially following fire. With the absence of fire, white spruce and black spruce will eventually replace these pine forests.

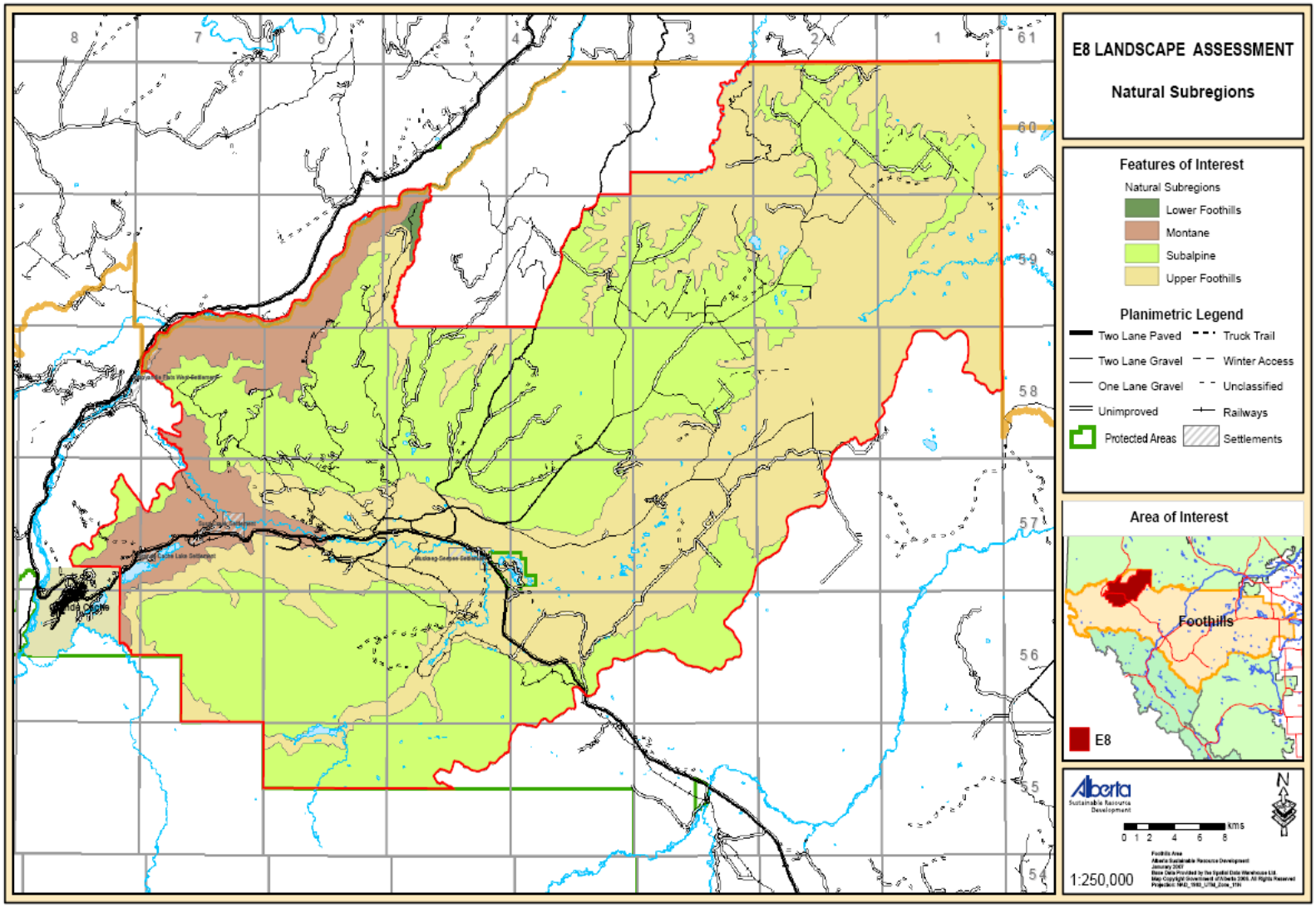


Figure 11: Natural Subregions in E8.

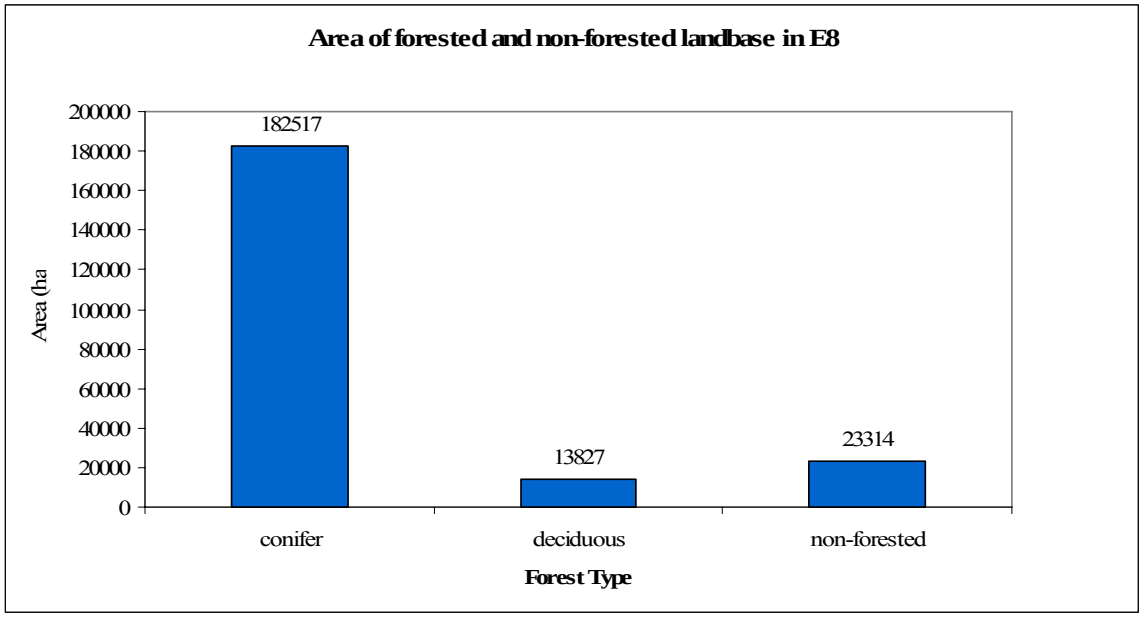
2.2 Forest Landscape Patterns and Structure

The forest landscape pattern and structure in the E8 Forest Management Unit is a result of natural and human disturbances on the landscape. The composition, age, and patterns of the forest are directly influenced by fire events, suppression of fire, industrial and non-industrial human activity.

For the E8 FMP, a Landbase Determination was completed for the Timber Supply Analysis (TSA). The Landbase Determination can be referenced in Section 11 and the TSA in Section 8. Further detail of the Landbase Determination components will follow.

There are many different ways to classify and analyze the patterns and structure of the forest. To begin with, there are two distinct groups, forested and non-forested landbases. The majority of the landbase consists of forested, productive forest. The non-forested landbase also consists of two classes; natural and anthropogenic areas.

In E8, the total area which is included in the forested landbase is 209 404 ha and the un-forested is 10 254 ha. The area of forested and non-forested landbase in E8 is shown in Graph 3. Not all of the forested landbase in E8 is harvestable. A detailed list of the limitations that contribute to whether or not a stand will be found in a particular area is explained in Section 11 of the FMP and Section 4 of the Landbase Determination.

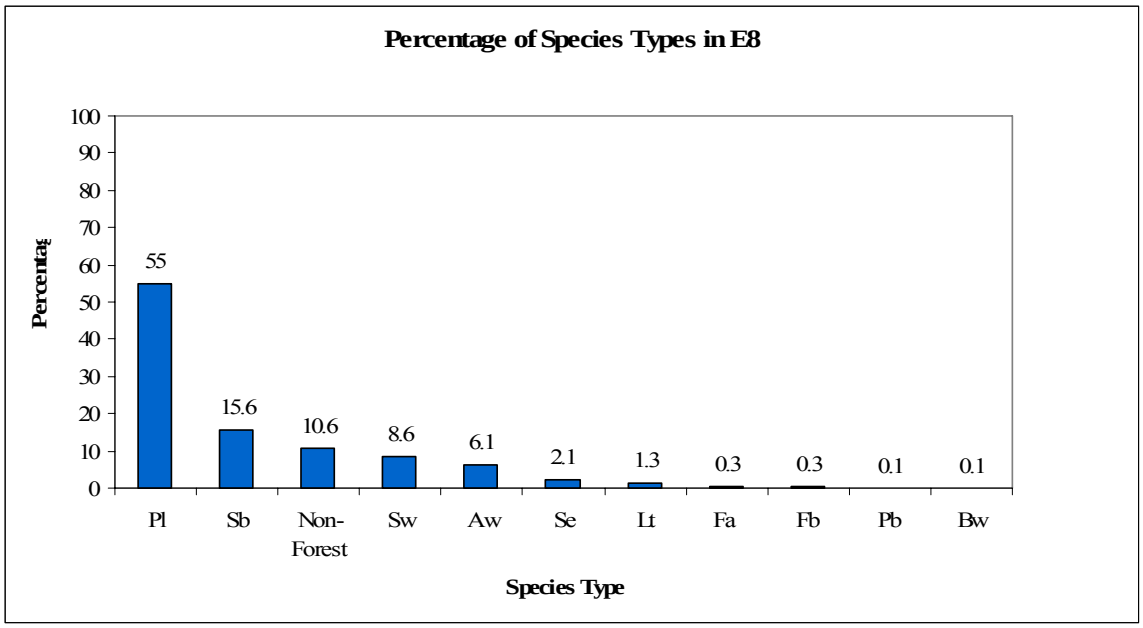


Graph 2: Area of Conifer, Deciduous and Non-forested Area in E8 (ha).

2.2.1 Forest Species (Amount and Distribution)

The E8 Forest Management Unit is comprised of mostly coniferous boreal forest. The predominant tree species found in E8 is lodgepole pine (*Pinus contorta var. latifolia*) which encompasses 55% of the area of E8. This is followed by black spruce (*Picea mariana*), white spruce (*Picea glauca*), Engelmann spruce (*Picea engelmannii*) and trembling aspen (*Populus tremuloides*). The non-forested

area accounts for 10.6% of the landbase. This includes areas such as water bodies, roads, well sites, grasslands, and other clearings. The area and species groupings are illustrated in Graph 3 and Table 1. The locations of various tree species within the E8 FMU are illustrated in Figure 12.



Graph 3: Percentage of Species Types in E8.

2.2.2 Forest Cover Types

There are several different forest cover types within the E8 FMU. Due to the historical harvesting practices, land use activities and natural disturbance regime, there is a significant variation in species composition. Map 13 illustrates the current amount and distribution of the cover types in E8.

The predominant cover group in E8 is pure Conifer (C), followed by Conifer-Deciduous mixedwood (CD), Coniferous clearcut (Con), Deciduous (D) and Deciduous-Conifer mixedwood (DC). The leading species in the C, Con, and CD stands is Lodgepole pine (*Pinus contorta var. latifolia*) and trembling aspen (*Populus tremuloides*) for the D and DC stands.

Table 1: Area of Species Type in E8

Species Type	Area (ha)
Pl	120718
Sb	34300
Non-Forest	23314
Sw	18996
Aw	13446
Se	4522
Lt	2863
Fa	560
Fb	558
Pb	206
Bw	174

2.2.3 Forest Age Class (Amount and Distribution)

The age-class distribution varies significantly within the E8 FMU again due to the historical harvesting practices, land use activities and natural disturbance regime. Map 14 illustrates the current amount and distribution of the forest age classes in E8.

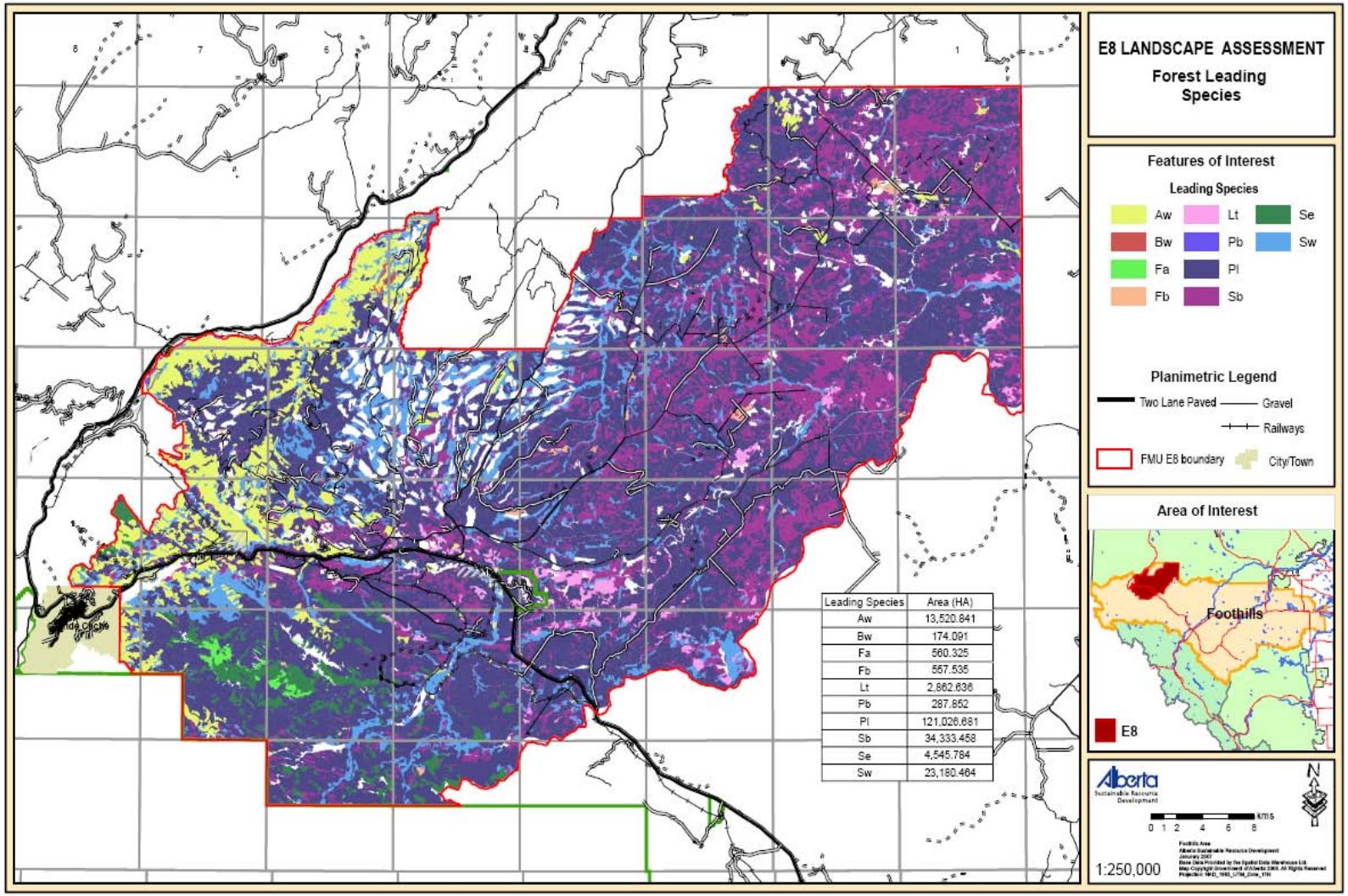


Figure 12: Forest Leading Tree Species in E8.

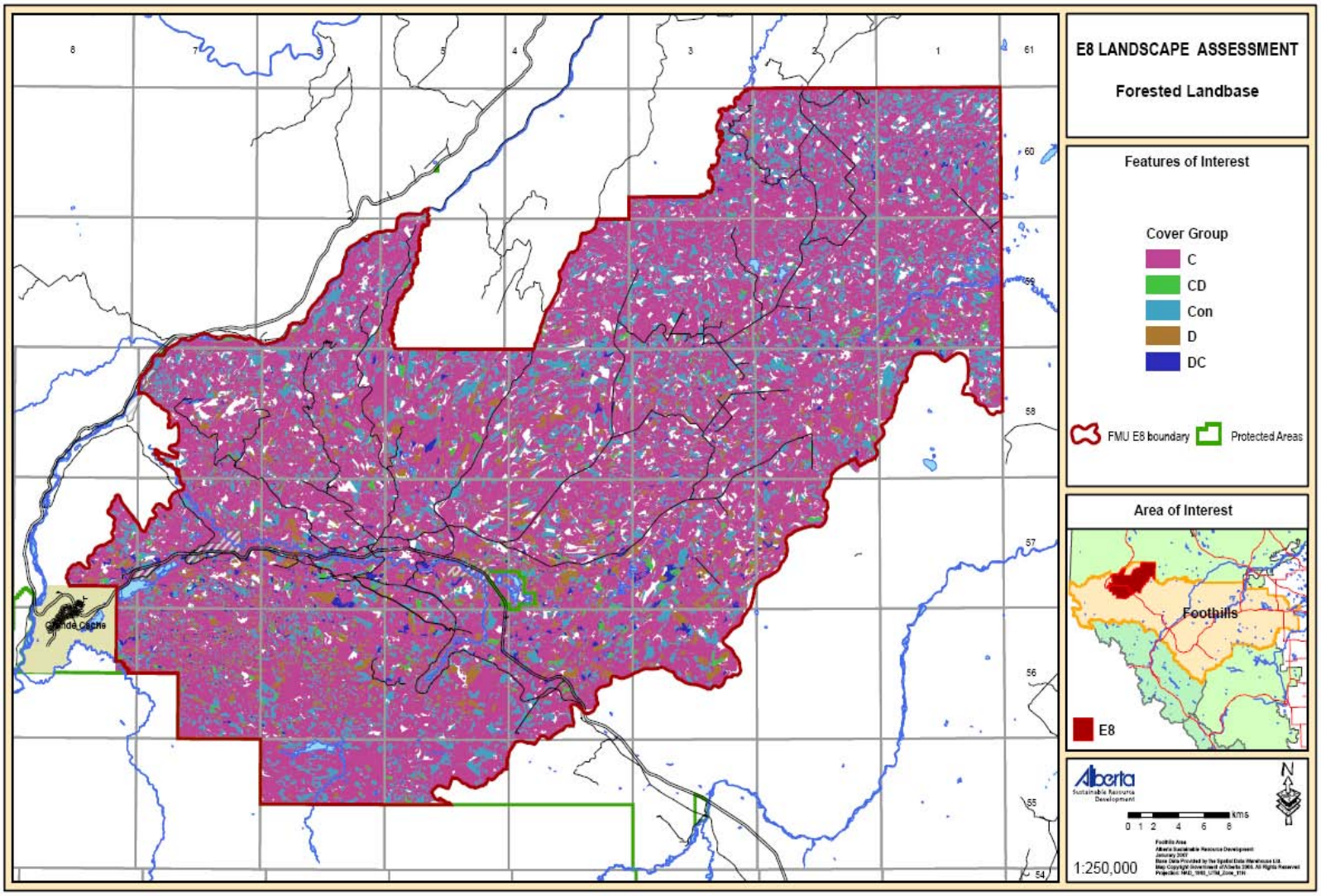

E8 LANDSCAPE ASSESSMENT
Forested Landbase
Features of Interest
Cover Group
C
CD
Con
D
DC
FMU E8 boundary
Protected Areas
Area of Interest
Foothills
E8
Alberta
Sustainable Resource Development
0 1 2 4 6 8
kms
1:250,000
Grande Cache
61
60
59
58
57
56
55
54
8
7
6
5
4
3
2
1

Figure 13: Cover group Distribution in E8.

