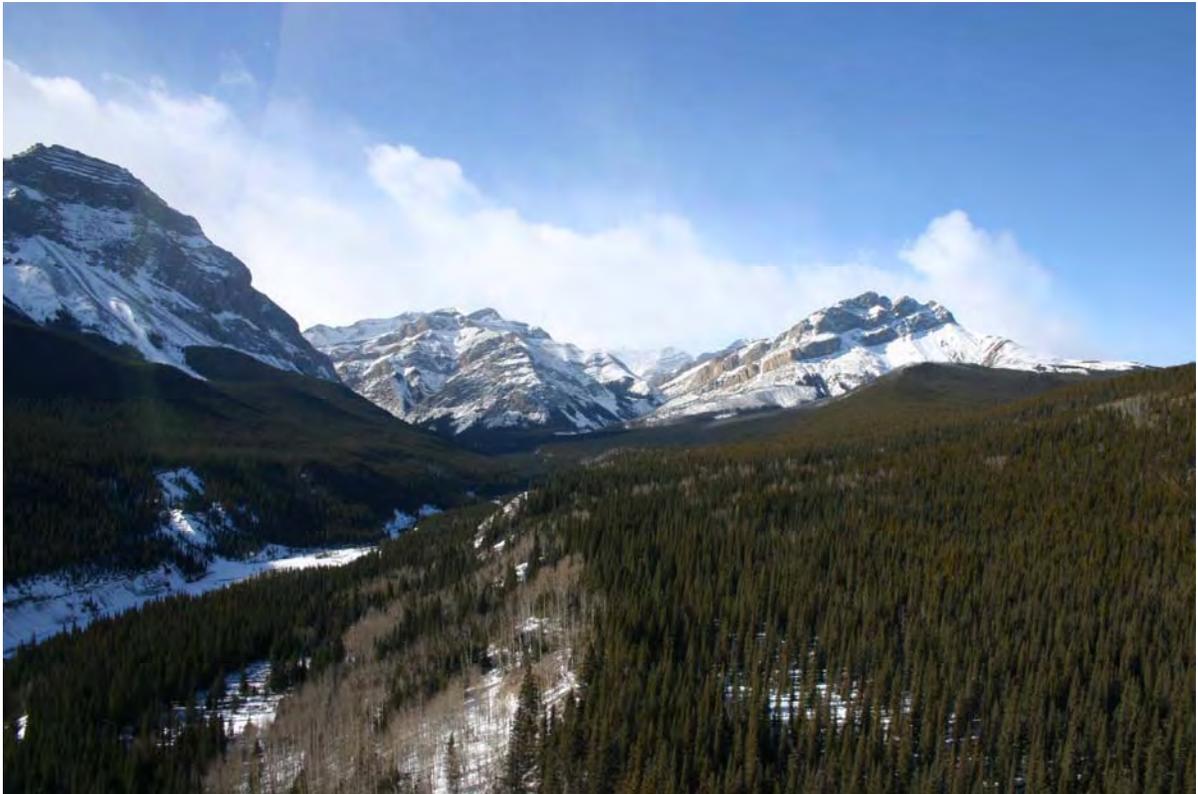


# **R11 Forest Management Plan**



**Alberta Sustainable Resource Development  
Forestry Division  
Clearwater Forest Area  
Rocky Mountain House, Alberta**

## **Acknowledgements**

The Planning Team would like to extend their appreciation to the following participants in the Charrette process who contributed the time and energy necessary to develop the framework for this plan: Nathan Ambler, Alan Ernst, Rhonda King, Colin Kure, Arin MacFarlane-Dyer, Dwight Oliver, Cal Rakach, and Cliff White. Their knowledge of the R11 Forest Management Unit and willingness to participate in a novel public input process helped strengthen the forest management plan for this important area. Gratitude is also expressed to Elizabeth Anderson who drafted much of the text, edited Planning Team submissions, and prepared the final document.

## Executive Summary

### Background

The R11 Forest Management Unit (FMU), also known as the Bighorn Backcountry, encompasses 521,900 ha of Rocky Mountains and foothills adjacent to Banff and Jasper National Parks. The Whitegoat and Siffleur Wilderness Areas as well as the Sundre Forest Products, Weyerhaeuser, and Sundance Forest Industries Forest Management Areas surround R11. Levels of human development within the R11 FMU are relatively low. Large-scale timber harvesting has been absent from the landbase, though small-scale harvesting has occurred for various purposes such as railway and mining construction and firewood cutting. Similarly, oil and gas development and exploration has been somewhat rare as hydrocarbon resources are typically located deep. However, the breathtaking beauty of the R11 area has resulted in tremendous recreational pressure, including both personal and commercial recreation. Alberta Sustainable Resource Development (ASRD) in consultation with the Bighorn Advisory Group developed a *Bighorn Backcountry Access Management Plan* in 2002 to protect the area's wilderness environment by providing explicit guidelines as to when and what recreational activities are permitted in a given area.

Wildfire, insect outbreaks, and diseases represent the primary natural disturbance agents historically present within the Alberta mountains and foothills. These disturbances created a mosaic of forest habitat types and ages across the landscape. However, decades of fire suppression to protect human development and values have altered the fire regime. Lack of disturbance from harvesting or natural fires has allowed fuel indices and mountain pine beetle risk to reach extreme levels, making the R11 area very susceptible to sudden, dramatic, and massive stand-level changes. As most timber in the R11 FMU remains unallocated, the Forestry Division of ASRD is charged with the prompt development of a forest management plan (FMP) that will create a more stable forest better able to provide the variety of values and services generated by this area. Specifically, this means creating a forest condition that

- reduces the threat of large-scale, catastrophic wildfire to existing and adjacent values,
- reduces the threat of a large mountain pine beetle outbreak,
- provides sufficient suitable habitat to maintain or improve a healthy grizzly bear population,
- provides sufficient suitable habitat to maintain or improve elk populations,
- maintains the visual qualities of the landscape,
- diversifies the stand age and tree species composition to provide habitat to a wider range of organisms,
- maintains healthy riparian ecosystems and the health of watershed values for the aquatic ecosystem and downstream users, and
- provides sufficient suitable habitat to maintain or improve conditions for specified endangered flora/fauna species.

### Planning Process

Planning Team members from Alberta Sustainable Resource Development, Alberta Tourism, Parks, Recreation, and Culture, and Alberta Conservation Association created a set of general values, objectives, indicators, and targets (VOITs) guided by the *Alberta Forest Management Planning Standard Version 4.1* as well as the national criteria for sustainable forest management. The Planning Team undertook a public Charrette process to acquire the specific values and objectives stakeholders wished to have encompassed in the future R11 landscape. This process incorporated the following stages: (1) Stakeholder Identification, (2) Process Scope and Guideline Development, (3) Preliminary Stakeholder Input, (4) Charrette Orientation Session, (5) Charrette Planning Session, (6) Plan Synthesis and Review, and (7)

Plan Approval. Stakeholders participating in the initial meetings and/or the intensive planning session included commercial users, recreational users, environmental or cultural users, fish and wildlife associations, adjacent land managers, and municipal and provincial governments.

The Planning Team established some minimal guidelines required from a government perspective that also helped provide direction for stakeholder participants and land managers developing the FMP. Specifically, the plan must

- Adhere to Integrated Resource Plans, legislation, and any existing landscape plans for the area including existing prescribed burn plans, existing FireSmart initiatives, Wilderness Area plans, *Bighorn Backcountry Access Management Plan*, and Forest Land Use Zones.
- Reduce number of high/extreme fire risk stands by a minimum 5%.
- Reduce the threat of escaped wildfire to surrounding forests outside of the R11 area, the Hamlet of Nordegg, Big Horn Reserve, and resorts, campgrounds, and lodges in the R11 planning area.
- Not create new permanent access.
- Not suggest prescribed burn ignitions in Wilderness Areas.
- Use indicators derived from existing government data.

Participants in the initial stakeholder meetings and the intensive Charrette planning session on September 14-16, 2005 brought forward core ecological, economic, and social values of importance, which were developed into 47 unique objectives that provide the management direction contained in this document.

## Plan Philosophy

When the composition, structure, and ecological processes of a forested ecosystem occur within their natural ranges of variation (NRV), the ecosystem can withstand or recover from most perturbations imposed by natural environmental forces or human disturbances. Attempting to manage a forest landscape within the context of natural spatial and temporal variation thus provides a range of acceptable management outcomes. Furthermore, such an approach provides a coarse-filter management strategy that is likely to conserve biological diversity in most associated species, communities, environments, and ecological processes, even in the absence of complete information. Particular species of concern, such as species-at-risk or species with high economic or cultural value, may require additional management activities to ensure their conservation (i.e., fine-filter management).

Healthy, productive forests contribute multiple benefits beyond those realized in an ecological context. Economic benefits can result from such activities as tourism and trapping, while social values encompassed in a sustainable forest can include aesthetic qualities, traditional or cultural sites, and a desirable and safe landscape for those living and recreating therein. This R11 Forest Management Plan provides the sustainable forest management direction that will maintain these multiple values for current and future generations. This FMP is novel in Alberta in that (1) public involvement occurred before formal plan development; (2) a long-term, even-flow supply of timber was not desired given the lack of timber commitments in the FMU; and (3) prescribed fire will be used as the primary management tool in many areas, with mechanical treatments (primarily harvesting) playing a secondary role.

## Key Values, Objectives, Indicators, and Targets

Several significant VOITs emerged from the planning process and are summarized below. Early public input recommended that the Planning Team utilize a natural disturbance emulation approach, based on the best available research. Thus, research findings from the Foothills Model Forest Natural Disturbance Program and the associated Highway 40 North Demonstration Project form the basis for many landscape-

level VOITs. Other ecological values not highlighted below relate to plant, fish, and wildlife species diversity, genetic diversity, sensitive sites, and watershed integrity. Economic values include domestic grazing and recreational opportunities, while social values captured in this plan include wildfire threat, inherent cultural and aesthetic values, recreational opportunities, access, community integrity, information and education, multi-agency cooperation, and public safety.

**Value:** Biodiversity – Ecosystem Diversity

**Objective:** Conserve ecosystem diversity by emulating natural disturbance patterns and the range of variation therein.

**Indicator:** Treatment size and residual pattern.

**Target:** Treatment size and pattern within the natural range of variation:  $>2/3$  of treatment events will be 600 ha or larger. The planning boundaries for individual treatment events will provide a minimum of 15% remnant undisturbed forest, with the average amount of post-treatment remnant area falling between 29% and 49%.

**Background:** Although the majority of wildfires in the foothills and mountains are small (<10 ha), it is the few large fires (>10,000 ha) that have the greatest impact on the landscape. R11 treatment activities will focus on creating 600ha+ events, although multiple treatments over a series of years may be clustered to emulate larger natural burns. Foothills Model Forest Natural Disturbance Program research also showed an average 39% (range: 15-62%) of the area within and around the perimeter of a burn remained as undisturbed forest remnants (i.e., islands and peninsulas). Prescribed burn and harvest planning will attempt to retain similar levels of residual structure within treatment events.

**Value:** Biodiversity - Ecosystem Diversity

**Objective:** Conserve ecosystem diversity by emulating natural disturbance patterns and the natural range of variation therein.

**Indicator:** Stand age distribution by area.

**Target:** Area of young (<20 years) and old (>180 years) forests falls within the NRV for each natural subregion.

**Background:** In the primarily fire-adapted R11 forest ecosystem, the associated fire regime will determine the amount of forest in various age classes at a given point in time. Fire cycle is one component of the fire regime, and can be used to model natural stand age distribution in a given natural subregion. The NRV in stand age distribution was estimated using a negative exponential function applied to the range of fire cycles reported for each natural subregion. In all natural subregions, the percentage area of young forest (0-20 yrs) currently observed is less than the expected NRV, while the amount of mature forest (101-180 yrs) exceeds the expected range. Treatment activities will target mature age classes to return the stand age back within the NRV (Table A).

Table A. Current and predicted % of forest area within the young and old age classes after one fire cycle length, based on disturbance from prescribed burn and harvest treatments alone or treatments plus the current wildfire rate over the last 20 years.

Natural Subregion	Age Class	Current	NRV	Predicted - treatments alone	Predicted - treatments + wildfire
Subalpine	Young	2	6-20	8	9
Subalpine	Old	23	14-55	48	42
Montane	Young	4	6-39	11	12
Montane	Old	6	1-55	36	31
Upper Foothills	Young	4	17-42	12	13
Upper Foothills	Old	7	1-18	32	28
Lower Foothills	Young	0	16-32	10	10

Lower Foothills	Old	45	3-20	39	39
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**Value:** Ecosystem Integrity and Productivity  
**Objective:** Maintain natural disturbance patterns at the landscape level.  
**Indicator:** Area disturbed per decade by natural subregion.  
**Target:** Periodic disturbance rate of 50% of the median reported fire cycle for forested and non-forested areas within each natural subregion (Table B).

Table B. Target treatment rates per decade for the forested and vegetated non-forest (i.e., herbaceous and shrubby meadow) areas of the R11 FMU.

Natural Subregion	Forested Area (ha)	Vegetated Non-forest Area (ha)
Alpine	378	168
Subalpine	7966	746
Montane	1387	178
Upper Foothills	3579	322
Lower Foothills	24	8

**Background:** Over the past 20 years, <5000 ha of young forest have been created by natural disturbance and prescribed burning. This is less than 40% of that expected based on the longest reported fire cycles and an order of magnitude less than the median reported fire cycles. As a result, the landscape disturbance rate has moved towards a much longer fire cycle than is natural. Ten-year disturbance targets have been set at 50% of the median reported fire cycle for each natural subregion to allow a substantial buffer for natural wildfire and overachievement of these targets while still remaining within the NRV for fire cycles.

**Value:** Ecosystem Integrity and Productivity  
**Objective:** Maintain natural disturbance patterns at the landscape level.  
**Indicator:** Disturbance via natural processes where appropriate.  
**Target:** Identification of natural fire zones for different Head Fire Intensities.

**Background:** The use of prescribed fire requires fuel management activities such as the establishment of strategic fuel breaks and fire doors on the landscape. Once such features are established, natural fire zones will be delineated where natural fire processes are permitted and suppression activities are limited.

**Value:** Ecosystem Integrity and Productivity  
**Objective:** Maintain natural disturbance patterns at the landscape level.  
**Indicator:** Fire intensity.  
**Target:** Distribution of Head Fire Intensity ranks across the landscape.

**Background:** Areas with high fuel build-up, such as the mature and old age classes created by decades of fire suppression activities within R11, are susceptible to intense, difficult to control fires under appropriate weather conditions. Treatment activities will reduce the forest age class structure and fuel loads to ensure a mosaic of predicted intensities across the landscape.

**Value:** Ecosystem Integrity and Productivity  
**Objective:** Allow natural reforestation processes in disturbed areas.  
**Indicator:** Area burned or harvested and left for natural regeneration.  
**Target:** 90% of burned or harvested areas will be left for natural regeneration.

**Background:** Commercial timber harvest in Alberta normally requires artificial reforestation under the authority of the Timber Management Regulation. Several benefits may accrue by leaving disturbances to go through natural reforestation processes including fewer financial costs, regeneration of trees and other

plant species carrying genes specifically adapted to that area, less potential for introduction of non-native weed species, and longer duration before crown closure providing enhanced forage for ungulates. Accordingly, natural reforestation processes will be permitted in disturbed areas within R11.

**Value:** Forest Health

**Objective:** Reduce the impact of mountain pine beetle.

**Indicator:** Stand Susceptibility Index.

**Target:** 75% reduction in the area of highly susceptible stands currently projected in 20 years.

**Background:** Altered fire regimes, which have left more mature and old-growth forests on the landscape, coupled with a changing climate, which has increased over-winter survival of larvae, have given rise to mountain pine beetle infestations in British Columbia and some areas of Alberta. Although mountain pine beetle has not yet been detected within R11, this species is spreading eastward through most of the major mountain passes. Three major factors define a stand's likelihood of mountain pine beetle attack and subsequent mortality: Mountain Pine Beetle Stand Susceptibility Index, climate suitability, and proximity to existing beetle populations. Currently, there are 54,341 ha of highly susceptible stands within R11 (i.e., Rank 1 stands are typically comprised of large, old pine, close to existing beetle populations, and/or in areas that are climatically suitable for beetle development). Proposed prescribed burning and harvesting treatments will target these stands, reducing the area of highly susceptible stands by 66%.

## Implementation

As part of the Charrette planning session, participants developed a conceptual operating plan that would satisfy the VOITs. The mapping exercise focused on dissecting the Forest Land Use Zones according to the preferred disturbance method (i.e., landscape-level decisions) rather than identifying specific areas to disturb (i.e., stand-level decisions). The resulting vegetation management zone map will be used by government land managers to identify specific areas to be treated as well as the timing of those treatment events. These proposed treatments will be conducted within 50 years and may be broken into smaller treatment units for logistical reasons. Related management activities have already been initiated or have been ongoing for several years (e.g., FireSmart planning and harvesting around Nordegg, prescribed burn planning, preparation of a Fire Management Plan). Stewardship Reports will be completed at five-year intervals to summarize progress.

## Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Historical Disturbance Within R11 .....	1
1.2	Sustainable Forest Management and Guiding Documents .....	5
1.3	Purpose and Scope of the FMP .....	6
1.4	Planning Team .....	7
1.5	Planning Stages and Milestones .....	7
<b>2</b>	<b>Landscape Description .....</b>	<b>12</b>
2.1	Administrative Boundaries .....	12
2.2	Natural Subregions .....	23
2.2.1	Alpine Natural Subregion .....	26
2.2.2	Subalpine Natural Subregion .....	30
2.2.3	Montane Natural Subregion .....	30
2.2.4	Upper Foothills Natural Subregion .....	31
2.2.5	Lower Foothills Natural Subregion .....	31
2.3	Forest Landscape Pattern and Structure .....	32
2.4	Fire Disturbance .....	38
2.4.1	Fire Regime .....	38
2.4.1.1	Fire Frequency .....	38
2.4.1.2	Fire Size .....	40
2.4.1.3	Fire Cause .....	43
2.4.1.4	Fire Season .....	46
2.4.1.5	Topographic Influences .....	46
2.4.2	Wildfire Threat Assessment .....	46
2.4.2.1	Fire Behaviour Potential .....	50
2.4.2.2	Fire Occurrence Risk .....	50
2.4.2.3	Values At Risk .....	50
2.4.2.4	Suppression Capability .....	55
2.4.2.5	Overall Wildfire Threat .....	55
2.5	Forest Health .....	60
2.5.1	Insects and Diseases .....	60
2.5.2	Non-native, Invasive Plants .....	62
2.5.3	Wind and Other Disturbances .....	62
2.6	Land and Resource Use .....	65
2.6.1	Infrastructure .....	65
2.6.2	Resource Extraction .....	65
2.6.3	Recreation and Tourism .....	71
2.6.4	Heritage and Culture .....	73
2.6.5	Visual Resources .....	74
2.6.6	Fish and Wildlife .....	76
2.6.7	Environmentally Significant Areas .....	79
<b>3</b>	<b>Values, Objectives, Indicators, and Targets for the Desired Future Forest .....</b>	<b>81</b>
3.1	Ecological Values and Objectives .....	81
3.2	Economic Values and Objectives .....	83

3.3	Social Values and Objectives .....	83
3.4	Indicators and Targets.....	84
3.5	Forest Management Direction .....	85
3.6	Detailed Indicator Sheets.....	81
<b>4</b>	<b>Operational Plan.....</b>	<b>230</b>
<b>5</b>	<b>Monitoring and Reporting Process.....</b>	<b>236</b>
<b>6</b>	<b>References.....</b>	<b>237</b>
<b>7</b>	<b>Glossary .....</b>	<b>244</b>
<b>8</b>	<b>Acronym Summary .....</b>	<b>256</b>

## List of Appendices

Appendix I. Preliminary Stakeholder Input: Values Identification Report .....	257
Appendix II. Rare Vascular Plant Species Potentially Found in the R11 Forest Management Unit .....	295
Appendix III. Environmentally Significant Areas and Special Features Found in the R11 Forest Management Unit .....	306

## List of Figures

Figure 1. Summary of planning stages in the development of the R11 Forest Management Plan. ....	9
Figure 2. Area of each natural subregion found within the R11 FMU.....	23
Figure 3. Dominant vegetation cover of the R11 landbase. ....	33
Figure 4. Seral stage area within the R11 FMU. Non-vegetated landbase or cover types where age is unknown (e.g., meadows) are excluded. Seral stages follow Andison (2000): young 0-20 yrs, pole 21-100 yrs, mature 101-180 yrs, and old >180 yrs.....	36
Figure 5. Percentage of the total number of fires and area burned (ha) for each fire size class within the R11 FMU between 1967 and 2006.....	41
Figure 6. General cause of wildfires within the R11 FMU between 1961 and 2001. ....	43
Figure 7. Distribution of historical disturbance event sizes in the Upper Foothills and Subalpine Natural Subregions (taken from Andison 2006a).....	98
Figure 8. Projected percentage of area disturbed in event size classes for each R11 natural subregion based on proposed harvest and prescribed burn treatments.....	100
Figure 9. Current percentage of the R11 FMU within each fire behaviour potential class during the spring season. ....	198
Figure 10. Current percentage of the R11 FMU within each fire behaviour potential class during the summer season. ....	198
Figure 11. Current percentage of the R11 FMU within each fire behaviour potential class during the fall season.....	199
Figure 12. Annual number of human-caused wildfires in the R11 FMU. Prior to 2001, abandoned, smouldering campfires were not recorded as wildfires and thus such data are not presented here. ....	202
Figure 13. Traffic counts from the Banff National Park East Gate on Highway 1. ....	215

Figure 14. Traffic counts from the Banff National Park East Gate on Highway 11. .... 216  
 Figure 15. Visitor counts from the Nordegg Heritage Centre tourist information booth. .... 216  
 Figure 16. Number of commercial trail riding “horse days” in and near the R11 FMU. .... 217  
 Figure 17. Backcountry travel voluntary registration at the Nordegg Ranger Station. .... 217

**List of Tables**

Table 1. Protected Areas within the R11 FMU administered by Alberta Tourism, Parks, Recreation, and Culture. .... 17  
 Table 2. Area covered by third-order watersheds within the R11 FMU ..... 26  
 Table 3. Reference sites showing typical overstory and understory vegetation and associated soils for each natural subregion found within R11 (adapted from Natural Regions Committee 2006). .... 32  
 Table 4. Area of each vegetation cover classification within the R11 landbase. .... 35  
 Table 5. Linear features within the R11 RMU. .... 36  
 Table 6. Seral stage area in hectares within each natural subregion found in the R11 FMU. The numbers in brackets represent the percentage area of the natural subregion in a given seral stage..... 37  
 Table 7. Fire frequency within the R11 FMU between 1967 and 2006. .... 39  
 Table 8. Basic wildfire statistics for natural subregions found within the R11 FMU as adapted from Tymstra et al. (2005). Note that these statistics are based on the fire regime after the onset of fire suppression activities and are for natural subregions at the provincial level. .... 39  
 Table 9. Fire frequency by size class within the R11 FMU between 1967 and 2006. .... 40  
 Table 10. Hectares burned by size class within the R11 FMU between 1967 and 2006..... 40  
 Table 11. Native forest health agents in the R11 FMU. .... 60  
 Table 12. Amount of the R11 FMU covered by human land uses. .... 65  
 Table 13. Current status ranking of high priority mammal, bird, reptile, amphibian, fish, and butterfly species thought to occur within the R11 FMU (adapted from ASRD 2006a). Plant species are listed in Appendix II. .... 76  
 Table 14. Summary of VOITs. .... 87  
 Table 15. Estimated natural range and actual percentage of the forest area in each age class within the Subalpine Natural Subregion in R11. .... 103  
 Table 16. Estimated natural range and actual percentage of the forest area in each age class within the Montane Natural Subregion in R11. .... 103  
 Table 17. Estimated natural range and actual percentage of the forest area in each age class within the Upper Foothills Natural Subregion in R11. .... 103  
 Table 18. Estimated natural range and actual percentage of the forest area in each age class within the Lower Foothills Natural Subregion in R11. .... 104  
 Table 19. Predicted percentage of forest area within the young and old age classes after a 200 year planning cycle, based on disturbance from prescribed burn and harvest treatments alone or treatments plus the current wildfire rate over the last 20 years. .... 104  
 Table 20. Potentially occurring and known ANHIC Ecological Community Tracking List communities within the R11 FMU. .... 107

Table 21. Current percentage of forest in each age class in areas identified as capable of supporting a given ungulate species throughout the year, compared to the natural range of variation.....	134
Table 22. Current percentage of forest in each age class in areas identified as capable of supporting a given ungulate species during the winter, compared to the natural range of variation.....	135
Table 23. Fur harvest returns for traplines within R11.....	148
Table 24. Watercourses within the R11 FMU on which Harlequin ducks have been observed. Note that the observation location itself may not be within the R11 boundaries. Records of most observations are stored in the Biodiversity/Species Observation Database and are summarized in MacCallum (2001). .....	150
Table 25. Target treatment rates per decade for the forested and vegetated non-forest (i.e., herbaceous and shrubby meadow) areas of the R11 FMU.....	162
Table 26. Forested area disturbed in each natural subregion in the R11 FMU between 1987 and 2006. ....	162
Table 27. Current disturbance rate compared to the median and range of natural fire cycles reported in Appendix III, Tymstra et al. (2005). ....	163
Table 28. Forecasted disturbance cycles (fire plus mechanical disturbance) for each natural subregion in the R11 FMU. ....	163
Table 29. Pine stand ranking system for Prevention (Pine) Strategy FMP planning and implementation (taken from Government of Alberta 2006c). ....	178

## List of Maps

Map 1. Location of R11 Forest Management Unit in the province of Alberta. ....	3
Map 2. Forest Management Agreements (FMA) adjacent to the R11 FMU.....	13
Map 3. Municipal counties, districts, and development nodes overlapped by the R11 FMU.14	
Map 4. Eastern Slopes Integrated Policy land use zones in the R11 FMU. ....	16
Map 5. Protected Areas within and adjacent to the R11 FMU.....	18
Map 6. Wildlife Management Units (WMU) overlapped by the R11 FMU. ....	20
Map 7. Bear Management Units (BMU) overlapped by the R11 FMU.....	21
Map 8. Forest Land Use Zones (FLUZ) within the R11 FMU.....	22
Map 9. Natural subregions overlapped by the R11 FMU.....	24
Map 10. Third-order watersheds found within the R11 FMU.....	25
Map 11. Slopes found within the R11 landbase. ....	27
Map 12. Mean annual temperature throughout the R11 FMU. ....	28
Map 13. Mean annual precipitation throughout the R11 FMU. ....	29
Map 14. Location of vegetation types within the R11 FMU.....	34
Map 15. Historic wildfires greater than 200 ha in size within the R11 FMU. ....	42
Map 16. Wildfire occurrence within the R11 FMU between 1993 and 2004. ....	44
Map 17. Lightning strikes density within and adjacent to the R11 FMU from 2001 to 2005.45	
Map 18. Fire behaviour potential ratings within R11 during the spring. ....	47
Map 19. Fire behaviour potential ratings within R11 during the summer.....	48
Map 20. Fire behaviour potential ratings within R11 during the fall. ....	49
Map 21. Fire occurrence risk ratings in R11 during the spring.....	51

Map 22. Fire occurrence risk ratings in R11 during the summer. ....	52
Map 23. Fire occurrence risk ratings in R11 during the fall.....	53
Map 24. Values at risk ratings within R11. ....	54
Map 25. Suppression capability within R11.....	56
Map 26. Overall wildfire threat rating in R11 during the spring.....	57
Map 27. Overall wildfire threat rating in R11 during the summer.....	58
Map 28. Overall wildfire threat rating in R11 during the fall. ....	59
Map 29. Mountain pine beetle hazard in R11. A Stand Susceptibility Index of 0 indicates the lowest hazard while an index of 14 indicates the highest hazard. ....	63
Map 30. Known weed sites in the R11 FMU as of 2006.....	64
Map 31. Human footprint within the R11 FMU.....	66
Map 32. Oil and gas development within and adjacent to the R11 FMU. ....	67
Map 33. Registered Fur Management Areas within and adjacent to the R11 FMU. ....	69
Map 34. Grazing allotments within and adjacent to the R11 FMU.....	70
Map 35. Trails, random sledding areas, and other recreational facilities in the R11 FMU....	72
Map 36. Visibility rankings of landscape near Highway 11. ....	75
Map 37. Provincially and nationally Environmentally Significant Areas (ESA) within and adjacent to the R11 FMU. ESAs were identified from Sweetgrass Consultants (1997); note that ESAs identified in Timoney (1998) are not included here. ....	80
Map 38. Location of known and suspected whitebark and limber pine stands in the R11 FMU.....	112
Map 39. Historical location of the only known wood anemone population within the R11 FMU.....	120
Map 40. Locations of known Lapland rose-bay populations with the R11 FMU.....	122
Map 41. Code of Practice for Watercourse Crossings map showing the Restricted Activity Periods for various watersheds within the R11 FMU. Watersheds identified in blue contain bull trout while brown indicates cutthroat trout and green indicates both bull trout.....	129
Map 42. Ungulate habitat limitation rating for R11 based on the Canada Land Inventory. A rating of 1 indicates the least limitations and thus the highest habitat capability.....	137
Map 43. Sample resource selection function map for grizzly bear based on the FMF Grizzly Bear Planning Tools. ....	144
Map 44. Approximate range boundaries and area of occurrence for the South Jasper and North Banff woodland caribou herds. (taken from Alberta Woodland Caribou Recovery Team 2005).....	154
Map 45. Head Fire Intensity ranks for the R11 FMU in spring 2005. Ranks range from a smouldering, creeping ground fire (Rank 1) to a conflagration with extreme fire behaviour (Rank 6). ....	168
Map 46. Head Fire Intensity ranks for the R11 FMU in summer 2005. Ranks range from a smouldering, creeping ground fire (Rank 1) to a conflagration with extreme fire behaviour (Rank 6). ....	169
Map 47. Head Fire Intensity ranks for the R11 FMU in fall 2005. Ranks range from a smouldering, creeping ground fire (Rank 1) to a conflagration with extreme fire behaviour (Rank 6). ....	170
Map 48. Vegetation Management Zones where particular management treatments will be used within the R11 FMU. ....	195

Map 49. Distribution of human-caused wildfires in the R11 FMU between 1996 and 2005. .... 201

Map 50. Conceptual operating plan map produced by Charrette participants outlining the general areas to be treated using specific vegetation management techniques. .... 231

Map 51. Vegetation management zones for the R11 FMU delineated based on the results of the Charrette mapping exercise. .... 233

Map 52. Proposed operational treatment boundaries in the R11 FMU ..... 235

# 1 Introduction

The R11 Forest Management Unit (FMU) encompasses 521,900 hectares of Rocky Mountains and foothills adjacent to Banff and Jasper National Parks (Map 1). The Whitegoat and Siffleur Wilderness Areas as well as the Sundre Forest Products, Weyerhaeuser, and Sundance Forest Industries Forest Management Agreement (FMA) areas surround the management unit. The lands covered by the R11 FMU are commonly known as the Bighorn Backcountry. Although there are no large timber commitments and a relatively small amount of oil and gas development, the breathtaking beauty of the R11 area has resulted in tremendous recreational pressure, including commercial recreation. Lack of disturbance from harvesting or natural fires has allowed fuel indices and mountain pine beetle risk to reach extreme levels, making the area very susceptible to sudden, dramatic, and massive stand-level changes.

Alberta Sustainable Resource Development (ASRD) is responsible for the administration of provincial forests and the determination of the Annual Allowable Cut allocated to various FMA holders. The relevant forest companies must prepare forest management plans (FMP) to describe how harvesting operations will be delivered and how they will affect both the timber resource and other resource values and uses contained within the landbase. As most timber in the R11 FMU remains unallocated, the Forestry Division of ASRD is charged with preparing the forest management plan for R11. The prompt development of a FMP was deemed prudent to evaluate alternative forest management strategies that will create a more stable forest; a forest better able to provide the variety of values and services generated by this area. Specifically, this means creating a forest condition that

- reduces the threat of large-scale, catastrophic wildfire to existing and adjacent values,
- reduces the threat of a large mountain pine beetle outbreak,
- provides sufficient suitable habitat to maintain or improve a healthy grizzly bear population,
- provides sufficient suitable habitat to maintain or improve elk populations,
- maintains the visual qualities of the landscape,
- diversifies the stand age and tree species composition to provide habitat to a wider range of organisms,
- maintains healthy riparian ecosystems and the health of watershed values for the aquatic ecosystem and downstream users, and
- provides sufficient suitable habitat to maintain or improve conditions for specified endangered flora/fauna species.

Goals delineated in this R11 Forest Management Plan will primarily be achieved through prescribed fire and harvest to result in a more biologically diverse and resilient ecosystem. There is no objective to create a long-term, even-flow of timber.

