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Environmentally Significant Areas

ENVIRONMENTALLY SIGNIFICANT AREAS
IN THE
MUNICIPALITY OF CROWNEST PASS

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For:

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1.0 INTRODUCTION

Environmentally Significant Natural Areas (ESA's) are important, useful and often sensitive features of the landscape. They provide long-term benefits to our society by maintaining essential ecological processes and by providing useful products. Large portions of many of Alberta's natural landscapes have been converted to other uses. Surface mining, forestry, agricultural, industrial and urban developments will continue to put pressure on the remaining natural areas. The identification and management of important natural areas is a valuable addition to the traditional socio-economic factors which have largely determined land use planning in the past. The social and economic benefits which ESA's and other natural areas provide are major and are just beginning to be recognized (Butler 1983; Power 1985; Wallis 1983 and 1985).

A few of the functions and uses of natural ESA's are defined by Eagles (1984):

1. protection of gene pools for future use, including reclamation of disturbed lands, breeding of genes into commercial species or development of new commercial products such as antibiotics.
2. protection of rare or endangered species and their habitat.
3. provision of travel corridors and resting places for migratory species.
4. preservation of mature, stable climax ecosystems with their constituent complete ecological complexity.
5. providing benchmarks against which man-altered areas can be compared.
6. conservation of large blocks of habitat for species that require extensive areas for breeding and survival.
7. conservation of representative samples of different plant and animal habitats characteristic of each natural region.
8. maintenance of habitat for wildlife and plants that require undisturbed natural areas.
9. research areas for earth and life science studies.
10. sources of groundwater recharge, low stream flow supplementation, flood peak reduction and headwater protection for hydrological systems.
11. filtration and cleaning of air and water flows.
12. conservation of soil and protection from erosion.
13. protection of significant geological features.

14. identification of lands with severe development constraints such as those on floodplains, steep and unstable slopes, or permanent wetlands.
15. provision of areas for public education of resources and their management.
16. maintenance of aesthetically pleasing environments.
17. provision of commercial products such as outdoor recreation.

Sweetgrass Consultants Ltd. was contracted by the Resource Evaluation and Planning Division of Alberta Forestry, Lands and Wildlife to undertake a study of Environmentally Significant Natural Areas in rural portions of the Municipality of the Crowsnest Pass. The primary purpose of the study was to develop an information base that would be useful in planning exercises in the area. Concurrently, another part of this study identified culturally significant sites and areas with high paleontological (fossil) potential (see Volume II of this report).

The study area included the rural portions of the Municipality of the Crowsnest Pass. The objectives of the study were:

1. to provide an inventory of environmentally significant areas of regional, provincial, national or international importance.
2. to evaluate the relative sensitivity of sites classed as environmentally significant areas.
3. to develop management strategies for environmentally significant areas.

Areas considered environmentally significant included:

1. areas which perform a vital environmental, ecological or hydrological function such as aquifer recharge;
2. areas which contain unique geological or physiographic features;
3. areas which contain significant, rare or endangered species;
4. areas which are unique habitats with limited representation in the region or are a small remnant of once large habitats which have virtually disappeared;
5. areas which contain an unusual diversity of plant and/or animal communities due to a variety of geomorphological features and microclimatic effects;
6. areas which contain large and relatively undisturbed habitats and provide sheltered habitat for species which are intolerant of human disturbance;

7. areas which contain plants, animals or land forms which are unusual or of regional, provincial or national significance; and
8. areas which provide an important linking function and permit the movement of wildlife over considerable distance.

Several means of data presentation are used. The report is organized so that the user can get an overview of the major biophysical resources, management considerations, and future study needs as well as more detailed information on each environmentally significant area.

Areas of cultural significance are presented in a separate volume in summary, tabularized, and map form. Areas of sensitivity based on fossil (paleontological) potential are outlined on a separate map.

Each of the environmentally significant natural areas is described in outline form so the reader can, at a glance, determine the following:

1. name of the area
2. location
3. major biophysical features which characterize the area
4. level of significance (regional, provincial, national, international)
5. background for determining level of significance
6. management considerations
7. references which will provide more scientific or detailed information should the user require it

Original references or copies have been provided to the client in file form, indexed by author and date for easier retrieval. In addition, a set of colour slides illustrating most of the Environmentally Significant Areas is provided. To facilitate use by planners, the number of map types has been kept to a minimum:

1. environmentally significant areas (natural)
2. historically significant areas
3. significant prehistoric sites
4. areas of paleontological sensitivity

Where available, more detailed locational data for sites within each significant area is provided in background reference material or in area descriptions.

