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**UPPER BOB CREEK ECOLOGICAL RESERVE
MANAGEMENT PLAN**

Alberta
ENVIRONMENTAL PROTECTION
Land and Forest Service



Recognizing the natural beauty and ecological value of Upper Bob Creek Ecological Reserve for present and future generations as described in this document, we hereby endorse the Upper Bob Creek Ecological Reserve Management Plan as an outline of the general policy and management plan for the site.

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Planning Team Member Date

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UPPER BOB CREEK ECOLOGICAL RESERVE

MANAGEMENT PLAN

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ENDORSEMENT PAGE

Recognizing the natural features and ecological value of Upper Bob Creek Ecological Reserve for protection purposes as discussed in this document, we hereby endorse the Upper Bob Creek Ecological Reserve Management Plan as an outline of the general policy and management intent for the site.

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ACKNOWLEDGMENTS

This management plan was prepared by a planning team consisting of representatives from Land and Forest Service, Natural Resources Service [formerly Fish and Wildlife Service, Parks Service], Improvement District #6, and the permit holder of Bob Creek Grazing Allotment.

The planning team consulted directly with individuals and organizations having an interest in the area. A list of these participants is found in Appendix 1.

1.0 SCOPE OF PLAN

This plan is the policy of the Alberta Government for the protection and use of Upper Bob Creek Ecological Reserve. The plan describes the role for the Ecological Reserve and how it is to be protected and managed. Guidelines for managing land uses and activities adjacent to the Reserve are also included. Contents of the plan include the following:

- a description of biophysical features,
- a review of land uses,
- prime values to be protected and managed,
- broad protection and management goals,
- management objectives,
- guidelines or conditions stating how objectives will be achieved, and
- implementation and evaluation guidelines stating who will be responsible for carrying out programs, and where additional information and resources will be required.

2.0 SYSTEMS CONTEXT

2.1 Ecological Reserves in Alberta

2.1.1 Classification of Protected Areas

Alberta's physical and biological landscapes can be broadly divided into six natural regions, namely: Grassland, Parkland, Foothills, Boreal Forest, Rocky Mountains and Canadian Shield. The six natural regions reflect the recurring, distinctive landscape patterns of vegetation, soils, landform, and to a limited extent wildlife patterns that are found within each of the regions. Although climate is a major controlling influence on vegetation, it is not used as a prime basis for subdivision because information is limited, and climate is not easily recognized in the field.

The six natural regions are further subdivided into 19 subregions. Recurring and distinctive landscape patterns within a particular natural region constitute an important basis for determining subdivision. Recognition of those subregions requires some knowledge and understanding of Alberta's natural history.

Ideally, one or more representative or special ecological reserves will be established within each of the 19 subregions.

2.1.2 Legislative Framework

Established pursuant to the *Wilderness Areas, Ecological Reserves and Natural Areas Act* (1980), the Ecological Reserves Program is an interdepartmental endeavor.

Overall program coordination and legislative responsibility is with the Minister of Environmental Protection. On-site management of individual reserves is assigned to the appropriate field agency. In the Green Area, the managing agency is usually Alberta Land and Forest Service.

Under Section 3.1 (1) of the *Wilderness Areas, Ecological Reserves and Natural Areas (WAERNA) Act*, public land may be designated as an ecological reserve to preserve it for ecological purposes. Ecological reserves include lands characterized by some or all of the following:

- are suitable for scientific research associated with the study of natural ecosystems,
- are a representative example of a natural ecosystem in Alberta,
- serve as an ecosystem that has been modified by man and that offers an opportunity to study the recovery of the ecosystem from modification,
- contain rare or endangered native plants or animals that should be preserved, or
- contain unique or rare examples of natural biological or physical features.

Under Section 5 of the Act, programs may be carried out with the approval of the Minister for the following purposes:

- management and preservation of the animal and plant life and environment of the ecological reserve,
- environmental research that does not involve any physical disturbance of the ecological reserve,
- public education and interpretation, and
- preservation and protection of the reserve.

To further protect ecological reserves, the WAERNA Act enables the use of regulations to designate controlled buffer zones. Strip mines, quarries, dams, diversions and other water resource undertakings are prohibited in controlled buffer zones.

A table summarizing permitted uses and prohibitions is included in Appendix 4.

2.1.3 Role of Ecological Reserves

Ecological reserves are defined as "**areas selected as representative or special natural landscapes and features of the province which are protected as examples of functioning ecosystems, as gene pools for research, and for education and heritage appreciation purposes.**" This overall purpose statement is further refined in terms of the four broad program objectives of Protection, Heritage Appreciation, Outdoor Recreation and Tourism. Specific to ecological reserves, the objectives are as follows:

- **Protection:** To protect the full range of landscapes, environmental diversity, and special natural features of Alberta.
- **Outdoor Recreation:** To protect natural landscapes throughout Alberta for a variety of resource-based, dispersed recreation pursuits.
- **Heritage Appreciation:** To protect landscapes that ensure, for Albertans and visitors, the opportunity to explore, understand and appreciate the full range of Alberta's natural heritage.
- **Tourism:** To protect areas capable of sustaining adventure travel and ecotourism, including extended tours, and enable visitors to experience the unspoiled landscapes and wildlife representative of Alberta's natural regions.
- The most important objective of ecological reserves is **protection**. Ecological reserves are legally established areas that protect our natural heritage, conserve biological resources and promote conservation of species and ecosystems over the long term.
- **Scientific research** is a primary use of ecological reserves. Reserves provide secure sites for both short- and long-term monitoring of environmental changes. Increased knowledge and understanding of natural ecosystems will help provide solutions to many practical resource management problems.

- Ecological reserves also serve as **benchmarks** against which to measure the effectiveness of resource management practices in other parts of the province.
- The maintenance of **genetic resources** for the benefit of present and future generations is an important component of the protection objective. Ecological reserves assist in ensuring the perpetuation of gene pools as an invaluable source of new genetic material. Ecological reserves enable genetic resources to continue to evolve, subject to naturally occurring environmental conditions. Genetic materials are of increasing scientific value for the development of new pharmaceuticals, for new varieties and strains of agricultural and forestry products for pest control and other products.

The protection role of ecological reserves includes consideration of natural processes which induce change and maintain ecological diversity. For example, fire is known to have a natural role in some ecosystems. Protection that compromises natural processes is contrary to the purpose of ecological reserves. Resource management strategies that simulate natural processes may be considered in the protection of ecological reserves.

2.2 Role of Upper Bob Creek Ecological Reserve

Upper Bob Creek Ecological Reserve is established to protect a representative example of the Montane Subregion of the Rocky Mountain Natural Region.

The primary role of the Reserve is to preserve and maintain its natural features, processes and genetic diversity that are representative of the montane ecosystem. The Reserve is recognized for its biological diversity. Notable are lush fescue grasslands, shrub communities, deciduous and mixed forests and coniferous stands representative of montane areas. Topography is also diverse including a broad alluvial valley, rounded hills, dissected ridges and rocky outcrops.

The biological and topographic diversity in combination with climatic effects (e.g., snow-free areas in winter) make the area attractive to a variety of animals. Herds of elk frequent the area, especially in winter.

The Reserve contains a number of **special features**. The north-south trending ridges in the area are important features because they contribute to the development of valued plant communities such as limber pine forests and fescue/oat grass grasslands.

The Reserve contains a variety of rare, uncommon or unusual plants. These include dwarf fleabane (*Erigeron radicans*), little rice grass (*Oryzopsis exigua*), marsh butterweed (*Senecio foetidus* var. *hydrophiloides*) and blue camas (*Camassia quamash*).

Several mammals that are found in the Reserve are uncommon in the montane or they are at the edge of their normal range. These include golden-mantled ground squirrels and sagebrush voles, as well as pikas and hoary marmots that have been reported in the Reserve.

Uncommon birds for the province that have been observed in or near the Reserve include golden eagle, prairie falcon, lazuli bunting, mountain bluebird, Cassin's finch and bobolink.

A secondary role of the Ecological Reserve is to encourage the acquisition and application of knowledge of montane ecosystems through scientific research and monitoring programs. Such programs that relate to livestock and hunting are especially important and relevant for this Ecological Reserve.

Guidelines in this plan also address program objectives relating to outdoor recreation, heritage appreciation and tourism even though they are not priority objectives for Upper Bob Creek Ecological Reserve.

3.0 OVERVIEW

3.1 Location

Upper Bob Creek Ecological Reserve is located within the foothills of southwestern Alberta, about 50 km west of Claresholm, north of the Oldman River. Figure 3.1 shows the location of the Ecological Reserve. The Reserve covers the headwaters of Bob Creek, which is west of Provincial Highway #22 and east of the Livingstone Range. The Reserve is bounded by and includes part of the Whaleback Ridge to the east, and a north-south trending ridge that forms part of the western boundary. The Reserve has an area of 2600 ha and is located in the following lands:

*TWP 12, RGE 2, W5M
Sec 4, 5, 6, 7, 8, 17, W/9, W/16, E of 9 & 16
west of Whaleback Ridge, E & SW 18, NW/18 east
of the height of land, S/19 east of the height
of land, SE & LSD 9 & 16 of 20 S creek, W & LSD
10 of 20 east of the height of land, 21, LSD
4 of 28, LSD 1 of 29.*

*TWP 12, RGE 3, W5M
1, 12 & 13 east of the height of land.*

3.2 Legal Status and Size

Upper Bob Creek Ecological Reserve was established under the WAERNA Act by Order in Council 142/89 on February 16, 1989. The Reserve is 2600.9 ha (10.04 sq. mi.) in size. Figure 3.2 shows a map of the Ecological Reserve.

3.3 Boundary Definition

The existing boundary was established to include a representative portion of the montane ecosystem within Alberta. The Reserve is located within the Whaleback region, the largest and most undisturbed area of montane in the province. The Reserve is bounded by and includes part of the Whaleback Ridge to the east, and a north-south trending ridge which forms part of the western boundary. The southern boundary follows the township line between townships 11 and 12. The upper portion of the Bob Creek watershed lies within the Ecological Reserve.

The northern boundary is irregular. It follows the headwaters divide between Bob Creek and Chaffen Creek for part of its length, and follows the legal survey grid and the watercourse of an unnamed creek for the rest of its length. The boundary was drawn so as to enclose a local rock

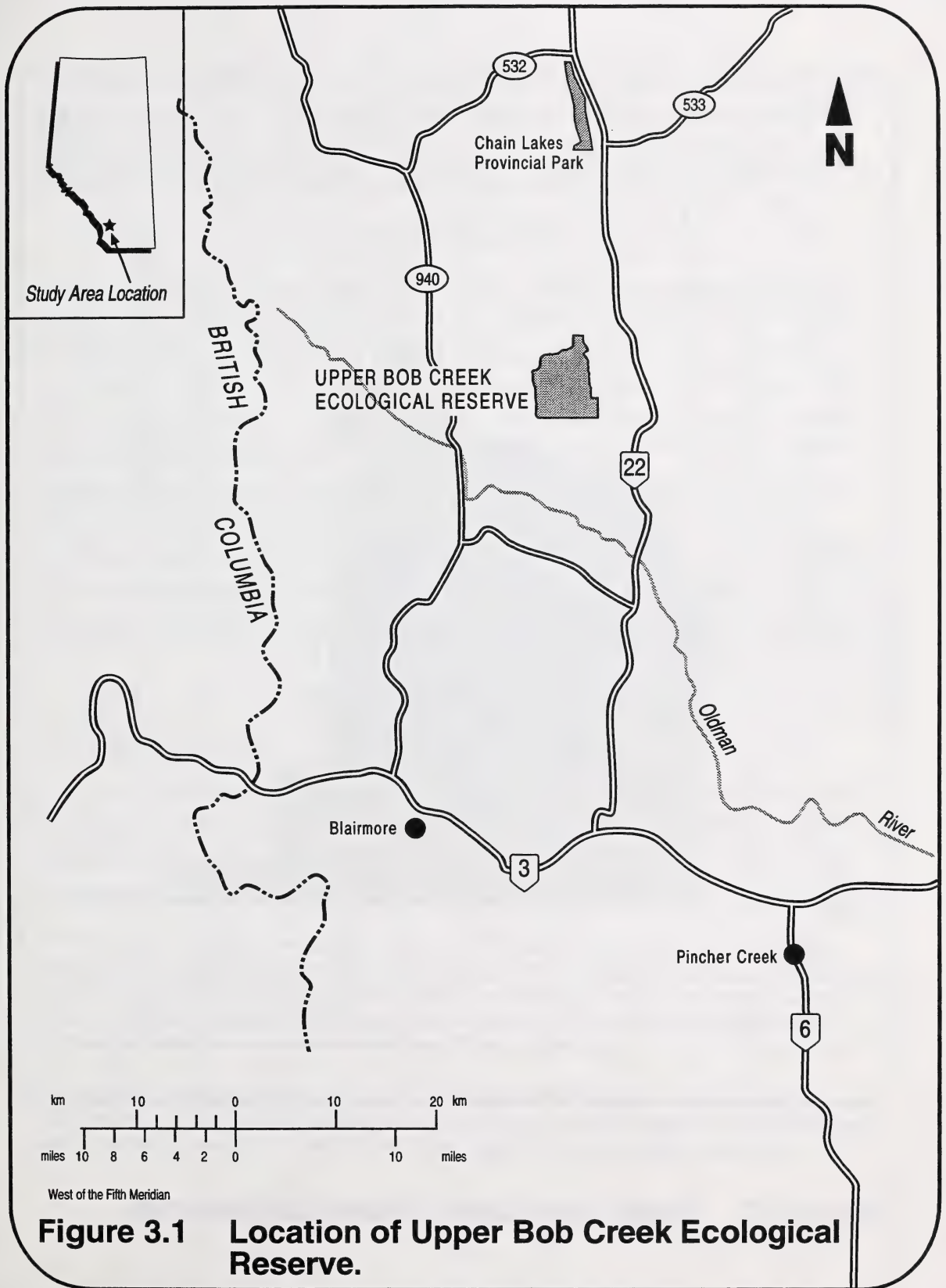


Figure 3.1 Location of Upper Bob Creek Ecological Reserve.