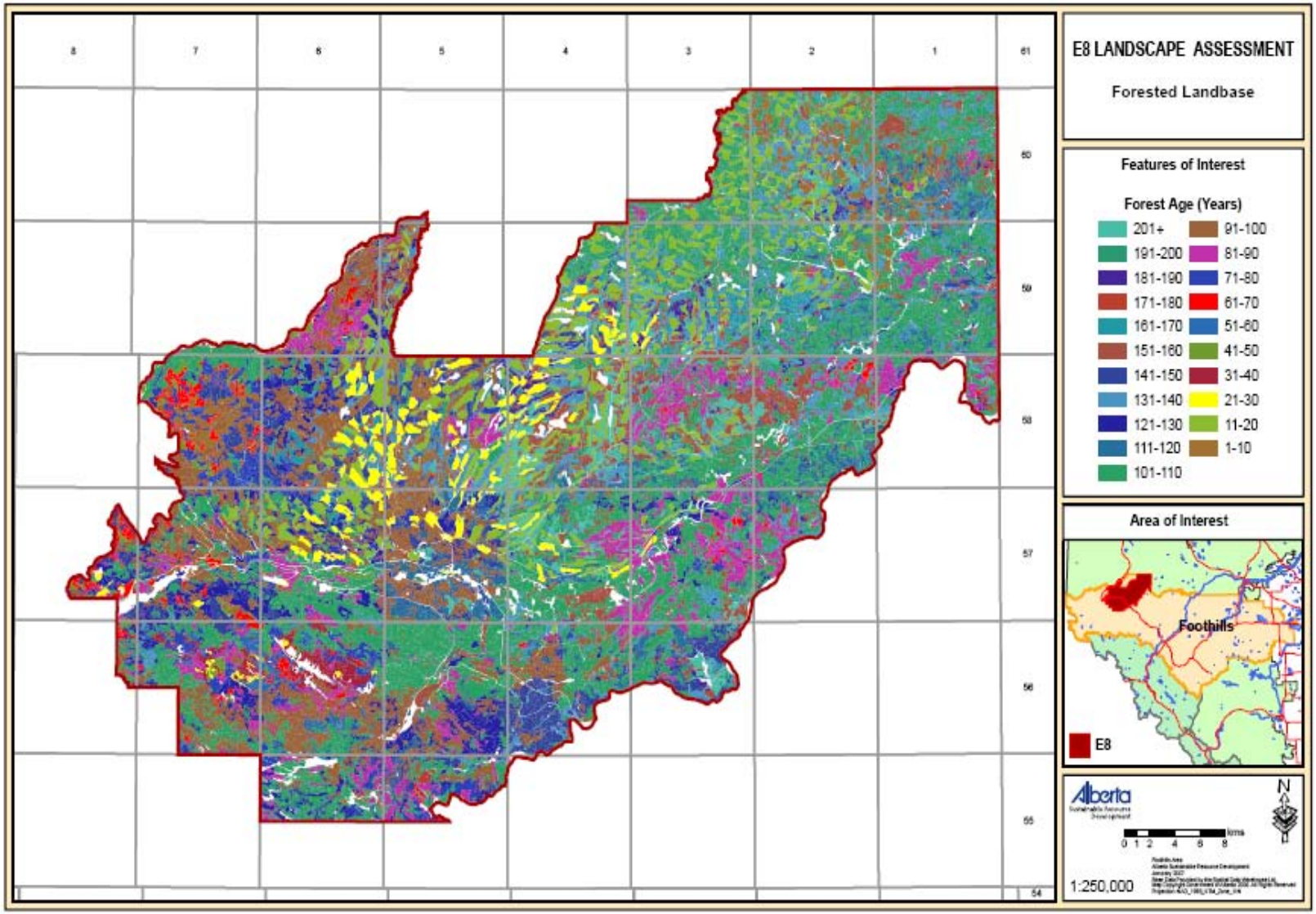


Figure 14: Forest Age Class Distribution in E8.

2.2.4 Seral Stages

A seral stage is defined as any stage of development of an ecosystem from initiation to a mature climax plant community. Seral stages for this landscape assessment were calculated based on work completed by SRD. This information can be found in Table 2.

Seral stages in E8 are shown in figure 15 and Graph 6, the percentage of area found in the various stages is shown in Graph 7.

Subregion	Strata	Regeneration	Young	Mature	Early Old growth	Late Old growth
Lower Foothills	D - Aw leading	0-20	21-70	71-130	131-160	>160
	D - Pb leading	0-25	26-80	81-140	141-180	>180
	DC - Pl leading	0-25	26-80	81-140	141-180	>180
	DC - Sw leading	0-30	31-90	91-150	151-190	>190
	CD - Pl leading	0-25	26-80	81-140	141-180	>180
	CD - Sw leading	0-30	31-90	91-150	151-190	>190
	C - Sw leading	0-30	31-90	91-180	181-230	>230
	C - Sb leading	0-40	41-100	101-200	201-250	>250
	C - Pl leading	0-30	31-80	81-160	161-210	>210
	C - Pj leading	0-30	31-80	81-140	141-180	>180
Upper Foothills	D	0-25	26-80	81-140	141-180	>180
	DC	0-30	31-90	91-150	151-200	>200
	CD	0-30	31-90	91-160	161-210	>210
	C - Sx leading	0-30	31-90	91-200	201-250	>250
	C - Sb leading	0-40	41-100	101-200	201-250	>250
	C - Pl leading	0-30	31-80	81-160	161-210	>210
Subalpine	D	0-25	26-80	81-140	141-180	>180
	DC	0-30	31-90	91-150	151-200	>200
	CD	0-30	31-90	91-160	161-210	>210
	C - Se leading	0-40	41-100	101-220	220-275	>275
	C - Pl leading	0-30	31-80	81-140	141-180	>181
	C - Pw leading	0-30	31-100	101-200	201-250	>250
	C - La leading	0-50	51-110	111-225	226-300	>300
	C - Sb leading	0-50	51-120	121-225	226-300	>300
Montane	D	0-25	26-70	71-120	121-150	>150
	DC	0-25	26-70	71-130	131-160	>160
	CD	0-25	26-80	81-140	141-170	>170
	C - Sw leading	0-30	31-90	91-180	181-230	>230
	C - Pl leading	0-30	31-80	81-130	131-170	>171
	C - Fd leading	0-30	31-90	91-200	201-250	>250
	C - Sb leading	0-40	41-100	101-200	201-250	>250

Table 2: Seral stages in E8

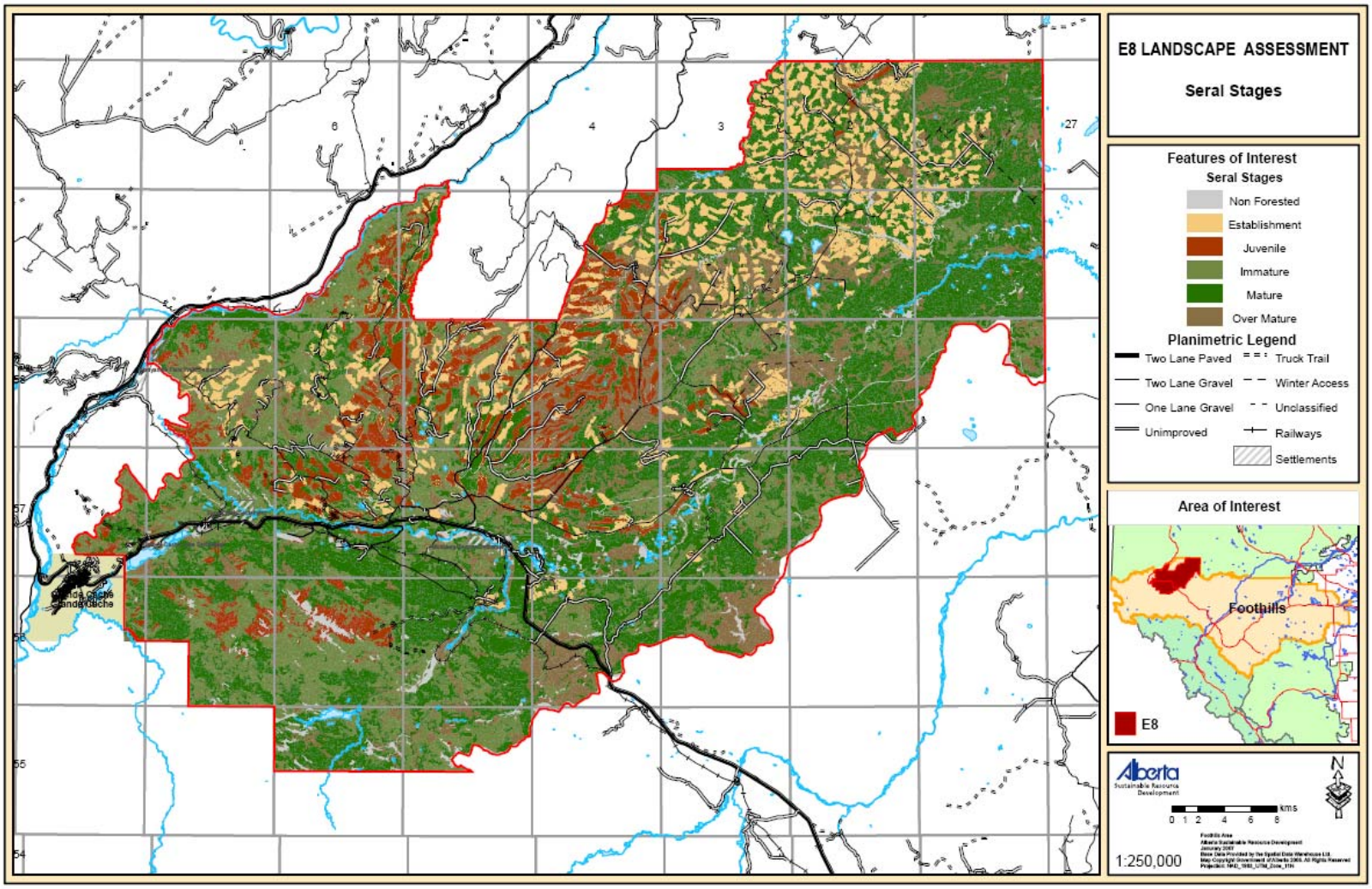
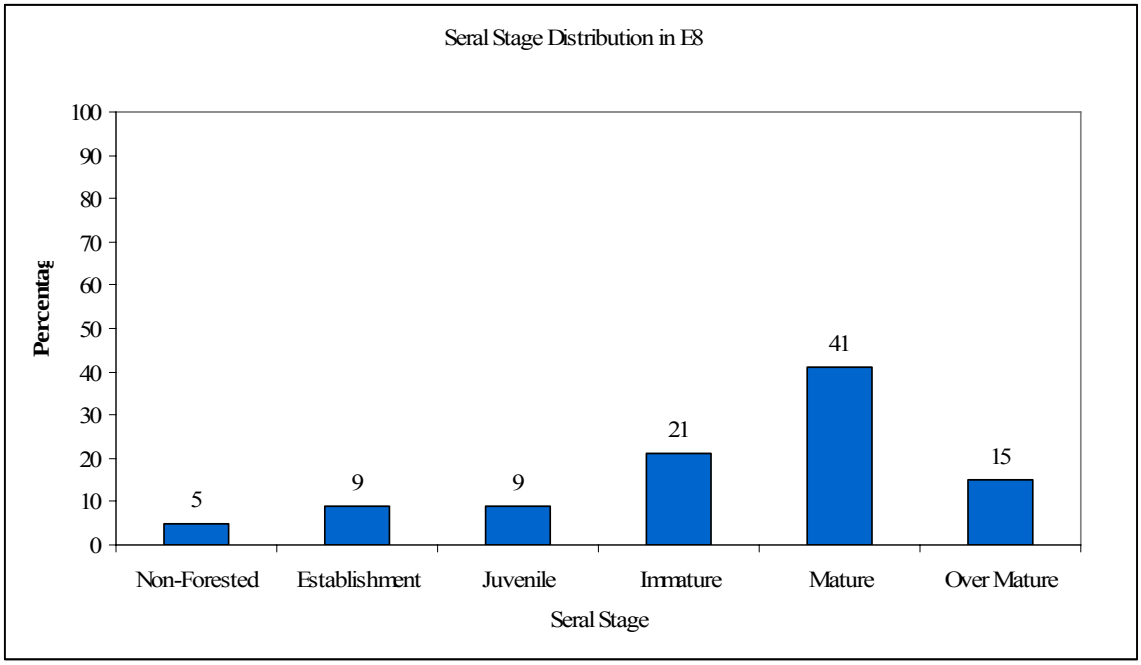
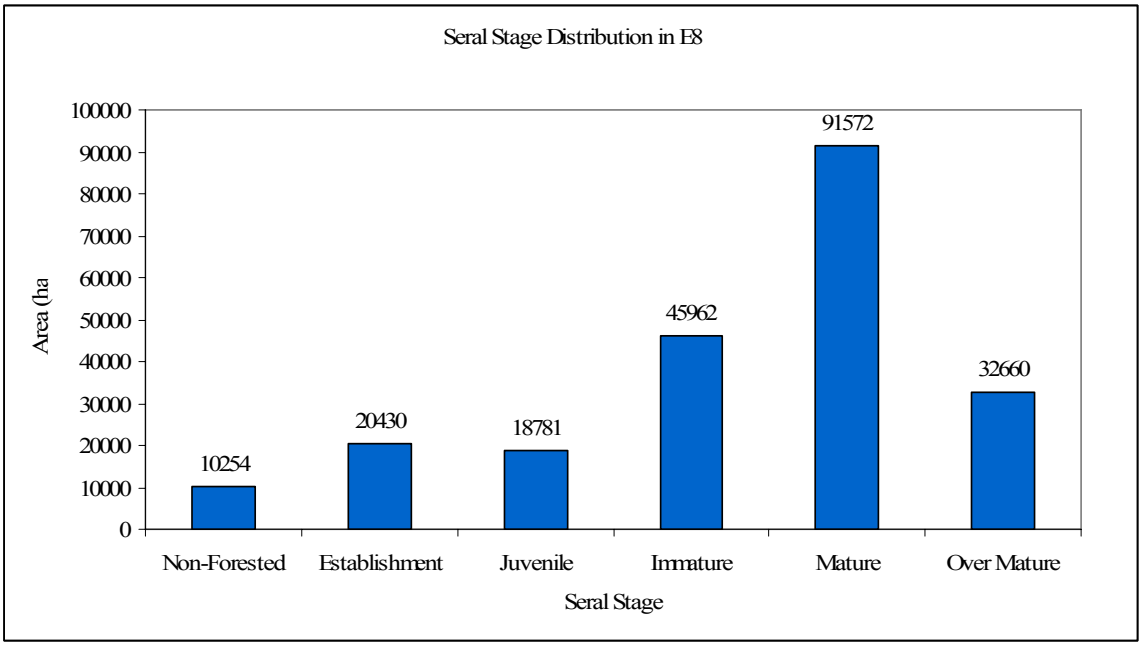


Figure 15: Seral Stages in E8.



Graph 6: Seral Stage Distribution in E8 (hectares)



Graph 7: Seral Stage Distribution in E8 (hectares).

2.2.5 Forest Patches

Interior Forest

An Interior Forest analysis was completed for E8 Management Unit to determine the amount of interior forest and its cover group. The methodology can be found in Section 15. Interior forest is defined as a forested area greater than 100 hectares 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.

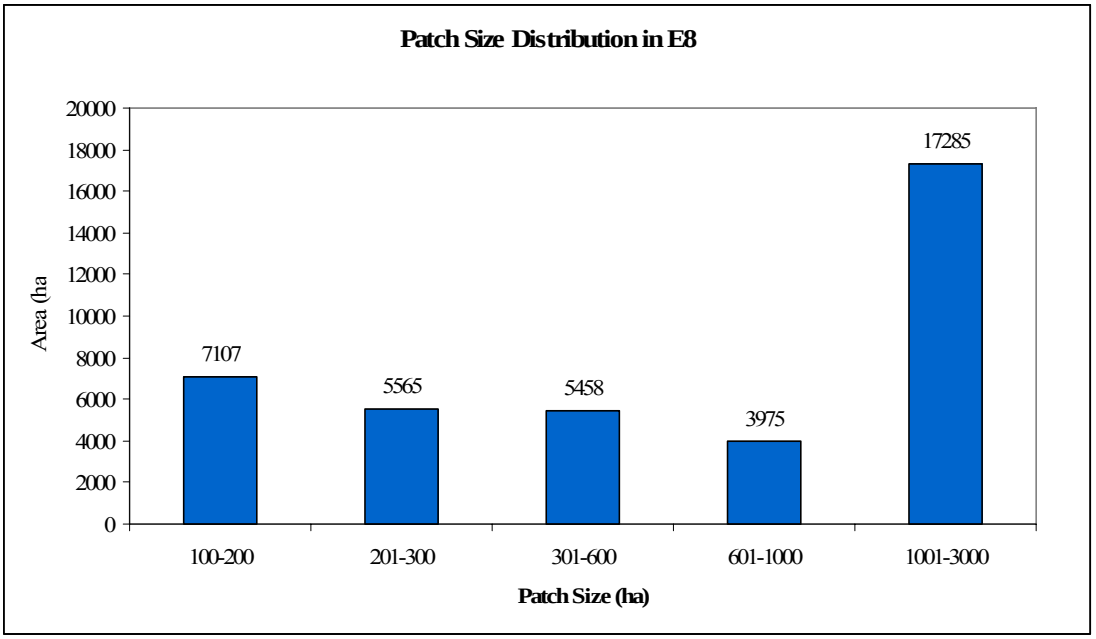
Forest Edge is defined in the *Alberta Forest Management Planning Standard* as a linear disruption in the forest cover greater than 8 m in width or the line along which forest seral stage class changes.

Figures 16 and 17 demonstrate the interior forest distribution using the Vector and Raster methodologies. A total of 96 polygons were created which resulted in an area of 55,688 ha using the Vector methodology. Figure 18 displays all of the patches in E8 that are greater than 100 ha and Graph 8 illustrates the total area in each patch size. The total area of patches greater than 100 hectares is 39 390 hectares or 5.6% of the total E8 area.

Forest Patch Size

A Patch Analysis was completed to show the areas of old, mature, and young forest in the management unit by cover class. This analysis can be found in Section 8 of the Timber Supply Analysis and shows the results of harvesting over a 200-year period at years 10, 50, 100 and 200. The goal set in this plan is to retain the full range of cover types and seral stages and to maintain biodiversity by avoiding landscape fragmentation.

Graph 8: Patch Size Distribution in E8.



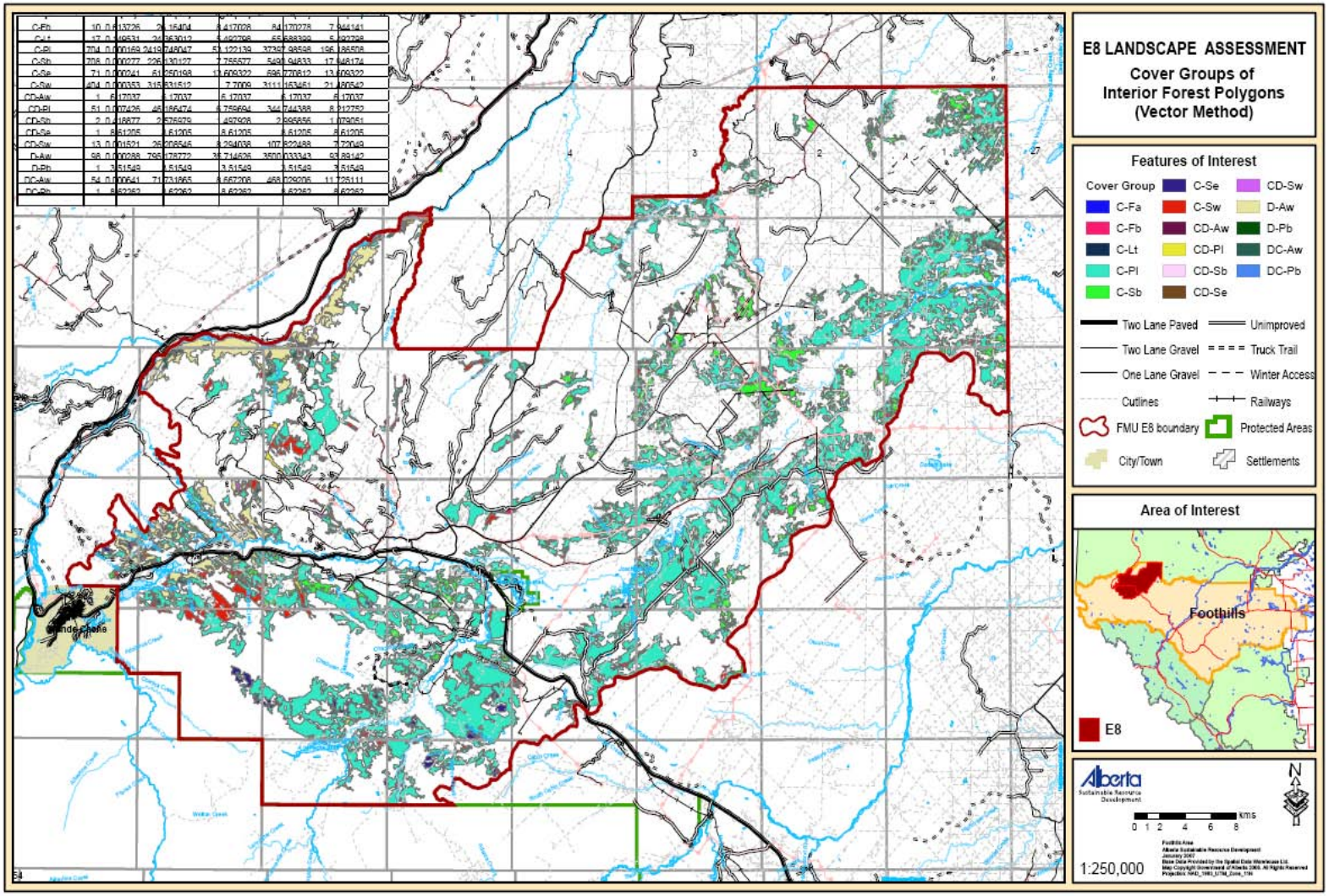


Figure 16: Interior Forest Polygons using the Vector Model.