2.0 DATA COLLECTION METHODS

Researchers involved in the natural history portion of the study included Cliff Wallis, Cleve Wershler and Ray Wershler. Their research backgrounds included the fields of botany, zoology, and geology.

The following methods of collecting environmental data were employed:

1. aerial photograph interpretation
2. reviews of published and unpublished information in government files and reports, scientific and popular publications, and consultant reports
3. interviews with experts and other knowledgeable persons
4. extensive field surveys

2.1 Aerial Photograph Interpretation

Aerial photographs of the study area were evaluated at the beginning of the project. Complete 1985 coverage in black and white was available at a scale of 1:30,000 and complete 1983 color coverage was available at a scale of 1:20,000.

In areas of native vegetation, detailed evaluations of the landscape and habitat features were made. Specifically, the following types of areas were searched for:

1. areas of vegetation diversity
2. major outcrops of uncommon rock types
3. major spring/seepage areas
4. extensive riparian woodland and shrubbery
5. areas with interesting or unusual landscape or vegetation features
6. marshes and wetlands
7. major stands of old-growth forest

The next step involved interpretation of bedrock geology and surficial geology maps. Major features noted included:

1. volcanic outcrops
2. areas of limestone rock

Representative field study sites were identified to enable reconnaissance of as many of the geological features and natural habitats as possible.

2.2 Literature Review

Alberta Fish and Wildlife reports, files and key area maps were surveyed in the Lethbridge regional office. Alberta Forestry, Lands and Wildlife (including the Natural Areas Program), Research Council of Alberta, and Alberta Culture reports and maps were also reviewed.

Numerous natural history articles, reports and books were also surveyed and relevant information was noted for further field checking and for incorporation into the final report.

2.3 Interviews

Government personnel were interviewed during and after the literature review sessions at the various agency offices. In addition to these interviews, several non-government specialists with specific regional knowledge were contacted and their contributions are gratefully acknowledged:

- D. Borneuf - Hydrogeology
- J. Godfrey - Geology
- J. Packer - Rare Plants
- C. Bradley - Fisheries
- J. Eisenhauer - Fisheries

In addition, local residents and naturalists were interviewed and provided valuable insights into current and historic aspects of the life and landscapes.

2.4 Field Surveys

Field surveys were carried out to check boundaries of natural areas, and to confirm the significance of potential sites identified from aerial photograph interpretation, literature reviews and interviews.

Field work was undertaken from late early July to late October in 1987, with the majority occurring from July to early August. Breeding bird song surveys were completed by mid-July. Rare plant surveys were undertaken throughout the growing season and were based on a knowledge of rare plant habitats. Geological and landscape information was collected throughout the field survey period.

Photographs were taken of most sites and field notes were taken, noting the major characteristics and plants, animals and interesting geological or landscape features observed. Field site evaluations involved a subjective evaluation based on professional judgement and a limited amount of formalized data collection. Field evaluations were later

reviewed taking into account information available from literature reviews and interviews.

3.0 OVERVIEW OF NATURAL FEATURES

3.1 The Physical Setting

The physical setting is described in some detail by Beaty (1975) and numerous geological reports. Elevations range from approximately 1,200 m in the valley bottom of the Crowsnest River at the eastern edge of the study area to 2,550 m on the summit of Mount Tecumseh in the northwestern corner.

The study area can be divided into two major physical landscapes:

1. Foothills which are characterized by parallel, linear ridges of intensively folded and faulted sedimentary rock, generally conforming to the underlying geologic structure
2. Rocky Mountains which are made up of great slabs of older sedimentary rocks that have been moved considerable distances to the east or northeast along numerous low-angle thrust faults

The bedrock is comprised of Mesozoic sandstones, conglomerates and shales of the Belly River Formation, Alberta Group, Blairmore Group, Kootenay Formation and Fernie Group and volcanic rocks of the Crowsnest Formation; and Paleozoic limestones, dolomites and sandstones of the Etherington Formation, Mount Head Formation, Livingstone Formation, Exshaw Formation, Banff Formation, Palliser Formation, Fairholme Group, Alexo Formation, and Elko Formation.

The Foothills in the study area occupy a narrow strip immediately east of the Livingstone Range. Because of the abundance of steep ridges in the Foothills, exposed bedrock and colluvium (slope deposits formed from eroding materials) characterize much of these uplands.