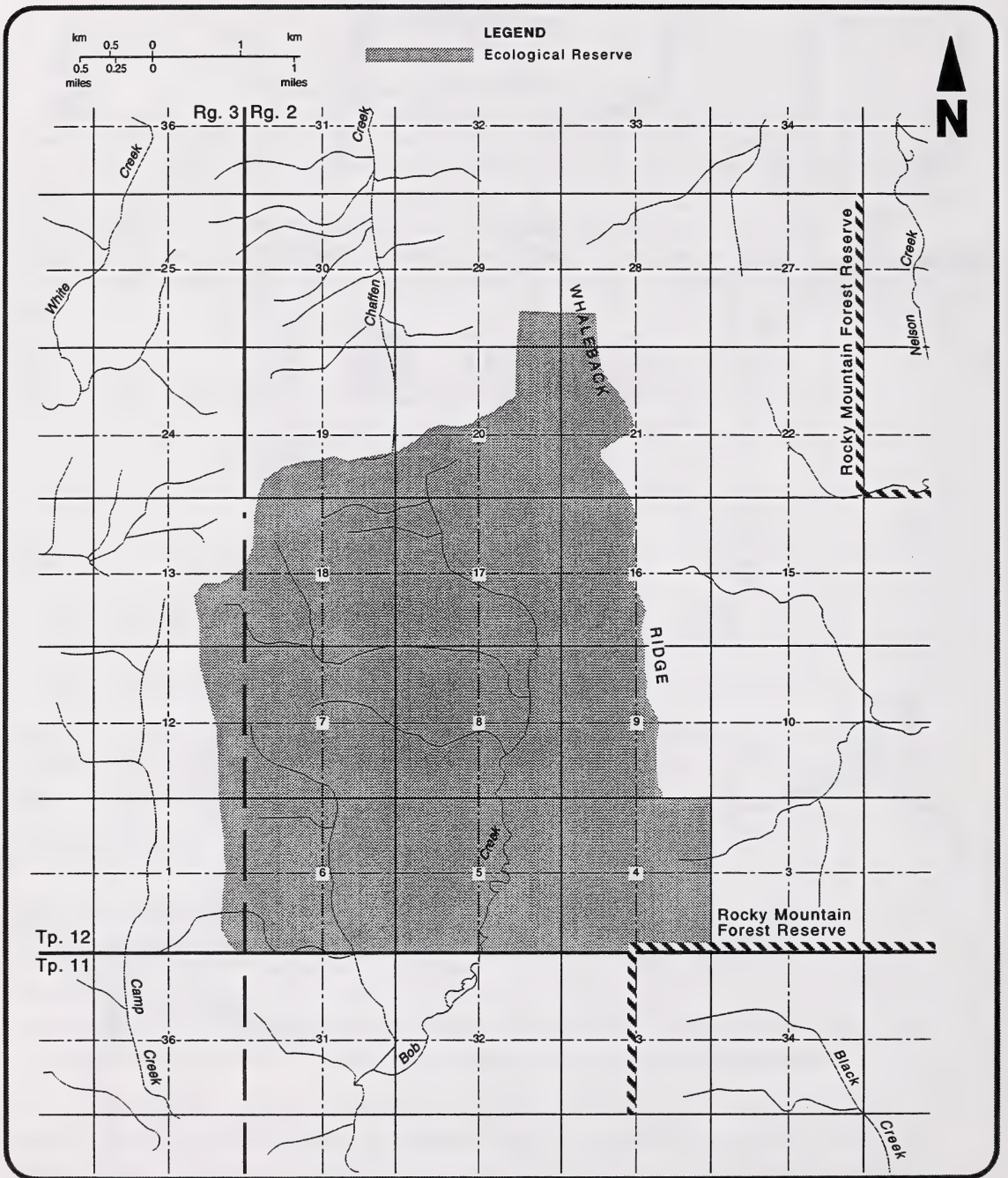


Figure 3.2 Upper Bob Creek Ecological Reserve.

outcrop in sections 20 and 21 in Twp. 12, Rge. 2, W5. This outcrop was apparently referred to in a biophysical report and in the Ecological Reserves Advisory Committee recommendations as *Chimney Rock*, a geological feature actually located about 3 km north of the established boundary. The outcrop located inside the Ecological Reserve is unnamed. The northern boundary is located just north of existing grazing allotment boundary fences and is not marked.

3.4 History of Designation

The upper Bob Creek area was identified as a relatively undisturbed montane landscape in several regional surveys which focused on the landscape and vegetation of the area. In 1980 the upper Bob Creek area was nominated as an ecological reserve. In a comparative study, *Biophysical Features and Land Use, Miles Coulee*, (Brown et al. 1986), upper Bob Creek was rated most representative of the Montane Subregion. A comprehensive biophysical study was undertaken in 1986, including an inventory and description of the vegetation and special features of the upper Bob Creek area. In 1987 the Advisory Committee on Wilderness Areas and Ecological Reserves held public meetings in Claresholm and in Lundbreck to determine public concerns with the proposed ecological reserve. The Advisory Committee on Wilderness Areas and Ecological Reserves is a committee appointed to represent the interests of the public as they pertain to ecological reserves and to advise the Minister of Environmental Protection on matters relevant to ecological reserves. As a result of these steps, the Advisory Committee advised the then-Ministers of Recreation and Parks and of Forestry, Lands and Wildlife that the upper Bob Creek area be set aside as an ecological reserve. Upper Bob Creek Ecological Reserve was established on February 16, 1989.

3.5 Biophysical and Archaeological Features

3.5.1 Geology and Landforms

Upper Bob Creek Ecological Reserve is located within the Southern Foothills Geological District of the Rocky Mountain Foothills Geological Region. "Foothills" in this region refers to a band of near-parallel, north-south trending ridges and valleys. This 10- to 20-km wide band forms the transition zone between the higher elevation, more rugged Rocky Mountains to the west and the lower elevation, rolling topography of the Porcupine Hills to the east.

Bedrock on the ridges is of the Brazeau Formation. This greenish gray sandstone and mudstone incorporates some tuff and thin coal beds. The valleys are composed of Cretaceous bedrock of the Alberta group. This bedrock features several formations including thin-bedded, cherty sandstone (Blackstone Formation), thick-bedded quartzose sandstone (Cardium Formation), and thin-bedded shale, siltstone, sandstone and ironstone (Wapiabi Formation).

The dominant geological features include the Whaleback Ridge along the eastern boundary, a rocky outcrop on the northern boundary and ridges along the western boundary. The outcrops are mostly massive, coarse-grained sandstones. Lower slopes of ridges and valley bottoms are

underlain by marine shales of the Wapiabi Formation. There is a narrow, northwest-trending band of Blackstone marine shales and Bighorn sandstone that cuts across the valley bottom.

Surface deposits on ridges are largely weathered material from the local bedrock. Along the lower flanks of the eastern ridge is a layer of till from former mountain glaciers. The valley bottom contains alluvial material moved and deposited by Bob Creek in post-glacial times.

Surface topography is varied, dominated by the broad creek valley of Bob Creek and by the massive ridge complexes on both sides of the creek. Numerous transverse east-west ridges branch off the main ridges. Local relief varies up to 200 m or more from the valley bottom to the tops of ridges. Hilly topography created by glacial till deposits and scattered rocky outcroppings add to the topographic diversity.

Geology of the Ecological Reserve is briefly summarized in *Physical Land Classification of the Upper Bob Creek Ecological Reserve* (Can-Ag Enterprises Ltd., et al. 1993, p. 3), and *Biophysical Features and Land Use, Upper Bob Creek Candidate Ecological Reserve* (Brown et al. 1986, p. 3).

3.5.2 Climate

The Montane Subregion has a climate influenced by two major factors: physiography and the interaction of physiography with major air masses. The high relief and mountain ranges to the west significantly affect climatic conditions. Summers can be quite short, especially at higher elevations and on north-facing slopes. Winter can be quite variable, including snow at higher elevations induced by Pacific air, bitter cold created by Arctic fronts and milder conditions created by Great Basin airstreams.

Yearly precipitation totals range from 308 mm to 1279 mm with a median of 515 mm. Two precipitation peaks may occur during early and late summer.

The mean January temperature is -8°C, the mean July temperature is 12°C. The Montane has the warmest winter temperatures of any forested subregion in Alberta. Although summer temperatures are cool relative to grassland subregions, there is potential for significant evapotranspiration deficits in midsummer.

There are chinook winds one day in three during midwinter. Local topography influences redistribution and retention of snow cover on the ground. A local snow study found that the winter snow depth on north-facing slopes usually ranges from 20 to 70 cm, whereas south-facing slopes have depths ranging from 0 to 60 cm.

Climatic information is taken from *Ecoregions of Alberta* (Strong and Leggat, 1992, pp. 16, 19 and 21).

3.5.3 Soils

Several soil types have developed under the different environmental conditions and vegetation types found within the Ecological Reserve. Distribution of soil types is described by Can-Ag Enterprises Ltd. et al. (1993).

Shallow Lithic/Orthic Brunisols have developed on weathered bedrock and colluvial materials on ridges; Orthic Eutric Brunisols and weakly developed Orthic Gray Luvisols have developed on weathered bedrock and colluvial deposits on upper slopes; Dark Gray Luvisols and Black Chernozems have developed on colluvial, residual and morainal deposits on the valley bottom plains; and Humic Gleysols have formed in the seepage areas and along streams.

3.5.4 Hydrology

The Ecological Reserve is drained to the south by Bob Creek and its several tributaries. The drainage basin occupies the uppermost 5 km of Bob Creek. The elevation of the valley bottom varies from about 1650 m to about 1480 m.

Bob Creek is a small permanent stream, which meanders through deep fluvial deposits overlying morainal material. Tributary streams have much steeper gradients and generally have cut through a fluvial veneer down to bedrock. Tributary streams may be dry during periods of dry weather. Seepage areas are common at the heads of these tributaries and at the base of slopes along the valley floor. There are no lakes in the area, although beaver regularly create temporary ponds along Bob Creek.

Hydrological information is taken from Brown et al. (1986, p. 3) and Can-Ag Enterprises, Ltd. et al. (1993, p. 6).

3.5.5 Vegetation and Flora

Vegetation characteristic of the Montane Subregion is restricted to the foothills and major valleys of the Rocky Mountains and is highly variable owing to complex topography (Strong and Leggat 1992). **The montane landscape is characterized by a pattern of grasslands, deciduous and coniferous forests.** Characteristic tree species include lodgepole pine (*Pinus contorta*) and Douglas-fir (*Pseudotsuga menziesii*), found in association with other tree species including aspen (*Populus tremuloides*), white spruce (*Picea glauca*) and limber pine (*Pinus flexilis*). Grasslands are typically dominated by fescues (*Festuca* spp.) and oat grasses (*Danthonia* spp.) with a large diversity of forbs.

Vegetation communities in the Ecological Reserve tend to be highly variable, the result of differences in local climate, aspect, slope position, fire history and available moisture. The valley bottom is dominated by grasslands, meadows and shrublands; hillsides support a patchwork of grasslands and different forest types. Grassland occupies the largest area of any vegetation type in

the Reserve; forest is the secondmost common vegetation type. An influence is also conveyed from other subregions in the southern Alberta foothills, such as the Fescue Grassland Subregion; however, the Montane influence predominates.