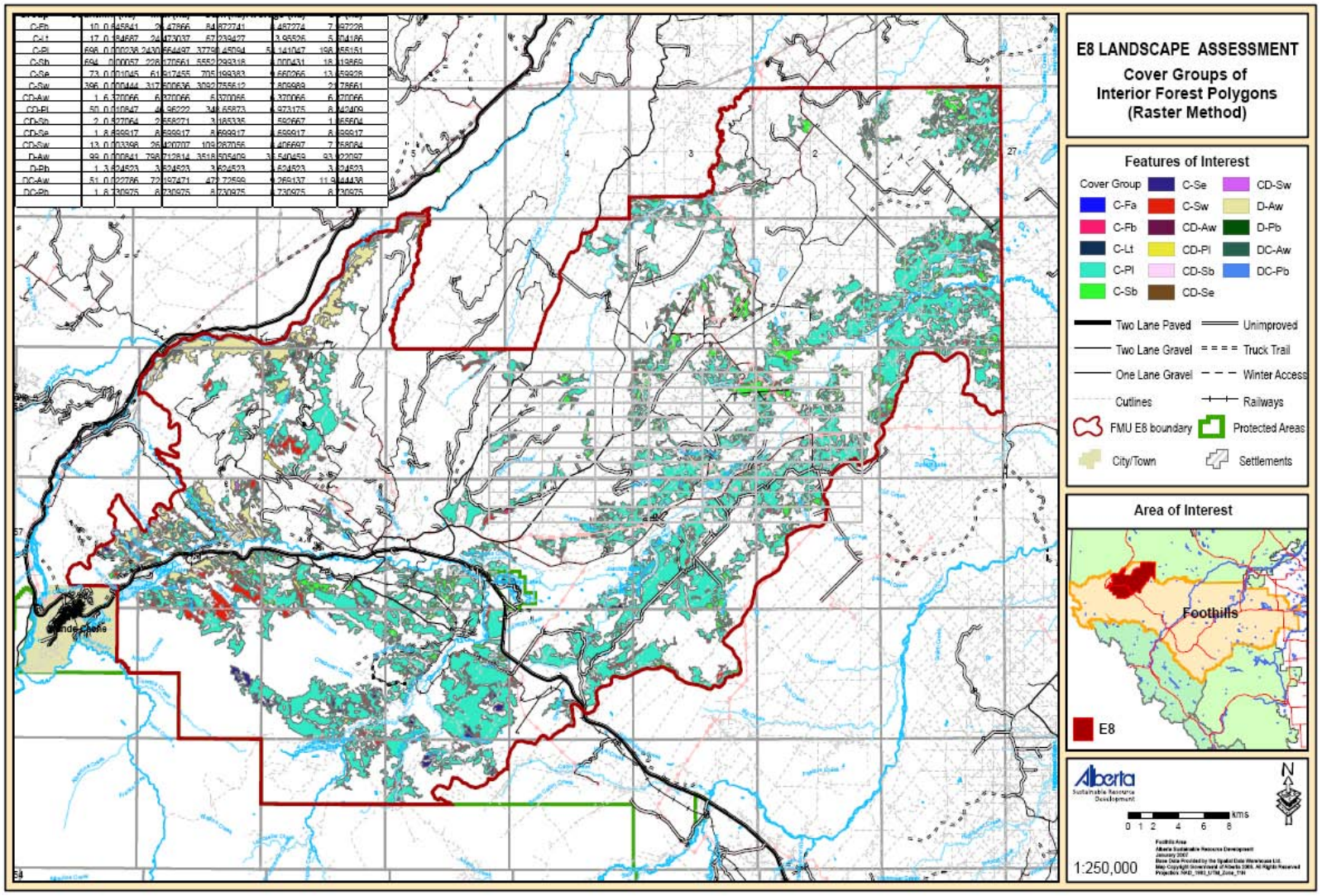


Figure 17: Interior Forest using the Raster Model.

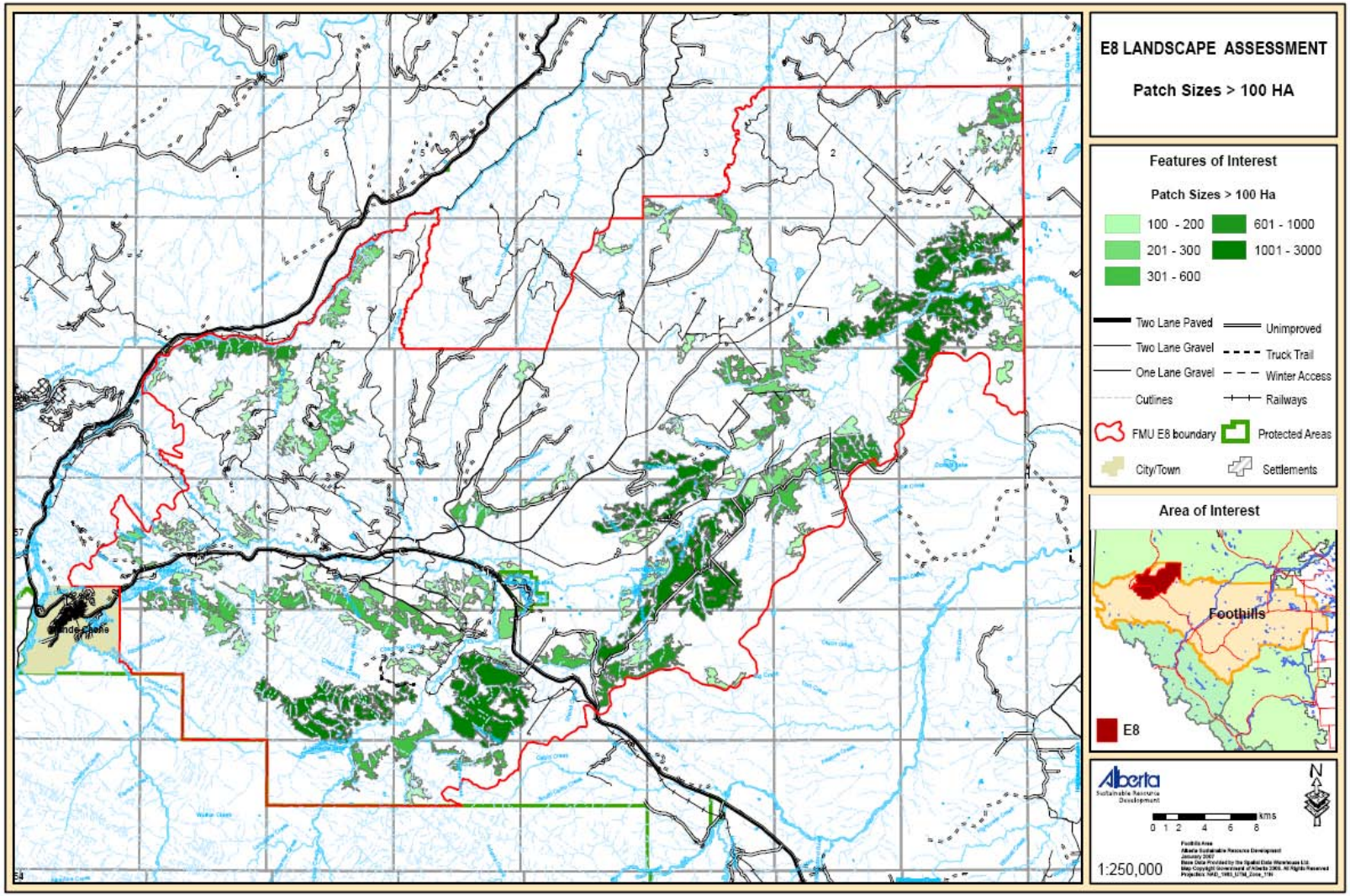


Figure 18: Patches Greater than 100 Hectares in E8.

2.2.6 Inherent Disturbance Regime

Fire

In recent history, disturbance caused by fire has been insignificant. Between 1994 and 2004, 54 fires were recorded that burned a total of 42.1 hectares of forest (Figure 19). Currently, the northern portion of E8 is fragmented due to oil and gas activity and timber harvesting, making it unlikely that a devastating fire will burn this area. The southern portion of the management unit is still relatively untouched, since it is considered to be prime Caribou habitat and commitments have been made to restrict harvesting to a degree. Due to the tracks of mature timber, poor access and lack of fragmentation, there is a higher probability of fire occurrence. A Landscape Wildfire Threat Analysis was also completed for this FMP and is located in Section 3 of this Plan.

Forest Health

Insects and Diseases

All forests have endemic insects and diseases that limit tree growth, cause abnormal growth, weaken, and even kill trees. These forest disturbance factors can play an important role in forest renewal by removing less vigorous trees and creating openings in the canopy. Thus, while a given forest health agent may cause considerable disturbance at a local level or over a long time period, concern is generally only raised when populations reach epidemic levels. Some non-native forest health agents occurring in an area outside of their natural distribution can be particularly troublesome as they have few natural controls in the infested area. Major insect pests of mature forests in Alberta include defoliators (e.g., spruce budworm, forest tent caterpillar) and bark beetles (e.g. mountain pine beetle). As well, devastating fungal diseases include root and trunk rot. Explanations of the major insects and diseases are outlined in Table 3. Forest health programs are run annually by SRD and focus on detection, survey and monitoring, risk and impact assessment, and the implementation of management programs in forest stands.

Annual aerial surveys are typically conducted to assess location, area disturbed, severity, possible causal agent, and host tree species for insect and disease disturbances. Aspen Defoliation/Spruce Budworm aerial survey takes place June 20 to July 10 after defoliation but prior to re-flush. Mountain Pine Beetle (MPB) aerial survey takes place August 15 to September 15. Monitoring sites baited with pheromone are also in place for mountain pine beetle, spruce budworm and gypsy moth (invasive). Any significant disturbances are mapped, and if deemed necessary, management actions are initiated.

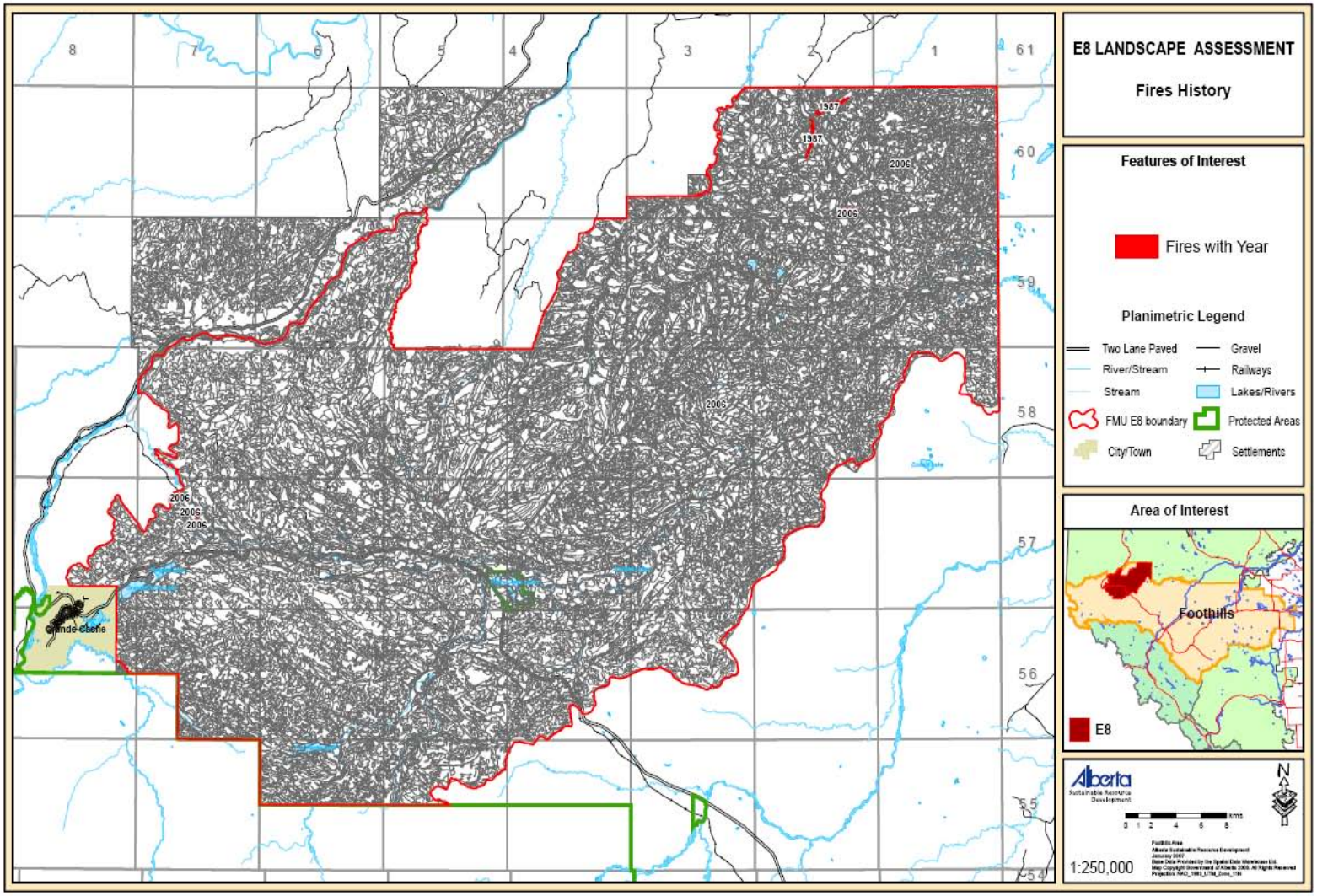


Figure 19: Historical Fires in E8.

Table 3: Forest health agents in the E8 FMU

Agent	Target Species	Target Species Age	Damage Caused	Historical Occurrence	Management Implications
Spruce Beetle	All spruce	80+	Mortality of entire tree in one year	Low	Although somewhat similar to mountain pine beetle, this insect prefers stressed/dying trees to healthy trees. Healthy trees can be attacked and killed once populations build.
Spruce Budworm	All fir Tamarack All spruce	All ages	Growth loss, top kill, and mortality caused by defoliation	Low	The species normally found (C. biennis) in the E8 FMU take two years to develop; therefore, the trees always have one year to recover from defoliation. If the population of budworm increases significantly, some spruce stands may lose volume.
Aspen Defoliaters - forest tent caterpillar - Bruce spanworm - Large aspen tortrix	Aspen, birch, other deciduous trees	All ages	Growth loss, top kill, and mortality caused by defoliation	Moderate to High	These insects are common in the E8 FMU, defoliating deciduous trees to varying degrees in June. The trees normally recover and re-flush leaves later in the summer. Some mortality of trees can occur if populations persist in one area over several years.
Root Collar Weevils	All pine All spruce Tamarack All fir	All ages attacked, damage occurs on trees <10 years	Mortality in young trees by girdling, growth loss in older trees	Low to Moderate	These insects can kill several seedlings and young trees. The weevils prefer wet ground and heavy duff and are often associated with Armillaria root disease. There are few management options available.

Armillaria Root Disease	All species but much more prevalent in conifer	All ages but most impact in stands <15 years old	Growth loss and mortality caused by tree girdling and root rot. Infected trees susceptible to wind throw.	Low to Moderate	This fungus can kill over 500 species of tree and woody plants. It is found throughout the E8 FMU. It spreads by root-to-root contact and rhizomorphs. In E8, the main impacts are the reduction of productivity of a site and the stocking levels in plantations possibly to NSR status. Removing the stumps from a site can be an option but has not been warranted in E8.
Tomentosis root disease	All conifer	Mature trees	Growth loss and mortality caused by root and butt rot. Infected trees susceptible to wind throw.	Low	This fungus is present in E8 but is generally at an endemic level. It causes butt rot that can reduce the value of timber and predispose trees to wind throw.

Mountain Pine Beetle

The mountain pine beetle (MPB) is the most serious enemy of mature pines in western Canada. It is a native insect pest in temperate, lodgepole pine forests of western North America. The eastern edge of the beetle distribution lies along the Rockies near the Alberta-British Columbia border. Accordingly, lodgepole pine forests in Alberta have evolved largely in the absence of mountain pine beetles. Altered fire regimes which have left more mature and old-growth forests on the landscape, coupled with a changing climate which has increased the over-winter survival of larvae, have given rise to mountain pine beetle infestations in areas considered outside their historical distribution. British Columbia is dealing with a major mountain pine beetle outbreak, and the beetle continues to spread eastward into Alberta.

From 2002 through 2007, MPB presence in Willmore Wilderness Park and in E10 FMU has increased steadily largely through continuous immigration. The infestation has also moved steadily eastward with detection in E8 occurring in 2006. While still at very low levels (<400 trees) within E8, the mountain pine beetle could potentially cause high pine mortality and could have a major impact on the forests in E8. The Forestry Division of SRD has undertaken an aggressive control program to cut and burn individual infested trees in E8, E10 and the Willmore Wilderness Park. The department is actively planning and implementing programs to manage for this pest in E8. The Pine Strategy has been adopted by SRD and Foothills Forest Products Ltd. The goal in the preferred management scenario is to reduce the highly susceptible pine by 55% over 20 years. Foothills Forest Products will be focusing their efforts in highly susceptible stands outside of the area which has been identified as important Caribou habitat.

Mountain Pine Beetle Susceptibility Maps (Figures 20 & 21) were created using the Stand Susceptibility Index (SSI) with the climate factor (CF). SSI is based solely on stand characteristics while SSI_CF incorporates climate characteristics. The climate factor in essence is the probability of a one year lifecycle in a given area. If a stand had an SSI of 30 based on stand characteristics and the CF was 0.8, the SSI_CF would be 24.

Wind and Other Disturbances

Additional forest disturbances within E8 can also result from other environmental factors including flooding, drought, and wind and snow damage. Forest damage caused by these factors is generally localized. Chinook conditions are fairly common in the E8 FMU and strong, unpredictable winds do occur. Incidences of damage associated with wind events are also affected by biotic conditions such as stand composition, canopy structure, stand age, and stand vigour. Abiotic conditions including wind severity and direction, exposure, landscape position, topography, and soil properties also affect the severity of damage. For example, wind events under saturated soil conditions will result in more blowdown of shallow-rooted species such as white spruce and black spruce.

Non-native Invasive Plants

Non-native, invasive plants species, often referred to as weeds, are species that have been introduced into an area beyond their natural range of occurrence. They have few natural enemies, and where uncontrolled, can spread and create severe damage by altering the forest habitat by displacing native species. Several non-native invasive plants have been identified within or immediately adjacent to E8 including oxeye daisy, scentless chamomile, tall buttercup, common tansy, Canada thistle and perennial sow thistle. Weed sites are typically treated by either hand-picking or herbicide application.