Compared to the Foothills, the Rocky Mountains have a much greater relief. The slopes are also much steeper on the average, occasionally with little or no soil or vegetation cover. The great majority of present land forms within the Rocky Mountains have been produced through the direct and indirect effects of alpine glaciation.

3.2 The Living Component

The study area includes representation from the Rocky Mountain Natural Region - Montane, Subalpine, and Alpine Sections.

3.2.1 Montane Habitats

Habitats typical of the Montane section of the Rocky Mountain Natural Region occupy most of the study area. There is a mosaic of coniferous and deciduous woodland, willow shrubbery, moist grasslands, and dry ridges. Open stands of Douglas fir (Pseudotsuca menziesii) and

lodgepole pine (Pinus contorta) characterize the forests. Spruce (Picea spp.) only occurs on the wettest and most sheltered sites. Limber pine (Pinus flexilis) is common on the drier ridges. Grasslands are most common on the south and west-facing slopes while deciduous woodlands occur on deeper soils along the valleys. Grasslands and deciduous woodlands support many of the species found in the Foothills Grassland and Foothills Parkland. Wetlands are quite localized in the Montane region. More detailed descriptions of montane vegetation types can be found in Moss (1944).

There is a high potential for uncommon plants and animals throughout this region. Montane and other habitats in southwestern Alberta support a large portion of rare species. Some are confined to a handful of very specific sites while others occur more widely.

The diverse vegetation provides key habitat for Mule Deer, White-tailed Deer, Elk, Moose and Bighorn Sheep. In Alberta, bird species such as the Cassin's Finch and Lewis' Woodpecker are most prevalent in the Montane section of southwestern Alberta. In Canada, the subspecies cognatus of the Northern Pocket Gopher is restricted to the Crowsnest Pass in Alberta and adjacent areas of British Columbia.

Many of the streams flowing out of the mountains are important habitats for sport fish. Several species of exotic trout have been introduced successfully into study area streams running through the Montane region. Native Cutthroat Trout and Mountain Whitefish are also characteristic of these streams. Cold, clear water, high levels of dissolved oxygen, abundant food, and clean gravel for spawning make these streams productive. The Crowsnest River below Blairmore provides some of the best stream angling in Alberta and is rated a provincially important sport fishery which has garnered national and international attention. Spawning occurs throughout this section of the Crowsnest River and its tributaries, wherever there is adequate water and a clean gravel substrate.

This is the most heavily disturbed of the three biogeographic sections in the study area. The principal disturbances within the natural habitats of this section include logging, roads, towns, coal-mining, pipelines, powerlines, and heavy cattle grazing.

3.2.2. Subalpine Habitats

The subalpine zone occurs at elevations above the montane and below the unforested alpine. Subalpine fir (Abies lasiocarpa) and Engelmann spruce (Picea engelmannii) are the characteristic trees of the mature forests. Fire-maintained lodgepole pine forest is also common. On the higher and more exposed situations, forest growth is reduced to islands or windswept mats of stunted trees and vegetation is often composed of a mixture of alpine and subalpine flora. Moist grassy meadows are local at higher elevations.

3.2.3. Alpine Habitats

Alpine habitats within the study area are very local, occurring only on the highest elevations of Mount Tecumseh. These sites are generally rocky and dry, and vegetation is rather sparse and species-poor.

4.0 EVALUATION OF ENVIRONMENTALLY SIGNIFICANT AREAS

Eagles (1984) stresses the need to have a standardized set of criteria for evaluating Environmentally Significant Areas (ESA's). These criteria fulfil several functions:

1. they allow a relatively systematic comparison of different sites and allow ranking schemes to be developed.
2. they help to outline the importance of sites to decision makers.
3. they stimulate research efforts towards refinement of definitions and concepts of significance.
4. they help to ensure similar approaches in other jurisdictions.
5. they aid in the process of boundary delineation as only those features that fulfil the criteria are included.