Grasslands in the Reserve are typically found on drier sites and are dominated by graminoid species that tolerate cooler conditions such as rough fescue (*Festuca scabrella*), California oat grass (*Danthonia californica*) and Parry oat grass (*Danthonia parryi*). A variety of grassland associations exist depending on local conditions. On ridges with thin rocky soil, the most common species are Parry oat grass, California oat grass, rough fescue, shrubby cinquefoil (*Potentilla fruticosa*) and hairy wild rye (*Elymus innovatus*). The grasslands of the lower slopes on well-drained sites consist of species similar to those on the ridges, although they grow more abundantly and include bluebunch fescue (*Festuca idahoensis*). On moister, valley bottom sites, the dominant grass species are rough fescue and bluebunch fescue and there is a rich component of forbs such as three-flowered avens (*Geum triflorum*), sticky purple geranium (*Geranium viscosissimum*), field mouse-ear chickweed (*Cerastium arvense*), smooth aster (*Aster laevis*), graceful cinquefoil (*Potentilla gracilis* var. *rigida*) and northern bedstraw (*Galium boreale*).

Where moister conditions occur within the grasslands, meadows have developed with a mixed flora of grasses and forbs. These areas are characterized by grasses such as bluebunch fescue, awnless brome (*Bromus inermis* ssp. *pumpellianus*), Kentucky bluegrass (*Poa pratensis*) and alpine foxtail (*Alopecurus occidentalis*).

Bluegrass (*Poa* spp.) and dandelion (*Taraxacum officinale*) communities also occur within the Reserve. Such plant communities are fairly common throughout grazed lands and reflect a long period of domestic grazing or past disturbances such as overgrazing.

Douglas-fir forests within the Reserve are found mainly on midslope to upper slope positions on relatively drier sites. Some areas of savannah occur on the east-facing slopes where the forest grades into lower slope grassland. Evidence of fire exists in many stands and regeneration of seedlings is common. Some mature stands consist of large, old specimens. Herbaceous cover commonly includes species such as white meadowsweet (*Spiraea betulifolia*), hairy wild rye, orange false dandelion (*Agoseris aurantiaca*), small-leaved everlasting (*Antennaria parvifolia*) and pine reed grass (*Calamagrostis rubescens*). Woody species generally include ground juniper (*Juniperus communis*). At higher elevations the Douglas-fir forest may grade into limber pine forest, which is one of the driest forest communities in Alberta.

Lodgepole pine forests are typically found at higher elevations. Douglas Fir and white spruce are occasionally present in these stands. Limber pine is common near upper ridges. Herbaceous cover is generally quite sparse and includes such species as pine reed grass, white meadowsweet, twinflower (*Linnaea borealis*), heart-leaved arnica (*Arnica cordifolia*), prince's-pine (*Chimaphila umbellata*) and prairie rose (*Rosa arkansana*). Woody cover such as creeping juniper (*Juniperus horizontalis*) is also present. Openings on upper ridges typically have a higher proportion of herbaceous plants.

Douglas-fir-lodgepole pine forest occupies hillside locations, mostly on east-facing slopes. Herbaceous plant species are similar to those in lodgepole pine forest and Douglas-fir forest. Lodgepole pine and Douglas-fir saplings are common in the understory.

Mixed forest contains Douglas-fir-aspen and pine-aspen as dominant associations. Aspen and pine appear to be younger fire-successional species and typically occur as understory components. The ground layer is richer in species here than it is in the coniferous forest. Common species include young aspen, common wild rose (*Rosa woodsii*), northern bedstraw, cream-colored vetchling (*Lathyrus ochroleucus*), white meadowsweet, harebell (*Campanula rotundifolia*), field mouse-ear chickweed and common yarrow (*Achillea millefolium*).

Aspen forest occupies moister sites on lower slope positions, especially on east- and west-facing slopes. Other tree species may occur including Engelmann spruce, Douglas-fir and lodgepole pine. The shrub layer is dominated by aspen saplings and also typically contains common wild rose. Herbs include narrow reed grass (*Calamagrostis stricta*), Lindley's aster (*Aster ciliolatus*), western sweet cicely (*Osmorhiza occidentalis*), wild strawberry (*Fragaria virginiana*), western meadow rue (*Thalictrum occidentale*), tall larkspur (*Delphinium glaucum*) and common fireweed (*Epilobium angustifolium*).

Spruce-lodgepole pine forest is usually found on relatively moist sites, typically in lower slope positions, in the lower basins of stream tributaries and on the east side of ridge crests where snow accumulates. In some areas, pure stands of spruce occur. Understory plants include twinflower, thimbleberry (*Rubus parviflorus*), bunchberry (*Cornus canadensis*), heart-leaved arnica and *Calamagrostis*. In some stands the ground cover consists mainly of feather mosses.

Shrubland occupies much of the valley bottom where an ample and steady supply of moisture is available. Principal shrub species are willow, especially smooth willow (*Salix glauca*), beaked willow (*Salix bebbiana*), myrtle-leaved willow (*Salix myrtillifolia*), pussy willow (*Salix discolor*) and shining willow (*Salix lucida*). Bog birch (*Betula glandulosa*) is commonly associated with willow. Herbs include large-leaved yellow avens (*Geum macrophyllum*), large northern aster (*Aster modestus*), common yarrow, broad-glumed wheat grass (*Agropyron violaceum*), wire rush (*Juncus balticus*), common fireweed and fringed brome (*Bromus ciliatus*).

Plant communities in Upper Bob Creek Ecological Reserve have evolved in the presence of wildfire and grazing. Fire scars from previous wildfires are evident in the Reserve. The area has a history of grazing by native ungulates such as elk and mule deer. Cattle were introduced to the area around the turn of the century. Although the effects of wildfire and grazing on Montane vegetation are only partly understood, they are generally considered to have important roles in maintaining vegetation diversity in native Alberta grasslands.

Approximately 300 plant species have been documented in Upper Bob Creek Ecological Reserve by Brown et al. (1986). A list is available from Land and Forest Service offices listed in this plan.

Additional details on vegetation communities in Upper Bob Creek Ecological Reserve are described by Brown et al. (1986) and in *Bob Creek Elk Winter Range Habitat Study* (O'Leary et al. 1989).

3.5.6 Fauna

Evidence suggests that until the late 1800s when they were extirpated from the western plains, bison periodically visited the Bob Creek area in search of food (Ronaghan 1990).

Elk inhabited the area before settlement. Although their numbers fluctuated during historical times, they are common in the area now, especially in winter when they use snow-free areas. Other ungulates found in the Ecological Reserve include moose, mule deer and white-tailed deer.

Larger predators likely to use the Reserve include black bear, coyote, gray wolf and cougar. Weasel, mink and pine marten are also likely to occur here. Grizzly bear have been sighted near the Reserve.

Smaller mammals include northern pocket gopher, Columbian ground squirrel, red squirrel, bushy-tailed wood rat (pack rat), golden-mantled ground squirrel, and sagebrush vole. Hoary marmot and pika are also reported to occur in the area.

Birds recorded in the Ecological Reserve are typical of the Montane Subregion in Alberta. Some of these include ruffed grouse, red-tailed hawk, pileated woodpecker, tree swallow, mountain chickadee, pine siskin and chipping sparrow. Species associated with alpine and subalpine zones include Clark's nutcracker, which is a permanent resident recorded in the general area.

Beaver ponds, streams and stream banks in the Reserve provide habitat for fish such as rainbow trout. Amphibian species include boreal toad and wood frog.

Information on fauna in this section is taken from Brown et al. (1986).

3.5.7 Landscape Diversity

Upper Bob Creek has considerable landscape diversity, which makes it a highly scenic area. The dominant natural features in the Reserve consist of the broad creek valley of Bob Creek with its lush grasslands and the massive ridge complex of the lower Whaleback Ridge with its associated transverse ridges.

Complexes of woodland grow on lower slopes of ridges with adjacent areas occupied by shrubland. Patches of woodland grow on east- and north-facing slopes and vary from closed forests at higher elevations to savannah at lower elevations. A range of topographic and moisture conditions create specialized habitats, such as dry, rocky outcrops and low shrubland communities, which add to the landscape diversity of the area.

Landscape descriptions are taken from a report entitled, *Montane, Foothills Parkland and Southwest Rivers Natural Landscapes Survey 1978-79* (Wallis 1980).

3.5.8 Archaeology

Although no archaeological surveys have been done in Upper Bob Creek Ecological Reserve, evidence suggests that Native tribes frequented the area. Prehistoric campsites dating back 8000 years have been documented along the Oldman River, a few kilometres south of the Ecological Reserve (Ronaghan 1990). These campsites are associated with human use of local food resources such as bison. A prehistoric buffalo jump is located adjacent to the Oldman River, about 8 km downstream from its junction with Bob Creek.

3.6 Land Uses

3.6.1 Historical Information

One of the first Europeans to visit the area was Peter Fidler, who recorded locations of Kootenay Indian encampments at The Gap in his diaries in 1793. In the early 1900s, the Bob Creek and Whaleback Ridge area were surveyed by the Dominion Department of Interior, and in 1911 the Rocky Mountain Forest Reserve was established. Early range inspections were conducted in the area as stock were introduced, and the first range surveys were conducted in the early 1950s.

3.6.2 Domestic Grazing

History of grazing in the area is summarized in a report entitled *The History of Grazing in the Porcupine Hills* (Hume 1969). Cattle were introduced to the nearby Porcupine Hills in the 1880s when the Government of Canada began leasing tracts of land for ranching. The nearby Waldron ranch was stocked in 1883-1884. As the original leases expired, they were replaced in 1918-1920 with annual permits with a specified grazing season from May 16 to November 15. Some trespass grazing occurred year-round in various parts of the Forest Reserve during this time and overgrazed conditions were reported. In 1930 with the construction of fences, more control of trespass grazing and closer inspections, the range conditions improved somewhat. Grazing was encouraged mainly to reduce fire hazard, so overgrazed conditions persisted. In 1951 the first range surveys were carried out in the area and the grazing season was changed to June 1 to October 31. The first range management plans were also developed at this time, and grazing levels were reduced.

Domestic grazing in the area is administered under the *Forest Reserves Act*. Ranchers who meet the requirements of the Act graze their livestock under a grazing permit. Ranges are divided into units called allotments, which are further divided into distribution units. Portions of four grazing allotments are located in Upper Bob Creek Ecological Reserve: Chaffen Creek, Chimney Rock, Bob Creek and Waldron Allotments. Bailey Distribution Unit, part of Bob Creek Allotment, is located entirely within the Ecological Reserve. Lower Livingstone Allotment lies adjacent to and

west of the Ecological Reserve. Figure 3.3 shows boundaries of these grazing allotments. A description of range types and range condition is contained in the range allotment plans for these allotments.

3.6.3 Hunting

Archaeological evidence suggests that Natives hunted bison in the Bob Creek area during prehistoric times. Elk, deer and moose have been the principal big game species in the Bob Creek area during historic times.

Although the numbers of ungulates, especially elk, suffered from lack of management in the early 1900s, populations increased later in the century. Some elk were moved from the Bob Creek area for introduction into other areas in the late 1970s and early 1980s.

Upper Bob Creek Ecological Reserve is contained within Big Game Zone 7, Wildlife Management Unit 308. White-tailed deer, mule deer, moose, elk, bighorn sheep, black bear and cougar are all available for hunting within this zone. The most popular species is elk, although other species such as deer are often hunted during an elk hunt. Hunting of big game in the Ecological Reserve has occurred annually since its establishment in 1989, pursuant to the Alberta Big Game Regulations and as authorized by the then-Minister of Tourism, Parks and Recreation.

The authority for carrying out management of elk in Upper Bob Creek Ecological Reserve was transferred to the Department of Forestry, Lands and Wildlife in 1990 (O.C. 139/90). This regulation was later amended so as to refer to big game as opposed to elk only (O.C. 588/90).

Bird Game Zone 6 also covers the area. Game bird hunting has been prohibited in Upper Bob Creek Ecological Reserve since its establishment in 1989.

3.6.4 Fishing

Bob Creek is a locally known trout stream. Beaver ponds provide locations for catching rainbow trout. Better fishing in Camp Creek, a drainage immediately to the west of Bob Creek, and in the Oldman River results in relatively low levels of fishing on Bob Creek. Fishing in Upper Bob Creek Ecological Reserve has been prohibited since establishment of the Ecological Reserve in 1989.

3.6.5 Trapping

A registered trapping area surrounds the Ecological Reserve. Historically, beaver has been the most common species trapped in the trapping area, along with small numbers of marten, coyote, badger, mink and red squirrel. There are no records to show which species were trapped in what is now the Ecological Reserve. Trapping in Upper Bob Creek Ecological Reserve has been prohibited since establishment of the Ecological Reserve in 1989.