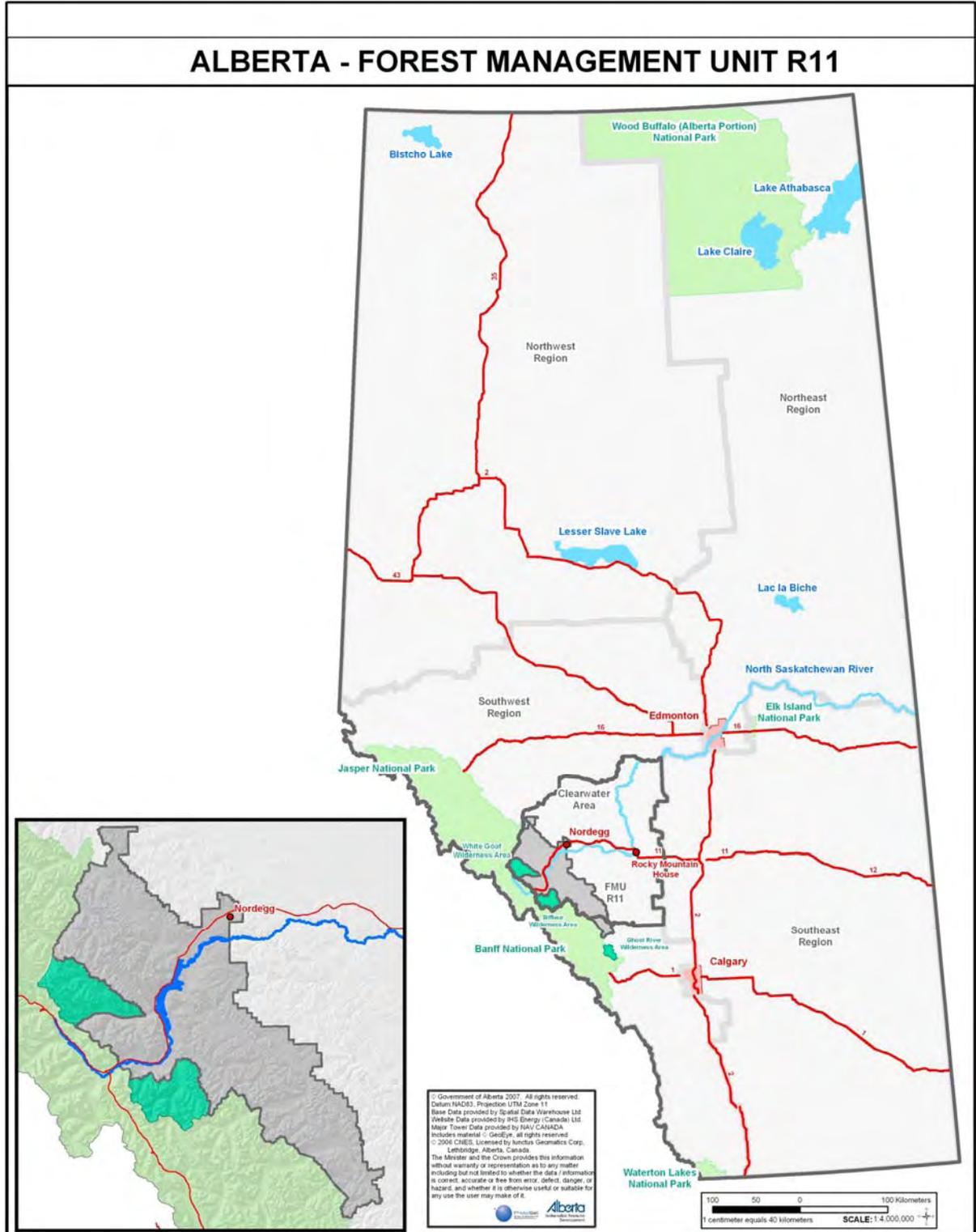
## 1.1 Historical Disturbance Within R11

Wildfire (both lightning and native-set fires), insect outbreaks, and diseases represent the primary natural disturbance agents historically present within the mountains and foothills of

Alberta prior to European settlement. These disturbances created a mosaic of forest habitat types and ages across the landscape. Extensive forest fires swept through the east slopes between 1889 and 1891 (Tymstra et al. 2005). However, decades of fire suppression to protect human development and values have altered the fire regime throughout much of the province, including the R11 area. This altered fire regime has created a more uniform landscape with a much older stand age distribution than may have existed for hundreds or even thousands of years (Pengelly and Rogeau 2001; Delong and Pengelly 2002). Increased fuel loads in the older forests further augment the potential for large, uncontrollable wildfires.



**Historical and recent photographs of Shunda Mountain (left) and Coliseum Mountain (right) showing the change in forest cover on the slopes**

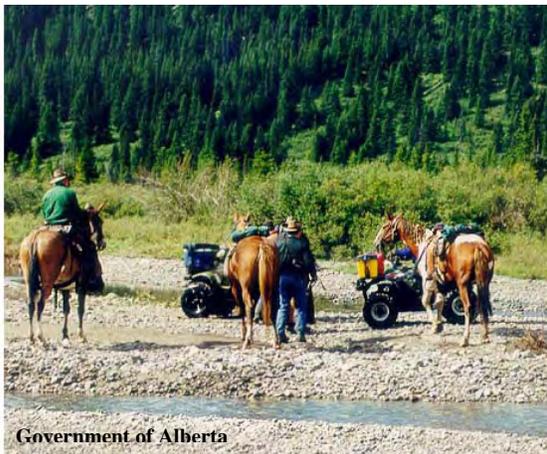


Map 1. Location of R11 Forest Management Unit in the province of Alberta.

Although mountain pine beetle is a native insect pest in temperate, lodgepole pine forests of western North America, most of Alberta is considered outside its natural range. Lodgepole pine forests here have thus evolved in the absence of mountain pine beetle, and there have been no historic outbreaks within the R11 area. However, altered fire regimes that have left more mature and old-growth forests on the landscape coupled with a changing climate that has increased over-winter survival of larvae have given rise to mountain pine beetle infestations in areas considered outside their historic distribution (e.g., Willmore Wilderness Park). British Columbia is dealing with a major mountain pine beetle outbreak, and the beetle continues to spread eastward into Alberta. The Forestry Division of ASRD has undertaken an aggressive control program to cut and burn individual infested trees; however, there is still concern that mature pine stands along the eastern slopes in R11 are vulnerable to mountain pine beetle attack.

Levels of human development within the R11 FMU are relatively low; however, the area has nonetheless experienced human disturbances in addition to fire suppression. Archaeological evidence estimates native occupation up to 10,000 years ago; First Nations peoples currently occupy the Big Horn Reserve (established in 1947) and use several ceremonial sites within the FMU. The North Saskatchewan River valley and Howse Pass were a traditional travel route through the mountains for the native Stoney Indians and their rivals, the Kootenay Indians. European explorers, fur traders, and settlers also used this route in the last 200 years, although the first clearing for the David Thompson Highway, the main east-west transportation corridor through R11, did not begin until 1958. The present all-weather highway opened in 1975. Construction of the Bighorn Dam on the North Saskatchewan River in 1972 flooded over 32 km of valley bottom, including important winter habitat for ungulates and several First Nations gravesites. Mining development within R11 has been minimal, with the exception of the Brazeau Collieries in Nordegg. The collieries operated from about 1910 to 1955 and at one time represented Canada's largest source of coal briquettes for railway and domestic fuel. Trappers have historically harvested furbearer populations throughout the FMU, and livestock grazing occurs along the southeastern boundary. Herds of feral horses also roam the forests in parts of the R11 FMU.

Perhaps the most pervasive and intensive human use of the R11 area over the past century has been recreation, both personal and commercial. For example, the forestry lookout on top of Coliseum Mountain, the first of its kind in Alberta, became a popular destination for hikes



Government of Alberta

**Equestrian and motorized users recreating in R11**

after its construction in 1927. The Ya Ha Tinda area has been used since 1905 to raise, train, and overwinter horses, initially by the Brewster family for their outfitting company and later by the National Park Warden Service for their patrol horses. Outdoor enthusiasts have used the forest management unit for a wide variety of activities including quadding, snowmobiling, equestrian trail riding, hunting, fishing, hiking, camping, mountain biking, skiing, ice and rock climbing, caving, etc. Commercial recreational use also continues to

the present day with several outfitting and trail riding companies, hospitality services, adventure camps, and a helicopter sightseeing operation. To protect the area's wilderness environment, ASRD in consultation with the Bighorn Advisory Group developed a *Bighorn Backcountry Access Management Plan* in 2002 to provide explicit guidelines as to what recreational access and activities are permitted in each area at given times of the year.

Large-scale timber harvesting has been absent from the R11 landbase, though small-scale harvesting has occurred for various purposes (e.g., railway and mining construction, habitat improvement projects, firewood cutting, fire salvage operations, FireSmart activities, etc.). Historical harvesting was concentrated in eastern portions of the FMU, and there are currently no timber commitments. Similarly, oil and gas development and exploration has been somewhat rare in R11 compared to many areas of the province. The first modern geophysical exploration took place in the mid-1950s. Although there have been sales of geophysical resources through much of R11, these resources are typically located deep, and relatively little development has taken place.

The land, water, plants, and wildlife in the R11 FMU have long been valued and altered by human use, but significant changes have occurred over the last century as a result of fire suppression, industrial and commercial development, and recreational enthusiasts. Accordingly, alternative management is imperative to “maintain and enhance the long-term health of the forest ecosystem, while providing ecological, economic, social, and cultural opportunities for the benefit of present and future generations” (CSA 2002); in other words, sustainable forest management is needed.

## **1.2 Sustainable Forest Management and Guiding Documents**

Sustainable forest management (SFM) arose through recognition of the multiple values provided by public forests and the need to consider these values when conducting forest management activities. Accordingly, forest management planning underwent a paradigm shift in the 1990s from sustained yield of timber to sustained yield of multiple values. Nowhere is this perhaps more important than in the R11 FMU where there are no forest tenure agreements or allocated annual cuts but instead are various other environmental, social, cultural, and economic considerations.

The Canadian Council of Forest Ministers (CCFM) developed a framework for achieving and evaluating sustainable forest management in Canada. The framework is summarized in *Defining Sustainable Forest Management in Canada: Criteria and Indicators 2003* and is based on six broad criteria that represent forest values Canadians wish to sustain and several supporting indicators that assess the forest state and measure progress over time (CCFM 2003). This CCFM framework has also been adopted in the Canadian Standards Association (CSA) standard entitled *CAN/CSA-Z809-02 Sustainable Forest Management: Requirements and Guidance* (CSA 2002). The standard provides guidance on the management framework, performance requirements, review of actions, public participation, and continual improvement for forest managers seeking certification of their forest management area. Although the CAN/CSA-Z809-02 document was consulted in the preparation of the R11 Forest Management Plan, ASRD does not intend to proceed with certification at this time

under CSA or any other certification standard (e.g., Forest Stewardship Council Principles and Criteria, Sustainable Forest Initiative Standard).

At the provincial level, the *Alberta Forest Legacy* represents the Alberta government's policy on sustainable forest management. Guidelines on how to develop an appropriate forest management plan to implement the SFM approach are contained in the recent *Alberta Forest Management Planning Standard Version 4.1* (ASRD 2006). The Planning Standard also draws heavily on the CSA document, and thus both documents were used in concert when developing the R11 Forest Management Plan. Note that Version 1a of the Planning Standard was in effect at the outset of the R11 planning process.

### **1.3 Purpose and Scope of the FMP**

The R11 Forest Management Unit was developed in 2001 as a result of a boundary alignment project initiated by Spray Lake Sawmills, Sunpine Forest Products Ltd.(now Sundre Forest Products Inc.), and Weyerhaeuser Canada Forest Management Agreement holders. The intent was to realign FMA boundaries to simplify administration of timber dispositions embedded within neighboring FMAs. As part of the project, many of the smaller FMUs were eliminated, resulting in one FMU for each FMA (Sunpine - R10 FMU; Weyerhaeuser - R12 FMU). All area to the west of both FMAs was amalgamated into the R11 FMU. Thus, R11 is composed of portions of the former R3, R6, R8, R9, and B6 FMUs. These former FMUs each had traditional sustained yield management plans completed for May 1, 1986 implementation, and had revisions and updates in May 1996. The resulting harvesting in each unit was predominantly east of the current R11 FMU. The current plan will be the first forest management plan for Bighorn Backcountry from a sustainable forest management approach. Furthermore, the R11 Forest Management Plan is unique among most plans in Alberta in that it follows the SFM approach without providing a long-term supply of timber for a forestry company. Rather, the goal of the plan is to manage the R11 forest in a manner that creates a future forest condition that is more desirable than that which would result from the continuation of current forest management strategies.

This FMP will provide landscape-level direction for forest management activities directed at creating a stable and resilient future forest that provides the multiple values currently important in the R11 area. Other strategic plans provide additional direction for non-timber land uses and, in many cases, take precedence over this FMP. To minimize conflict between plans, the objectives detailed in this document are aligned wherever possible with the guidance or regulations encompassed in these other plans. Existing land use plans include

- A Policy for Resource Management of the Eastern Slopes, Revised 1984
- Nordegg-Red Deer River Sub-Regional Integrated Resource Plan
- David Thompson Corridor Local Integrated Resource Plan
- Bighorn Backcountry Access Management Plan
- Forest Land Use Zones
- Protected Areas Management Plans

Although the R11 FMP will not apply to any private or federal lands within the FMU (i.e., Big Horn Reserve, Ya Ha Tinda), opportunities to coordinate management activities will be pursued.

This FMP should be viewed as a dynamic document that will require updating as additional data and information become available. As such, some elements of the *Alberta Forest Management Planning Standard* are addressed only tangentially or not at all: future versions of this FMP will address these issues more completely. Specifically, a few objectives detailed in Annex 4 – Performance Standards are not dealt with directly in the objectives, indicators, and targets outlined in this plan. A 50-year planning horizon was used in this iteration instead of the 200-year planning horizon required by the Planning Standard. Finally, this FMP does not include a Timber Supply Analysis as a long-term, even-flow supply is not an objective.

#### **1.4 Planning Team**

The R11 FMP planning process was initiated during the summer of 2004 as a collaborative effort between Alberta Sustainable Resource Development Forestry Division, ASRD Fish and Wildlife Division, Alberta Tourism, Parks, Recreation, and Culture (ATPRC), and Alberta Conservation Association (ACA). The Planning Team was composed of the following representatives:

##### Project Leaders

Kevin Gagne, Senior Forester, Forestry Division, ASRD  
Dan Lux, Forest Health Officer, Forestry Division, ASRD

##### Team Members

Gary Mandrusiak, Fire Prevention Officer, Forestry Division, ASRD  
Jim Allen, Wildlife Biologist, Fish and Wildlife Division, ASRD  
Robert Anderson, Habitat Coordinator, ACA  
Myles Jensen, District Team Leader, ATPRC  
Steve Herman, Fisheries Technician, Fish and Wildlife Division, ASRD  
Ksenija Vujnovic, Heritage Protection Specialist, ATPRC  
Stephen Wills, Forest Planner, Forestry Division, ASRD  
Anne Murphy, GIS Technician, ASRD  
Yvette Choma, Administrative Support, ASRD  
Rita Stagman, Administrative Support, ASRD

#### **1.5 Planning Stages and Milestones**

Planning team members met from September 2004 until January 2005 to create a set of key values, objectives, indicators, and targets (VOITs) as directed by the *Alberta Forest Management Planning Standard*. In order to gather useful, timely, and cost-effective input from the public, the Planning Team researched various multi-stakeholder processes and decided that a Charrette input gathering process would be appropriate. Accordingly, the team delineated the following stages to facilitate the creation of the R11 Forest Management

Plan (Figure 1): (1) Stakeholder Identification, (2) Process Scope and Guideline Development, (3) Preliminary Stakeholder Input, (4) Charrette Orientation Session, (5) Charrette Planning Session, (6) Plan Synthesis and Review, and (7) Plan Approval. These stages are discussed briefly below and described in further detail in the *Preliminary Stakeholder Input: Values Identification* report included in Appendix 1. Laslo (*in prep*) also provides further details on how to design and implement a public Charrette process, using the R11 Forest Management Plan as a case study.

**Stakeholder Identification** – Stakeholders having an interest in the R11 Forest Management Unit were identified based on the list of stakeholders derived from the *Bighorn Backcountry Access Management Plan* process and invited to participate in the planning process. The 61 stakeholder groups were organized into clusters based on similar interests and values, and a separate meeting was scheduled for each group. The interest clusters were as follows:

- Adjacent Land Managers
- Commercial Users (Accommodations/Helicopter Operators)
- Commercial Users (Trappers/Recreation/Industrial)
- Environmental/Cultural Users
- Fish and Wildlife Associations
- Municipal and Provincial Governments
- Recreational Users

**Process Scope and Guideline Development** – The Planning Team established some minimal guidelines required of the forest management plan from a government perspective. These guidelines provided direction for stakeholder participants in the process, as well as land managers developing the FMP. Specifically, the plan must

- Adhere to Integrated Resource Plans (IRPs), legislation, and any existing landscape plans for the area including existing prescribed burn plans, existing FireSmart initiatives, Wilderness Area plans, *Bighorn Backcountry Access Management Plan*, and Forest Land Use Zones (FLUZ).
- Reduce number of high/extreme fire risk stands by a minimum 5%.
- Reduce the threat of escaped wildfire to surrounding forests outside of the R11 area, the Hamlet of Nordegg, Big Horn Reserve, and resorts, campgrounds, and lodges in the R11 planning area.
- Not create new permanent access.
- Not suggest prescribed burn ignitions in Wilderness Areas.
- Use indicators derived from existing government data.