4.1 Criteria for Environmentally Significant Areas

Under the terms of reference, areas which had the following attributes were to be considered for this study:

1. areas which contain significant, rare or endangered plant or animal species;
2. significant habitats with limited representation in the region or are a small remnant of once large habitats which have virtually disappeared;
3. areas which contain an unusual diversity of plant and/or animal communities due to a variety of geomorphological features and microclimatic effects;
4. areas which contain important and relatively undisturbed habitats especially for species which are intolerant of human disturbance;
5. areas which provide an important linking function and permit the movement of wildlife over considerable distances, including migration corridors and migratory stopover points;
6. areas which contain important species, landscapes, geological or other natural features;
7. areas which perform a vital environmental, ecological or hydrological function such as aquifer recharge;
8. areas that are excellent representatives of one or more ecosystems or landscapes that characterize a natural region;

9. areas with intrinsic appeal due to widespread community interest or the presence of highly valued features or species such as game species or sport fish; and
10. areas with lengthy histories of scientific research.

Size played some role throughout the evaluation. Areas were not initially rejected because of small size; however, in the final analysis, some areas were only considered of local significance if they were relatively small areas and several larger areas of the same feature were available elsewhere in the region.

As many areas, particularly in Montane portions, have experienced some degree of disturbance (roads, gas development, pipelines, grazing, logging), sites were not eliminated unless the natural vegetation cover had been completely removed.

Although they have been used in other jurisdictions, aesthetic factors were not used as a primary criteria for evaluating sites in the study area. However, many of the diverse landscapes and habitat areas are aesthetically pleasing to many people and add to the value of the ESA's. All areas with regionally, provincially or nationally significant, aesthetically pleasing natural landscapes have been identified as ESA's based on other criteria.

4.2 Level of Significance

Evaluating areas in terms of their level of significance requires considerable knowledge of significant features outside the jurisdiction under study. In some cases, this is facilitated by lists of rare, threatened and endangered species (Alberta Fish and Wildlife 1985; Cottonwood Consultants 1987; and Packer and Bradley 1984) or evaluations of natural ecosystem complexes or landscapes (Cottonwood Consultants 1983) which are available at provincial, national and international levels.

In some fields, notably geology, there have been very few studies which summarize the significance or distribution of features. In these cases, professional judgement by several researchers has been used to determine the level of significance. The history of assigning significance levels shows that areas are generally underrated. As more information and methods of evaluation become available, then levels of significance can be altered accordingly.

ESA's in the study area were further subdivided on the following basis:

<u>Significance Level</u>	<u>Criteria</u>
Regional	- features which are of limited distribution or are the best examples of a feature in the Municipality of Crowsnest Pass
Provincial	- features which are limited in distribution at a provincial level or which are the best examples of a feature in Alberta
National	- features which are limited in distribution in Canada or which are the best or only representatives at a national level

Included in the areas of regional significance are:

1. key areas for Mule Deer, White-tailed Deer, Elk, Moose and Bighorn Sheep
2. diverse areas of natural habitat
3. habitats which support significant populations of plants or animals which are rare in the Municipality of the Crowsnest Pass
4. landforms, landscapes, geological and hydrological features which are rare in the Municipality of the Crowsnest Pass

Included in the areas of provincial significance are:

1. habitats which support significant populations of plants or animals which are rare in Alberta
2. geological features which are rare in Alberta
3. landforms, landscapes, geological and geological features which remain in a natural state and which are the best examples of their types in Alberta

Included in the areas of national significance are:

1. landscapes or geological features which are the best examples of their types in Canada
2. rivers which are among the best sport fish production streams in Canada

"Significant populations" of rare plants or animals generally refers to populations which are self-sustaining. Occurrences of individuals are not considered significant unless they are one of very few localities for the species.

Areas of local significance are not presented on the maps. These are areas which may be important in a limited part of the Municipality of the Crownsnest Pass but which do not have sufficient biophysical resources to allow consideration at the regional level.

5.0 MANAGEMENT OF ENVIRONMENTALLY SIGNIFICANT AREAS

The appropriate management of Environmentally Significant Areas (ESA's) is one essential component of a general environmental management strategy. Considering the extent of these resources and the compatibility of many existing land uses, it would neither be feasible nor desirable to achieve conservation goals through direct government ownership and control.

The various administrative agencies can provide assistance in the conservation of these sites through Integrated Plans, General Municipal Plans, Area Structure Plans, Area Redevelopment Plans and Land Use Bylaws. However, many land use practices, especially those on private lands, are not regulated at any level of government. Success in meeting objectives for ESA's on these lands can only be achieved through cooperative approaches with private landowners. Administrative agencies can provide support in these situations through information programs and acting as sources of resource information.

Key elements of ESA management include:

1. the integration of ESA conservation into existing administrative structures.
2. the maintenance of an environmental data base.
3. the development of administrative staff expertise in environmental management.
4. the use of environmental education to foster public awareness.