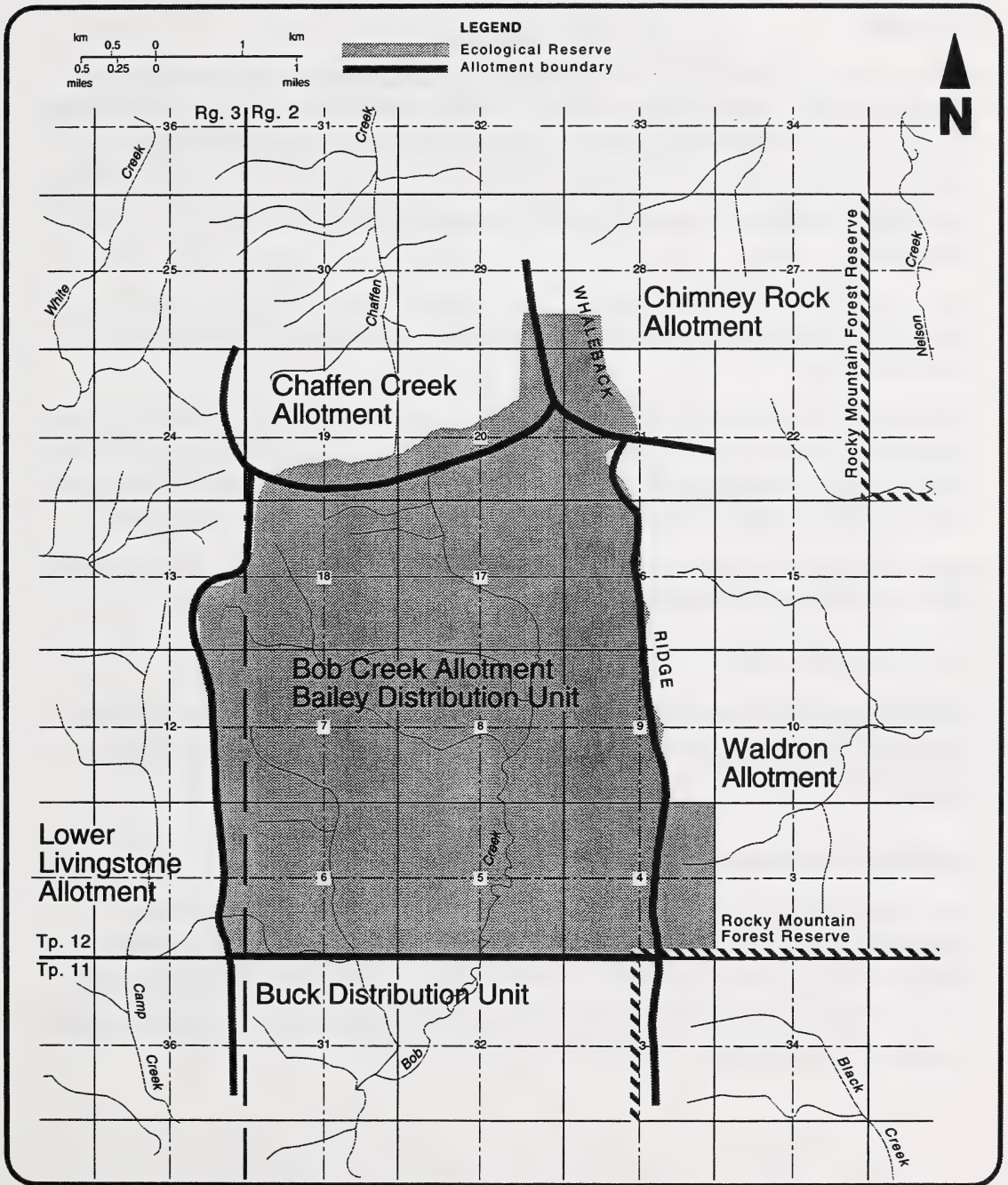


Figure 3.3 Grazing allotments.

3.6.6 Access

The upper Bob Creek area is accessible primarily along an unimproved trail that crosses private land and the Rocky Mountain Forest Reserve. The trail parallels Bob Creek for much of its length (see Figure 3.4). It has provided traditional access into the area such as foot, horseback and motorized vehicle access. The trail has also been used to reach areas located north of the reserve. Grazing permittees and government staff have used the trail for doing range inspections, grazing herd management and enforcement work. Other users of the trail included hunters, recreationists and trappers.

There are also several other locations that provide potential points of access into the Ecological Reserve; however, these are seldom used because they are unmarked and located in difficult terrain (see Figure 3.4).

Before establishment of the Ecological Reserve, the trapper who operates the registered trapline in the area used trails along Bob Creek for motorized access to parts of the trapping area. These trails are now located within the Ecological Reserve and are closed to motorized access except where authorized as described in this plan. A spur trail shown in Figure 3.4 is one such trail.

Motorized vehicle use within Upper Bob Creek Ecological Reserve has been prohibited, except when authorized for management purposes, since its establishment in 1989.

3.6.7 Outdoor Recreation

With the exception of big game hunting, the Bob Creek area has traditionally provided limited opportunities for outdoor recreation owing to its location and limited access. Recreational activities have included fishing, horseback riding, wildlife viewing, nature study, hiking and camping.

3.6.8 Mineral Development

Upper Bob Creek Ecological Reserve area was last explored for oil and gas by seismic exploration in 1983. There is currently one active petroleum and natural gas licence partially located within the Ecological Reserve. It was issued July 22, 1992, for a five-year term and is subject to a no-surface access restriction on the portion contained within the Reserve. No wells have been drilled within the Ecological Reserve. Both a coal lease and an application for metallic minerals have been cancelled.

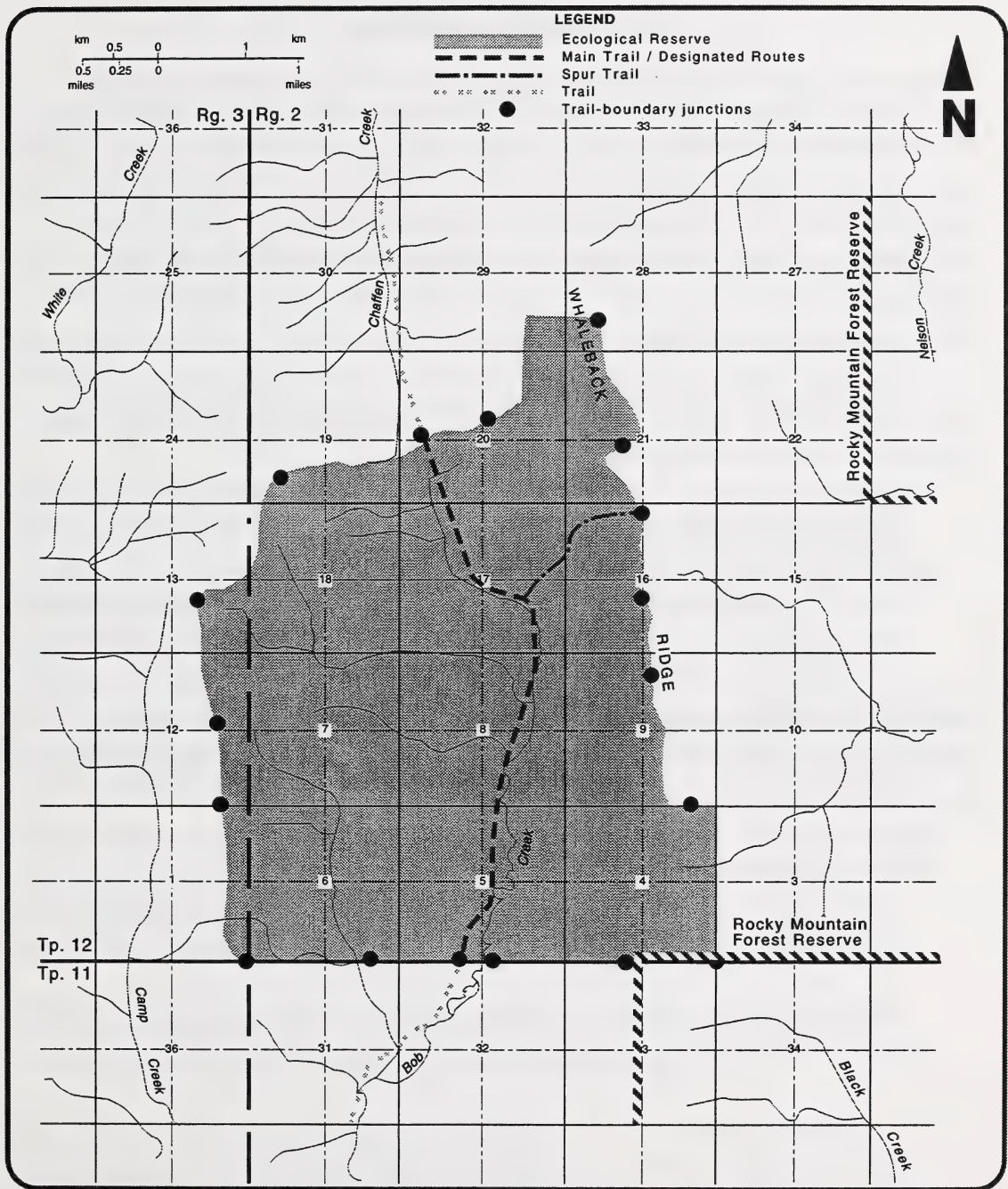


Figure 3.4 Trails.

4.0 MANAGEMENT ISSUES

A number of management issues have been identified for the Ecological Reserve. They include issues relative to grazing, hunting, access, monitoring, fire management, weed control, insects and disease, reclamation and camping.

Some of these issues were addressed by the Advisory Committee on Wilderness Areas and Ecological Reserves in its deliberations before establishment of the site as an ecological reserve. At that time, the advisory committee made recommendations concerning these issues. This approach was taken primarily to recognize the traditional land uses that occur in the area. The recommendations were based on biophysical reports, written and verbal submissions and the studied consideration of its members.

The Fifth Annual Report (1987/88) of the advisory committee contains the recommendations which were agreed to for the Ecological Reserve. These recommendations were approved by the then-Minister of Recreation and Parks in 1988, and are as follows:

- that individuals holding grazing rights within the Reserve be directly involved in management planning for the area,
- that grazing be maintained in the Reserve for management purposes,
- that vehicle access within the Reserve be restricted, and that active management of wildlife populations should be considered essential within the area and that hunting be a condition of establishment of the Reserve.

Hunting for management purposes was understood to refer specifically to elk. The advisory committee further recommended that hunting be used as a management tool for species other than elk, if hunting is determined to be the most appropriate mechanism to maintain and/or protect the integrity of the natural resources within the Ecological Reserve.

5.0 VALUES AND GOALS

5.1 Values

Upper Bob Creek Ecological Reserve contains a number of valued landscapes and biophysical features that are representative of the Montane Subregion. This Ecological Reserve is an important component of a provincial program to protect examples of Alberta's natural heritage.

The following briefly describes the principal biophysical features for which Upper Bob Creek Ecological Reserve is established to protect.

Landscapes representative of the Montane Subregion: The Ecological Reserve contains high topographic diversity including massive ridge complexes, rocky outcrops, rolling terrain and a broad alluvial valley. The ridges are especially good examples of the rolling topography of the foothills, where much of Alberta's Montane Subregion occurs.

Flora and vegetation representative of the Montane Subregion: The montane vegetation of Upper Bob Creek Ecological Reserve is rich in species diversity and is found in several habitat types including a variety of grassland, shrubland, savannah, deciduous forest, mixed forest and evergreen forest associations. Grassland communities vary from types on exposed ridges with thin rocky soils to types growing on well-drained slopes and moister alluvial deposits.

A diversity of forest communities: Forest communities reflect the interactions of climate, topography, soils and fire history. Some of these communities include pure Douglas-fir stands that grow on midslope to upper slope positions and which grade into savannah on lower slopes. At higher elevations, lodgepole pine forests are the dominant vegetation, whereas limber pine grows near the upper ridges and along craggy rock outcrops.

Animals common to the Montane Subregion: A variety of animal species are found in the Bob Creek area and add to the values of the Ecological Reserve. These include small mammals such as Columbian ground squirrel, golden-mantled ground squirrel and sagebrush vole. Bird species include pileated woodpecker, Clark's nutcracker and mountain chickadee. Bob Creek provides important winter habitat for large grazing animals such as elk and mule deer.

Geological features: Geological features include abrupt ridges that intercept wind and support grassland and savannah communities. Other geological and landscape features include cliffs and rock outcrops, glacial deposits, alluvial deposits and materials weathered in place.

Special features: In addition to the above values, special features have been identified that include rare flora and a talus area that reportedly supports a local population of pika and hoary marmot. Examples of flora reported in the Ecological Reserve that are on rare plant lists include the following: *Erigeron radicans*, *Oryzopsis exigua*, *Senecio foetidus*, *Potentilla plattensis*, *Angelica dawsonii*, *Aster maccallae* and *Conimitella williamsii*. Examples of plants that are not

on rare plant lists but are uncommon include *Camassia quamash*, *Besseyia wyomingensis* and *Goodyera oblongifolia*.

5.2 Goals

The following goals provide broad direction for the preservation and use of Upper Bob Creek Ecological Reserve.

Primary goal:

1. To protect and manage the natural features and ecological processes of the Ecological Reserve so as to maintain this ecosystem as representative of the Montane Subregion, with all its component parts and processes such as diverse landscapes, soils, floral and faunal communities and hydrological processes.