### Planning Process Summary

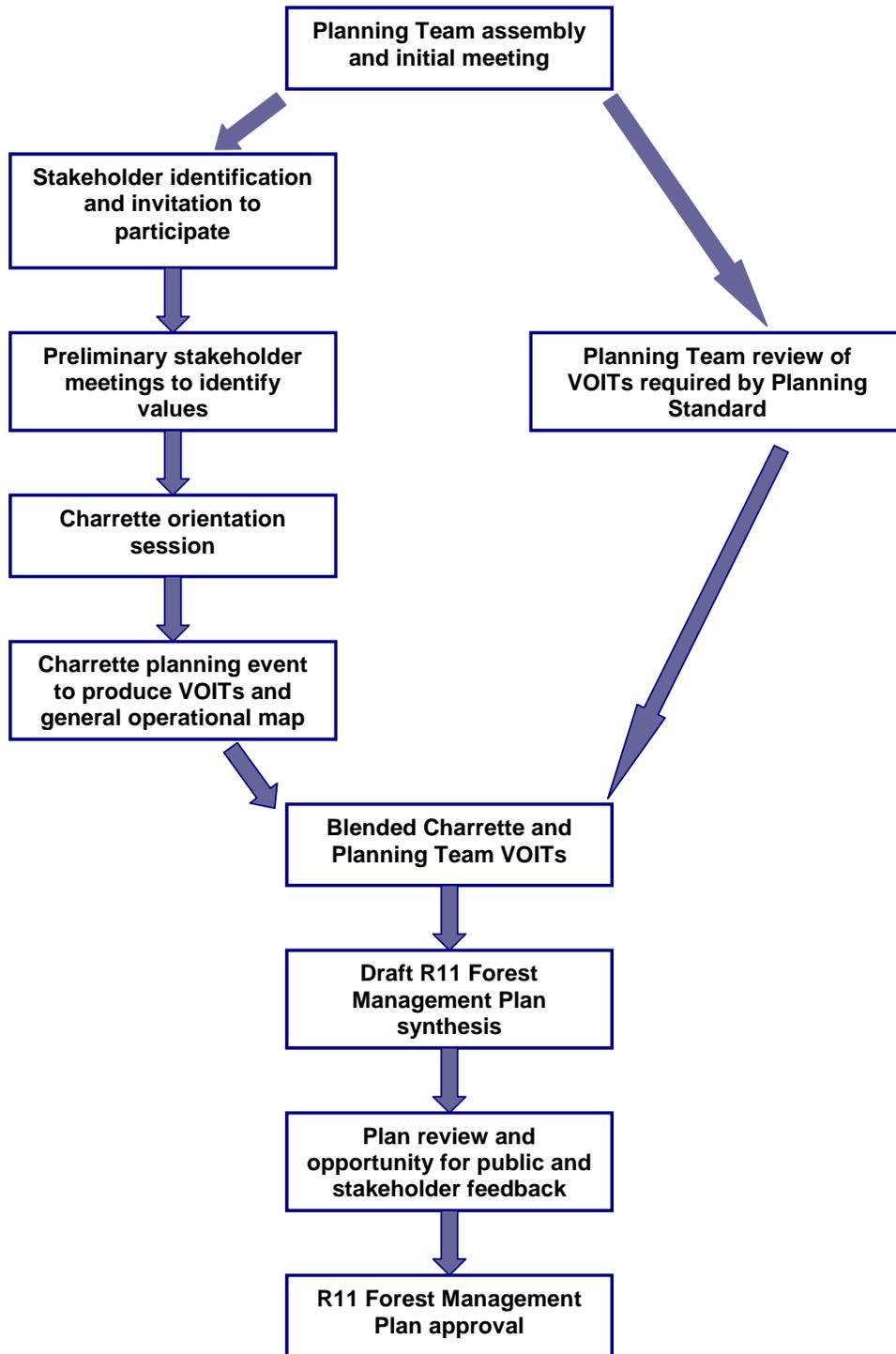


Figure 1. Summary of planning stages in the development of the R11 Forest Management Plan.

**Preliminary Stakeholder Input** – Initial stakeholder meetings were held between June 28 and July 5, 2005 to solicit input from the public and provide an opportunity for stakeholders to learn about the planning process. The meeting participants were asked to provide their group’s perspective on current values to be addressed in the FMP as well as their vision for the future of the R11 planning area. Input gathered at these preliminary meetings was collated for inclusion in an information package for Charrette participants. Stakeholders were also invited to indicate their interest in participating in the Charrette planning session by submitting their name to the Planning Team. Those stakeholders not able to participate in the Charrette planning session were encouraged to provide input at subsequent stages (e.g., review draft plan).

**Charrette Orientation Session** - A public Charrette is an effective method of obtaining multi-stakeholder input on planning initiatives, traditionally used by urban planners and more recently by landscape planners with the US Department of Agriculture. It is a collaborative process that harnesses the talents and energies of parties representing various disciplines and stakeholder groups to create and support a feasible plan. After initial background preparation by a design or planning team, stakeholders and the planning team members engage in successive iterations of a design-input-revise cycle during an intensive multi-day session. The public Charrette has emerged as an alternative to the “design and present” convention often followed by those leading stakeholder processes. While the “design and present” approach fosters a reactive stakeholder process, the Charrette process engages stakeholders in the initial development of a plan. (For more information, visit the National Charrette Institute website at <http://www.charretteinstitute.org/>). To encourage success of the R11 Charrette planning session, an orientation meeting was held with stakeholder participants on August 26, 2005 to review the process, expectations and guidelines, information packages, and overall deliverables.

**Charrette Planning Session** – The R11 Charrette Planning Session was an intensive workshop held over three consecutive days (September 14-16, 2005) at the Goldeye Centre near Nordegg. The public Charrette provided the opportunity for nine stakeholders to focus and build the momentum required to complete the framework for the R11 Forest Management Plan. Respecting the guidelines outlined by the Planning Team, facilitators helped the participants work collaboratively to set objectives, indicators, and targets for the various values previously identified as important at the preliminary stakeholder meetings. Stakeholders were then given an opportunity to incorporate these objectives through participation in an initial spatial planning exercise to create a conceptual operating plan. This further developed the participants’ understanding of the complexity involved in



**Charrette participants identifying important areas on maps**

creating a forest management plan and provided an opportunity to identify priority areas that might meet their VOITs.

**Plan Synthesis and Review** – In March 2006, approval was granted from the Executive Director of the Forest Management Branch, Forestry Division to proceed in plan development without forecasting for a 200-year planning horizon as required by the *Alberta Forest Management Planning Standard*. Accordingly, the Planning Team used the input from Charrette participants to subsequently develop the comprehensive list of VOITs, prepare the operational plan with recommended priority areas, predict the impacts of burning and harvesting on the Charrette VOITs, and prepare the R11 Forest Management Plan document. After completion of the draft in March 2007, hardcopies were made available to the public and the plan was posted to the ASRD website where all interested parties and stakeholders had an opportunity to provide feedback. Any comments were addressed in this version of the plan.

**Plan Approval and Implementation** – The draft plan was submitted to the departmental executives overseeing the planning process for their review. The R11 Forest Management Plan was forwarded to the Director of the Forest Management Branch for final approval. Upon approval, annual operating plans and prescribed burn plans will be prepared, and plan implementation will be coordinated with the surrounding jurisdictions including federal lands, provincial lands managed by Alberta Tourism, Parks, Recreation, and Culture, and Forest Management Agreement Areas.

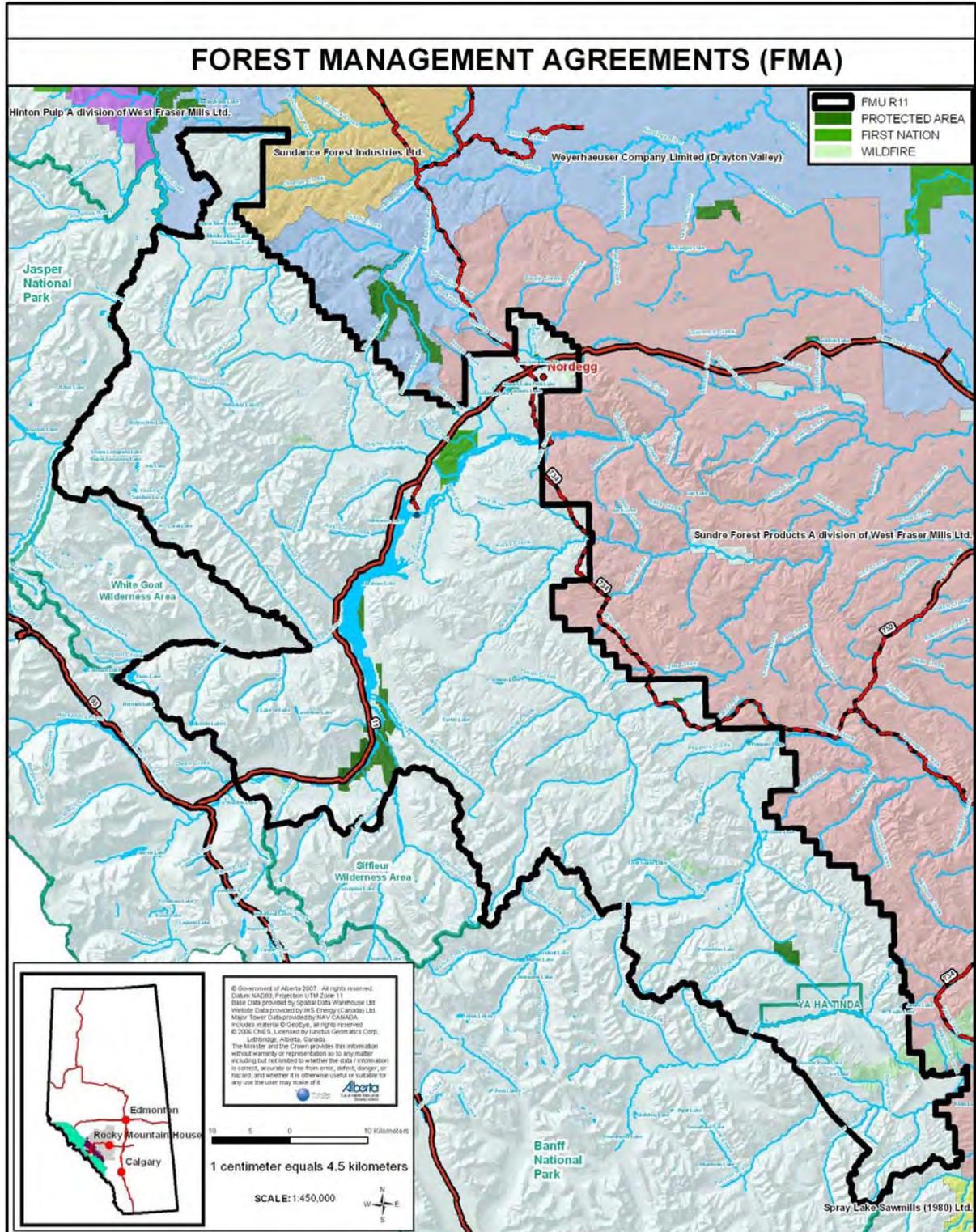
## 2 Landscape Description

Current knowledge of the values, uses, and forest conditions represented within the R11 Forest Management Unit is required prior to developing a forest management plan that creates a desired future landscape as well as for use in theoretical models which can describe or predict landscape changes based on management activities. Furthermore, such information represents the ecological, social, and economic conditions against which the success of plan objectives and treatment activities will be measured. The following landscape assessment describes several facets of the R11 landbase, specifically administrative boundaries, biotic and abiotic components of the forest, disturbance patterns, and existing land uses.

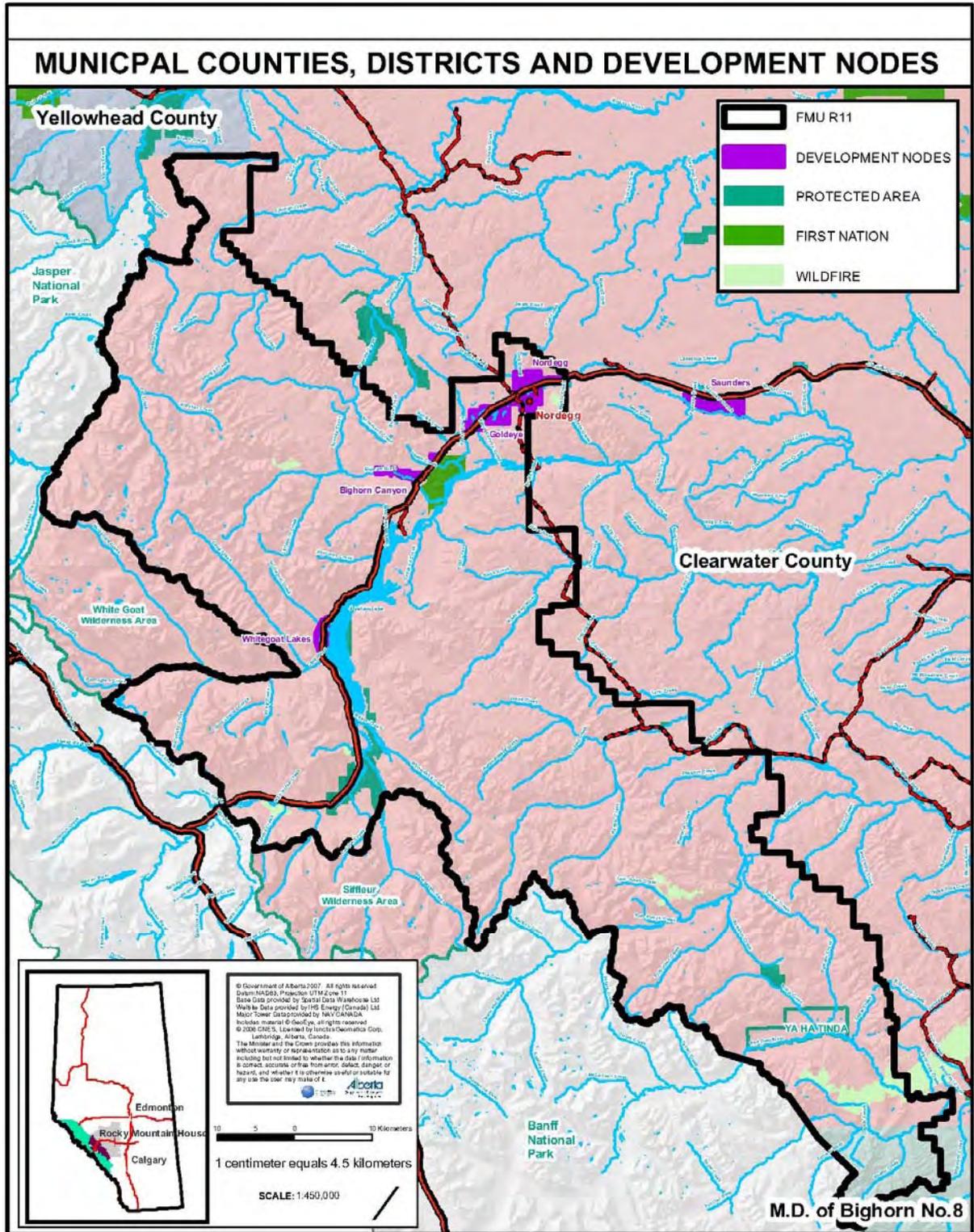
### 2.1 Administrative Boundaries

The R11 Forest Management Unit, created through the amalgamation of the former R3, R6, R8, R9, and B6 FMUs, lies to the west of the Weyerhaeuser Company FMA and the Sundre Forest Products Inc. FMA (formerly Sunpine Forest Products Ltd.). Sundance Forest Industries Ltd. and Hinton Pulp (formerly Weldwood of Canada Limited) also hold FMAs adjacent to the northern portion of R11, while the lands adjacent to the southern portion of R11, specifically the B11 FMU, are not committed (Map 2).

The FMU falls entirely within the boundaries of Clearwater County, with the exception of the extreme southern portion, which is within the Municipal District of Bighorn No. 8 (Map 3). Aside from the Hamlet of Nordegg and the Big Horn Reserve, few permanent dwellings are found in R11. The nearest town, Rocky Mountain House, is located approximately 100 km to the east. Five development nodes have been identified by Clearwater County to facilitate orderly development along the David Thompson corridor: Saunders/Alexo, Nordegg, Shunda/Goldeye, Bighorn Canyon, and Whitegoat Lakes. Development activities within the nodes fall under dual jurisdiction: the County issues development permits while the provincial government issues land leases as all lands within the nodes remain crown property (with the exception of Nordegg). The southern portion of R11 was part of Banff National Park until the Transfer of Resources Act in 1930; however only Ya Ha Tinda (3945 ha) now remains under the jurisdiction of Banff National Park. Similarly, the Big Horn Reserve (2127 ha) is federal crown land and thus not covered under provincial jurisdiction or this FMP.