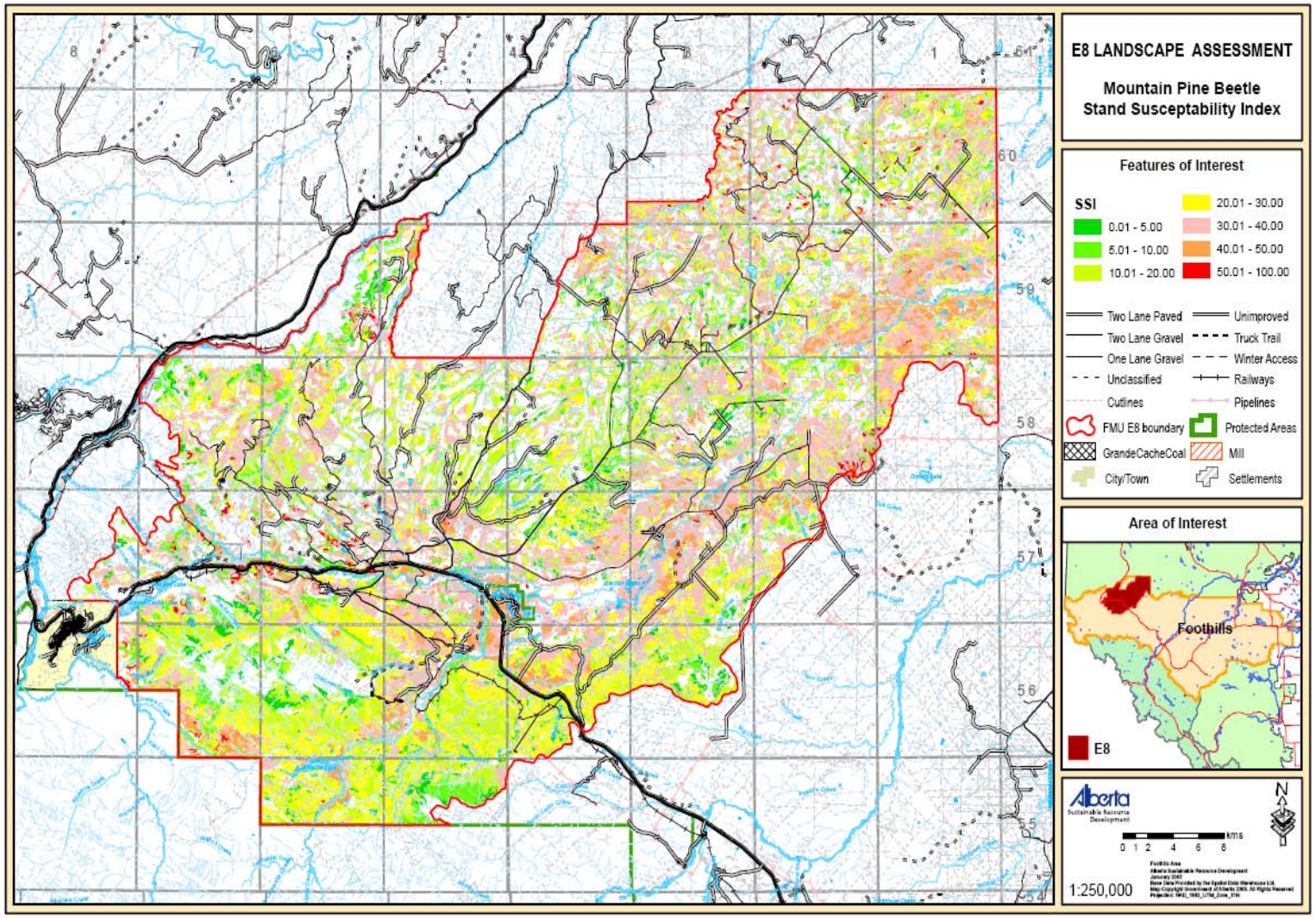


Figure 20: Mountain Pine Beetle Stand Susceptibility Index for E8 (with Climate Factor).

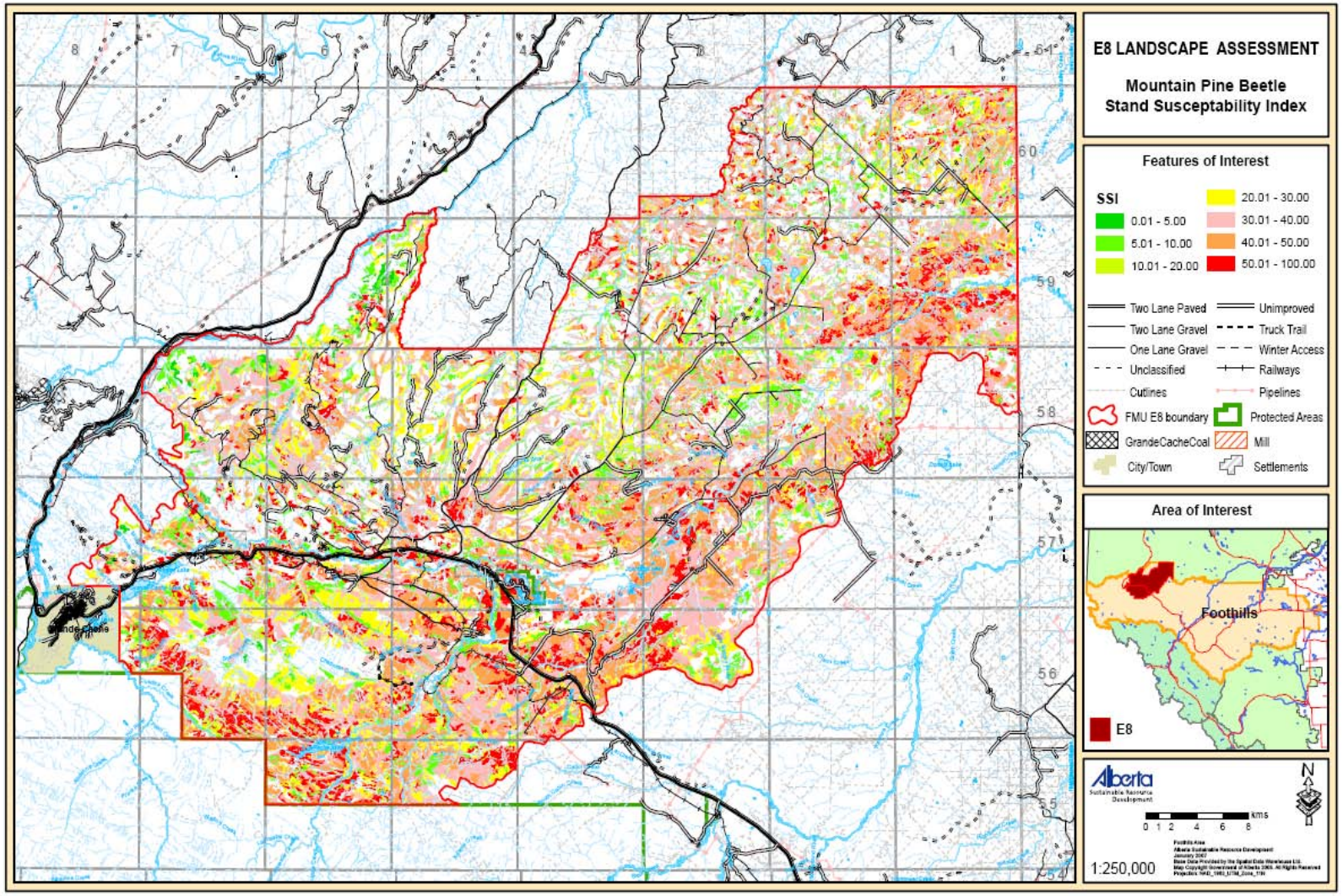


Figure 21: Mountain Pine Beetle Stand Susceptibility Index for E8 (with Climate Factor).

Timber Harvesting

Foothills Forest Products is currently the primary operator in E8. The Coniferous Timber Quota Certificate allocated to the company entitles them to 99.66% of the net annual allowable cut of coniferous timber.

Foothills Forest Products has a Deciduous Timber Allocation. The net annual allowable cut is 11,349 m^3. The only deciduous timber harvested to date has been in the form of incidental created from harvesting conifer.

Precision Forest Industries has small quota, whose quadrant allowable cut is 0.34% of coniferous annual allowable cut.

The previous operator, Weyerhaeuser Canada concentrated its operations in the E8 management unit. Prior to 2005, a total of 34,482 ha of forest has been harvested in this management area. The locations of the areas harvested are found in Figure 22.

Access

There is an extensive road system in E8, created and utilized by industrial operators for primarily timber harvesting and oil and gas activities. Other users include sand and gravel operators, trappers, outdoor enthusiasts, and hunters. In the past decade, activity in the area has increased substantially and access is a controversial and difficult management issue. There are fish and wildlife issues, reclamation issues and concerns with attempting to integrate access to minimize the industrial footprint on the landscape.

To determine the extent of the existing access development in E8, a road and cutline density analysis was completed. Results of this analysis are shown in Figures 23 and 24 where the road and cutline densities are displayed by township. The information displayed is in units of km/km^2. The data used in this analysis was updated in the summer of 2005 by GPS'ing roads south of Township 58 and obtaining information from orthophotos taken in 2003 and 2004 north of Township 58. One of the goals of this plan is to maintain biodiversity by better managing access.

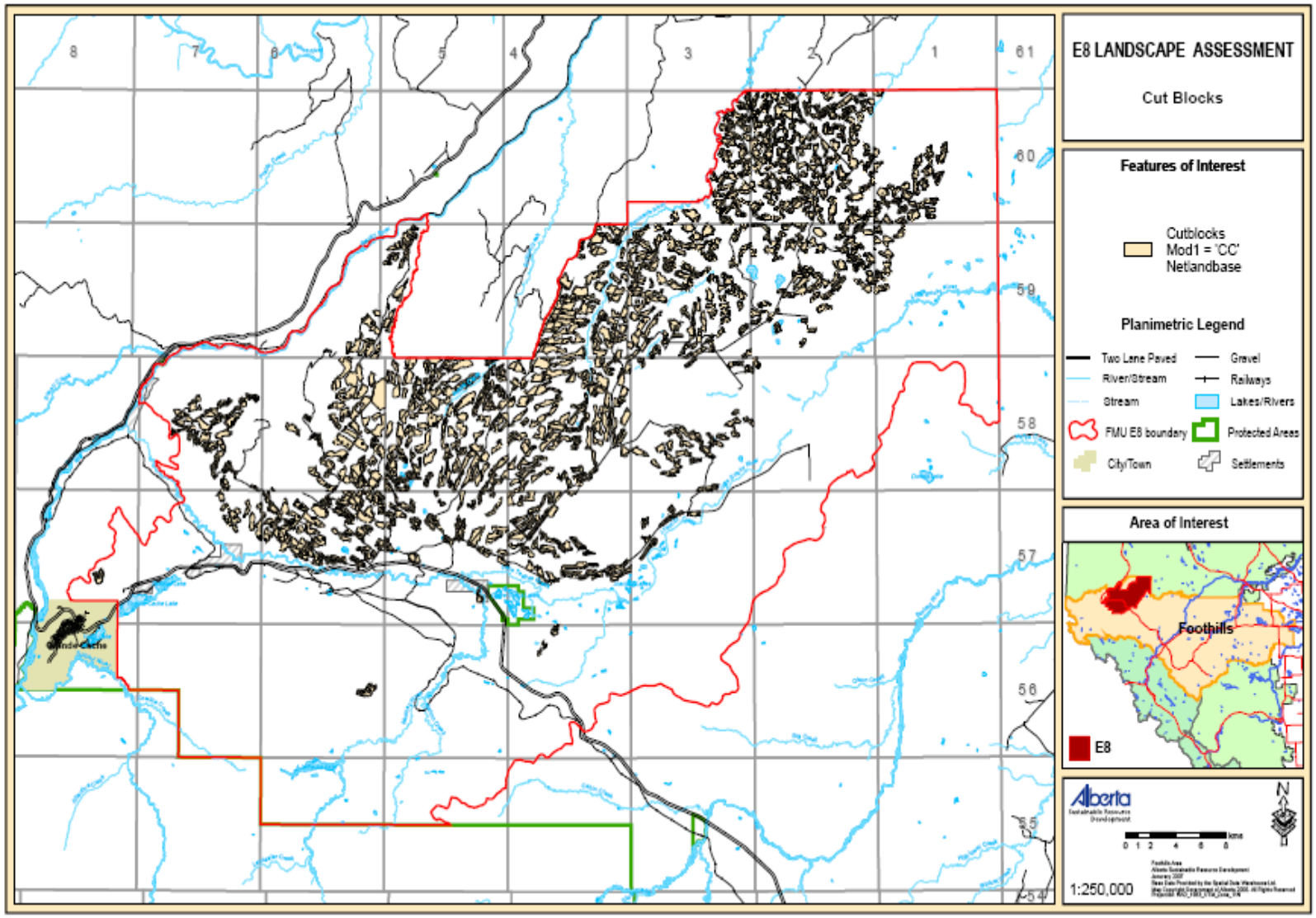


Figure 22: Historical Cutblocks in E8.

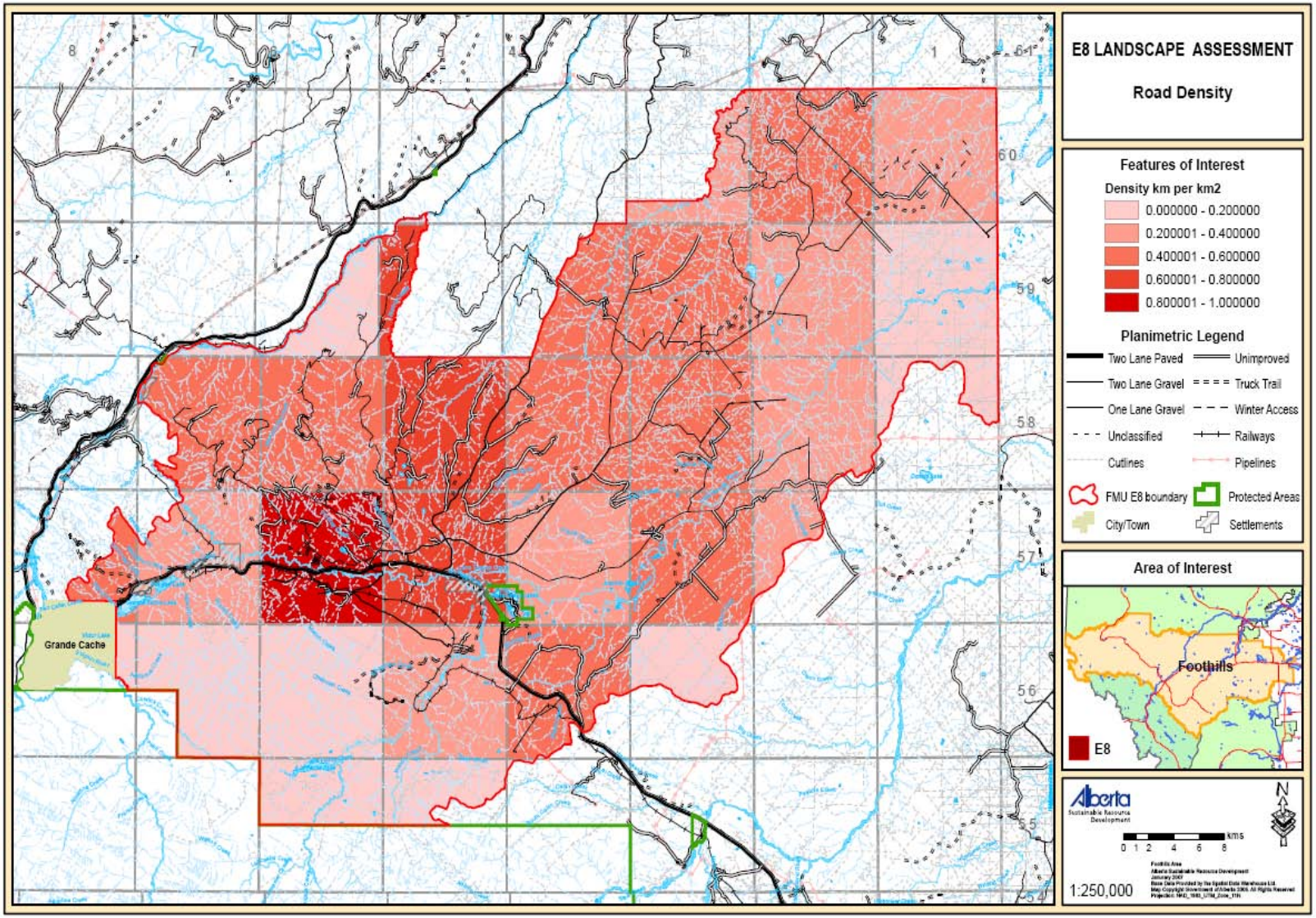


Figure 23: Road density in E8.

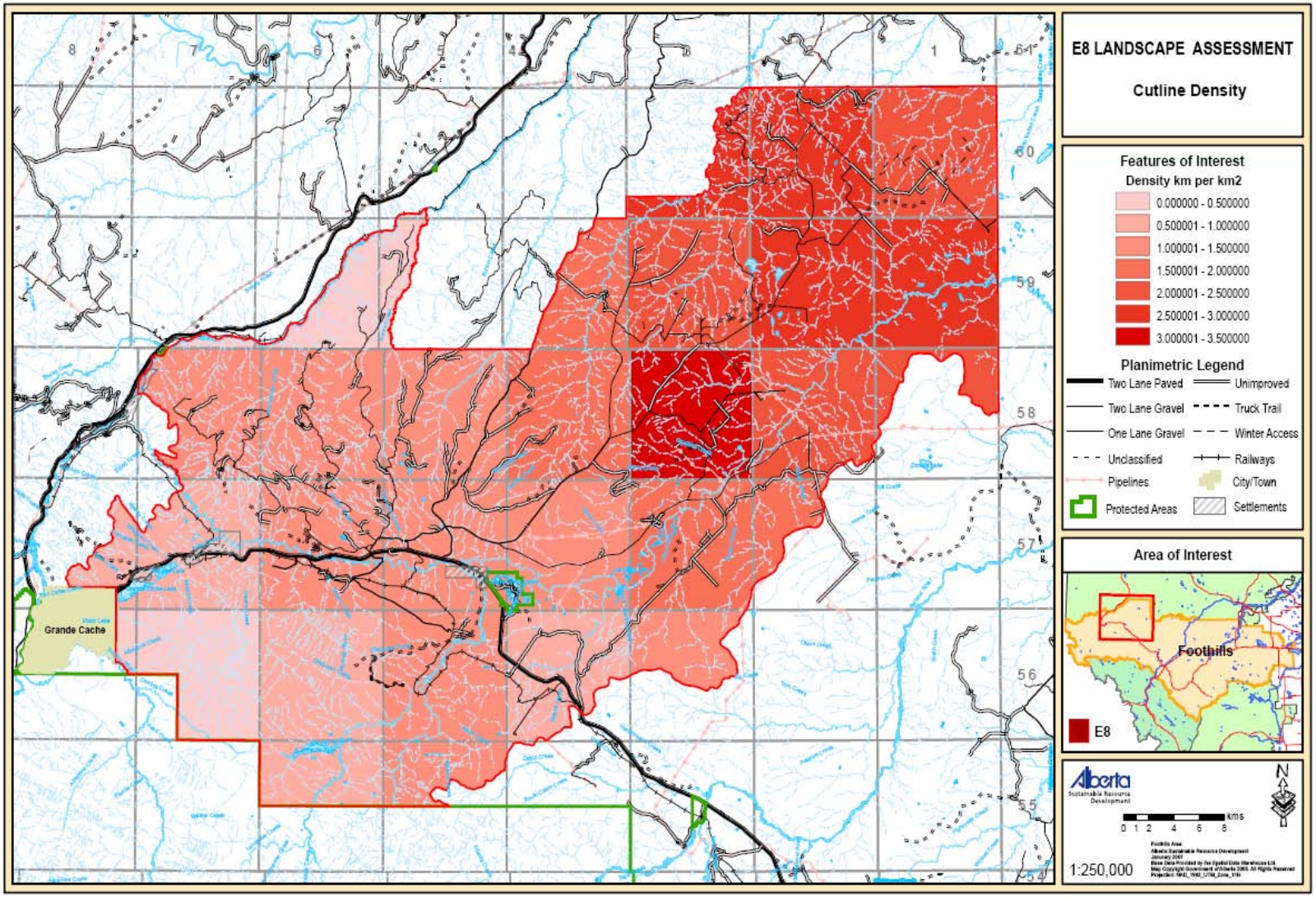


Figure 24: Cutline Density in E8.

Industrial Development

In the E8 Management Unit, there are many non-timber industrial users of the landscape. Industrial activity is ever increasing in this area. Dispositions are mainly owned by energy companies, forestry companies, as well as sand and gravel operators. The forestry companies include Foothills Forest Products and Canadian Forest Products.

The major oil and gas companies that operate in the E8 FMU are Devon Canada Corporation, Talisman Energy Inc., Peyto Exploration & Development Corp., Encana Corporation, Canadian Natural Resources Limited, Burlington Resources Canada and Paramount Resources Ltd.

The locations of the various dispositions located within the E8 FMU are illustrated in Figures 24 through 27.