More specifically this goal includes:

1. Protecting natural and special features such as habitats of rare flora and a talus area from artificial disturbances, and
2. Defining and maintaining ecological diversity, natural ecological processes and native habitats within the mosaic of montane grassland, shrub, savannah and forest communities in the Ecological Reserve.

Secondary goals:

1. To ensure availability of the Ecological Reserve in a natural state for education through scientific research or other purposes compatible with the role of the Ecological Reserve.
2. To acquire and apply knowledge concerning the ecological role of grazing within a montane ecosystem.
3. To acquire and apply knowledge concerning the ecological role of hunting within a montane ecosystem.
4. To study the recovery of disturbed areas from previous activities such as seismic exploration trails in a montane ecosystem.
5. To consider how management programs within the Ecological Reserve may affect adjacent lands, so as to minimize the impacts.
6. To consider how resource management programs on adjacent lands may affect the Ecological Reserve, so as to minimize the impacts.

6.0 OBJECTIVES AND GUIDELINES

This section contains objectives and guidelines for protecting natural features and managing resources in Upper Bob Creek Ecological Reserve. Objectives and guidelines provide management direction so that specific activities may be developed.

6.1 Protection

6.1.1 Vegetation/Flora

Plant Communities/Species

Objectives:

1. To define, monitor and maintain natural ecological diversity and ecological processes in plant communities within the Ecological Reserve.
2. To study how management strategies such as domestic grazing affect plant species and communities in the Reserve.

Guidelines: A vegetation management plan will be prepared that will contain guidelines for maintaining natural diversity of plant communities and ecological processes within the Reserve. Guidelines contained within this plan will assign measurable objectives to distribution, species composition and condition of the vegetation to be maintained, and will make specific recommendations for management practices such as grazing.

The vegetation management plan will be based upon information obtained through a detailed biophysical inventory. The inventory will include:

- a description and map(s) of plant communities at a scale of 1:15 000,
- a description of rare plants and their habitats, and
- assessment of historical changes in areal extent of vegetation cover through the use of air photos and early 1900s surveys.

A monitoring program will be established to determine changes in plant communities over time and the effects of management activities such as domestic grazing on plant species and communities. For example, at what rate is aspen encroaching into the grasslands and what communities are being affected? Is shrubby cinquefoil also encroaching? Results obtained from monitoring will be used to ensure management programs are having the desired results and to form a basis for making changes to existing management programs or for development of new ones.

A vegetation management plan will be developed in consultation with an advisory group, a plant ecologist and a range management specialist. Information on the membership and role of the advisory group is found in Appendix 3.

Fire

Objectives:

1. To encourage study of the role of fire in the montane ecosystem.
2. To protect resources adjacent to the Ecological Reserve from wildfires that originate within the Reserve.
3. To minimize the impact of fire suppression activities should they occur.

Guidelines: Wildfire is known to have a role in the maintenance of grassland communities. Some species depend on fire for their survival. However, there are numerous factors that will determine how well a plant will survive a fire. Species such as lodgepole pine and aspen are adapted to a fire environment and will quickly invade a burned area. On the other hand, some species such as white spruce may be negatively affected by fire.

Although prescribed fire may be a management tool, more information is required before it can be used operationally in Upper Bob Creek Ecological Reserve. For example, how often is fire required, what intensity of fire would be required and what species would benefit from a fire? Which communities burned in the past and at what frequency? How would prescribed fire be used and how would it be controlled? Until more information is acquired, prescribed fire will only be used for research purposes in Upper Bob Creek Ecological Reserve. Proposals for research concerning the use of prescribed fire in the Ecological Reserve will be encouraged.

If wildfire occurs in the Ecological Reserve, study plots will be considered to document the response of plants and animals to burns. Studies on species that appear to be invading grassland, such as aspen and shrubby cinquefoil, will be encouraged.

However, letting "nature take its course," by allowing wildfires to burn in the Ecological Reserve, will not be considered an option. Resources that surround the Ecological Reserve include some for which Alberta Land and Forest Service has a mandate to protect through control of wildfire. All wildfires within the Reserve will be suppressed. The following conditions will be followed when suppressing fires in the Ecological Reserve to help ensure that the values of the Reserve are protected and damage minimized:

- a. every reasonable effort will be made to minimize disturbance to the Reserve,
- b. the location of the Ecological Reserve will be shown on a map in fire management plans for the area, and fire suppression conditions for the Ecological Reserve will be included in the fire management plans,
- c. equipment use on the ground will be limited to hand tools wherever possible and where practical; water pumps will be used during the building of fire lines and to extinguish fires,
- d. fire retardants may be used and will be restricted adjacent to streams,
- e. any disturbance caused by equipment will be restored to as natural a state as possible immediately following fire suppression action,

- f. a map showing locations of special areas and rare plants will be provided to fire crews, who will be instructed to avoid disturbing these areas wherever possible,
- g. use of heavy equipment, although extremely unlikely, may be approved by the Director, Land and Forest Service, Southern East Slopes Region, and
- h. vehicle access will be confined to designated routes, whereas other areas will be accessed by foot or by air wherever possible.

Weeds

Objectives:

1. To control noxious and nuisance weeds, and to eliminate restricted weeds if they are found within the Ecological Reserve.
2. To develop a monitoring program to determine changes in infestation over time, and to document the effectiveness and impacts of control actions if they are taken.

Guidelines: Weeds will be treated in accordance with legislation as defined in the *Weed Control Act* (1980). In the plan area, I.D. #6 is responsible for enforcing the regulations pursuant to the *Weed Control Act*, whereas Land and Forest Service implements weed control programs within the Green Area. A weed inspection within the Reserve will be completed and procedures recommended in accordance with legislation and consistent with this management plan. A monitoring program will be identified as part of the vegetation management plan for the Reserve.

Treatments will include methods that minimize disturbance and the possibility of further spread of weeds in the Ecological Reserve or to surrounding areas. Methods such as handpicking, mechanical removal and chemical treatments may be considered. Handpicking will be considered as a first option, followed by less selective means of control such as mechanical techniques as a second option, and finally chemicals as a third option, provided the other techniques have been established to be inappropriate. Chemical techniques require review by the appropriate regulatory and review agencies. Mechanical and chemical techniques require approval from the Minister of Environmental Protection.

Catastrophic Events

Ecological reserves will be affected by environmental conditions that cannot be fully controlled or managed. Examples include heavy rains/flooding, droughts, widespread insect infestations and major fires.

No action will be taken in the event of a catastrophe.

6.1.2 Fauna

Species/Communities

Objectives:

1. To determine the faunal species that inhabit and use the Ecological Reserve.
2. To identify and describe the plant communities important to faunal species, and other critical factors such as water, security and competition.
3. To maintain the role of faunal habitats in the Reserve in supporting animal diversity in the montane ecosystem.
4. To study how activities such as domestic grazing and big game hunting affect faunal habitats, and to use the results of the studies to change management practices accordingly.
5. To develop a monitoring program for determining how habitats change over time, and to document the effectiveness and impacts of management actions.

Guidelines: In developing faunal studies and monitoring, all main faunal groups will be considered, including mammals, birds, reptiles, amphibians, fish and invertebrates.

The Ecological Reserve is only a small part of the local montane ecosystem. This perspective will be considered in defining and managing habitats. The intent will therefore be to maintain habitats that would be expected to occur in the Ecological Reserve in relation to natural ecosystem processes as opposed to maintaining all seral stages of habitat within the Reserve. Proposals from animal ecologists and ecosystem specialists should be considered in implementing faunal studies for the Reserve.

Insects and Diseases

Objectives:

1. To allow populations of forest insect pests and diseases within the Ecological Reserve to be controlled by natural processes, except when adjacent areas are threatened.
2. To control forest insect pests and diseases using techniques that minimize disturbance wherever possible, when populations reach levels that threaten adjacent areas.

Guidelines: Regular operational monitoring and surveys of forest insects and diseases by Land and Forest Service and Forestry Canada will be used to evaluate insect and disease conditions and to assess threat to adjacent areas. Possible insect infestations in the area include mountain pine beetle, spruce beetle and spruce budworm.

Manual, biological and mechanical techniques will be considered first in the control of insect pests and diseases. Generally, methods that cause the least disturbance and that have the most selective degree of control will be considered as a first option. For example, selective removal of diseased trees by hand-falling will be considered a first option. Chemical techniques will be considered as a last option provided the other techniques have been thoroughly reviewed on a

step-by-step basis and are considered to be inappropriate. Mechanical and chemical techniques will require approval from the Minister.

6.1.3 Aquatic Values

Objectives:

1. To protect Bob Creek, its tributaries and seepage areas from disturbances.

Guidelines: Aquatic areas will be inspected and any problems identified. Where problems are occurring, programs will be undertaken to correct them. A monitoring program will be developed to ensure desired results are obtained from management programs.

6.1.4 Aesthetic Values.

Objectives:

1. To protect aesthetic values from disturbances.

Guidelines: Management programs will consider the natural aesthetic values of the Reserve. The open grasslands are especially susceptible to aesthetic disturbances. Any structures such as monitoring equipment and devices are to be designed and located such that visual impacts are minimized.

6.1.5 Geology/Landforms

Geological Features/ Landforms

Objectives:

1. To protect rocky outcroppings and the talus area from disturbances.
2. To control erosion caused by activities such as cattle grazing.

Guidelines: Geological features such as rocky outcroppings and the talus area in the northern part of the Ecological Reserve are in a natural, undisturbed state and will receive priority consideration for protection. No active changes in management are required at present.

A special features map will be provided to fire control crews who will be instructed to avoid these areas whenever possible or to minimize damage caused by fire-fighting activities.

Reclamation

Objectives:

1. To encourage regeneration of native cover on actively eroding areas caused by disturbances such as previous seismic exploration and vehicular activity.
2. To close, through reclamation programs, trails adjacent to the Ecological Reserve that are

not required for access into the Ecological Reserve.

3. To monitor the effectiveness of reclamation projects in the Reserve and to use the results in changing reclamation techniques as required.

Guidelines: Although natural erosion processes exist in the Ecological Reserve, erosion from former activities such as seismic exploration may also be present.

Erosion problems will be assessed to determine work required. Actively eroding areas along man-made disturbances such as seismic trails will be stabilized, natural contours restored and conditions suitable for natural regeneration will be created. Reclamation techniques that cause the least disturbance will be used. Where techniques relying on natural regeneration are ineffective, then reclamation planting may be employed, but only species native to the area will be used. Seed and live material should be obtained from the Ecological Reserve or immediate area so that genetic integrity is maintained.

Trails adjacent to the Reserve will be assessed to determine whether closure through reclamation is required. Only native, local plant material or seed will be used within 100 m of the Ecological Reserve for reclamation work.

A monitoring program should be designed and implemented to document the effectiveness of reclamation projects.

6.2 Uses

6.2.1 Domestic Grazing

Objectives:

1. To develop and apply prescriptions for domestic grazing for ecological management purposes, specifically to help maintain and promote vegetation diversity and natural ecological processes.
2. To minimize the impact of range management activities such as fence maintenance on vegetation.

Guidelines: Grazing, properly managed, is known to help improve and maintain grassland plant diversity. Although light grazing can maintain or improve the condition of native rough fescue grassland, it has been found that even a modest increase in stocking rate can lead to a decline in range condition, as described in *Effects of Stocking Rate on A Rough Fescue Grassland* (Willms et al. 1985). The grassland in Upper Bob Creek Ecological Reserve has been grazed by cattle for over a century, and is considered to be the best example of montane vegetation in Alberta. Grazing may be kept at present levels to maintain plant diversity, or modified to achieve specific objectives.

Prescriptions for domestic grazing for ecological management purposes will be made under the following conditions:

- a. the prescription will complement a vegetation management plan mentioned in Section 6.1.1,
- b. prescriptions will consider range management plans and practices within the plan area so as to ensure that the prescription is integrated with resource management concerns,
- c. until the new grazing prescription is approved, cattle grazing in the Ecological Reserve will continue to be administered under existing policies and range management plans. This includes the following grazing allotments: Bob Creek, Chaffen Creek, Chimney Rock and Waldron,
- d. a monitoring program will be designed to determine the effects of grazing on plant species, communities and ecological processes. For example, the effects of various grazing systems on different vegetation types may be studied. The effects of grazing by elk as well as cattle will be considered in monitoring the overall effects of grazing. Results obtained from monitoring will be used to help make management decisions or change current range management practices, and
- e. any possible changes to existing range management plans will be made in consultation with allotment permit holders.

Grazing permit holders are responsible for maintenance of fences. Fence maintenance will be done in a manner so as to minimize disturbance to natural features and resources. Fence maintenance will be done according to the following guidelines:

- a. removal of trees and shrubs along fence lines will be done during frozen ground conditions,
- b. width of fence lines will not exceed 3 m in width under normal circumstances,
- c. brush and debris will be dealt with so as to cause the least disturbance to the site and so as not to create a fire hazard, and consequently, burning of debris will be subject to approval by a forest officer,
- d. trees that are too big to be effectively piled for safe burning will then be cut up, piled and burned,
- e. there will be no soil disturbance as a result of equipment used, and under normal circumstances, roads or access trails may not be constructed, and
- f. material such as wire and posts will be removed or salvaged, and unserviceable posts can be disposed of in burn piles.