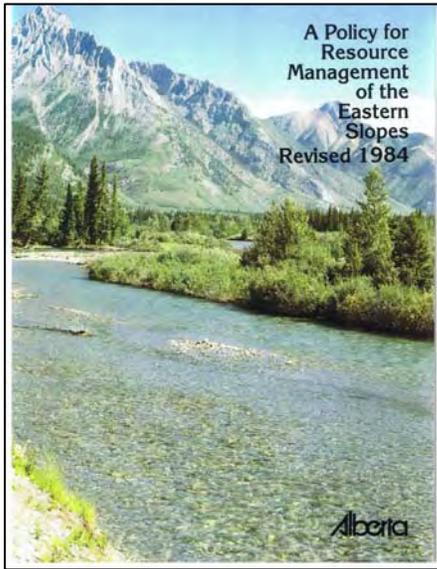


Map 2. Forest Management Agreements (FMA) adjacent to the R11 FMU.



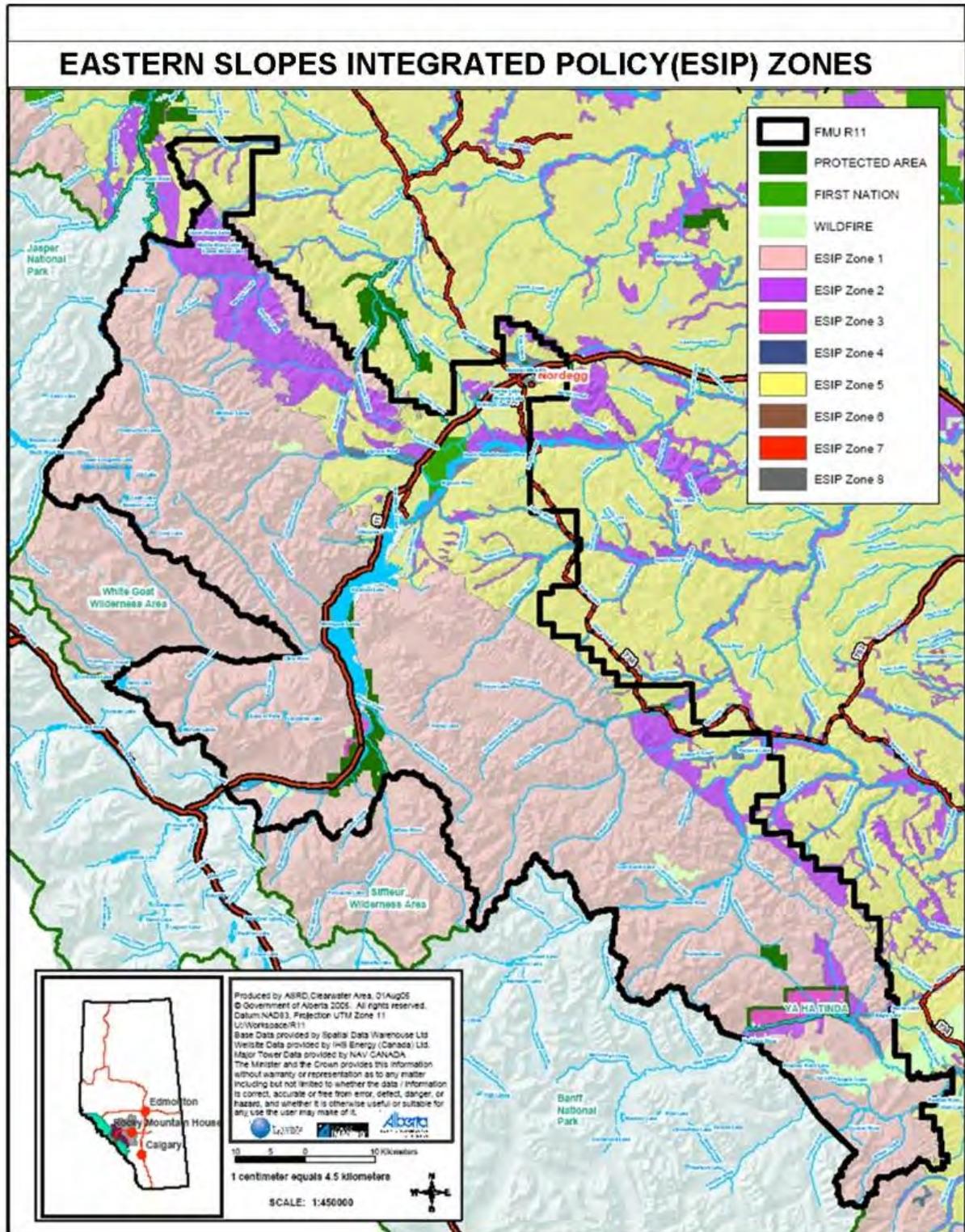
Map 3. Municipal counties, districts, and development nodes overlapped by the R11 FMU.

The Government of Alberta is responsible for allocation, extraction, and/or management of water resources, forest resources, fish and wildlife, oil/gas/coal/minerals, historical resources, protected areas, and public lands within R11, while federal departments and agencies retain jurisdiction over select other lands and resources including navigable waters, fisheries habitat, endangered species, and migratory birds. Integrated resource management policies and plans are an important tool that provide management direction for the various



provincially-administered resources at a regional level. *A Policy for Resource Management of the Eastern Slopes, Revised 1984* (also known as the *Eastern Slopes Policy*; Government of Alberta 1984) outlines resource use opportunities and priorities for specific zones within the Eastern Slopes. The *Nordegg-Red Deer River Sub-Regional Integrated Resource Plan* is an extension of the *Eastern Slopes Policy* that provides the details necessary to implement the zoning, priorities, and objectives, and to assist in landuse decision-making and conflict resolution (Alberta Energy/Forestry Lands and Wildlife 1988). In both of these plans, overall priority is placed on watershed protection and recreation benefits with management of renewable and non-renewable resources only in zones deemed appropriate.

Most of R11 falls within Prime Protection Zone 1 (Map 4) where preservation of environmentally sensitive terrain and valuable ecological and aesthetic resources are the primary considerations; where industrial and commercial development are largely constrained; and where management activities are restricted to wildlife habitat improvement, fire suppression, and timber sanitation to protect values in adjacent zones. Critical Wildlife Zone 2 protects terrestrial and aquatic habitats, such as key winter ranges, migration routes, calving areas, or spawning areas, considered crucial to the maintenance of specific fish and wildlife populations. In addition to watershed, fisheries, and wildlife management activities, opportunities for resource extraction activities (i.e., logging, oil and gas, mineral exploration, etc.) may be considered in Zone 2.

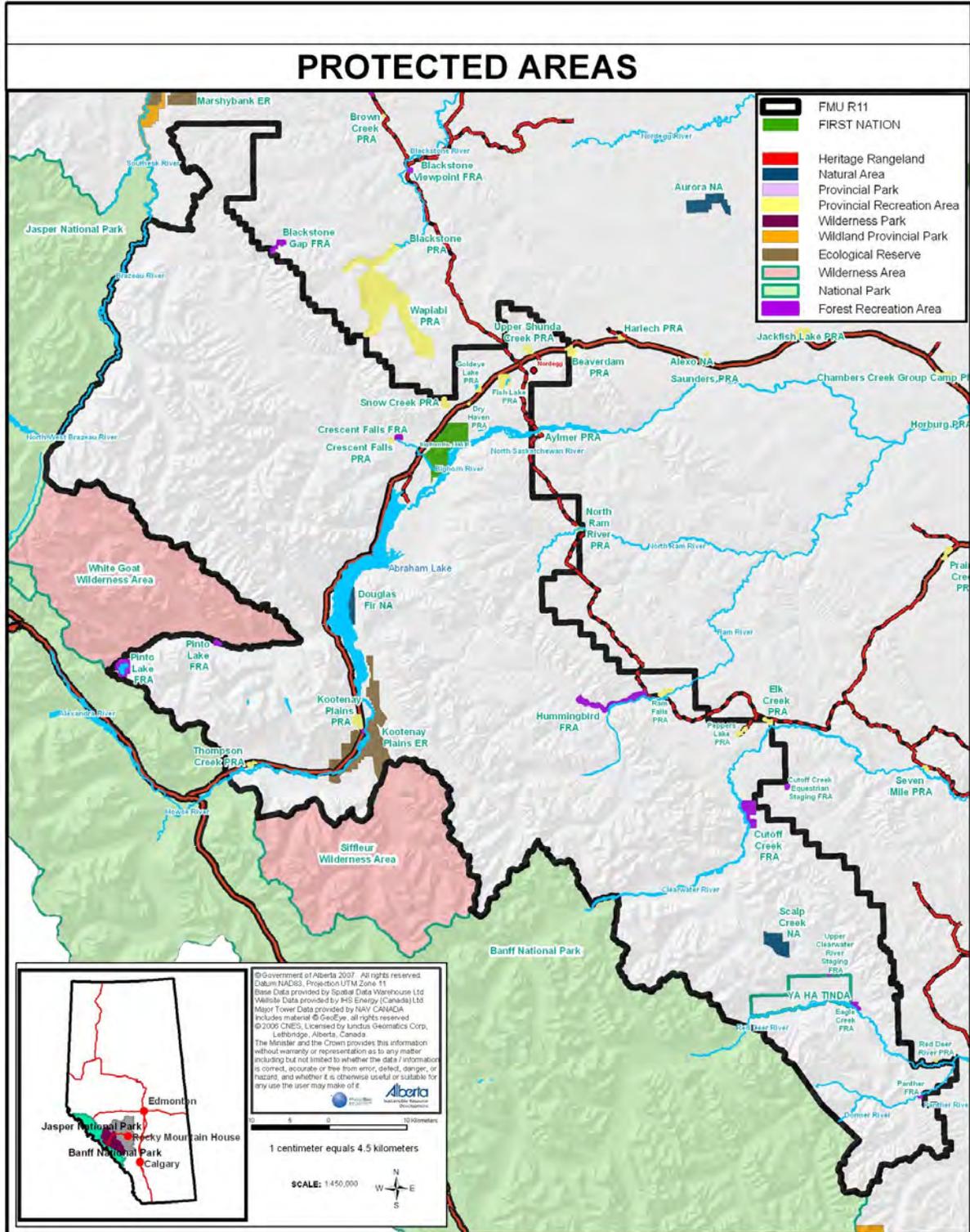


Map 4. Eastern Slopes Integrated Policy land use zones in the R11 FMU.

Numerous protected areas are administered by Alberta Tourism, Parks, Recreation, and Culture (Table 1, Map 5) to maintain ecological processes, conserve genetic diversity, and serve as ecological benchmarks while others serve primarily recreational purposes. Ecological Reserves protect functioning ecosystems devoid of roads or facilities for scientific research, education, and heritage appreciation. Natural Areas protect special or sensitive landscapes of local or regional significance while permitting some limited development and recreational use. Finally, Recreation Areas allow a wide range of recreational pursuits and often have lower preservation value due to their small size, facility development, and high visitor use. Management plans currently exist for the Kootenay Plains Ecological Reserve, the Siffleur Wilderness Area, and the White Goat Wilderness Area. Note that Siffleur and White Goat Wilderness Areas are not included within the R11 FMU boundaries; however, representatives from Alberta Tourism, Parks, Recreation, and Culture, which manage these Wilderness Areas, were involved in the planning process for this FMP and, similar to Banff and Jasper National Parks, will be consulted prior to the implementation of treatment activities.

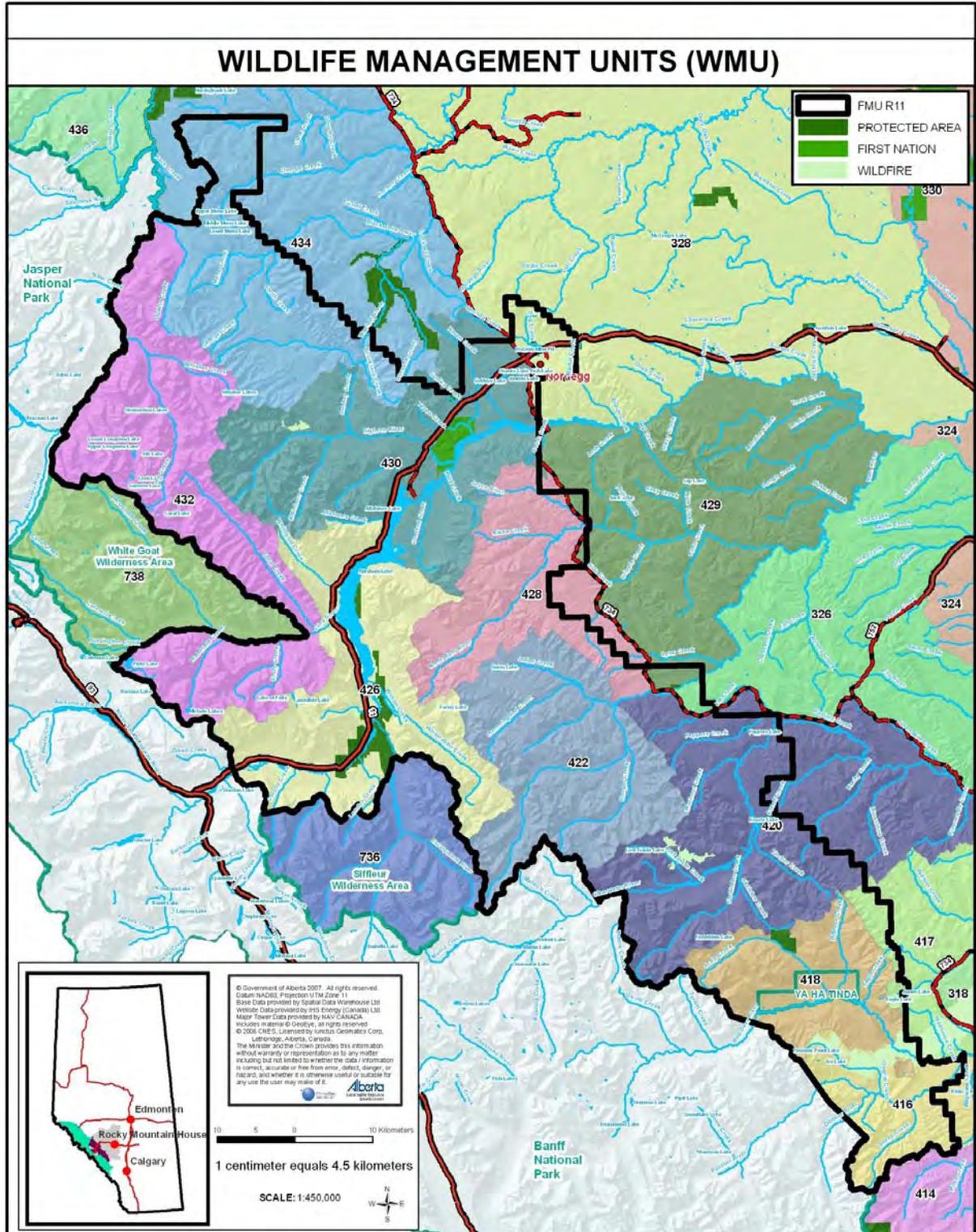
Table 1. Protected Areas within the R11 FMU administered by Alberta Tourism, Parks, Recreation, and Culture.