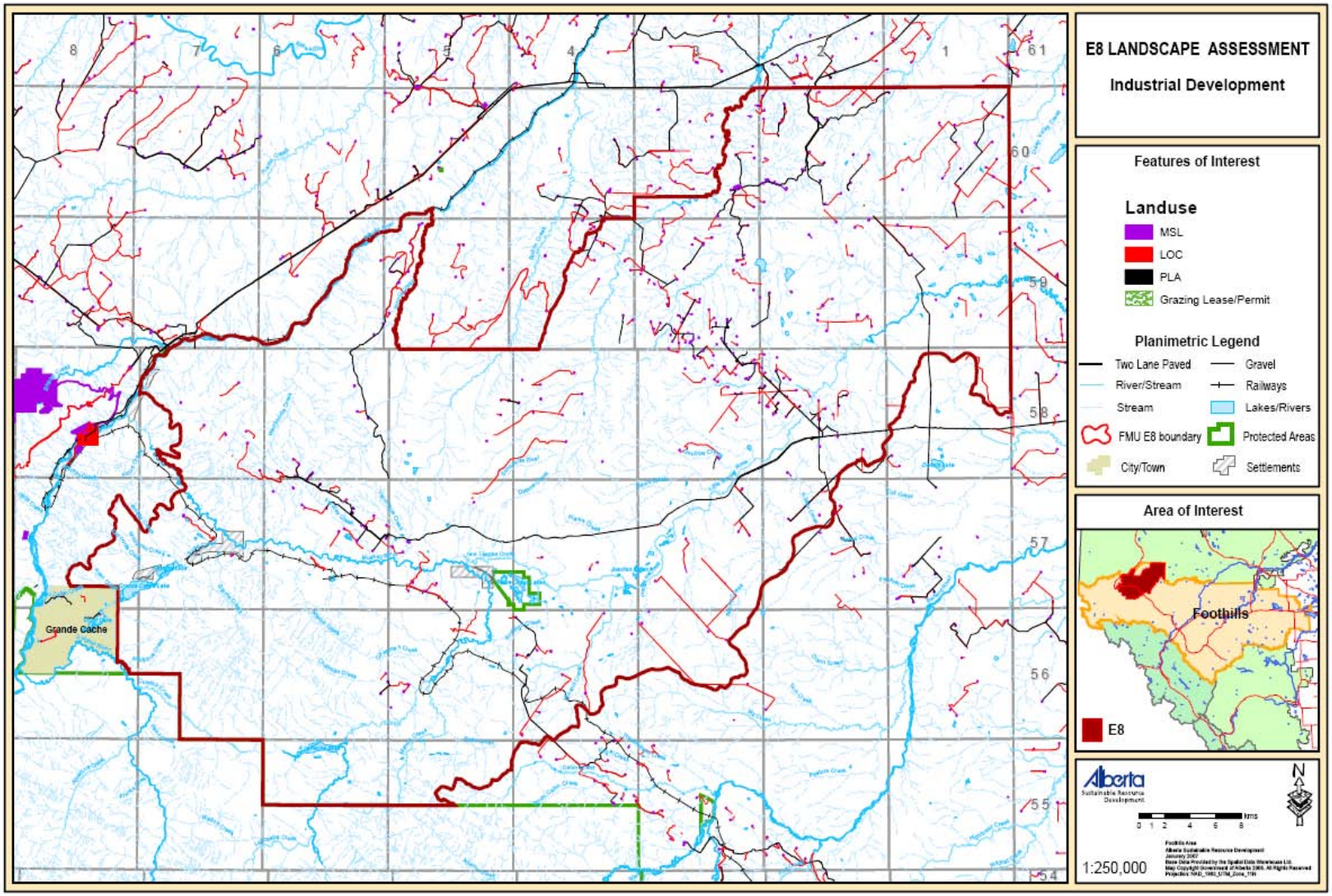


Figure 24: Location of well sites, pipelines roads and grazing disposition in E8.

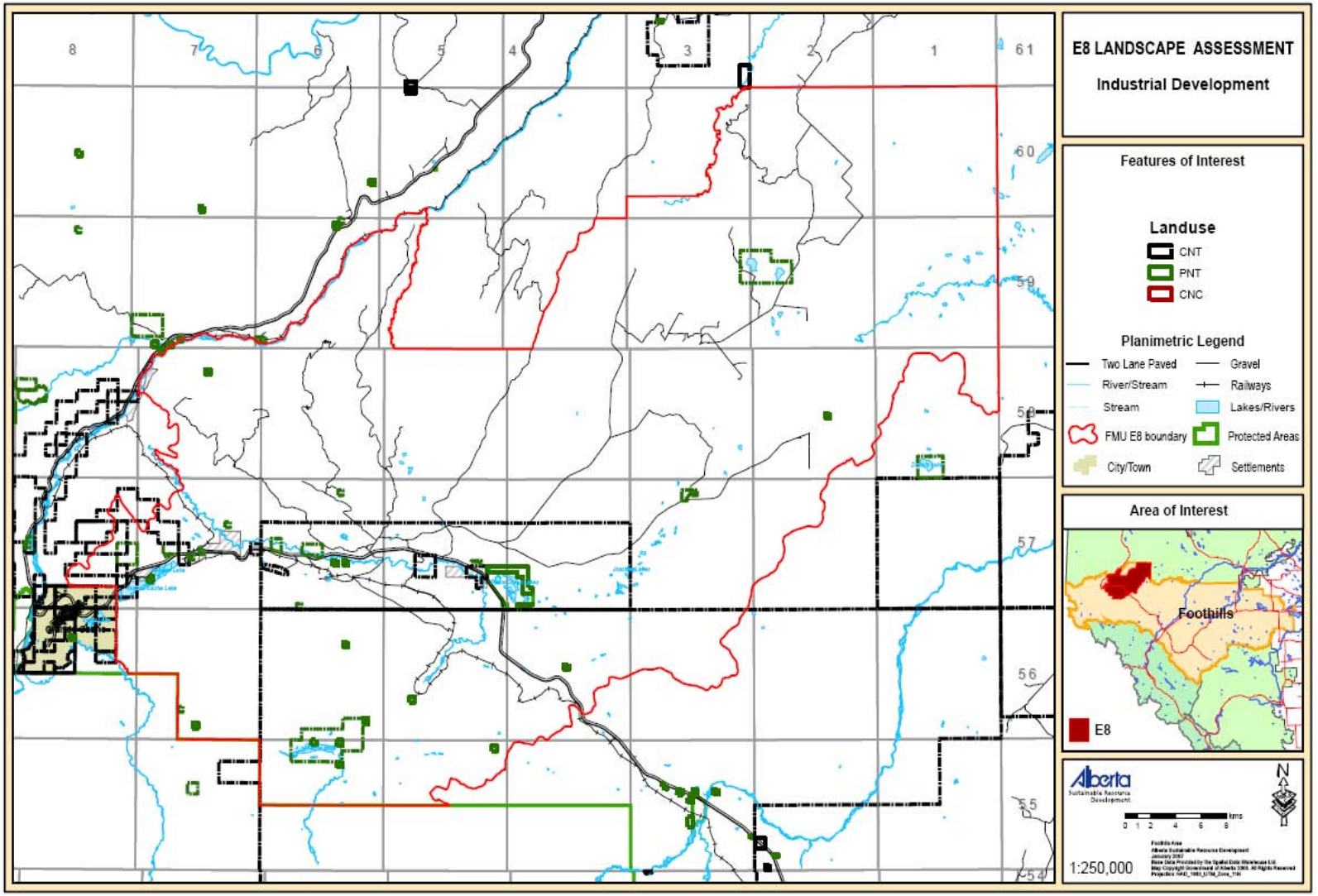


Figure 25: Location of PNTs, CNTs and CNCs in E8.

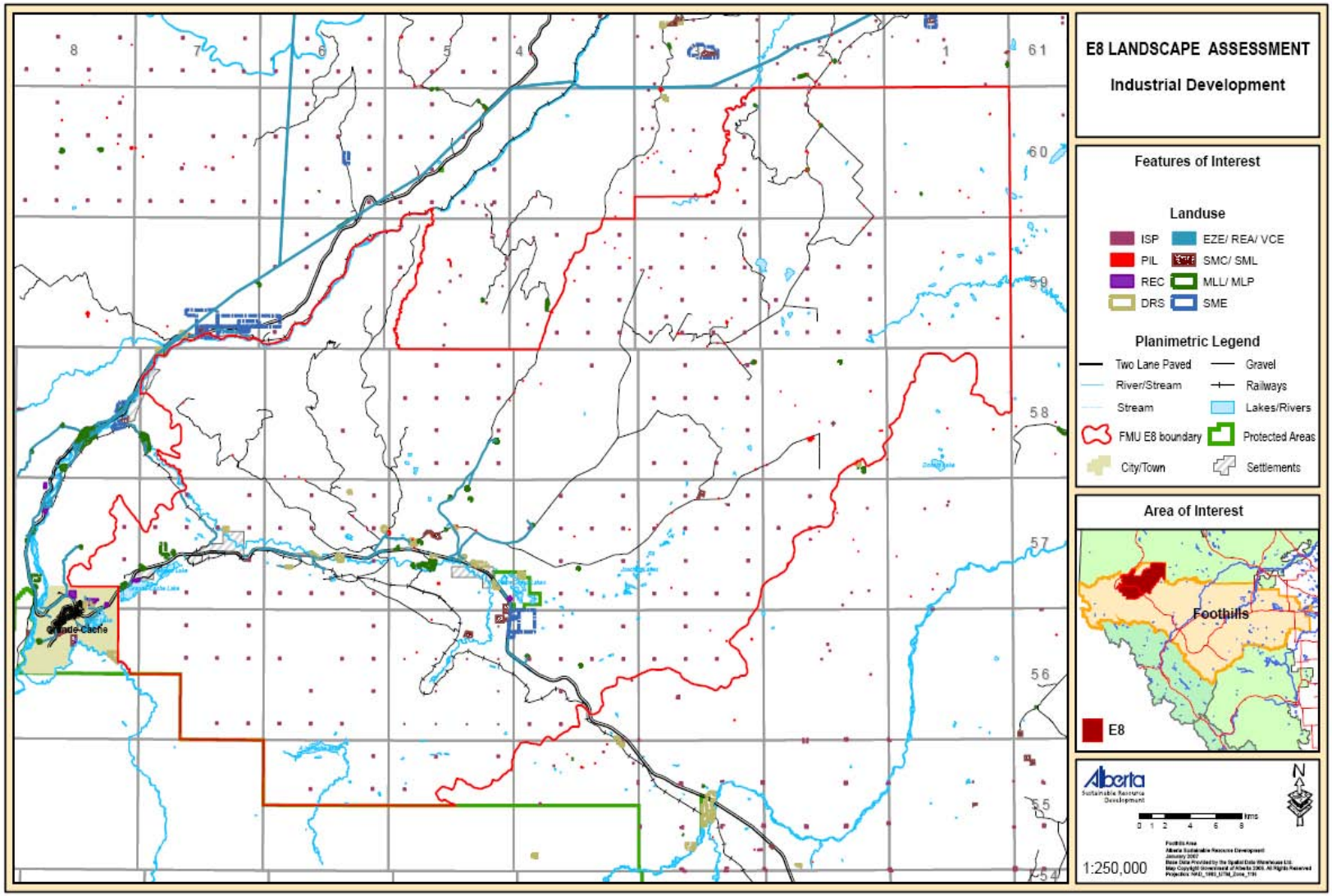


Figure 26: Miscellaneous Dispositions in E8.

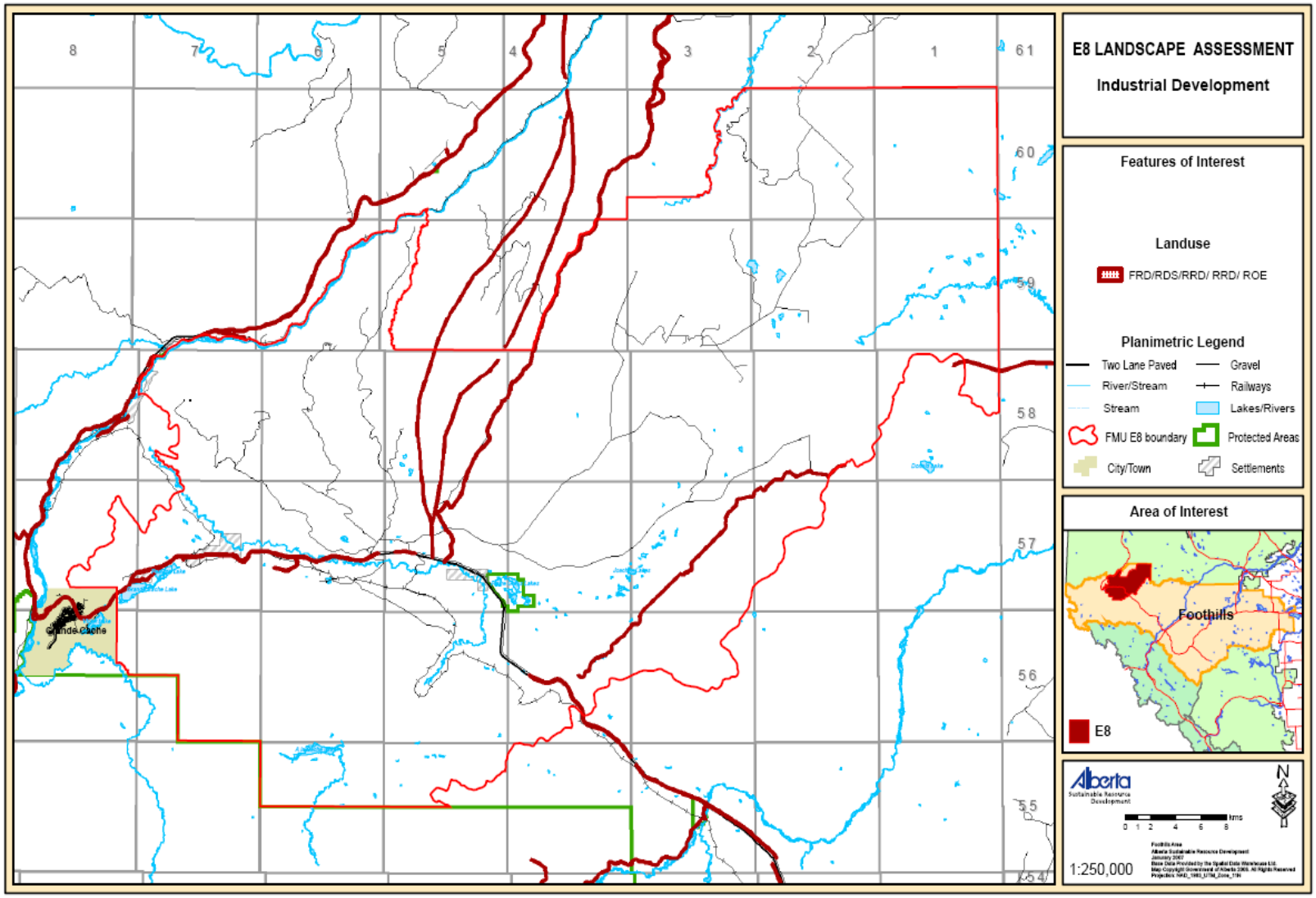


Figure 27: FRD, RDS, RRD, & ROE Dispositions in E8.

2.2.7 Monitoring Sites

In 2007, seven monitoring sites were established as part of the Alberta Biodiversity Monitoring Institute in E8. There is one Provincial monitoring site in E8. It is PNT 900214. More information on this program can be found at **www.gov.ab.ca**. Locations of the monitoring sites, in particular site PNT 900024 found in E8, are shown in Figures 28 and 29.

2.2.8 Integrated Resource Planning

The Natural Disturbance Program is a cornerstone of the Foothills Research Institute (FRI). Since 1996, industry and government have invested significant resources to understand how natural disturbances, primarily forest fires, shaped the FRI landscape. Underlying this research is the belief that practices, such as timber harvesting and prescribed burns, that emulate natural disturbances are a fundamental step in conserving biodiversity. Focus within the Natural Disturbance Program is now shifting from high-quality research to the integration of this new knowledge into forest and resource management decisions. An example of this evolution is the Highway 40 North Demonstration Project.

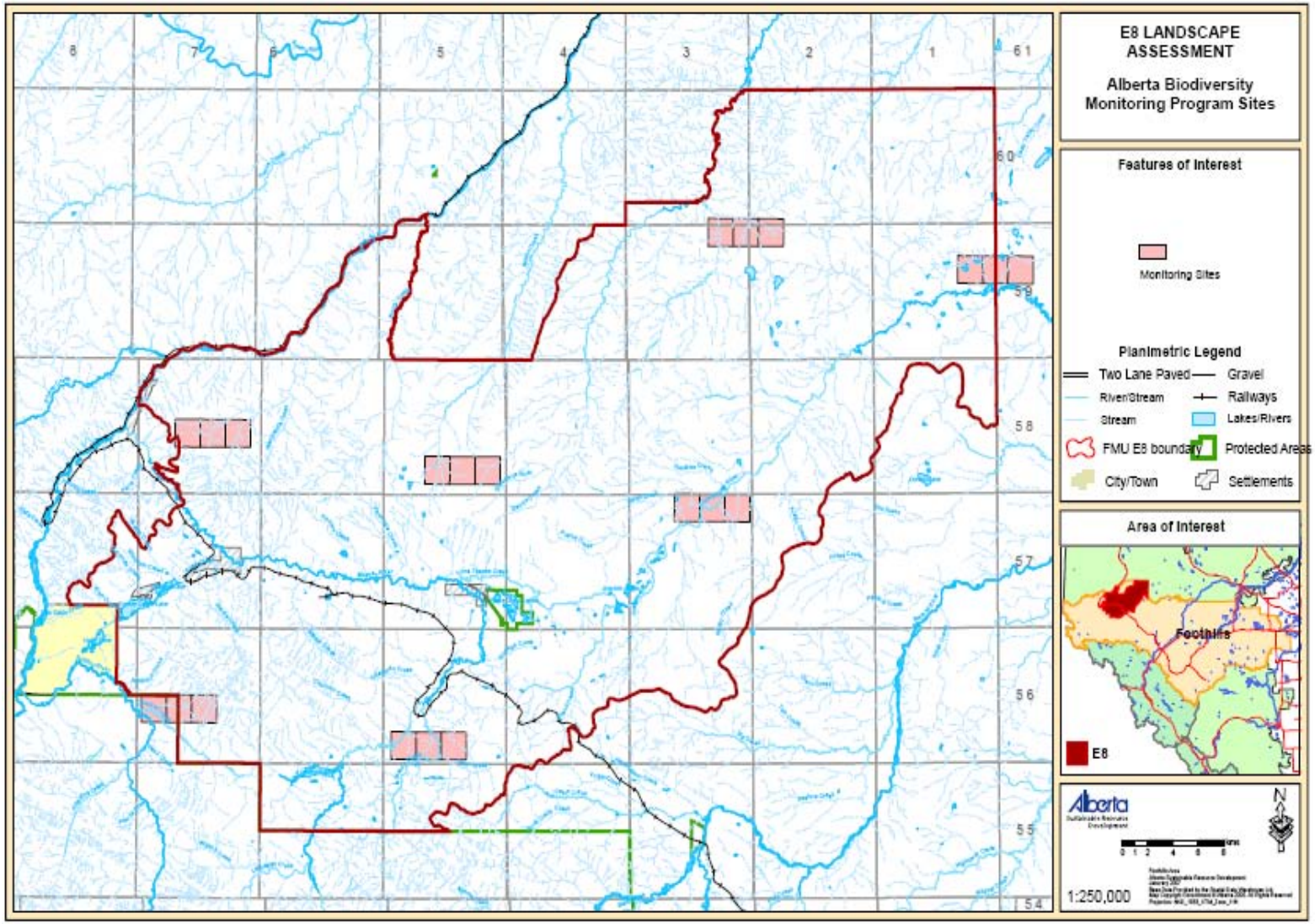


Figure 28: Alberta Biodiversity Monitoring Program sites in E8.