Effective ESA management will ensure the long-term maintenance of the area's features. Intensive manipulation may be necessary in a few instances but the most frequent management activity will probably be to guard against negative impacts. The specific management approaches for each ESA should be based on the requirements and sensitivities of the area's features.

5.1 Guiding Principles

Some guiding management principles have been set forth by Eagles (1984):

1. no major development should be permitted in ESA's due to detrimental impact or physical constraints.
2. certain developments may be carried out subject to environmental impact analysis and appropriate mitigation if no feasible alternatives are available.
3. long-term resource protection and management (and therefore long-term economic benefits) should have priority over short-term economic gains which result in the loss of future options.

4. recognition of a site as an ESA does not imply that it will be purchased by a public agency or that it is open for public use.
5. maintaining an environmental data bank is useful.
6. in-depth studies may be necessary in those areas that are subject to development threats in the near future. Proactive actions are preferable to reactive ones.
7. further precision in delineating boundaries of ESA's can be obtained by more detailed field surveys. Environmental impact assessments can provide data that are useful for detailed boundary delineation, comparison of alternatives, assessment of long-term consequences, and development of management plans.
8. buffers may be necessary but cannot be designed until the proposed activity is known and its impacts assessed.
9. information dissemination is an important feature. Agencies and individuals cannot fully assist with site management if documentation is lacking. Publish ESA maps and supporting data so that all interested and involved parties, especially landowners, can be made aware of the features, their significance and management considerations.
- * 10. ESA's should appear as a land-use designation in official plans and zoning by-laws, and not as an overriding development control over a variety of land use designations. *
11. appropriate procedures and staff must be available to ensure effective implementation and supervision of policies, plans and regulations.
12. regulations, by-laws and policies should permit innovative approaches, including management agreements with owners of ESA's.

Some legal considerations have also been outlined by Eagles (1984):

1. a balance must be made between the land development rights of the landowner and the ecological common property rights of the public. ✓
2. it is necessary to shift proposed incompatible uses out of ESA's.
3. an attempt should be made to allow private economic land use while limiting negative environmental impact. This is preferable to outright activity prohibition. The amount of restriction should not be greater than necessary. ✓
4. ESA management should be integrated with other resource management efforts such as recreation, forestry, and agriculture.
5. regulation should be applied fairly and equally in private as well as government activities.

6. local policy plans should contain broadly-based resource management policies as well as specific ESA policies.
7. adjacent administrative districts should be encouraged to develop similar programmes to ensure consistency across jurisdictions.

5.2 Site Management Plans

Ultimately, it may be desirable to develop site management plans for each ESA. The first step is to determine management objectives such as protecting ecological diversity, maintaining or enhancing populations of rare species, increasing habitat diversity, commercial product exploitation and water level manipulation. Next, a detailed biophysical inventory of the ESA and adjacent lands should be carried out, and the current level and type of human impact should be documented. Based on this, management priorities for each feature (e.g. landform, process, species, habitat type) can be established including:

- level of alteration allowed or encouraged
- preferred amount of resource extraction
- methods for reducing harmful uses
- manipulative methods (e.g. burning, cutting, damming, grazing)
- protective methods (e.g. fencing, education, wardens)

Once the management priorities have been defined, then the various interested parties should cooperate in developing suitable arrangements to manage each site. Through simple techniques of encouragement, provision of information, and legal agreements, many management objectives can be met provided landowners are sympathetic.

5.3 Specific Management Considerations

In the Calgary Region and Stomax River Region ESA studies several recommendations with respect management of the major types of ESA's were made (Calgary Regional Planning Commission 1983; Cottonwood Consultants 1987). For natural sites, major types included significant natural landscapes, significant wildlife habitats, key fish habitats, other areas of biological importance and significant geological sites.

More detailed discussions of fire, grazing, off-road vehicle use and buffer zones with respect to the management of "natural areas" can be found in Bradley (1984).

5.3.1 Significant Natural Landscapes

Residential developments, extraction activities, transportation and utilities corridors, and cultivation are not compatible with the maintenance of the natural character of significant landscapes. The subdivision of a natural landscape into a number of parcels undermines ecological processes in the area. Properly sited individual dwellings may not greatly affect an area's overall character.

Highway commercial development, trailer parks, most commercial campgrounds, amusement attractions, all forms of non-extractive industrial development and intensive forms of agriculture, such as feedlots, poultry farms and nurseries are also considered incompatible with maintaining significant natural landscapes.