<b>Protected Area</b>	<b>Size (ha)</b>
Kootenay Plains Ecological Reserve	3437
Douglas Fir Natural Area	320
Scalp Creek Natural Area	323
Beaverdam Provincial Recreation Area	59
Crescent Falls Provincial Recreation Area	32
Dry Haven Provincial Recreation Area	2
Elk Creek Provincial Recreation Area	15
Fish Lake Provincial Recreation Area	118
Goldeye Lake Provincial Recreation Area	29
Kootenay Plains Provincial Recreation Area	108
North Ram River Provincial Recreation Area	16
Peppers Lake Provincial Recreation Area	30
Ram Falls Provincial Recreation Area	117
Red Deer River Provincial Recreation Area	117
Snow Creek Provincial Recreation Area	65
Thompson Creek Provincial Recreation Area	32
Upper Shunda Provincial Recreation Area	47
Wild Horse Provincial Recreation Area	5

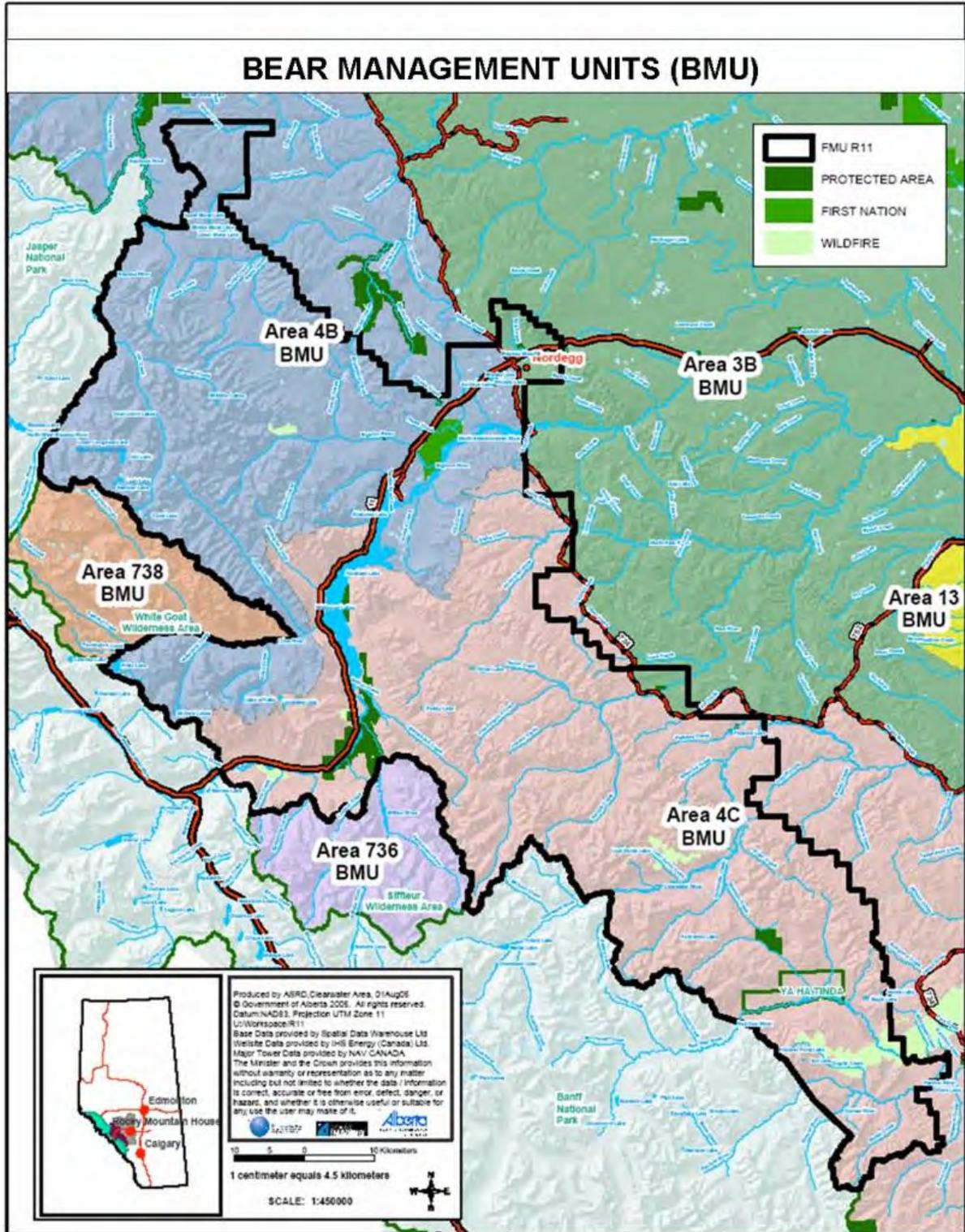


Map 5. Protected Areas within and adjacent to the R11 FMU.

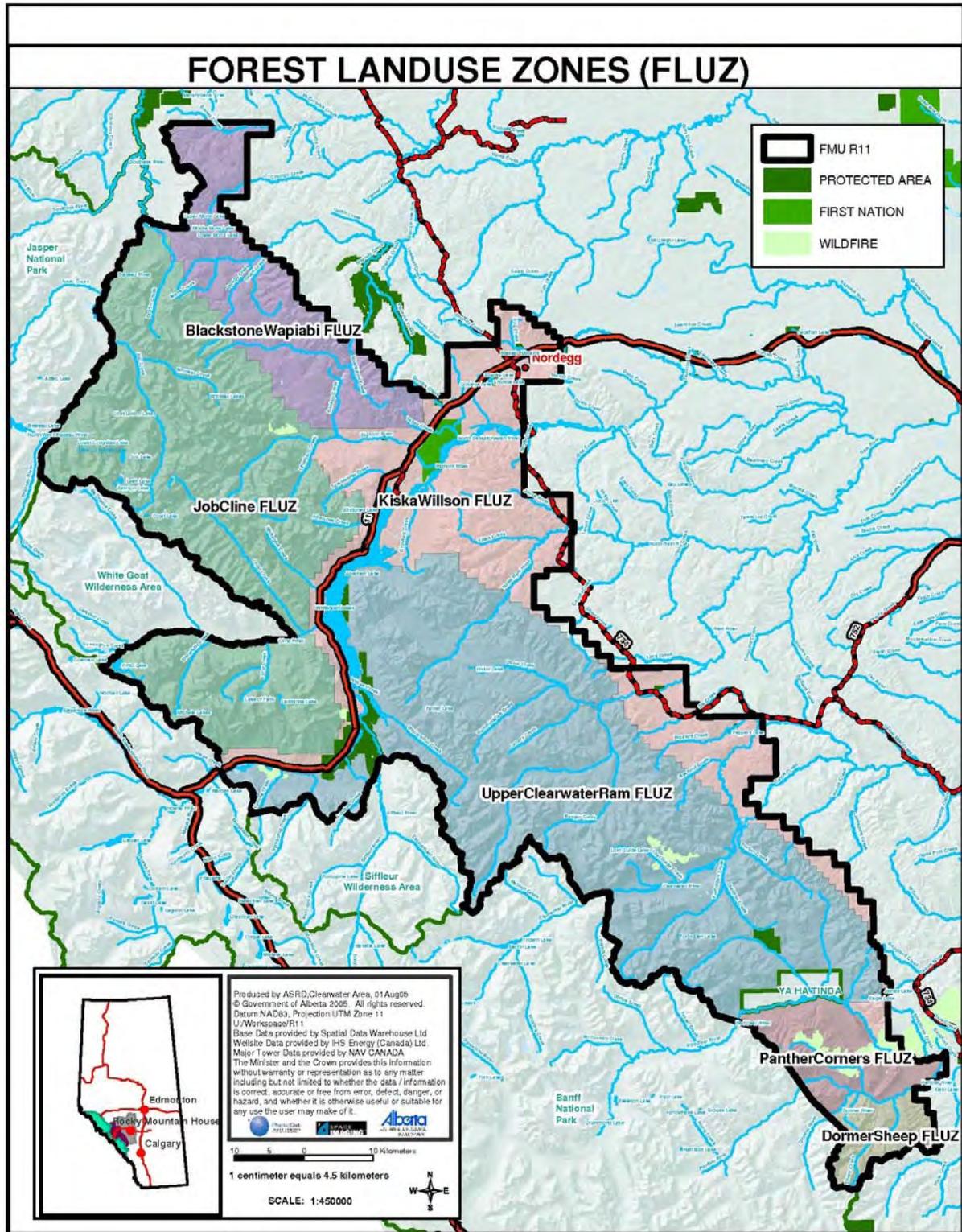
Alberta Sustainable Resource Development, Forestry Division delineates Wildfire Management Areas (WMA) within which resources are allocated on a daily basis during the fire season. Clearwater WMA encompasses most of the R11 FMU. The area south of the Red Deer River, however, falls within the Southern Rockies WMA. ASRD Fish and Wildlife Division similarly has identified functional units to facilitate their operations and programs. All of R11 is included in Fish Management Zone 1 East Slopes, specifically the Red Deer and North Saskatchewan Unit ES2. The following 13 Wildlife Management Units (WMU) fall in part or in whole within R11 (Map 6): Baseline – 326, Shunda – 328, Corners – 416, Wilson – 417, Ya Ha Tinda – 418, Clearwater – 420, Hummingbird – 422, Upper Saskatchewan – 426, Kiska – 428, Meadows – 429, Bighorn – 430, White Goat – 432, and Blackstone – 434. Portions of Bear Management Units 4B and 4C are captured with R11, and small areas along the periphery of Bear Management Unit 3B, located east of the Forestry Trunk Road (Hwy 734), are also within R11 (Map 7). ASRD Forestry Division administer six Forest Land Use Zones (FLUZ) within the Bighorn Backcountry (Map 8). Permitted activities vary greatly among FLUZ. For example, equestrian users must abide by timing restrictions on some trails within the Job/Cline and Kiska/Willson FLUZ while no restrictions are present in the other FLUZ.



Map 6. Wildlife Management Units (WMU) overlapped by the R11 FMU.



Map 7. Bear Management Units (BMU) overlapped by the R11 FMU.



Map 8. Forest Land Use Zones (FLUZ) within the R11 FMU.

## 2.2 Natural Subregions

Diverse topography and geology, cool climate, high annual precipitation, and a complex mosaic of vegetation ranging from lichen-encrusted bedrock and low shrubs to coniferous forests and grasslands characterize the Rocky Mountain Natural Region, within which most of the R11 landbase falls (Natural Regions Committee 2006). Approximately 34.4% of R11 is within the Alpine Natural Subregion; 46.6% is within the Subalpine Natural Subregion; and 6.8% is within the Montane Natural Subregion. Remaining lands fall in the Foothills Natural Region: 12.0% along the eastern boundary and major river corridors is part of the Upper Foothills Natural Subregion, while a small sliver of Lower Foothills Natural Subregion, representing only 0.15% of the FMU, is found adjacent to the North Saskatchewan River near Nordegg (Figure 2, Map 9).

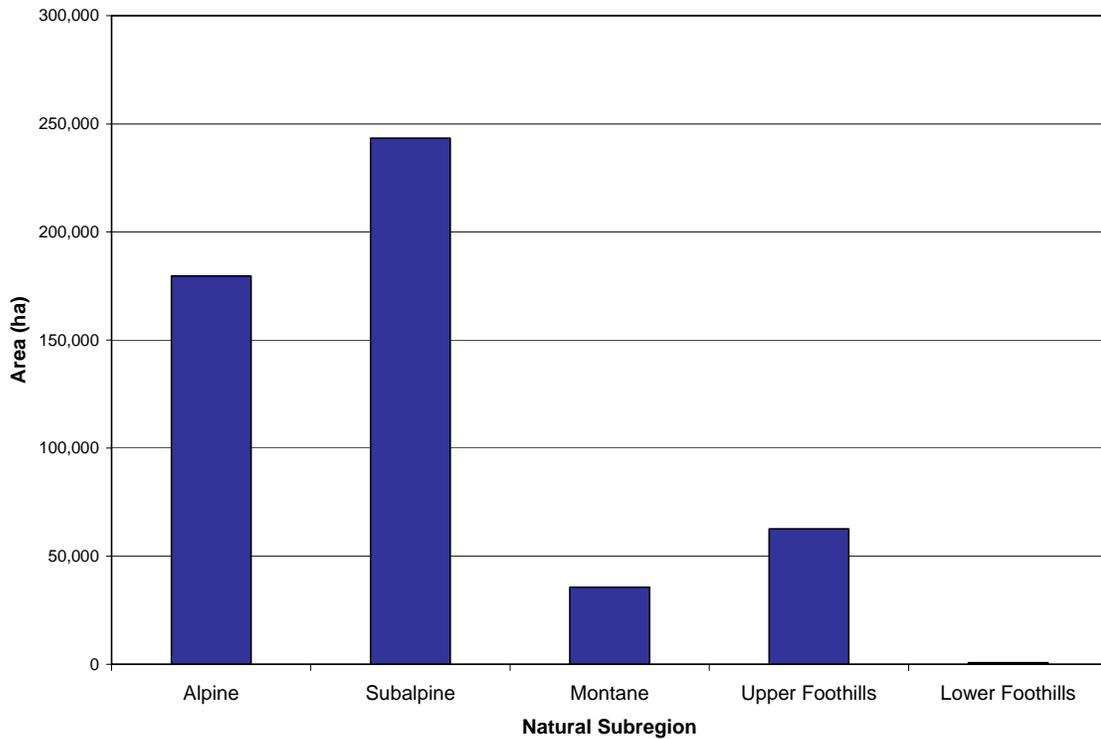
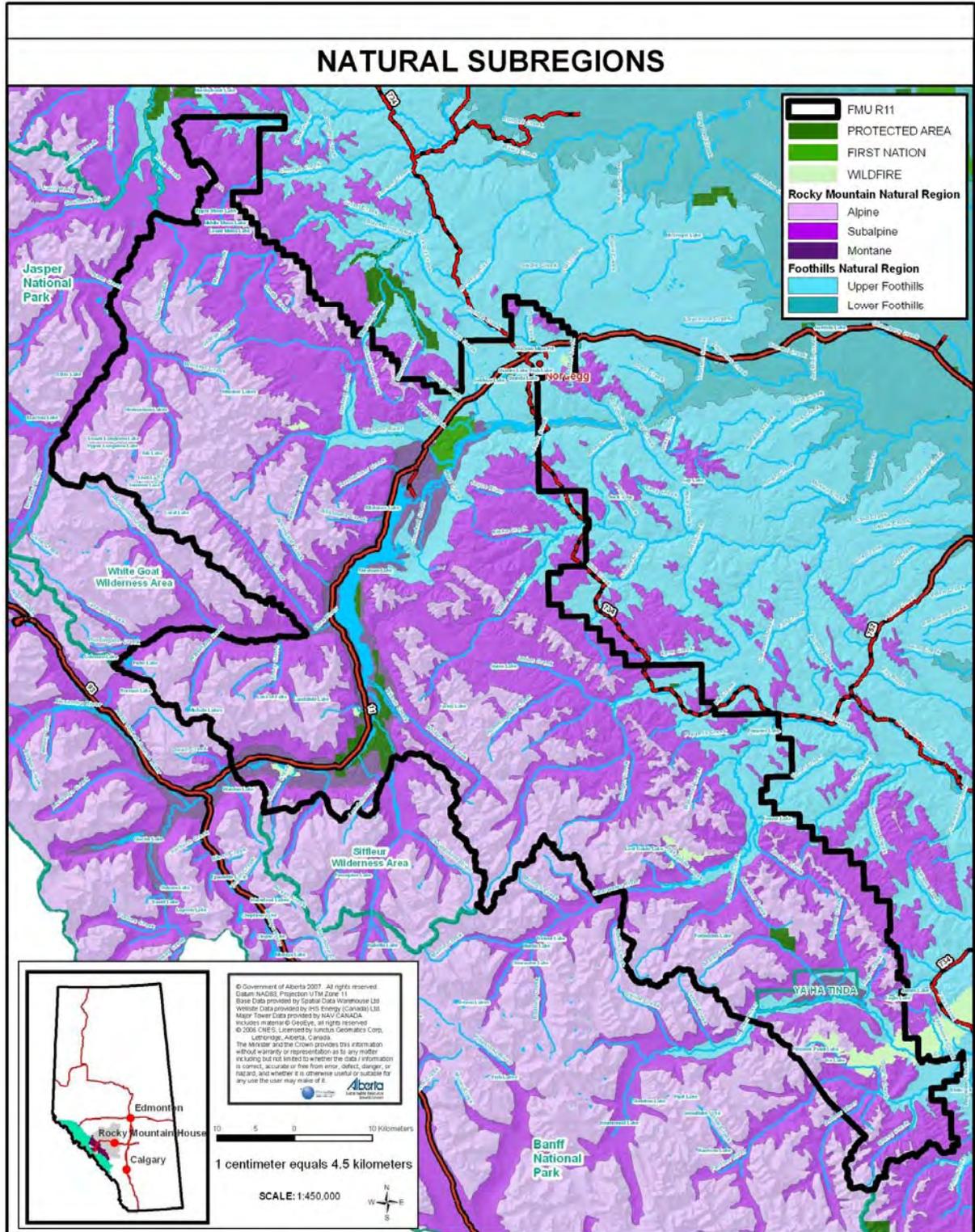
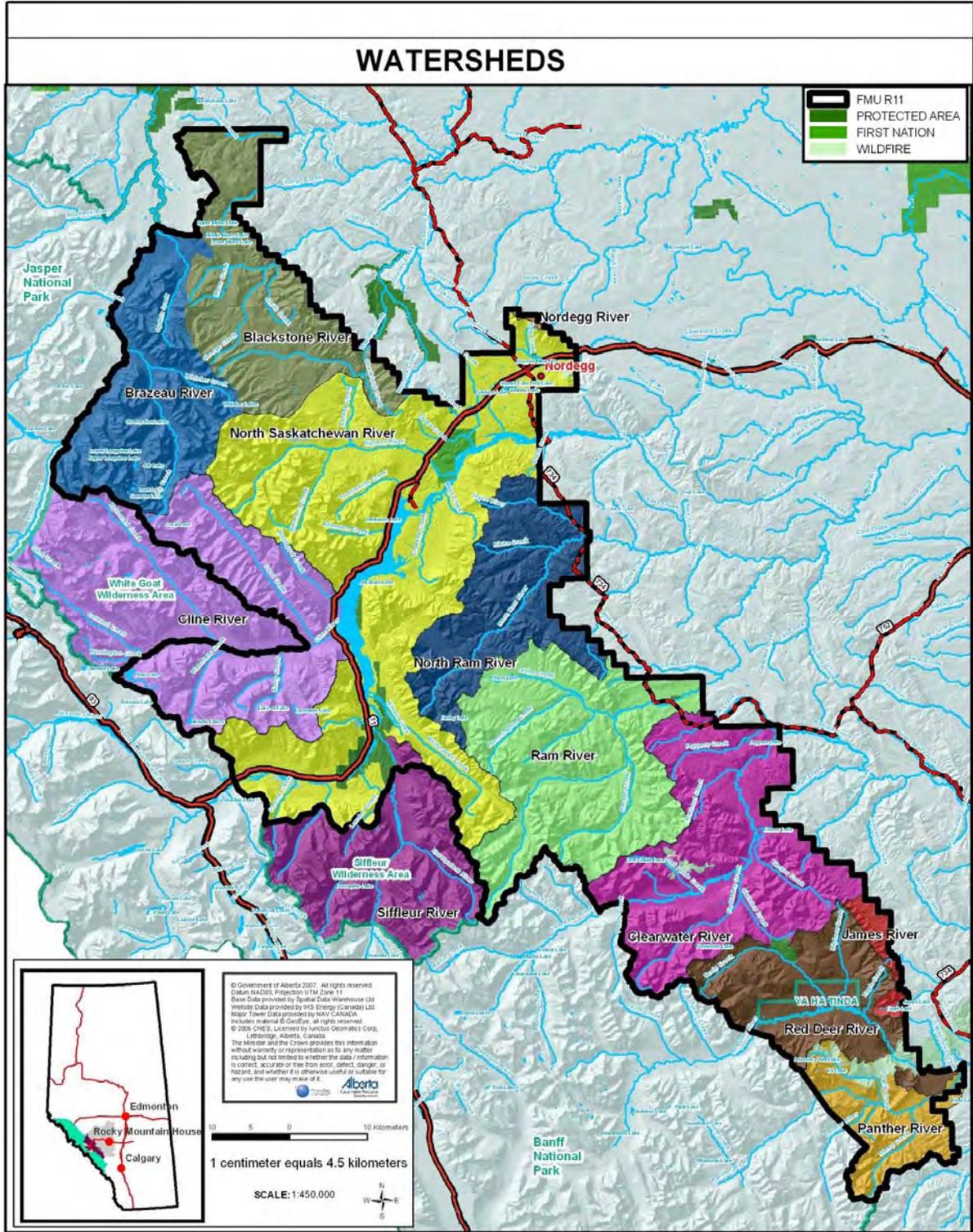