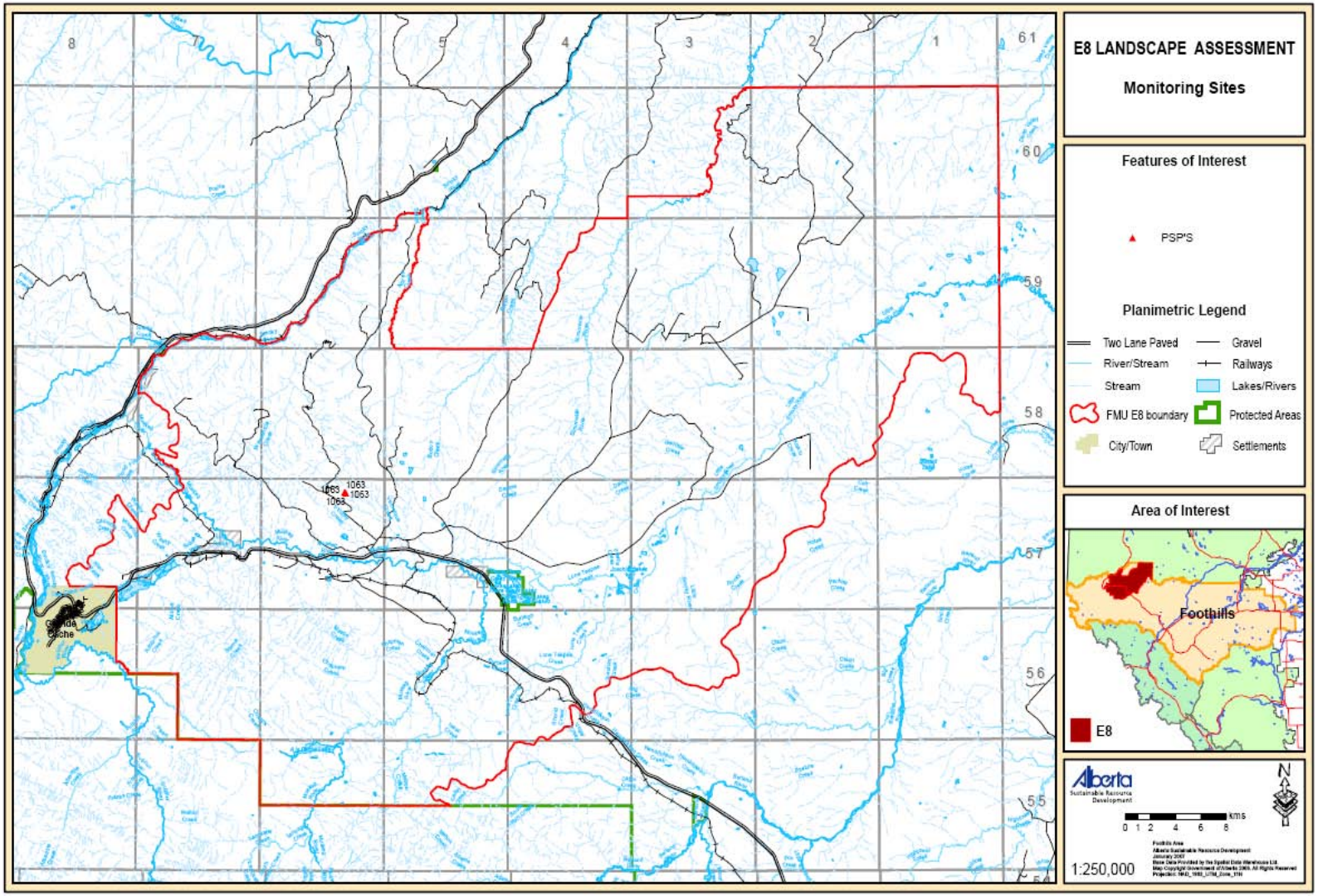


Figure 29: Monitoring Sites in E8.

The Highway 40 Demo project was designed to implement some of the learnings from the FRI Natural Disturbance project and test if a natural disturbance approach to forest and land management planning would address forest values more favourably than the traditional planning approach. A 70,000 ha area that encompasses two FMAs and one quota operator as well as the Willmore Wilderness Park was chosen. A project team was formed and began work on determining the size, shape and location of the disturbance event. Multiple objectives guided this process including:

- Landscape level fuel breaks,
- Demonstration abilities,
- MPB threat reduction,
- Direction from existing higher level forest management plans,
- Minimization of access, and
- Combined disturbance footprint.

After reviewing numerous options, the team chose an area along Hwy 40 that met the greatest number of objectives. It included Hinton Wood Products (HWP) FMA, ANC Newsprint Ltd FMA and portions of Foothills Forest Products E8 Quota. After considerable discussion, both Willmore and E8 were removed from the implementation plan. Normal approval processes were followed for the operational approval of the ANC and HWP plans, but with a focus on identifying prescribed burn opportunities and incorporating natural disturbance patterns into the harvest design. ANC has submitted their plan for approval while HWP is continuing work on their component.

A Policy for Resource Management of the Eastern Slope – revised 1984 (Eastern Slopes Policy) provides broad, landscape level direction on land and resource management through zonation of the area from the Montana/Alberta border to just north of Grande Prairie (Figure 30). All of FMU E8 falls within the policy area. Most of the area is zoned multiple use, with small areas recognized for their recreation potential; Pierre Grey Lakes, A la Peche Lake and Victor and Grande Cache lakes. In addition, a small amount of the Little Smoky River valley is also zoned recreational. There is a small area near the settlement of Muskeg zoned for facility. With these small exceptions, there is very little planning direction provided by this policy, largely due to the very broad, landscape level scale of the document.

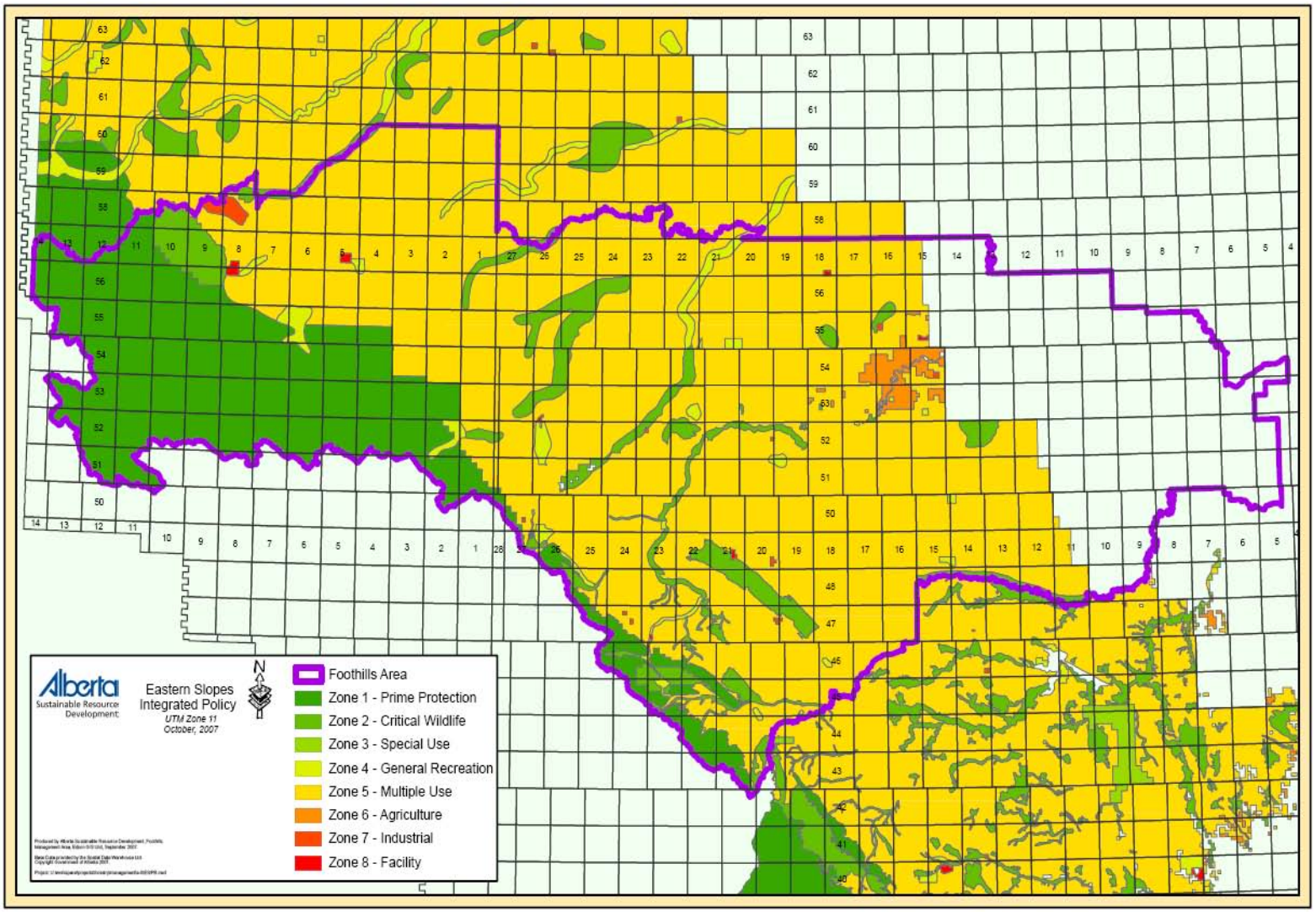


Figure 30: Eastern Slopes Policy Area in E8.

The Alberta Caribou Committee (ACC) is the group leading caribou conservation and recovery in Alberta. In response to recommendations made in the Alberta Woodland Caribou Recovery Plan, and received from the Boreal Caribou Committee, the Minister of Sustainable Resource Development has created the Alberta Caribou Committee. The ACC is open to representatives from the forest, peat and energy sectors, aboriginal groups, research scientists, environmental interest/conservation groups, and various provincial and federal government departments.

The ACC's goal is to maintain and recover woodland caribou in Alberta's forest ecosystems while providing opportunities for resource development, following guidance provided by the Alberta Woodland Caribou Recovery Plan, as qualified by the Minister of Sustainable Resource Development. There is an expectation that the ACC will oversee and coordinate provincial woodland caribou research. The ACC may recommend changes to government and industry policies and practices that will support, or are required for, provincial woodland caribou conservation and recovery. Caribou will be managed across five identified caribou landscapes in the province. The West Central Caribou Landscape Planning Team is included in the Foothills Forest Products land base. Initial landscape descriptions and strategies necessary to conserve caribou are expected in June 2007.

2.2.10 Recreation

Campground/Recreation Inventory

Recreation opportunities are readily available in the E8 FMU. There are Provincial Parks, a day use area, and many random camping areas embedded within the area. This inventory only includes recreation areas that are used throughout the year and does not include seasonal hunting camps as their locations can vary from year to year.

Mason Creek Recreation Area. This is a day use area managed by Foothills Forest Products with several facilities including fire pits, outhouses, picnic tables and an enclosed group cooking area. It is located north of Highway 40 across from the Millsite at the Junction of Mason Creek and the Muskeg River. It is primarily used by picnickers and fisherman.

Colter's Lease. This is an area located south of Highway 40 along the north bank of the Muskeg River. It is a large grassy meadow that was farmed in the past decades. There is some old farm machinery and some rustic campsites with stone fire rings. There are no designated sites and it remains unmanaged. A small Cadet camp is located in the area and is used as a training facility. This area is primarily used by local campers, fisherman and hunters.

A La Peche Lake. This area is a PNT and is currently unmanaged. There is a government ranger cabin on the east end of the lake at the end of the A La Peche trail. Found are a few day use fire rings located along the north end of the lake near the trail. This area is primarily used by ATV users, fishermen, mountain bikers, hunters and the occasional guide.

Pierre Greys Lakes. This is a Provincial campground located 32 km east of Grande Cache. It is managed by the ministry, Tourism, Parks, Recreation and Culture and has a wide diversity of campground facilities. Cross country skiing, mountain biking, fishing, and hiking are some the main activities done in the park.

Grande Cache Lake. This day use area is managed by the town of Grande Cache.

McDonald Flats. This area is located near the First Nations settlement of Susa Creek.

Cowlick Creek Staging Area. This area is located a few km east of Grande Cache and is one of the entry points into the Willmore Wilderness Park. It is also the trailhead for the Mt. Louie Trail.

Muskeg River Bridge. This random camping area is very popular with local outdoors enthusiasts from Grande Cache. It has several fire rings, and ATV'ing, fishing, and canoeing are the most popular activities done in the area.

Lone Teepee Creek. This random camping area is very popular with locals. There are two or three fire rings/campsites next to the muskeg river slightly downstream from where Lone Teepee Creek confluences. Fishing, and off highway vehicle use are the two most popular activities here.

Ghost Lakes. This area is protected under a PNT. It is 45 kilometres up the ghost main road another 45 kilometres off the West Ghost road. There are no campgrounds or recreation areas known to be here at this time.

2.2.11 Hiking Trail Inventory

Flood Mountain Trail- This trail leads up flood Mountain from Highway 40 near Susa Creek. This trail is used by local hikers and is a part of the Death Race Trail.

Cowlick Creek Trail- This is a main access route into the Willmore Wilderness Park. It enters and exits E8 along the Sulphur River Valley. It is primarily used by Guides and there are opportunities for hiking and mountain biking.

Mt. Louie Trail- This trail begins part way up the Cowlick creek trail and continues on to the summit of Mt. Louie. The trail offers excellent views of Grande Cache Lake, the town of Grande Cache, and the Willmore Wilderness Park.

Slugfest Trail- A short portion of this trail is contained in E8. It is part of the Death Race Trail and connects flood mountain with Grande Mountain.

Canadian Death Race Trail- The Canadian Death Race occurs every August long weekend in Grande Cache. The Death Race Trail only briefly leads through the Forest Management Unit E8. Half of Leg one (along highway 40 and the Lakes) and the first part of leg 2 (prior to reaching the slopes of Flood Mountain) travel through E8. Below is a description of trail (Figure 31).

First leg, 19 km. The Downtown Jaunt Approximately 6 km of pavement initially, followed by trail and 3.5 km of gravel road. It includes a net elevation loss of 500 feet, rolling hills with flat sections, several creek crossings and one significant downhill. The course will start in downtown Grande Cache and the race officially begins at the 5 km mark, after passing the Grande Cache Saddle club. It then continues past Grande Cache Lake and Peavine Lake, mainly on quad trails and including a section along a ridge. This section offers a spectacular view of Peavine Lake and the mountains of Willmore

Wilderness Park. After crossing Washy Creek and skirting the north end of the CN rail yard through a deep mud bog, is the first full aid station and relay exchange zone.

Second leg, 27 km. Flood & Grande Mountain Slugfest includes about 1 km of pavement. The rest is dirt trail with rocky and swampy sections, and approximately 6 km of hard packed dirt road. Net elevation gain is 500 feet, but the total elevation change is well over 6,000 feet. This leg of the race is characterized by long sustained climbing with about 3 km of very rough terrain and two creek crossings. The trail from the summit of Flood Mountain to the summit of Grande Mountain is the roughest piece of trail in the Death Race. The power line down the front of Grande Mountain leading back into town is the most dangerous part of the entire course. This is due to the steep, rocky drop-offs and unstable footing while running downhill. The Slugfest is the most technical section and is rated the second hardest leg of the Death Race (although many rate this leg as the hardest of all).

Third leg, 19 km. Old Mine Road (or "City Slicker Valley") includes 5 km of pavement: the rest is dirt road with several creek crossings. One creek runs right down the trail as you descend the first part of the Mine Road., making for very slippery, rocky terrain for 30 meters. This section passes through the lowest point in the race, hitting the very bottom of the Smoky River valley floor, with knee deep water for 25 meters. (If it's a wet summer, it's worse.) With a net elevation loss of about 1,000 feet, this section is the fastest and easiest of the race and one of the most beautiful, offering stunning views of the Smoky River valley.

Fourth leg, 38 km Hamel Assault is a mostly dirt trail and hard packed gravel. While the net elevation gain is zero, the total elevation change is well over 6,500 feet, which comes practically all at once. The ascent of Mount Hamel (elevation: 6,986 feet) is broken into two very long climbs, with one small reprieve as you gain the shoulder of the mountain at the mid-point. You will pass the Hamel Escape station where racers can bail out if they've had enough. At the forestry tower on the summit of Mount Hamel runners check in and then continue toward the spectacular cliff bluffs at Hell's Canyon, where they must retrieve a prayer flag as proof they have made the turnaround point. The descent is strewn with boulders and deep ruts. The downhill is not that technical, but any falls will be on very unforgiving ground. (Read the waiver section about being in remote areas and not being rescued in time to prevent serious injury or death.) This entire leg is fantastically scenic.

Fifth and final leg, 24km, The Raft Ride Home, includes 1 km pavement, 6 km gravel road, and a raft crossing. The rest dirt trail, grass, and single track. There is a net elevation change of over 2,500ft. This section runs from the Northwest end of the Hell's Gate Access Road southward to the Sulphur Gates Road, across from the Hell's Gate emergency aid station. The trail crosses the Hell's Gate road and heads down to the Boat Launch road Runners will be ferried across the Smoky River. There is an emergency aid station on the west bank of the river. From the raft crossing, racers will proceed up the east shore of the Smoky River and follow the trail to the Sulphur Rim trail. The course passes the Firemen's Park, heads up Firemen's Park Road and continues to the Finish line in the Grande Cache town square.

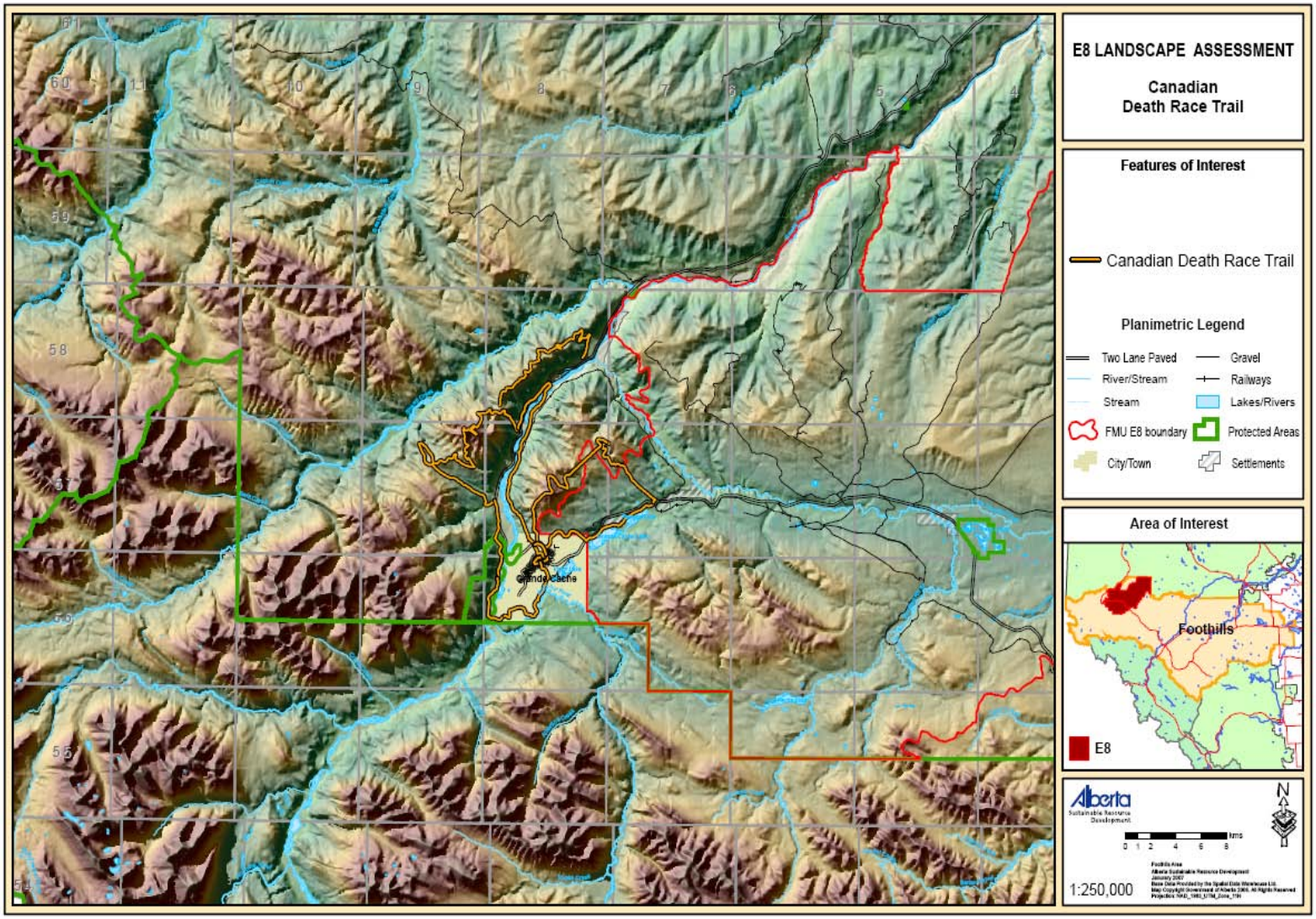


Figure 31: Canadian Death Race Trail.

2.2.12 Fish and Wildlife Resources

Caribou

Two woodland caribou populations; the Al La Peche and Little Smoky occupy E8 at different times of the year (Figure 32). Landscape alterations resulting from timber harvest and petroleum development is one of the several contributing complex and interrelated factors that have resulted in a decline in population number.