Any new fencing will be done in accordance with vegetation management guidelines and grazing prescriptions developed as a result of this plan.

The existing boundary of the Ecological Reserve encloses parts of range allotments that are north of the Reserve. The boundary does not follow fence lines, making future management changes within the enclosed areas impractical. Proposed changes to the Ecological Reserve boundary will

be reviewed and approved as part of the regular five-year review of the plan. Permit holders for Chaffen Creek, Bob Creek and Chimney Rock allotments will be involved in recommending any changes to the existing boundary.

6.2.2 Hunting

Objectives:

1. To maintain a natural distribution of big game animals, especially elk, within the Ecological Reserve and surrounding area during hunting season.
2. To maintain elk use of the Reserve's grassland in as natural a condition as possible during the hunting season.

Guidelines: Big game hunting will be allowed within the Ecological Reserve to maintain a natural distribution of elk. Studies indicate that large numbers of elk which use the Bob Creek area during winter feed primarily on native fescue grasses, and favor snow-free areas (Berg 1983). Hunting of elk in the Ecological Reserve will be used to discourage the elk from congregating in the Ecological Reserve during the big game hunting season in the Bob Creek area. Hunting in Upper Bob Creek Ecological Reserve will be carried out under the following conditions:

- a. Alberta Environmental Protection will conduct regular surveys of elk and other big game in the Bob Creek area to assess management requirements concerning big game populations,
- b. plant communities will be studied and monitored, as specified in a vegetation management plan described in Section 6.1.1. Information collected will be used to adjust management practices so that objectives are met,
- c. hunting of only big game species will be permitted. Big game hunting will be used to discourage elk from congregating in the Ecological Reserve during hunting season, and to prevent disproportionate use by elk of the Reserve's grassland. Hunting of all species (other than big game) is prohibited, WAERNA Act, Section 8 (1) (b), and
- d. hunting will be carried out as part of the regular big game hunting season in Wildlife Management Unit 308, according to provincial hunting regulations that are in effect. This approach is seen as the only practical alternative to managing an elk hunt in the Ecological Reserve, for the following reasons:
 - an alternate elk hunt managed just for the Ecological Reserve would have no ecological basis, considering the migratory nature of elk,
 - an "elk only" hunt in the Ecological Reserve would be impractical to legislate and administer.

6.2.3 Scientific Research

Objectives:

1. To encourage scientific research that will contribute to the understanding and management of the Montane ecosystem will be encouraged.

2. To consider other research proposals on their own merit.

Guidelines: Scientific research will be carried out according to a *Policy for Research and Collection Activities in Ecological Reserves*. (Parks Service 1993). Copies of this policy are available from Natural Resources Service and Land and Forest Service, of Alberta Environmental Protection.

Scientific research is considered a prime use of ecological reserves, and an important role for Upper Bob Creek Ecological Reserve. Studies needed to refine management of the Ecological Reserve include studies such as the ecological effects and control of prescribed fire, ecological effects and management of grazing, role of hunting on big game (elk) use of grassland, and species/community ecology of fescue grasslands.

6.2.4 Access

Objectives:

1. To discourage activities that may improve motorized vehicle access.
2. To close off all trails adjacent to the Ecological Reserve to motorized vehicle access, except those required for access to areas outside the Ecological Reserve.
3. To provide vehicular access for resource management purposes.

Guidelines: Improvements to the main trail that intersects with the southern boundary of the Ecological Reserve will be discouraged. Work on this trail will be limited to erosion control.

Those existing access trails that are adjacent to the Ecological Reserve and not required will be closed through reclamation work. Reclamation work will be consistent with off-site policy guidelines contained in Section 7.0 of this plan.

A designated vehicle route will be established pursuant to the WAERNA Act, Section 8 (1) (i), under a regulation for the purpose of operating motorized vehicles on a designated route. Figure 6.1 shows the location of a trail that had been traditionally used for motorized vehicle access along Bob Creek before establishment of the Ecological Reserve. This trail will provide access for resource management purposes within the Reserve.

The designated route will be established subject to the following conditions:

- a. the designated route will be for the purpose of allowing vehicular access for resource management purposes within the Ecological Reserve (i.e., range management, retrieval of big game during the hunting season), with the exception of allowing motorized access through the Reserve for the operator of the registered trapline in the surrounding area (see special conditions below),
- b. information explaining the purpose, location and restrictions on the designated route, and that motorized vehicle use is prohibited except on the designated route, will be clearly

- posted at main entry points,
- c. patrols will be done in a manner to ensure a visible presence and effective program of enforcement. For example, during hunting season, patrol frequency will be increased to discourage off-trail vehicular use and enforce infractions relating to off-trail vehicular use. Individual and joint patrols may be done by Land and Forest Service and permittee,
 - d. if vehicle use in the Ecological Reserve as authorized by this plan becomes a problem, further restrictions to prevent impacts will be implemented as required,
 - e. permanent closure of the designated route will be considered if conditions warrant (e.g., valued features in the Reserve are being impacted or enforcement becomes a problem), and
 - f. erosion problems along the designated route will be monitored and minimal-level repairs will be made to correct problems.

Special Conditions:

Travel restrictions on the designated route as described above preclude motorized travel by the registered trapper in the area. Consequently, access to the registered trapline is more difficult and more costly. By authority of this plan, the registered trapper in the area will be given permission to operate a motorized vehicle along a designated route within the Ecological Reserve according to special conditions stated in this plan.

Providing access to the trapper will provide benefits for the management of the Ecological Reserve. The trapper will assist Alberta Environmental Protection with stewardship of the Reserve through additional monitoring and reporting of illegal activities and environmental concerns. Ensuring a registered trapper has good access to the area is a measure that will help Natural Resources Service avoid having to carry out any problem wildlife control programs in the area. Motorized access through the Ecological Reserve will encourage normal trapping distribution throughout the registered trapping area (including areas away from the Reserve), as opposed to the possibility of changing trapping distribution to areas closer to the Reserve.

The following conditions will apply:

- a. authorized travel through the Reserve for the registered trapline operator will be allowed only along a designated route (i.e., the main trail plus an existing spur trail leading east from the main trail to the top of the Whaleback Ridge, as shown in Figure 6.1). By regulation, the trapper will be the only public person authorized to operate a motorized vehicle along the spur trail portion of the designated route,
- b. travel only by quad or snowmobile will be allowed. Travel will be allowed only during trapping season and only for the purpose of servicing the trapline,
- c. key access points will be clearly signed (e.g., motorized vehicles prohibited except as authorized),
- d. trapper access will be allowed only after hunting season (e.g., December 1 to February).

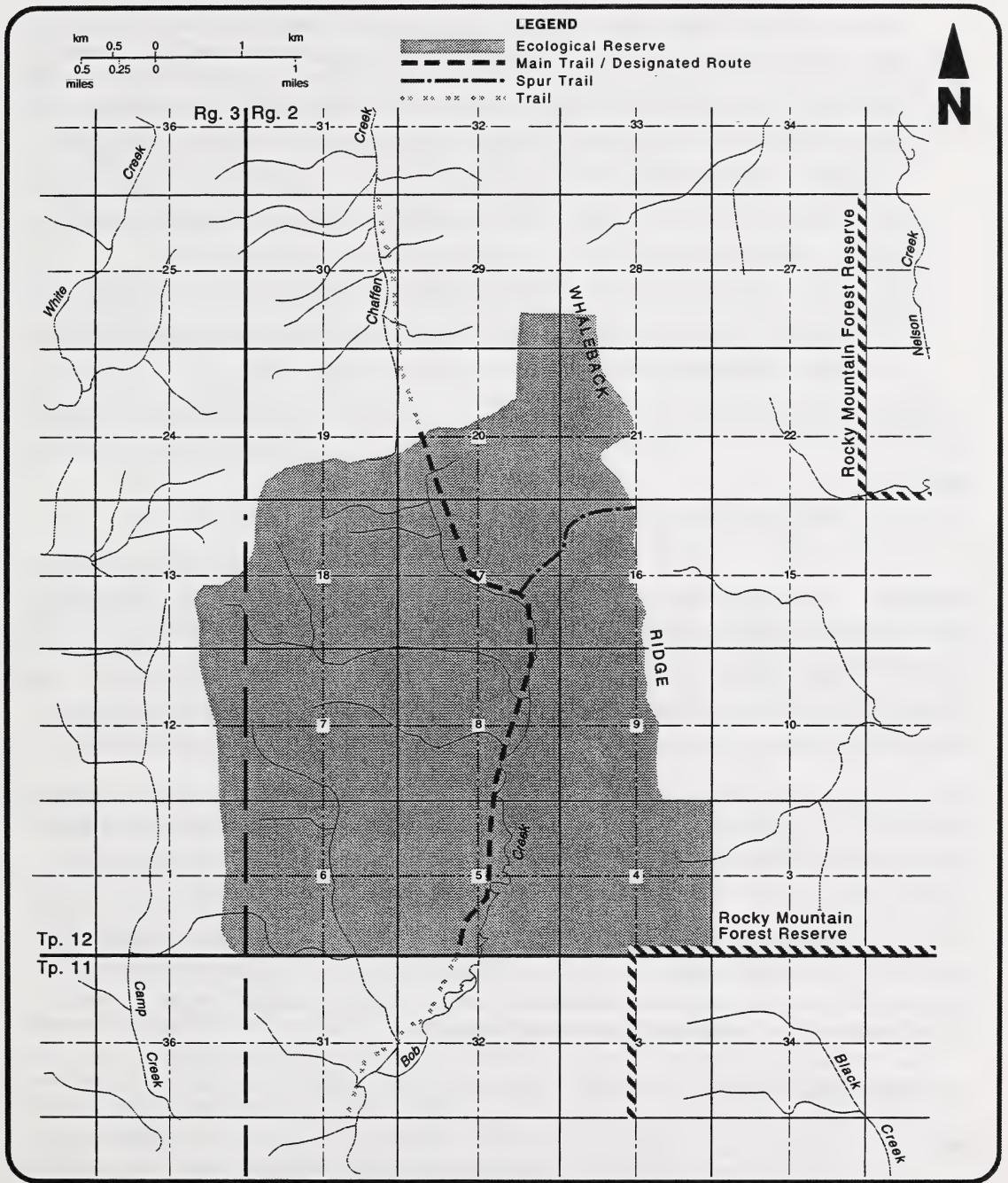


Figure 6.1 Main trails / designated route.

- e. the main information sign at the south end of the Ecological Reserve will inform users that motorized vehicles may be used only within the Reserve (only along a designated route) during the hunting season for the purpose of retrieving killed big game, or where individuals are authorized to use motor vehicles for resource management purposes,
- f. the trapper will report immediately any illegal or suspicious activities and environmental concerns noted during trips through the Ecological Reserve. An annual report will be prepared and a copy given to Land and Forest Service at the end of each trapping season. The report will contain the number and dates of trips made through the Reserve, and any changes to the condition of the trail and signs along the designated route, and
- g. Alberta Environmental Protection will monitor frequency of trips made by the trapper through the Reserve, monitor problem wildlife incidents and distribution of traplines in the area to evaluate whether objectives are being met and to determine if changes to the management of trapper access are needed.

6.2.5 Tourism and Outdoor Recreation

Objectives:

1. To not encourage tourism and outdoor recreation in the Ecological Reserve.
2. To allow only "no-impact" activities.

Guidelines: Although tourism and outdoor recreation are program objectives of the Ecological Reserves program in Alberta, they are not considered priority uses in Upper Bob Creek Ecological Reserve. Should disturbances to natural features and resources occur as a result of these uses, activities will be discontinued. Tourists who enquire about visiting protected or undisturbed areas in the region will be encouraged to visit components of the outdoor recreation system such as forest recreation areas, provincial parks, recreation areas and natural areas.

Owing to the possibility of disturbances to soils and vegetation from people, horses and vehicles associated with camping in the upper Bob Creek area, **camping in the Ecological Reserve will not be permitted.** To control camping in the Reserve, a regulation will be established under the WAERNA Act to provide enforcement in this area. Although overnight camping is not a prohibited activity under the WAERNA Act, open fires are not allowed, Section 8 (1) (j), and any person who damages plant life or animal life in an ecological reserve is guilty of an offence, Section 10 (1). In the 9th Annual Report of the Advisory Committee on Wilderness Areas and Ecological Reserves, the committee recommended that camping be considered not an acceptable activity in an ecological reserve and should be prohibited.

6.2.6 Heritage Appreciation

Objectives:

1. To not promote educational and interpretative programs.
2. To provide for public awareness and understanding of the purpose and management of the Ecological Reserve.

Guidelines: Although heritage appreciation is not considered a prime objective for Upper Bob Creek Ecological Reserve, activities that encourage heritage appreciation of the Reserve and which have "no-impact" on natural features and resources are appropriate. Because there are no existing facilities in the Ecological Reserve and activities are presently minimal, minimal guidance is the most appropriate first step. Should a demand arise for facilities or signs related to education, awareness and interpretation programs, facilities such as signs may be considered where required for resource management purposes.