Figure 2. Area of each natural subregion found within the R11 FMU.



Map 9. Natural subregions overlapped by the R11 FMU.



Map 10. Third-order watersheds found within the R11 FMU.

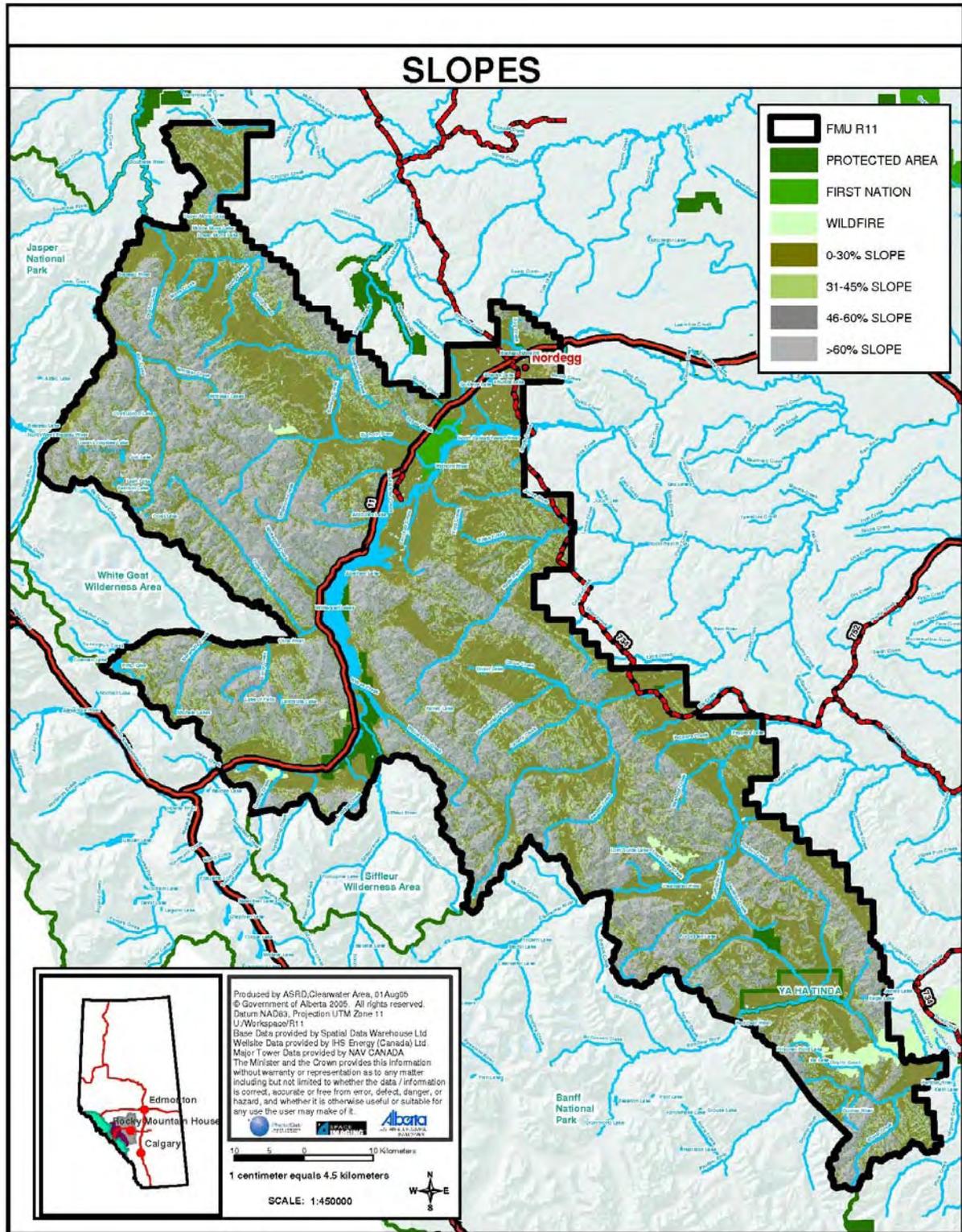
The North Saskatchewan River bisects the R11 area and ultimately drains the majority of the FMU via the Brazeau, Siffleur, Cline, North Ram, Ram, and Clearwater Rivers, with the southernmost portion draining to the Red Deer River via the Panther River (Map 10, Table 2). Even within a given natural subregion, the North Saskatchewan River valley often marks a transition between climatic conditions and vegetative associations characteristic of southern regions of the province to those found at more northerly latitudes. The following description of climate, vegetation, soil, and landform features associated with each natural subregion is summarized largely from Natural Regions Committee (2006), and that document should be consulted directly for additional detail. For each natural subregion, Table 3 presents a soil-vegetation combination that typifies distinctive characteristics of that natural subregion.

Table 2. Area covered by third-order watersheds within the R11 FMU

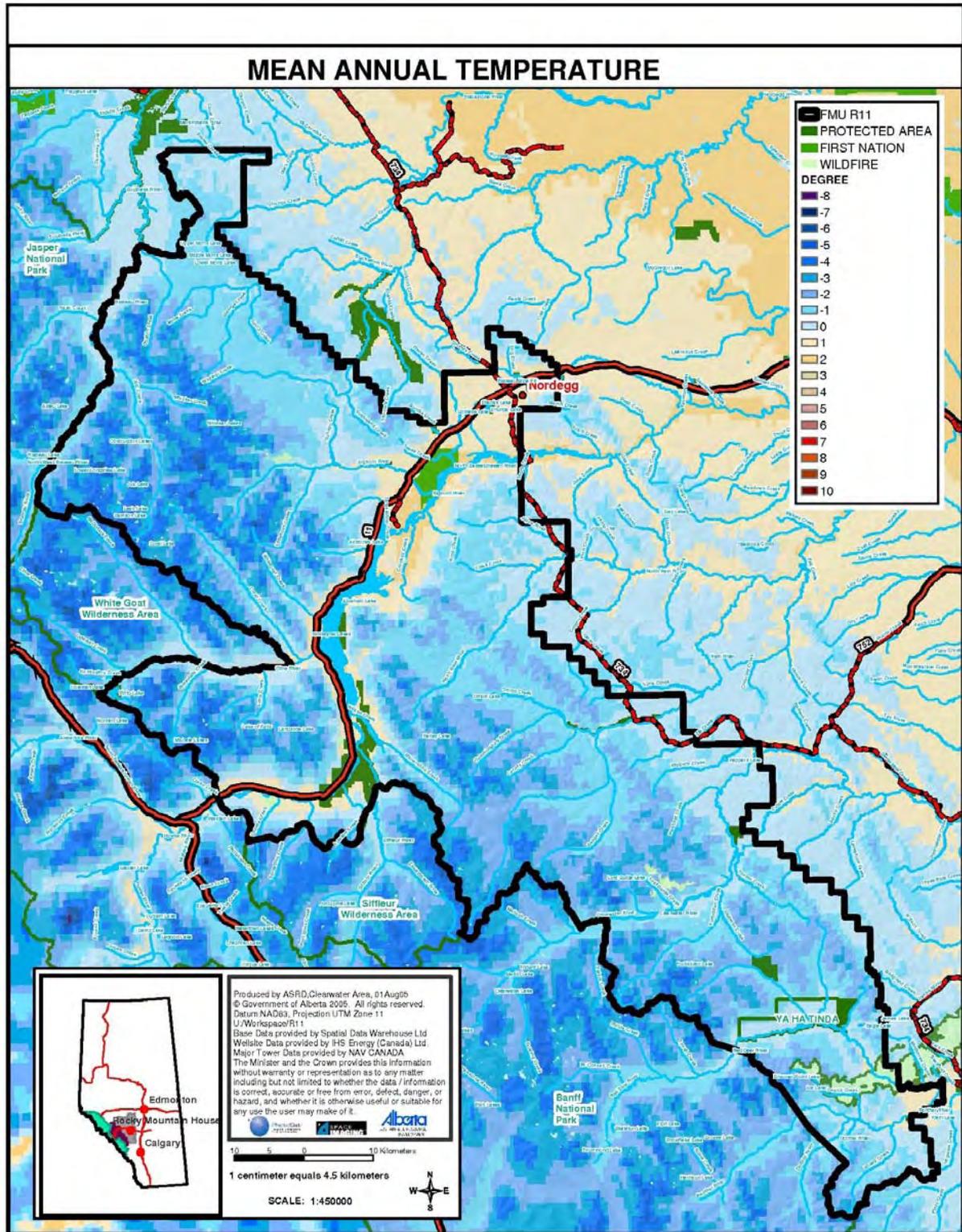
<b>Watershed</b>	<b>Area (ha)</b>
Blackstone River	48,106
Brazeau River	45,684
Nordegg River	420
North Saskatchewan River	144,400
Cline River	93,564
North Ram River	39,188
Ram River	66,337
Clearwater River	65,811
Siffleur River	44,176
James River	4,482
Red Deer River	36,825
Panther River	21,050

### **2.2.1 Alpine Natural Subregion**

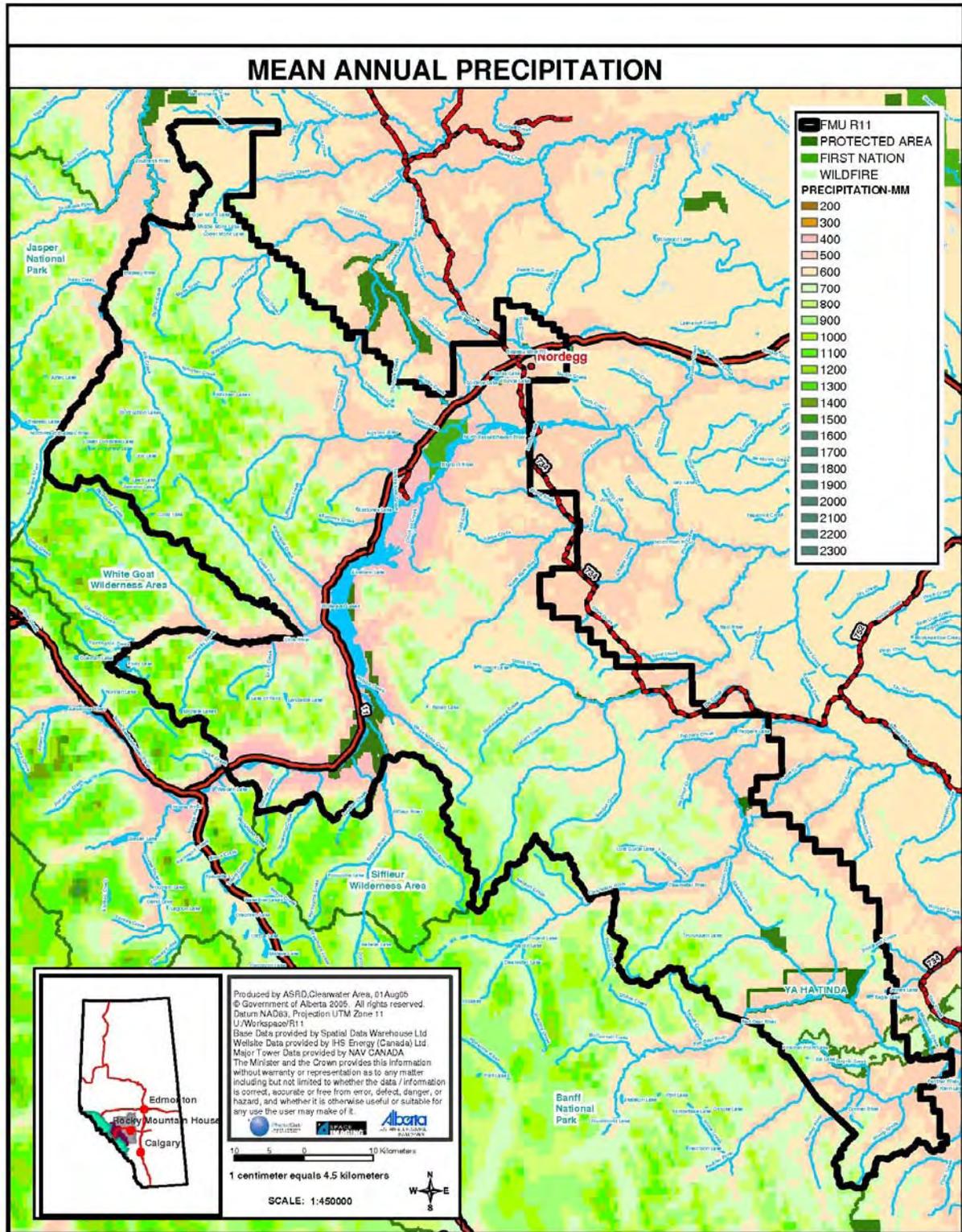
The harshest of conditions in R11 are found within the Alpine Natural Subregion, a landscape of rock, snow, wind, and low productivity. Slopes typically exceed 45% (Map 11) and thus exposed bedrock is common, with colluvial deposits or thin glacial deposits covering about 40% of the natural subregion. Where soils are present, they are primarily Brunisols with some Regosols and Gleysols in poorly drained locations. Summers are shorter and colder and winters have higher snowfall than any other natural subregion in Alberta. Mean annual temperatures are several degrees below freezing (Map 12), while mean annual precipitation ranges between 800 and 1200 mm (Map 13). This severe climate, coupled with steep, unstable substrates and weak soil development, limit plant growth to sheltered locations possessing a suitable microclimate (i.e., warmer, moister sites where snow deposition protects plants in the winter but are snow-free for a time period during the summer). Plant communities range from nothing more than lichen growing on exposed rock at the highest elevations to low-growing heather and sedges to scrubby willow and bog birch with a few scattered dwarf trees at the lowest elevations. Fire is not a dominant influence on plant communities in this natural subregion.



Map 11. Slopes found within the R11 landbase.



Map 12. Mean annual temperature throughout the R11 FMU.



Map 13. Mean annual precipitation throughout the R11 FMU.