Alberta's approach to timber management in E8 is unique for two reasons; (1) establishing a maximum rate of timber harvest on a portion of the caribou range (SRD 2004) as a contributing attempt to allow persistence of woodland caribou, and (2) focusing wood fibre related economic benefit on end product value rather than volume of fibre extracted. Ultimately, the diminished size of remaining productive caribou range limits caribou population resilience to further damage of the remaining patches of caribou reproductive range. Allocations to further timber and petroleum extraction, obliges that both caribou range restoration and resource extraction be achieved simultaneously. This then forms the goal and challenge of E8.

In keeping with actions under the Alberta Caribou Recovery Plan, wolf control has been implemented in the Little Smoky herd range. Reduction of primary prey populations (deer, elk, and moose) by enhanced licensed hunting opportunity is anticipated by the West Central Plan.

Further results of the response of caribou and other significant wildlife to industrial alterations are expected to be available in 2008 from West-Central Alberta Caribou Committee research. Subsequently, further caribou research may become available from the Alberta Caribou Committee. Monitoring information will be available from SRD initiatives under the Alberta Caribou Recovery Plan. Additionally, A La Peche herd specific monitoring information may be available from the Highway 40 Planning team efforts are under discussion. Research initiatives proposed under the Highway 40 initiative, to date, have already been addressed at a superior level by completed research efforts.

Caribou range covers 166 601 ha of the 219,657 ha total in E8. Significant cutblock and petroleum related disturbance characterizes the northern portions of both the Al La Peche and Little Smoky caribou ranges. In an effort to meet fibre requirements and maintain caribou range the ranges of the two caribou herds were divided into north and south portions. Currently, the migration patterns of the A La Peche herd have changed and they are no longer utilizing all of their historical range.

The disturbed northern portions of both ranges will be managed under a strategy of extracting remaining second pass timber, and promoting forest regeneration suitable for caribou persistence, within an 80 year period. The remnant southern portions of both ranges will be managed utilising the "Intactness Areas" developed by the Foothills Landscape Forum (formerly CMLA). This will provide immediate and future range for caribou persistence for at least the next 20 years. Initial steps to achieve immediate caribou persistence in the southern portions of both ranges were the deferral of timber harvest for the first 20 year period.

Harlequin Duck Assessment

The Harlequin duck (*Histrionucus histrionucus*) is a small sea duck that occupies a niche different from all North American waterfowl, nesting in fast flowing, and turbulent east sloped stream in Alberta. The upper Muskeg River drainage supports harlequin duck nesting. Occupation of such a narrow ecological niche and limited geographic range, low density and low reproductive potentials render the species susceptible to changes in environmental conditions. Primary concerns for the species are; changes in hydrology and stream turbidity, or predator abundance, due to land use or vegetation cover changes.

Harlequin duck inventory, including locations of occurrence to enable habitat assessment, have been conducted in Willmore Wilderness Park and the Muskeg River drainage from 1998 to 2006. Continued collection of this information would be beneficial to FFP, providing that habitat requirements of harlequin ducks are determined so as to enable appropriate land management and timber harvest. Maintenance of riparian buffers and adherence to fisheries codes of practice including bridging access crossings, drilling or boring pipeline crossings and limiting industrial activities to winter will assist harlequin duck conservation.

Grizzly Bear

Grizzly bears are wide ranging, long lived, low productivity, low density, habitat generalists susceptible to population declines attributable to human caused mortality. Grizzly bear abundance, distribution and demographic performance (i.e. age class structure, survival and recruitment) are believed indicative of broad scale persistence of ecological processes and functions that cause and sustain the productivity and diversity of ecological communities. Grizzly bears are highly valued as an indicator of environmental sustainability and as a charismatic species.

Population estimates and trends have not been reported for lands that include the E8 forest management unit. Grizzly bear habitat mapping has been completed on lands that include the E8 Forest Management Unit. Mapping identifies grizzly bear habitat state based on probability of female grizzly bear occurrence and mortality risk; allowing mapping of relationships between demographic performance (survival and recruitment) and abundance and distribution. Five habitat states are defined and mapped:

- water, rock, ice, no data - resulting in low probability of female occurrence;
- secondary sink –moderate probability of female occurrence and high risk of mortality;
- primary sink – high probability of female occurrence and high risk of mortality;
- secondary habitat –moderate probability of female occurrence and low risk of mortality; and
- primary habitat – high probability of female occurrence and low risk of mortality.

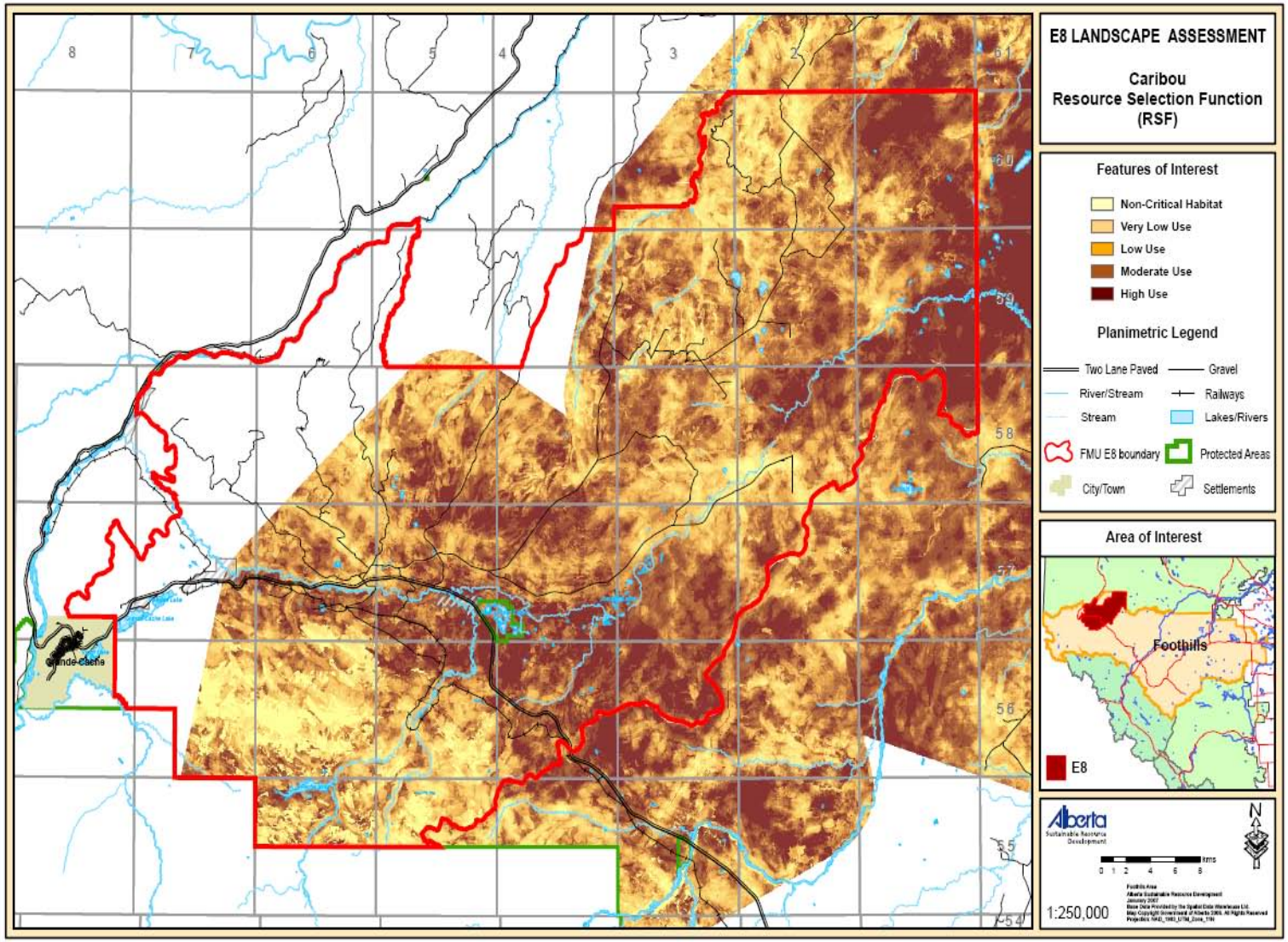


Figure 32: Caribou Habitat using the Resource Selection Function.

Grizzly bear habitat mapping indicates that E8 is a primary area for grizzly bear habitat restoration. Lands are predominately categorized as moderate to high probability for female grizzly bear occurrence with low mortality risk. These primary and secondary habitats are associated with protected areas, alpine and the Little Smoky and Al La Peche caribou ranges. Industrial development has not occurred or has been limited, and access development is typically limited to frozen or matted ground in the caribou ranges.

The preponderance of primary and secondary habitat available in E8, outside of Protected Areas or alpine is in marked contrast to the preponderance of primary and secondary sinks that characterize the foothills on surrounding lands. However, areas of high probability for mortality (primary sinks) occur in conjunction with industrial roads and anthropogenic food sources in the northern portion of E8. Significant numbers of mortalities occur in rare, concentrated sites. Documentation of this phenomenon on the Foothills Research Institute (FRI) land base corroborates findings by management agencies and research initiatives, throughout western North America, including Alberta.

Please refer to Section 13 for the "Analysis of Forest Management Activities on Grizzly Bear Habitat in FMU E8".

Fish Inventory and Distribution

There are 13 main species of fish found in E8. The locations of these are shown on the included map (Figure 33). Of these, one species is considered to be threatened under the Endangered Species Act, the Bull Trout (*Salvelinus confluentus*). The distribution of this fish is also indicated on the attached Fish Distribution map (Figure 33).

In terms of management for this species, Foothills Forest Products Inc. follows the Alberta Provincial Harvesting Ground Rules and the Watercourse Code of Practice to ensure that fish bearing streams are not harmed by forest management activities.

A study of the Bull Trout was completed by the Foothills Research Institute. A probability of fish capture by reach and probability of bull trout capture by basin study was completed. The maps which display the data are included in this section (Figure 34).

2.2.13 Wildlife Management Units

Wildlife Management Units (WMUs) are intended to allow population level management of wildlife species. WMU legal descriptions are based on geographic features to allow ease of identification. WMUs in and adjacent to E8 are listed and named as below in Table 4 and shown on a map in Figure 35.

Table 4: Wildlife Management Units in E8

WMU Number	WMU Name
344	Wildhay
352	Berland
353	Deep Valley
355	Redrock
356	Cutbank
440	Adams creek
441	Joachim
442	Sheep Creek
444	Mount Hamel
446	Kakwa river

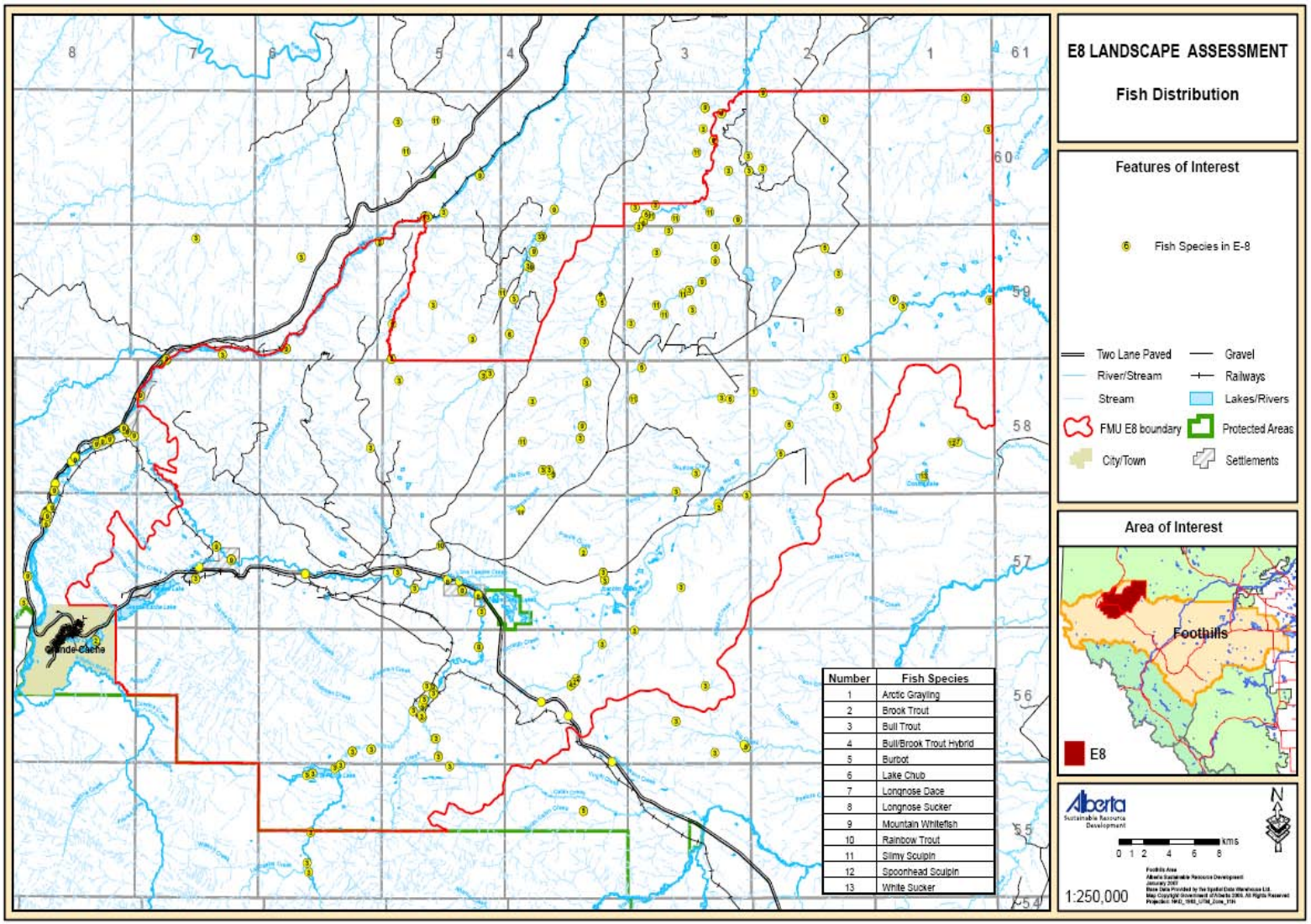


Figure 33: Fish Distribution in E8.

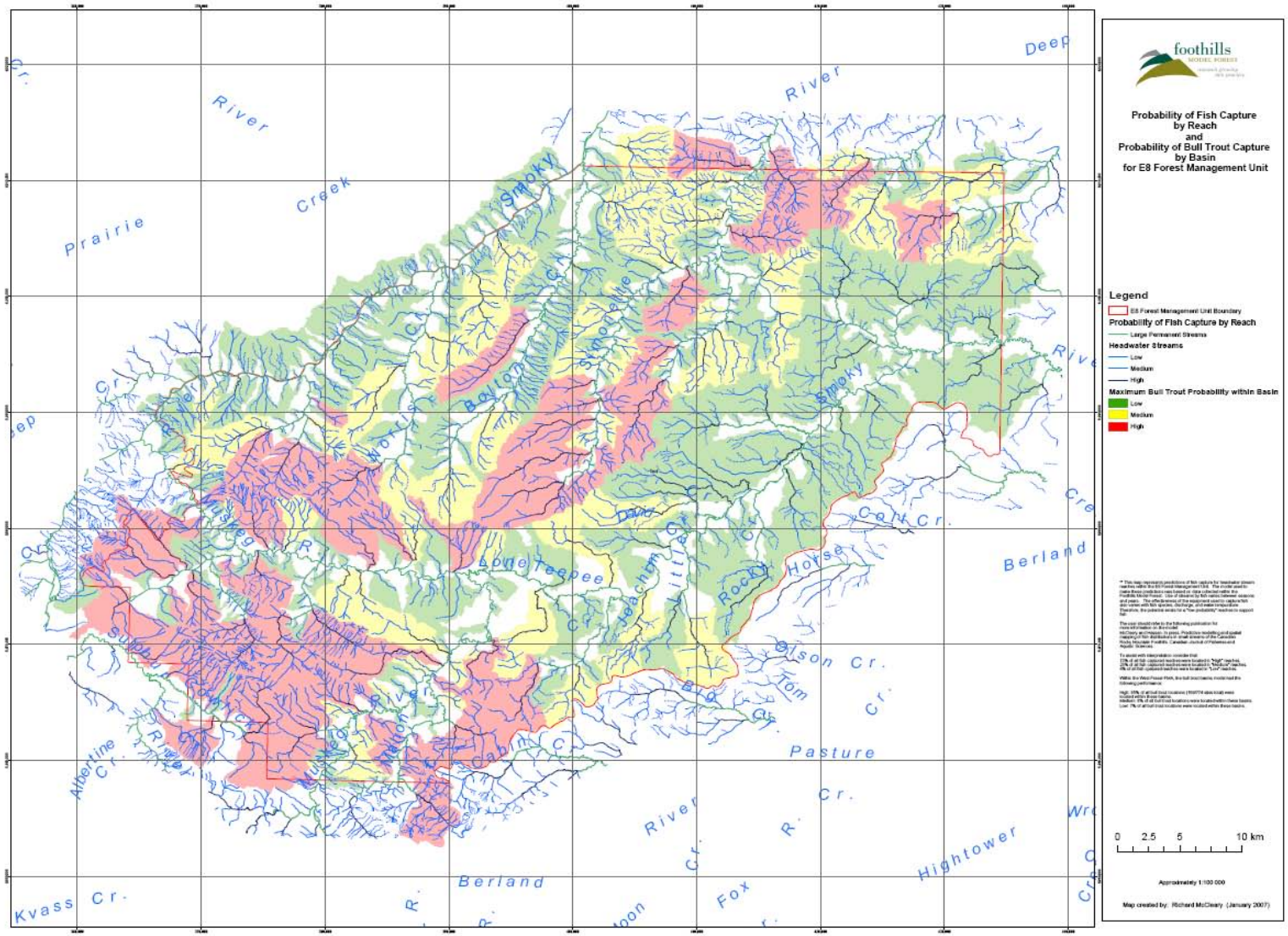


Figure 34: Probability of Fish Capture.

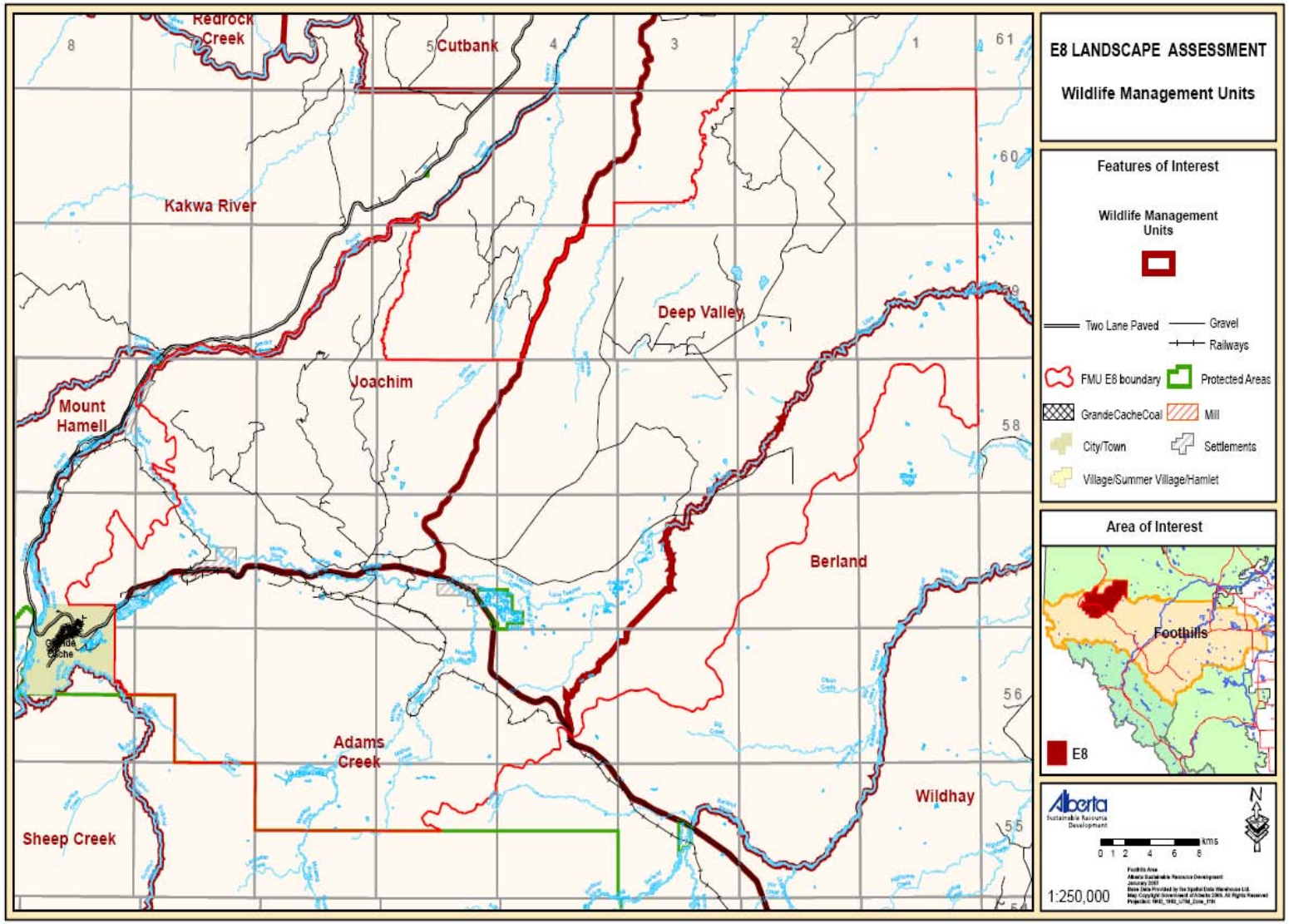


Figure 35: Wildlife Management Units in E8.