Commercial land uses such as guest ranches and destination resorts, which seek to conserve a large component of the natural landscape, may be quite appropriate provided that development and siting proceed in an environmentally responsive manner.

In some cases, buffer zones adjacent to significant natural landscapes may be needed to help screen these areas from adjacent residential, agricultural or industrial activities. Examples include the location of upland residences sufficiently far away from edges of significant natural valleys so that they are not visible from valley bottom positions. This will also provide the added benefit of avoiding soil stability problems which are encountered in several valley situations.

Recreation is often an important activity in natural landscapes. The effects on terrain, vegetation and wildlife can be significant. Some of the problems include garbage and human waste disposal and damage caused by all-terrain vehicles, illegal hunting and vandalism. While most land management and administrative agencies have limited powers in recreation management, they can help by:

1. providing forums for landowners and recreationists to discuss their concerns and cooperate in formulating solutions such as designated access sites and designated travel routes;
2. monitoring or coordinating the monitoring of recreational use in ESA's;
3. providing funds for basic facilities and improvements, such as fencing and signage, which would help maintain environmental quality in ESA's on which landowners are permitting public access.

5.3.2 Significant Wildlife Habitats

Many of the management considerations discussed for natural landscapes would also benefit significant wildlife habitats. Alberta Fish and Wildlife maintains and updates its key area maps on a regular basis and keeps some of this information confidential. Potential changes in land use in ESA's should be discussed with Fish and Wildlife to determine any

additional considerations beyond those expressed in this document. Some of the major wildlife management approaches are outlined below.

Riverside (riparian) woodland and shrub habitats are extremely important for deer and many species of migrating and nesting birds. Heavy grazing, water storage projects, cultivation of bottomlands, and stream flow regulation have had significant impacts on these habitats in Alberta. Regeneration of these habitats is dependent upon major flood events. Channelization and stream flow regulation can have serious negative impacts on ecosystem survival. Water storage projects and cultivation are not compatible with maintenance of these habitats. Gravel operations and road-building can be mitigated to prevent large-scale negative changes in riparian habitats.

Heavy grazing has been cited as a major cause of habitat loss in riparian cottonwood forests in other jurisdictions (Gjersing n.d.; Smith and Flake 1981). High livestock densities associated with many rest-rotation systems may cause more damage to woody vegetation than other grazing systems. Complete rest for degraded riparian areas from livestock grazing may be required (Platts 1978) to reestablish healthy native plant communities. Severson and Boldt (1978) suggest that winter use of these habitats is less detrimental than use in other seasons. Kusler (1985) provides a model statute for riparian habitat management.

Big game species such as Bighorn Sheep, Elk, Mule Deer, Moose, and White-tailed Deer are highly valued species. Protection of critical wintering ranges and protecting animals from disturbance while on those ranges are important management considerations. Certain resource activities may be compatible in certain seasons but not during others. In many instances, the best methods of conserving big game habitat are to maintain natural habitat through native rangedland ranching operations or other non-intensive land uses.

Controlled burning should be considered in certain areas which have been protected from fire for so long that the habitat quality has deteriorated because of tree invasion in grasslands and shrubbery or because of stagnation of shrub or grass growth.

Range improvement should be balanced with more laissez-faire attitudes. Large-scale brush removal may benefit one species like Elk but may be detrimental to other species like Moose and a variety of songbirds.

Prior to large-scale logging in this century, forests were influenced by fire, disease and insect infestations. Despite this, certain stands made it to the old-growth stage and higher elevation stands in protected sites may have remained largely untouched for thousands of years. Individual trees or groups of trees died out but the newly opened canopy provided opportunities for the establishment of young trees. Several wildlife species like Pileated Woodpeckers evolved with these older stands and their survival is dependent on them. On the other hand, some species like the Lewis' Woodpecker prefer recently burned woodlands and their populations appear to have declined with fire suppression programs (C. Wallis and E. Jones, personal communication). Maintenance of a variety of forest types including burned-over areas and old-growth

forest is important to retaining wildlife diversity (Meehan et al 1984).

Waterfowl and marsh bird production areas are very local in the Municipality of Crowsnest Pass. Currently dry wetlands, if not cultivated, could once again be productive during wet years. Wetland conservation involves maintaining existing water regimes; operating man-made water-bodies with water birds and marsh habitats in mind; protecting wetlands from non-compatible land uses such as cultivation and heavy grazing; and protection of adjacent shoreline and upland vegetation.