Public awareness and understanding of the role of resource management programs in the Ecological Reserve are considered to be important to the success of these programs. Information on programs such as grazing and hunting will be made available to the public. Maps with the designated route will be available on request. A brochure on Upper Bob Creek Ecological Reserve will be developed to respond to public requests and to provide information. The brochure will include a map of the Reserve and provide information on the history and role of the Reserve, management programs and allowed uses in the Ecological Reserve.

6.3 Nonconforming Uses

6.3.1 Petroleum and Natural Gas

There are no existing mineral dispositions within the Ecological Reserve. No new surface dispositions in connection with petroleum and natural gas exploration and development will be issued.

6.3.2 Trapping

Trapping is prohibited in the Ecological Reserve, under WAERNA Act, Section 8 (1) (b). The trapping area boundary will be amended so as to exclude the Ecological Reserve.

6.3.3 Problem Wildlife

The objective is to deal with problem wildlife that come into direct conflict with human safety and economic interests.

A management goal for the Ecological Reserve is to maintain species diversity that includes all animal species native to the Reserve. However, if individual animals become a problem, they will be handled in accordance with Natural Resources Service's policies and practices. In responding to problem wildlife incidents, every effort will be made to deal as specifically as possible with the animal or animals that have caused the problem. Information on policies dealing with problem wildlife can be obtained from Natural Resources Service.

6.4 Environmental and Ecological Monitoring

Objectives:

1. To assist in refining existing management programs.
2. To guide the development of future management programs.
3. To evaluate the impacts of uses and management programs on the ecosystem.

Guidelines: Monitoring is required to document the use the Ecological Reserve receives (e.g., public use, grazing), any management programs carried out (e.g., reclamation, weed control) and the effects these activities have on the complex ecosystem of the Reserve. The information gathered through monitoring programs can be used to help define where changes to management are needed or when new management programs may need to be introduced. A well-designed monitoring project measures the effectiveness of management actions, and improves understanding of the structure, processes and responses of the ecosystem. This improved understanding, in turn, improves the quality and certainty of decision making (*Eastside Forest Ecosystem Health Assessment*, Everett 1993).

The issues for which monitoring programs should be developed include grazing, hunting, motorized use, species of concern including aspen and shrubby cinquefoil, insect, regeneration of disturbed areas and fire. Further information on monitoring programs is contained in Section 8.5.

7.0 OFF-SITE POLICY DIRECTION

The Livingstone Porcupine Hills Integrated Resource Plan provides overall policy direction for the management of lands surrounding the Upper Bob Creek Ecological Reserve. The Ecological Reserve lies in "East Livingstone Resource Management Area C" of the Livingstone-Porcupine Hills planning area. A designation of Critical Wildlife (Zone 2) has been applied over the majority of this resource management area in light of the significance of the elk and sheep habitats. Emphasis in the south half of the resource management area, which includes Bob Creek, is placed on securing elk winter range and to complement objectives for the perpetuation of ecological resources. Multiple Use (Zone 5) is the predominant zoning designation in the northern half of the resource management area. This zone lies immediately to the north and west of the Ecological Reserve. A range of resource uses and activities are considered to be compatible within this zone.

The objective for managing activities on lands adjacent to Upper Bob Creek Ecological Reserve is to minimize the impact on the Ecological Reserve from human disturbances, such as timber operations and oil and gas activities. Examples of the kinds of impacts that may affect the integrity of the Reserve and what should be considered during an application include:

- potential for unwanted access into the Reserve,
- edge effects such as increased wind turbulence,
- windthrow and increased predation,
- habitat fragmentation,
- introduction of weeds and other exotic plants,
- erosion,
- disturbances to nesting birds and other animals,
- spills from well sumps and drilling fluids, and
- accidental release of hydrogen sulphide from sour gas wells.

Although the WAERNA Act makes provision for the use of a controlled buffer zone, development and activities adjacent to the Ecological Reserve will be managed instead by focusing on the goodwill of industries and other users. Control of developments and activities is achieved by putting conditions on developments, and is the responsibility of Alberta Land and Forest Service in accordance with the internal referral system of Alberta Environmental Protection. Other provincial government agencies and jurisdictions will be referred to, according to standard procedure. If putting conditions on developments is not effective in controlling impacts on the Ecological Reserve, a controlled buffer zone will be considered.

The following conditions for off-site activities adjacent to Upper Bob Creek Ecological Reserve are necessary to ensure that the values of the Ecological Reserve are protected. They are intended to assist field staff in the review and approval of resource exploration and development applications and other land use activities. Various off-site activities will be reviewed, including but not limited to petroleum and natural gas surface dispositions, timber harvesting, public works, recreation activities, forest protection and grazing. These guidelines are complementary to

established policies and guidelines:

- a. **Petroleum and Natural Gas:** Access through the Ecological Reserve will not be allowed. Seismic trails will be cut by hand within a minimum of 500 m from the Ecological Reserve, and within 100 m, geophones will be laid by hand with minimal disturbance to the vegetation. Roads and wellsites will be kept a minimum of 100 m from the Reserve. New roads will be gated to control public access. Applications for developments or activities within 500 m of the Ecological Reserve will be referred to Natural Resources Service,
- b. **Timber:** If access were approved through the Ecological Reserve for logging equipment or trucks, no ground disturbance such as road construction will be allowed. All access within 500 m of the Ecological Reserve will be permanently closed following operations. Adequate timber buffers will be used to minimize impacts to the Ecological Reserve such as windthrow, introduction of exotic species and weeds, and visual effects. A 100-m buffer between cutovers and the Reserve is suggested as a minimum standard. Operating plans for areas within 500 m of the Ecological Reserve will be referred to Natural Resources Service,
- c. **Camping:** Camping and open fires within 500 m of the Ecological Reserve will be discouraged,
- d. **Forest Protection:** Disturbances to natural vegetation within 500 m of the Ecological Reserve will be minimized. Disturbances will be restored to as natural a state as possible immediately following action,
- e. **Reclamation:** Natural revegetation will be used where possible within a minimum distance of 500 m of the Ecological Reserve. Where seeding is required, use of certified weed-free seed mixes will be used. Only local, native seed or plant material will be used within 100 m of the Ecological Reserve,
- f. **Grazing:** Sound range management practices in areas adjacent to the Ecological Reserve will help keep the range in good condition and weed free. Disturbances will be kept to a minimum within 500 m of the Ecological Reserve,
- g. **General Conditions:** In addition, the following general conditions should be considered for how activities are to be carried out to minimize disturbances to the Ecological Reserve:
 - specific time frames for the activity to occur,
 - a specified minimum distance will remain undisturbed between the activity and the Ecological Reserve boundary,
 - a specified minimum distance between activities,
 - consideration of lateral or directional drilling,
 - access to an activity site should use existing access where practical, or access that is direct and perpendicular to the reserve.

8.0 IMPLEMENTATION

8.1 Roles and Responsibilities

Land and Forest Service is the field agency responsible for implementing the *Upper Bob Creek Ecological Reserve Management Plan*. Implementation includes review and approval of research applications, enforcement, safety, maintenance of facilities such as trails, signage and litter control. Implementation also includes resource management programs such as grazing, designated route/motorized vehicle use regulation, access control, fire suppression, weed control, insect and disease control, and monitoring.

Natural Resources Service (Fish and Wildlife) are responsible for the planning, development, approval and implementation of programs in the Reserve concerning game and nongame animal species (e.g., hunting, problem wildlife), and enforcement of the *Wildlife Act*. Applications for permitted uses such as research activities are referred to Natural Resources Service.

Natural Resources Service (Recreation and Protected Areas Division) provides overall coordination and administration of the Ecological Reserves Program in Alberta, and is involved in planning, development and approval of site management programs. Referrals for permitted uses such as research activities are referred to this division.

The Ecological Reserves Steering Committee is a provincial government interagency committee that focuses on the integration of government agency interests concerning the planning, management and operation of ecological reserves. The committee reviews and may recommend approval of draft management plans and site management plans to the Minister.

8.2 Boundary/Signage

The Ecological Reserve boundary will be marked by standard boundary signs, as required to be clearly visible. Signage will include the following:

1. boundary signs,
2. information sign at designated access points, and
3. designated route markers within the Ecological Reserve.

Figure 8.1 shows the locations for signage for the Ecological Reserve. Wording for the information sign is appended to the management plan.

The boundary of the Ecological Reserve will be reviewed as described in Section 6.0.

8.3 Regulations/Enforcement

Section 13 of the WAERNA Act was amended to allow every peace officer the authority, responsibility and duty to enforce the provisions of that Act. Peace officers include the RCMP, Wildlife Officers, Forest Officers and Park Rangers. Even though these peace officers have the authority to enforce provisions of the WAERNA Act, the primary responsibility for doing so will rest with Forest Officers, Wildlife Officers and the RCMP. When necessary, enforcement assistance will be provided by Park Rangers.

Camping is prohibited in Upper Bob Creek Ecological Reserve to protect natural features and ecological processes. To enforce this prohibition, a regulation will be established under the WAERNA Act.

Motorized vehicular access will be permitted along a designated route for resource management purposes within the Reserve. A regulation to enforce the restrictions for use of the route as contained in this plan will be established under the WAERNA Act.

8.4 Information Needs

Development of vegetation management guidelines as recommended in Section 6.1.1 will require a detailed vegetation inventory at a mapping scale of 1:15 000. Additional needs may be identified by the advisory group. A fenced range enclosure in the Ecological Reserve will be used in monitoring the effects of cattle grazing and will provide additional data for management purposes.

Information needs for faunal studies recommended in Section 6.1.2 will be identified when terms of reference are developed for these studies. Integration of plant and faunal community studies is recommended to ensure overall plan objectives are achieved and to avoid duplication of efforts.

A special features map will be prepared by Land and Forest Service for reference in fire suppression. The special features map in the 1986 biophysical report completed for the Reserve by Brown et al. will be used until further studies provide additional information.

8.5 Monitoring

Monitoring of various components of the ecosystem are recommended in this plan, including native plant communities, weeds, reclamation, and grazing competition between cattle and elk. When monitoring programs are designed, integration of activities is recommended to ensure objectives are achieved in the most efficient, effective way possible.

8.6 Safety

Standard operational safety procedures will be used by managing agencies in Upper Bob Creek Ecological Reserve to ensure a reasonable level of public safety.

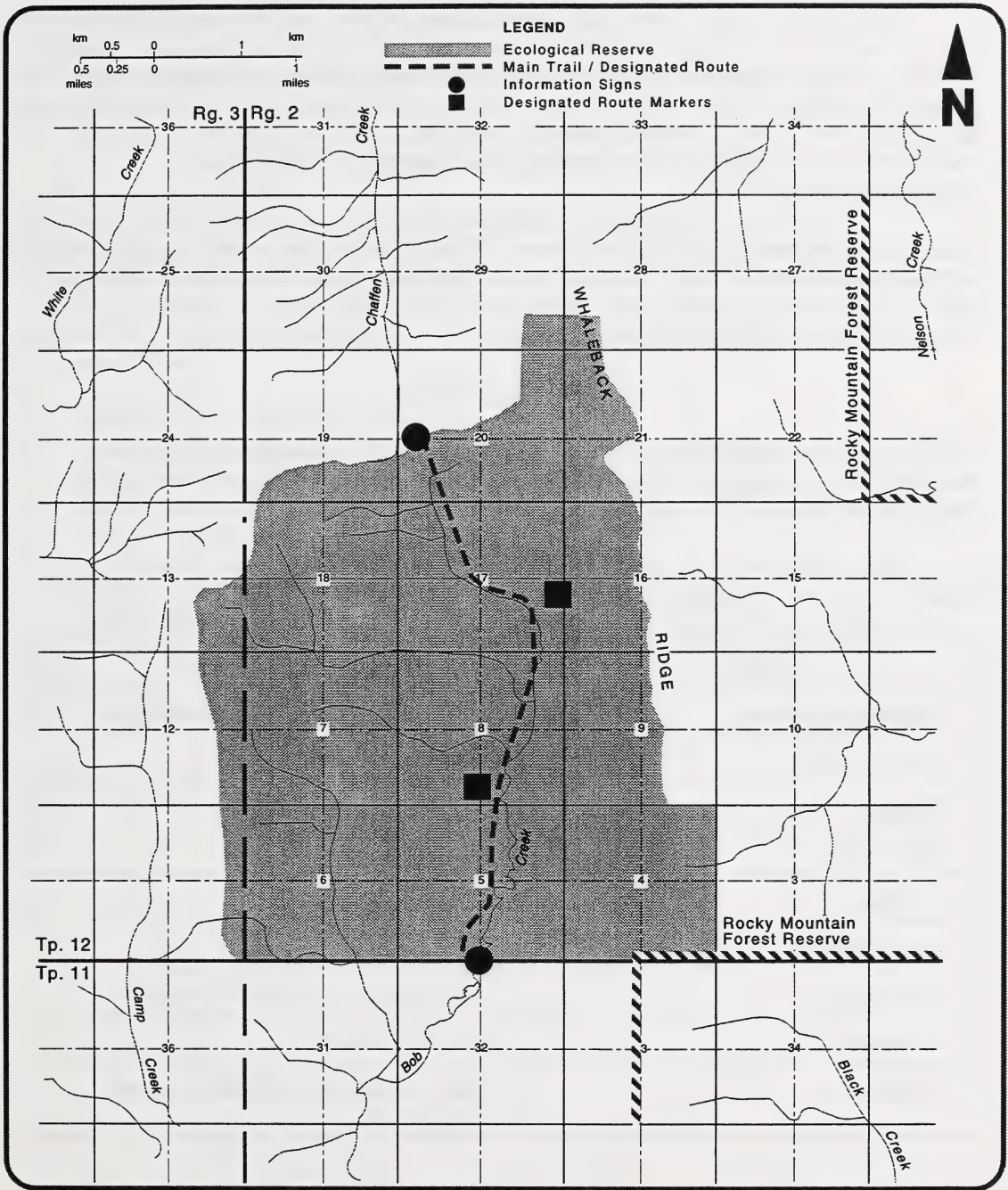


Figure 8.1 Location of Signage.