2.2.14 Fur Management Zones

Fur Management Zones (FMZs) are large tracts of land (as prescribed in legislation) having similar environmental features, to enable management of fur harvest. Two of the eight FMZs in Alberta occur within and adjacent to E8, and these are shown in Figure 36.

2.2.15 Historical Resources

A Historical Resource Assessment was completed for E8. There are 14 areas of historical significance located in E8, with only one being a Registered Historic Resource. Each historical resource listed has an assigned historical resource value. The highest rank is "1" and the lowest is "5". The higher the value, the less significant the resource is considered. There may be areas that are of historical significance which are not yet identified. These may be revealed through consultation efforts with the local community members and the AWN.

The included map shows the location, value, and description of the historical resources in E8 (Figure 37).

As other sites are identified, they will be reported to the Ministry of Tourism, Parks, Recreation and Culture. Areas that are currently identified as having high historical value and those discovered in the future will be addressed according to the requirements in Historical Resources Act.

2.2.16 Protected Areas

Displayed in Figure 38, are all of the known historical cabins, archaeological sites, historical & significant sites, trails and environmentally significant sites. The majority of these sites follow the major waterways within E8. Harvest Plans can be sent to the Foothills Research Institute (FRI) for historical resource assessments.

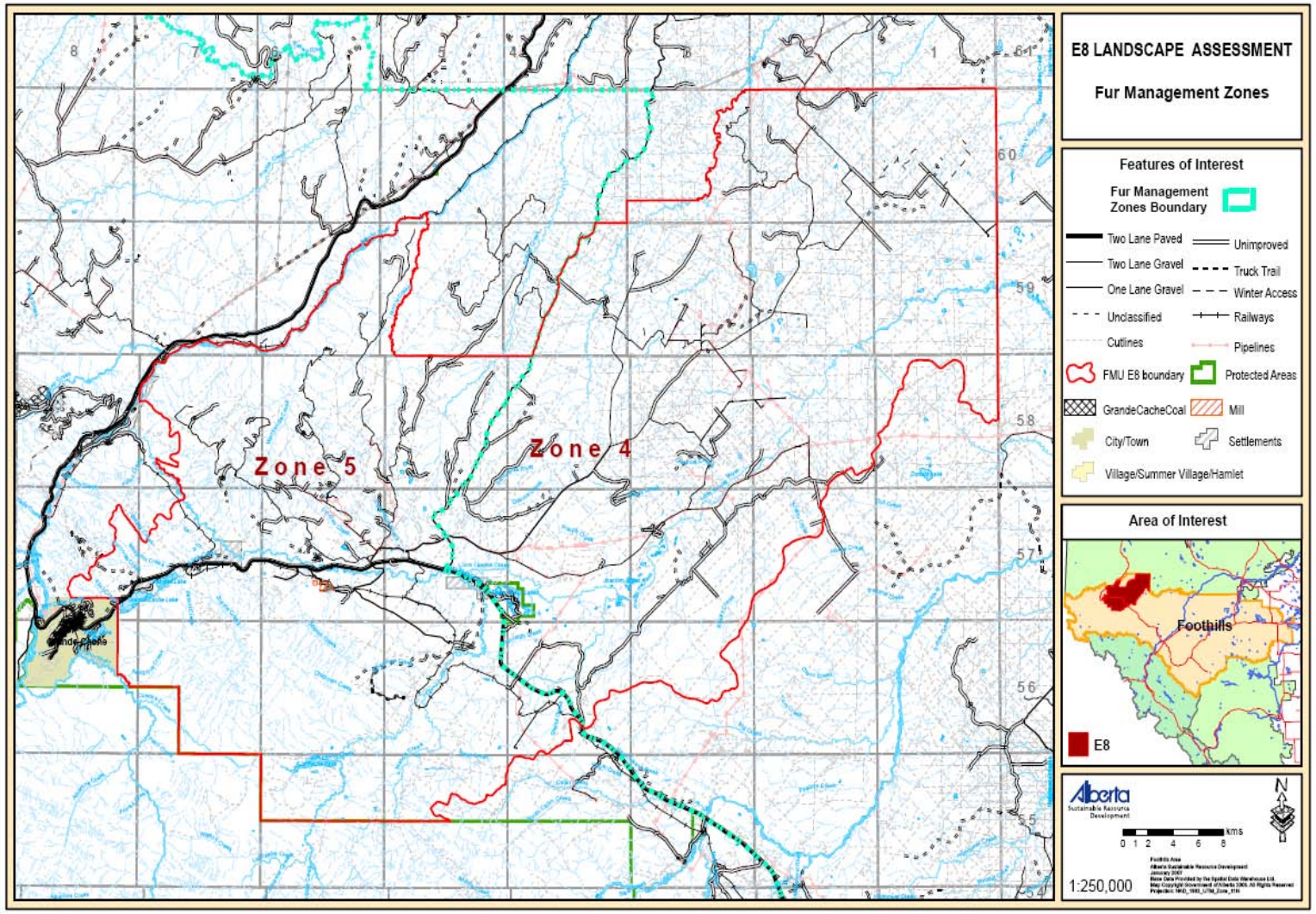


Figure 36: Fur Management Zones.

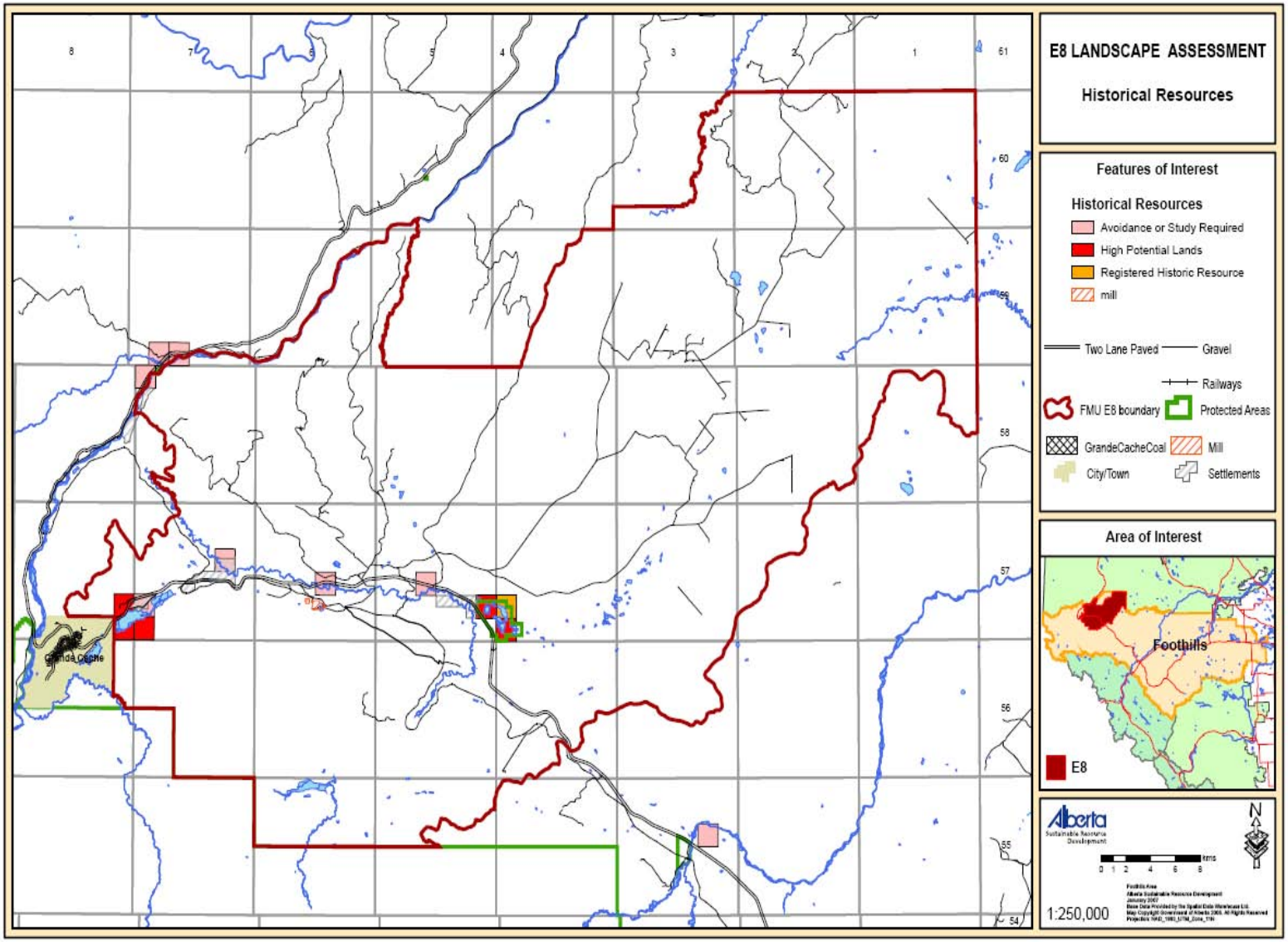


Figure 37: Historical Resources in E8.

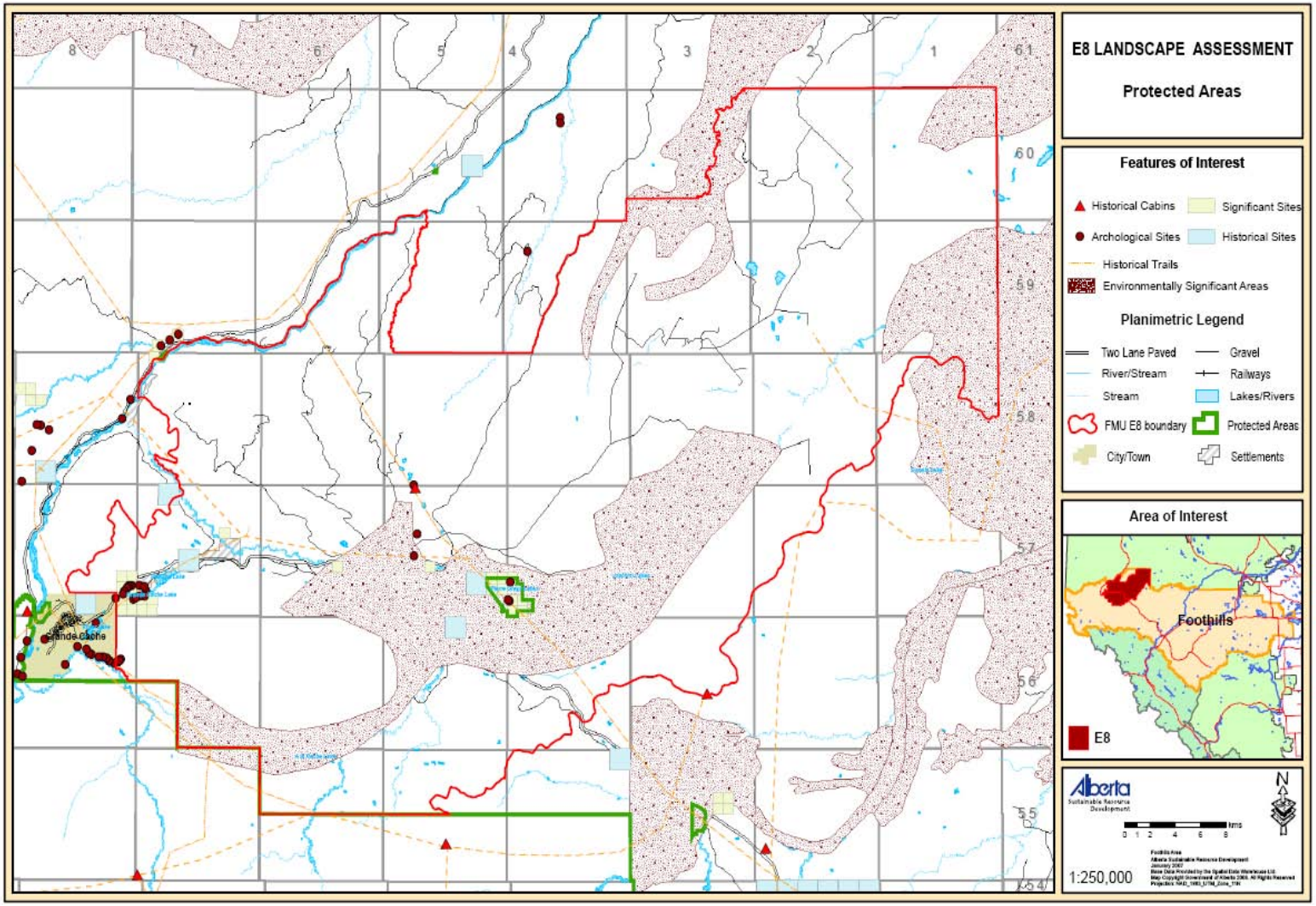


Figure 38: Protected Areas in E8.

2.2.17 Rare Plants and Animals Inventory

An inventory of rare plants and animals for E8 was obtained from the Alberta Natural Heritage Information Centre in March 2005. This inventory is illustrated in Figure 39 and Table 5. Thus far, 23 species of plants and animals have been identified. 100% of communities identified will be maintained. All areas that contain known uncommon species will be avoided to the extent feasible.

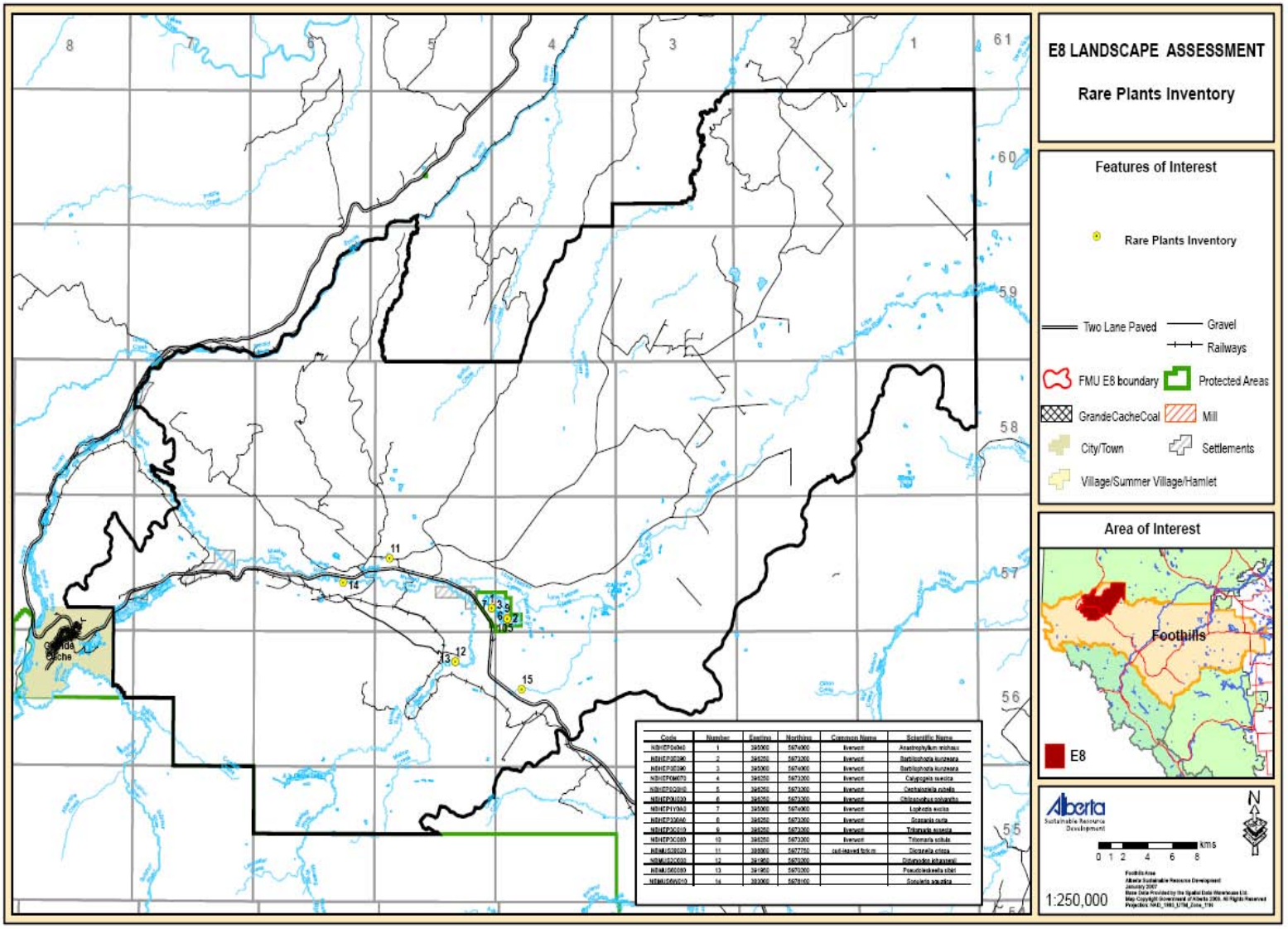


Figure 39 Rare Plant Inventory in E8.

Table 5: Rare Plant and Animal Communities found within E8.

Survey Date	Last Observation	1st Observation	Species Rank	Species Name	Species Common Name
7/28/1991	7/28/1991	7/28/1991	S2	*Boloria napaea*	Napaea Fritillary
8/18/1975	8/18/1975	8/18/1975	S1	*Anastrophyllum michauxii*	liverwort
8/18/1975	8/18/1975	8/18/1975	S2	*Barbilophozia kunzeana*	liverwort
XXXX-XX-XX	XXXX-XX-XX	XXXX-XX-XX	S2	*Barbilophozia kunzeana*	liverwort
8/18/1975	8/18/1975	8/18/1975	SNR	*Calypogeia suecica*	liverwort
8/18/1975	8/18/1975	8/18/1975	SNR	*Cephaloziella rubella*	liverwort
8/18/1975	8/18/1975	8/18/1975	S1	*Chiloscyphus polyanthos*	liverwort
10/9/1993	10/9/1993	10/9/1993	S1	*Gymnocolea inflata*	liverwort
8/18/1975	8/18/1975	8/18/1975	S2	*Lophozia excisa*	liverwort
8/18/1975	8/18/1975	8/18/1975	S2	*Scapania curta*	liverwort
8/18/1975	8/18/1975	8/18/1975	S1	*Tritomaria exsecta*	liverwort
8/18/1975	8/18/1975	8/18/1975	S2S3	*Tritomaria scitula*	liverwort
6/6/1972	6/6/1972	6/6/1972	S2	*Dicranella crispa*	curl-leaved fork moss
6/6/1972	6/6/1972	6/6/1972	S2	*Didymodon johansenii*	
6/6/1972	6/6/1972	6/6/1972	S2	*Pseudoleskeella sibirica*	
10/9/1993	10/9/1993	10/9/1993	S2	*Scouleria aquatica*	
6/6/1972	6/6/1972	6/6/1972	S1	*Schistidium pulvinatum*	
10/10/1993	10/10/1993	10/10/1993	S2S3	*Rhizomnium magnifolium*	
8/14/1980	8/14/1980	8/14/1980	S2	*Cladonia cyanipes*	
8/5/1964	8/5/1964	8/5/1964	S1	*Nephroma isidiosum*	
2003-XX-XX	2003-XX-XX	XXXX-XX-XX	S2	*Rangifer tarandus pop. 14*	Woodland Caribou -- boreal ecotype
2003-XX-XX	2003-XX-XX	XXXX-XX-XX	S1	*Rangifer tarandus pop. 1*	Woodland Caribou -- mountain ecotype
5/31/2000	5/31/2000	7/5/1991	S3B	*Histrionicus histrionicus*	Harlequin Duck