Drainage, in-filling and cultivation of wetlands are clearly not compatible with wetland maintenance. Moreover, adjacent shorelines and uplands are important to nesting waterfowl and certain land use activities may have to be curtailed at least on a seasonal basis if wetland productivity is to be maintained. Cultivation to the edge of significant wetlands should be discouraged.

Overwintering areas (hibernacula) for snakes are very locally distributed throughout Alberta and the availability of these sites is a major limiting factor in their life cycles. Excavation of hibernacula, destruction of surrounding natural habitats, and large-scale elimination of snakes will result in the loss of these local populations.

5.3.3 Key Fish Habitats

The management of key fish habitats is more problematical than management of other ESA's. Many of the tributary streams to the Crowsnest are important trout spawning streams. Fish migrate extensively within the drainage system. While certain reaches may be more significant than others, land uses well outside those areas may have profound impacts on them.

While direct conservation and protection of spawning habitat may be helpful in the most significant reaches, it is important to promote sound land management practices throughout the drainage basins. These are essential to the maintenance of fish migration routes and water quality and quantity. Even in areas which have no major sport or commercial fisheries, many of the recommendations for maintaining fish habitat will also improve water quality and keep the rivers suitable for a variety of other lifeforms.

Detailed information on current impacts and water management considerations for fish can be found in Longmore and Stenton (1981) and Platts (1978; 1979). The following is a summary of their major findings.

Water quality and quantity are affected by forestry operations, sewage disposal, storm sewer runoff, runoff from agricultural land and feedlots, water abstraction for domestic and agricultural use, stream regulation and water storage, and disruption of streambeds by channelization, diking, seismic line crossings, and construction of bridges and pipelines. Clearcutting watersheds removes protective

vegetation from streambanks and enhances spring flooding and channel erosion. Cattle can trample streambanks, making them unstable and susceptible to erosion and also cause local pollution and eutrophication.

Nutrient loading of streams and rivers because of municipal sewage or feedlot waste disposal combined with seasonally low flows can substantially affect water quality. Residues from fertilizers, herbicides, pesticides and a number of other toxins find their way into waterbodies via storm sewers and runoff from agricultural lands and feedlots. While there is little direct action that can be taken in many of these instances, major pollution sources such as feedlots should be located away from watercourses. There is evidence in some areas of nutrient loading exceeding the maximum acceptable levels for adequate protection of fisheries and aquatic life. Monitoring of existing operations would help to more fully determine the extent of any current problems.

Reduced flows from diversion of water for other uses results in higher water temperatures, lower dissolved oxygen levels and a reduced ability of the streams to assimilate waste. Flow augmentation may be necessary to counteract the negative effects. Stabilization of water flows by impoundment structures may increase overall stream productivity but may have adverse effects on riparian habitats if peak floods are controlled (see previous section).

Impoundment structures such as weirs and dams act as barriers to fish movement, thereby reducing the viability of populations which are dependent on a variety of reaches in the drainage basin. The potential impact of any in-stream barrier requires careful consideration. Fish often migrate long distances to spawn in headwater streams. Improperly designed weirs, road crossings, or man-made channel constrictions in small tributary streams may have significant impacts on important downstream fisheries. Design of fish passage facilities into these structures can significantly reduce impacts.

Significant spawning habitats must protected from major inputs of silt which can cause the loss of viability in developing eggs. Trout are particularly vulnerable to siltation. Land use and construction practices adjacent to spawning streams should be carefully considered. Maintaining a buffer zone of natural vegetation along streambanks is helpful in controlling runoff problems. Fencing streambanks from cattle use can significantly increase stream productivity. Sewer outfalls and other direct input sources of toxins or effluent should not be located in spawning streams. The deposition of material on the bed or banks of spawning streams should be prohibited.

5.3.4 Other Considerations for Areas of Biological Importance

Specific management guidelines should be drawn up for rare and endangered plant and animal species. Where known, these have been cited in the wildlife management sections and in the area descriptions. The management and monitoring of most rare and endangered plants and animals

is still in its infancy. As knowledge increases, management techniques will improve.

Unlike in Mixed Grasslands further east, heavy grazing may be detrimental in the study area as it often decreases the plants and animals which are most characteristic of the Montane section.

Large blocks of habitat are generally preferable to small parcels in that native plants and animals are better able to withstand the direct and indirect effects of adjacent land uses over the longer term (Graul 1980).