### **2.2.2 Subalpine Natural Subregion**

The Subalpine Natural Subregion is found elevationally below the Alpine Natural Subregion, from treeline down to valley bottoms within R11, except along major rivers (Map 9). Although colluvial materials and residual bedrock exposures may occur at higher elevations, surficial materials are primarily morainal deposits. Fluvial and glaciofluvial deposits are found along major valleys with lesser amounts of glaciolacustrine and Aeolian materials. The most common soils are Brunisols and Luvisols, with Regosols common on colluvial slopes and Gleysols and Organics on wet sites. The climate in the Subalpine Natural Subregion is more moderate than in the Alpine Natural Subregion; however, summers are still short, cool, and wet and winters are long and cold with an abundance of snow (Map 12, Map 13). The mean annual temperature is about 0°C, but freezing temperatures can occur in any month. Annual precipitation within the Subalpine Natural Subregion in R11 is typically between 500 and 700 mm. Climatic conditions are again in part responsible for the low productivity and slow growth rates in this natural subregion. Progressively more open Engelmann spruce-subalpine fir stands, with a subalpine larch and whitebark pine component in areas south of the North Saskatchewan River, characterize the forests of the Upper Subalpine zone. Lower Subalpine forests contain closed lodgepole pine with some interspersed Engelmann spruce, subalpine fir, and Engelmann spruce/white spruce hybrids. Upper elevation sites typically experience a longer fire interval than do lower elevation pine forests.

### **2.2.3 Montane Natural Subregion**

Within R11, the Montane Natural Subregion is only found at lower elevations along the North Saskatchewan River Valley and at Ya Ha Tinda. Along the valley bottoms and adjacent terraces, surficial deposits are fluvial and glaciofluvial sands and gravels, while till and colluvial deposits are found on lower slopes. Brunisols and Chrenozems are common on the valley bottoms; Regosols are common on the fluvial terraces and less stable side slopes; and finally, Luvisols and Brunisols are found on stable side slopes. Gleysols and Organics are the dominant soils on wetter sites. Although summers are still cool, the winters are warmer than most other locations in Alberta (owing to Chinook conditions), and snowfalls are much lower than in the Subalpine or Alpine Natural Subregions. The mean annual precipitation is between 400 and 500 mm (Map 13). The mean annual temperature is 1-2°C along the North Saskatchewan River and about 0°C at Ya Ha Tinda (Map 12). The Montane Natural Subregion experiences highly variable microclimates as a result of differing aspects, slopes, elevations, and wind exposures. For example, south- and west-facing slopes receive more direct sunlight and prevailing westerly winds and thus are warmer and drier than more north- and east-facing slopes. Distinct plant communities form as a result of these microclimates as well as from latitudinal changes. Grasslands containing mountain rough fescue, bluebunch fescue, and Parry oatgrass or open forests containing lodgepole pine, Douglas-fir, aspen, and white spruce may be present on moderately dry south- and west-facing slopes in the Ya Ha Tinda area. Moister sites support similar canopy species but a more diverse understory. Northern wheatgrass and June grass dominate grasslands in the Kootenay Plains, while open forests include Douglas-fir and occasionally limber pine at

exposed locations (this is the northern extent of limber pine in the province). Mixed lodgepole pine, aspen, and white spruce stands can be found on moderately moist sites along the North Saskatchewan valley. Nutrient-rich moist sites typically have an aspen-balsam poplar forest with a lush understory.

#### **2.2.4 Upper Foothills Natural Subregion**

The Upper Foothills Natural Subregion extends into R11 along major river valleys including the Bighorn, North Saskatchewan, North Ram, Ram, Clearwater, Red Deer, and Panther River valleys (Map 9). The terrain is strongly rolling and the surficial materials are thinly deposited glacial till. Some colluvium and exposed bedrock may be present on steeper slopes. The soils are typically Brunisols and Luvisols with Gleysols and Organics in wetter areas. The climate of the Upper Foothills Natural Subregion is characterized by short, wet summers and snowy, cold winters (mean annual precipitation 400-600 mm, mean annual temperature 0-2°C; Map 13, Map 12). Such conditions favour the growth of coniferous species, with even-aged, fire-origin lodgepole pine and white spruce stands forming the dominant forest on mesic sites north of the North Saskatchewan River and lodgepole pine, aspen, and white spruce on mesic sites south of the North Saskatchewan River. Pure deciduous stands are restricted to south- and west-facing aspects, while white spruce and Engelmann spruce hybrids are common at the upper elevational boundary of the natural subregion. The community composition of wet areas depends on nutrient conditions, but black spruce, white spruce, and tamarack may occur in the canopy. Overall, wetlands are more common in the Upper Foothills Natural Subregion than the other natural subregions found within R11: however, they still tend to be confined to major valleys and occupy only 10% of the area. Wildfire is an important disturbance factor in this natural subregion.

#### **2.2.5 Lower Foothills Natural Subregion**

A small finger of the undulating Lower Foothills Natural Subregion projects into R11 along the North Saskatchewan River valley south of Nordegg (Map 9). Medium-textured glacial till can be found on steeply sloping lands, with exposed bedrock outcrops also present. Surficial materials at lower elevations are composed primarily of glaciofluvial sands. Upland soils are dominated by Gray Luvisols with Brunisolic subgroups at higher elevations. Mesisols occur under poor to rich fens, while Gleysols often occur adjacent to wetlands. Regosols can be found along stream valleys and steeper slopes. This natural subregion experiences a more continental climate and is thus slightly drier and warmer than Upper Foothills Natural Subregion. For the R11 fraction, the mean temperature is about 2°C and the mean precipitation is about 500 mm per year, with two thirds falling during the summer (Map 12, Map 13). Lodgepole pine occurs in pure or mixed stands with aspen, balsam poplar, white birch, black spruce, white spruce, balsam fir, and tamarack; however, mixed stands are rare along the boundary with the Upper Foothills Natural Subregion as found in R11. Pure deciduous stands may occur on any aspect, compared to their restriction to south-facing slopes in the Upper Foothills Natural Subregion. Wetlands, particularly treed fens, are more common in this natural subregion compared to those subregions described previously and can cover 15-40% of the area.

Table 3. Reference sites showing typical overstory and understory vegetation and associated soils for each natural subregion found within R11 (adapted from Natural Regions Committee 2006).

<b>Natural Subregion</b>	<b>Reference Site*</b>
Alpine	Heather on moderately well- to imperfectly-drained Brunisols (more common association is mountain avens on well-drained nonsoils, Regosols, and Brunisols)
Subalpine – <i>north of North Saskatchewan River</i>	Engelmann spruce, subalpine fir, and lodgepole pine with false azalea, white-flowered rhododendron, common Labrador tea, dwarf bramble, and tall bilberry on well-drained Brunisols and Luvisols at low to middle elevations
Subalpine – <i>south of North Saskatchewan River</i>	Engelmann spruce, subalpine fir, and lodgepole pine with false azalea, grouseberry, low bilberry, and Canada buffaloberry and feathermosses on well-drained Brunisols and Luvisols at low to middle elevations
Montane – <i>north of North Saskatchewan River</i>	Lodgepole pine, aspen, or white spruce, hairy wild rye, Canada buffaloberry, diverse forbs, feathermosses; moderately moist, well-drained, medium-textured Brunisols. Douglas-fir also occurs north to Kootenay Plains and Jasper.
Montane – <i>south of North Saskatchewan River</i>	Forests: Douglas-fir, white spruce, lodgepole pine, aspen, hairy wild rye, pine reed grass on well-drained, medium- to fine-textured Luvisolic and Brunisolic soils. Grasslands: south- and west-facing aspects, well- to moderately well-drained Chernozemic soils
Upper Foothills	Lodgepole pine, white spruce, subalpine fir, tall bilberry, common Labrador tea common on mesic sites, minor black spruce, Brunisolic Gray Luvisols and Brunisols on clayey soils, average nutrients
Lower Foothills	Lodgepole pine, aspen, white spruce, mixtures of some or all, minor black spruce, diverse understory, Gray Luvisols on loamy to clayey soil, average nutrients

\* Reference sites are defined as sites with deep, well- to moderately well-drained, medium- textured soils with neither a lack nor an excess of soil moisture and nutrients and that are neither exposed nor protected from climatic extremes.

### 2.3 Forest Landscape Pattern and Structure

The composition, age structure, and landscape pattern of the vegetation within the R11 FMU reflect the influence of both natural disturbances, predominantly fire, and human activity, predominantly fire suppression. Over half of the landbase is covered by conifer forest, while another third consists of rock and barren areas (Figure 3), perhaps not surprising given that 34% of the FMU falls within the Alpine Natural Subregion. The remaining landbase is

covered primarily by grasslands, shrubs, and human infrastructure. White and/or Engelmann spruce are the dominant cover species on 54% of the forest landbase, typically in higher elevations than the lodgepole pine that dominates 40% of the forest (Map 14; Table 4). Mixedwood or pure deciduous stands are rare, comprising just over 1% of the forested landbase. Grasslands and shrubs comprise about 11% of the vegetated landbase (Table 4) and are most frequently found at lower elevations along watercourses or in higher elevation alpine habitats. Linear features are not as prevalent in R11 as in other sections of the province; however, there are 4190 km of trails that are accessed by non-motorized and/or motorized users (Table 5).

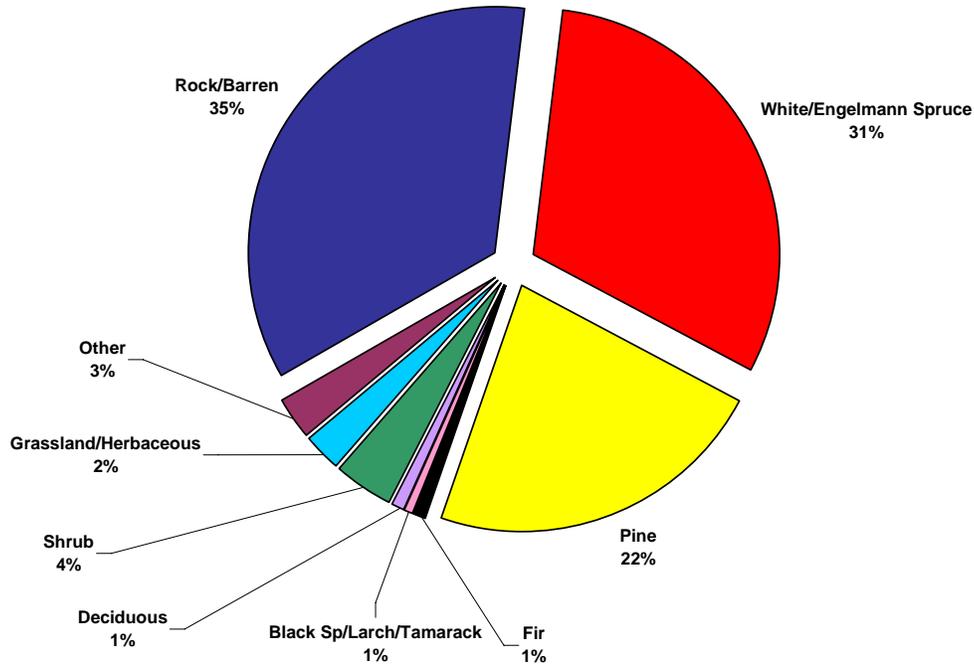


Figure 3. Dominant vegetation cover of the R11 landbase.



Table 4. Area of each vegetation cover classification within the R11 landbase.

<b>Vegetative Cover</b>	<b>Area (ha)</b>	<b>% of Vegetated R11 Landbase</b>	<b>% of Forested R11 Landbase</b>
Aspen	1807	0.56	0.62
Aspen Mixedwood	1871	0.58	0.65
Balsam Poplar	206	0.06	0.07
Balsam Poplar Mixedwood	164	0.05	0.06
Birch	64	0.02	0.02
Birch Mixedwood	91	0.03	0.03
Black Spruce	852	0.26	0.29
Black Spruce Mixedwood	37	0.01	0.01
Black Spruce Wetland	1655	0.51	0.57
Black Spruce/Larch Tamarack Wetland	89	0.03	0.03
Larch Tamarack Mixedwood	14	0.00	0.00
Larch Tamarack Wetland	4	0.00	0.00
Mixed Conifer (Larch Tamarack)	5	0.00	0.00
Mixed Conifer (White/Engelmann Spruce)	219	0.07	0.08
Pine (Lodgepole/Jack)	116014	35.77	40.06
Pine (Lodgepole/Jack) Mixedwood	1263	0.39	0.44
True Fir	4414	1.36	1.52
True Fir Mixedwood	16	0.00	0.01
White Spruce Wetland	1913	0.59	0.66
White/Engelmann Spruce	156422	48.23	54.01
White/Engelmann Spruce Mixedwood	2494	0.77	0.86
<i>Total</i>	<i>289611</i>	<i>89.30</i>	<i>100.00</i>
Grassland Dry	8224	2.54	
Grassland Mesic	2378	0.73	
Herbaceous Clearcut	502	0.15	
Herbaceous Clearing	105	0.03	
Industrial Reclamation-Vegetated	314	0.10	
Partial Cut/Regenerating Clearcut	600	0.18	
Perennial Forage Crops	771	0.24	
Rough Pasture Closed Mesic	57	0.02	
Shrub Meadow Closed Dry	1091	0.34	
Shrub Meadow Closed Mesic	8689	2.68	
Shrub Meadow Open Dry	2193	0.68	
Shrub Meadow Open Mesic	5950	1.83	
Shrub Wetland	2416	0.74	
Wet Graminoid	1426	0.44	
<i>Total</i>	<i>34716</i>	<i>10.70</i>	

Table 5. Linear features within the R11 RMU.

Linear Feature	Length (km)
Pipelines	29
Powerlines	22
Railine	7
Trails	4190

A seral stage is a plant community condition that develops during ecological succession from a major disturbance to the climax vegetation stage. Each forest cover type will have unique characteristics and ages at which those characteristics are attained. Given that the majority of the forested R11 landbase is pine- or spruce-dominated stands, this FMP will adopt the seral stage definitions outlined in Andison (2000):

- young forest: 0-20 years old
- pole forest: 21-100 years old
- mature forest: 101-180 years old, and
- old forest: >180 years old.

The age structure of the R11 landbase is dominated by mature and old seral stages (Figure 4): less than 20% of the landbase is in the young or pole stages (i.e., < 100 years old). Across all forested natural subregions, less than 2% of the landbase has been disturbed within the last 20 years (Table 6). These figures are indicative of successful fire suppression efforts and the lack of timber harvesting under the direction of the *Eastern Slopes Policy*.

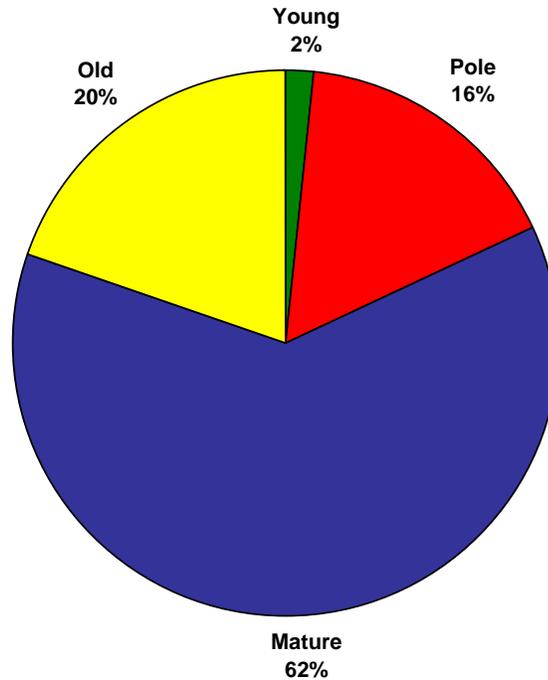


Figure 4. Seral stage area within the R11 FMU. Non-vegetated landbase or cover types where age is unknown (e.g., meadows) are excluded. Seral stages follow Andison (2000): young 0-20 yrs, pole 21-100 yrs, mature 101-180 yrs, and old >180 yrs.

Table 6. Seral stage area in hectares within each natural subregion found in the R11 FMU. The numbers in brackets represent the percentage area of the natural subregion in a given seral stage.

<b>Natural Subregion</b>	<b>Young</b>	<b>Pole</b>	<b>Mature</b>	<b>Old</b>
Alpine	836 (3.9)	1187 (5.5)	10,646 (49.7)	8,730 (40.8)
Subalpine	3,006 (1.6)	29,697 (15.4)	116,260 (60.3)	43,749 (22.7)
Montane	381 (1.5)	4,860 (19.8)	17,924 (72.9)	1,419 (5.8)
Upper Foothills	617 (1.1)	12,336 (22.8)	37,547 (69.4)	3,632 (6.7)
Lower Foothills	0 (0.0)	46 (9.7)	214 (45.7)	209 (44.6)
<i>Total Area (ha)</i>	<i>4,840</i>	<i>48,125</i>	<i>182,591</i>	<i>57,739</i>