8.7 Communications

All public communications concerning Upper Bob Creek Ecological Reserve will relate to the purpose of ecological reserves and to the management intent and guidelines in this plan. All agencies involved in public communications that may affect public use in the Bob Creek area should familiarize themselves with this plan and ensure that its guidelines for public communications are followed.

Visitors to Upper Bob Creek Ecological Reserve will be informed of its purpose, legal location and the main activities allowed within the Reserve. Information will be made available through patrols, especially during hunting season, and through "information signs" according to the *Signs Policy for Ecological Reserves* (October 1991).

8.8 Budget Requirements

Some of the strategies identified in this plan will have a money and manpower requirement associated with carrying out a specific project. Various projects with budget requirements are listed in Table 8.1.

Table 8.1. Projects to be budgeted.

| <u>PROJECT</u> | <u>ACTIVITIES</u> |
|-------------------------|--|
| 1. Vegetation inventory | Data collection, analysis and mapping |
| 2. Erosion control | Equipment rentals |
| 3. Signage | Production, installation |
| 4. Trail repairs | Equipment rentals, culverts |
| 5. Brochure | Writing, design |
| 6. Enforcement | Patrols |
| 7. Faunal studies | Data collection, analysis and mapping |
| 8. Reclamation | Equipment rentals |
| 9. Monitoring | Data collection and analysis, permanent sample plots |

Projects requiring major funding such as erosion control, trail repairs, vegetation management, reclamation, faunal studies and monitoring are subject to divisional budget priorities. Lower cost projects such as signage and brochures can generally be funded from existing operational programs.

8.9 Review and Amendments

A review process for Upper Bob Creek Ecological Reserve provides evaluation of the management plan in the context of the Ecological Reserves Program. The review process ensures that values of the Ecological Reserve are being protected and that the plan is updated as required.

Guidelines for review and amendment of the Upper Bob Creek Ecological Reserve Management Plan are as follows:

- a. the plan will be reviewed every five years,
- b. Land and Forest Service, Bob Creek Advisory Group, permittee, stakeholders and Ecological Reserves Coordinating Committee will be involved in the five-year review,
- c. informal meetings will be used for the review. Public meetings will be considered an option during the review process,
- d. the Director, Land and Forest Service, Southern East Slopes, will be responsible for initiation of the five-year review, and
- e. the Ecological Reserve Steering Committee will review and make recommendations to the Minister for approval of any revisions made to the plan.

Proposed amendments to the plan may be reviewed at any time.

APPENDICES

Appendix 1. Participants in management planning.

Planning Team

Land and Forest Service (Chair)

Fish and Wildlife Service [now Natural Resources Service]

Parks Service [now Natural Resources Service]

Improvement District No. 6

Permit Holder, Bob Creek Allotment

Consultative Team Members

Alberta Fish and Game Association

Alberta Transportation and Utilities

Alberta Wilderness Association

Permit Holder, Chaffen Creek Grazing Allotment

Permit Holder, Chimney Rock Grazing Allotment

Permit Holder, Lower Livingstone Grazing Allotment

Permit Holder, Waldron Grazing Allotment

Appendix 2. Draft text for information sign.

Upper Bob Creek Ecological Reserve was established to protect and preserve representative examples of montane ecosystems and their associated plants and animals.

This reserve of about 26 km² contains a high diversity of grassland, forest and shrubland communities within the largest montane landscape in Alberta.

Enjoy the natural features of this ecological reserve and leave them unimpaired for other visitors to the area. To protect this special area, unauthorized motorized vehicles, fishing, trapping, construction of improvements, overnight camping and lighting of open fires are not permitted.

Hunting and cattle grazing are permitted in this reserve for management purposes.

A designated vehicle route, established by regulation _____, 199_, provides a motorized vehicle access route within the Ecological Reserve for resource management purposes (e.g., range management, retrieval of big game taken during the hunting season). Vehicle travel off the designated route is prohibited. For travel for any other purpose, access by foot is recommended.

For more information on this and other ecological reserves, please contact Land and Forest Service in Blairmore at 562-3210, or the Provincial Parks Service in Vulcan at 485-2261. If calling long distance, dial 310-0000 to be connected toll free.

Appendix 3. Terms Of Reference, Upper Bob Creek Ecological Reserve Advisory Group.

Authority Established through approval of the Upper Bob Creek Ecological Reserve Management Plan.

Role To provide a consultative role to Alberta Environmental Protection concerning reviews of the management plan and preparation of site management plans for the Ecological Reserve, such as vegetation management guidelines, faunal studies and boundary reviews.

Membership Allotment Permit Holders:

Bob Creek
Chaffen Creek
Chimney Rock
Waldron

M.D. of Ranchlands

INTRODUCTION:

The following summary outlines details relating to dispositions and other land use activities as governed by the *Wilderness Areas, Ecological Reserves and Natural Areas Act*. This summary is intended only to provide general direction; it is not a legal interpretation. "Minister" refers to the Minister of Environmental Protection unless otherwise stated.

Under section 5 of the act, the Minister of Environmental Protection may approve programs to be carried out for:

- the management and preservation of the animals, plants or environment,
- environmental research that does not involve physical disturbance,
- public education and interpretation,
- preservation and protection of the reserve.

All of the activities listed under the section entitled "*Other Land Use Activities*" (page 4 below) are generally not permitted [section 8(1)] unless required to carry out the above programs [section 9(a)] or unless required to extinguish forest fires, prevent damage to natural resources or property or in emergencies involving the health and safety of people [section 9(b)].

When the term "existing" is used in the following discussion, it refers to dispositions and/or activities that were in existence **prior to** the ecological reserve being established.

DISPOSITIONS:

1. Petroleum and Natural Gas (PNG) Dispositions. NOTE: This refers only to subsurface leases.
 - New dispositions may be issued [section 7(b)].
 - Existing dispositions may continue to expiry [section 6(2)].

2. Dispositions under the **Public Lands Act** or **Special Areas Act** in connection with a PNG disposition made under the Mines and Minerals Act.
 - Existing dispositions (e.g., wellsites, access roads, pipelines) may continue to expiry and be renewed with the Minister's consent [section 6(3)(a)].
 - No new dispositions may be granted [section 7(1)(b)].

3. Dispositions under the **Public Lands Act** other than in connection with a PNG disposition made under the Mines and Minerals Act (e.g., grazing leases, recreation leases, etc.)
 - Existing dispositions may either be terminated [section 6(1)(a)] or allowed to continue to expiry and renewed only with the written consent of the Minister [section 6(3)(b)].
 - No new dispositions may be granted [section 7(1)(b)].

4. Dispositions under the **Special Areas Act** (e.g., leases, permits, easements, etc.) other than in connection with PNG agreements.
 - Existing dispositions may either be terminated [section 6(1)(b)] or allowed to continue to expiry and renewed only with the written consent of the Minister [section 6(3)(c)].
 - No new dispositions may be granted [section 7(1)(b)].

5. Dispositions under the **Mines and Minerals Act** other than PNG dispositions (e.g., coal leases, quarriable mineral leases).
 - Dispositions must be terminated as soon as possible [section 6(1)(e)].

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| 6. Timber licences and timber permits under the Forest Act . | <ul style="list-style-type: none">● Existing dispositions may either be terminated [section 6(1)(c)] or allowed to continue to expiry and renewed only with the written consent of the Minister [section 6(3)(d)].● No new dispositions may be granted [section 7(1)(b)]. |
| <hr/> | |
| 7. Livestock grazing permits under the Forest Reserves Act . | <ul style="list-style-type: none">● Existing dispositions may be allowed to continue to expiry and renewed only with the written consent of the Minister [section 6(3)(e)].● No new dispositions may be granted [section 7(1)(b)]. |
| <hr/> | |
| 8. Other dispositions or land interests under other legislation. | <ul style="list-style-type: none">● No dispositions can be granted by any minister or government agency [section 7(2)]. |
-

OTHER LAND USE ACTIVITIES:

- | | |
|---------------------------------------|--|
| 1. Petroleum & Natural Gas Activities | <ul style="list-style-type: none">● Existing activities (e.g., operation of wellsites, utilization of roads and pipelines) may be allowed to continue subject to the Minister's consent [section 6(3)(a)].● New activities (e.g., geophysical operations, drilling of wells, etc.) are not permitted [section 7(1)(b)]. |
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| 2. Constructing, maintaining, repairing or operating of public works, roads, railways, aircraft landing strips, helicopter bases and other structures or installations. | ● These activities are not permitted [sections 7(3)(a) and 7(3)(b)] excepting certain situations as described in the Introduction above. |
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| 3. Hunting and Trapping | ● These activities are not permitted [section 8(1)(b)] excepting certain situations as described in the Introduction above. |
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| 4. Fishing | ● This activity is not permitted [section 8(1)(c)] excepting certain situations as described in the Introduction above. |
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| 5. Landing an aircraft | ● This activity is not permitted [section 8(1)(d)] excepting certain situations as described in the Introduction above. |
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| 6. Littering | ● This activity is not permitted [section 8(1)(e)] excepting certain situations as described in the Introduction above. |
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| 7. Collecting, destroying or removing any plant, animal, fossil or object of cultural or scientific interest. | ● These activities are not permitted [section 8(1)(f)] excepting certain situations as described in the Introduction above. |
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| 8. Introducing substances or materials harmful to plants or animals. | ● These activities are not permitted [section 8(1)(h)] excepting certain situations as described in the Introduction above. |
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9. Operating motorized vehicles

- This activity is not permitted [section 8(1)(i)] excepting certain situations as described in the Introduction above.
- Where permitted, motor vehicles are required to travel on routes designated by regulation for that purpose.

10. Lighting Fires

- These activities are not permitted [section 8(1)(j)] excepting certain situations as described in the Introduction above.

11. Constructing, repairing or adding to existing improvements.

- These activities are not permitted [section 8(1)(k)(i)] excepting certain situations as described in the Introduction above.

12. Disturbing the surface of the land.

- These activities are not permitted [section 8(1)(k)(ii)] excepting certain situations as described in the Introduction above.
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GLOSSARY

Distribution Unit - To assist in achieving uniform levels of grazing, most range allotments are divided into a series of pastures or fields called distribution units.

Mesic - Mesic sites are those sites on which the moisture conditions experienced by plants are primarily under the control of the local climate.

Problem Wildlife - Problem wildlife is defined as wildlife that come into direct conflict with human safety or economic interests. Such conflicts could include such things as bear or wolf predation on cattle, or bear-human conflicts.

Range Allotment - A range allotment is a natural drainage basin where grazing is permitted in the forest reserve. Other activities such as hiking, horseback riding, hunting, fishing and timber harvesting may also occur. Grazing in range allotments is authorized by means of annual, temporary or on/off permits issued by Land and Forest Service. Permittees agree to follow a range management plan that has been developed for each allotment.

Seral stage - A seral stage is any one of the various biotic communities that successively occupy and replace each other in a particular environment over time, such as the changes that can be observed over a period of 100 years following the abandonment of a plowed field. Taken from *Forest Ecology* (Kimmins 1987, p. 386).

Soil - The unconsolidated material on the immediate surface of the earth that serves as a natural medium for the growth of plants. For definitions of soil terms, the reader is referred to a *Glossary of Terms in Soil Science*. 1976. Canada Department of Agriculture, Research Branch, Publication 1459, or *Soil Landscapes of Canada. ALBERTA*. 1989. Agriculture Canada. Publication 5237/B.

Tuff - A type of volcanic rock.

Xeric - Xeric sites are those sites that are drier than would be expected from local precipitation data. This condition can arise because of rapid drainage of water such as with steep slopes and thin, coarse soils.

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