5.3.5 Significant Geological Sites

The geological sites identified in this study are most significant in their undisturbed state. With the exception of intensive developments such as quarrying and mining, most current land uses are compatible with maintenance of geological features. Recreational users sometimes vandalize features but these instances are relatively limited in scope.

6.0 DATA GAPS

The most well-studied resources are the hydrological (Cherry et al 1972) and geological features, although significant paleontological resources probably still remain undiscovered.

The most conspicuously lacking information is with respect to the site specific distribution of rare plants and animals. While the critical habitats for some species such as ungulates are reasonably well-documented, only patchy research has been undertaken on smaller mammals, songbirds, reptiles, amphibians, non-sport fish, invertebrates, and plants.

We are, however, confident that all rare species known for the study area are represented in habitats which have been incorporated into Environmentally Significant Areas (ESA's) for other reasons. While minor areas of rare plant and animal habitats may still not be defined, the most significant concentrations of rare plants and animals should be accounted for by this study. The details of rare plant and animal distribution within most of the ESA's are not known. Although areas of potential habitat could be extracted from existing data, further field studies are required to accurately define the specific distribution of rare plants and animals.

Considerably more work is needed at regional, provincial and national levels to assess the significance of sites for lower plants and animals.

7.0 FUTURE RESEARCH

More detailed studies should be undertaken in areas which are considered a priority either because of their high significance levels or because of planned developments. Suggestions for the type of information to be gathered and the level of detail are provided in the Environmentally Significant Area Checklist which follows. A map of each site showing the principal biological and landform features should also be prepared.

An ongoing program of data acquisition and storage will build upon the basic information provided by this study. The cooperation of agencies at all levels of government, landowners, researchers and naturalists would greatly enhance the type and amount of information collected. Initial studies should be directed to further identification of sites of rare, threatened or endangered plants and animals. Integration with other studies such as the Alberta Bird Atlas project would also be helpful.

8.0 REFERENCES

- Alberta Fish and Wildlife. 1985. List of scarce avian species. Unpublished manuscript, Alberta Fish and Wildlife, Edmonton.
- Beaty, C. 1975. The landscapes of southern Alberta. University of Lethbridge, Lethbridge.
- Borneuf, D. 1983. Springs of Alberta. Earth Sciences Report 82-3, Alberta Research Council, Edmonton.
- Bradley, C. 1984. Management issues in ecological reserves and natural areas, five discussion papers. Unpublished manuscript.
- Butler, J. 1983. Challenges and changing perspectives in the management of fish and wildlife resources. Agriculture and Forestry Bulletin 6 (3): 10-13.
- Butler, J. and W. Roberts. 1987. Considerations in the protection and conservation of amphibians and reptiles in Alberta. Pages 133-135 in "Endangered species in the Prairie Provinces, proceedings of the workshop". Occasional Paper No. 9, Provincial Museum of Alberta, Edmonton.
- Calgary Regional Planning Commission. 1983. Environmentally Significant Areas of the Calgary Region. Prepared by R. Lamoureux & Associates Ltd., Calgary, Alberta.
- Cherry, J., R. Everdingen, W. Meneley and J. Toth. 1972. Hydrogeology of the Rocky Mountains and Interior Plains. Excursion 26, XXIV International Geologic Congress, Montreal.
- Cottonwood Consultants. 1983. A biophysical systems overview for ecological reserves planning in Alberta. Alberta Recreation and Parks, Edmonton.
- Cottonwood Consultants. 1986. An overview of reptiles and amphibians in Alberta's Grassland and Parkland Natural Regions. World Wildlife Fund Canada and Cottonwood Consultants Ltd., Calgary.
- Cottonwood Consultants. 1987. Alberta snake hibernacula survey. World Wildlife Fund Canada and Cottonwood Consultants Ltd., Calgary.
- Cottonwood Consultants. 1987. Environmentally significant areas in the Oldman River Region. Oldman River Regional Planning Commission, Lethbridge.
- Eagles, P. 1984. The planning and management of environmentally sensitive areas. Longman, London and New York.
- Everdingen, R. van. 1972. Thermal and mineral springs in the southern Rocky Mountains of Canada. Water Management Service, Department of the Environment, Ottawa.

- Gjersing, F., no date. Effects of grazing on riparian zones in northcentral Montana. Montana Fish, Wildlife and Parks, Havre, Montana.
- Graul, W. 1980. Grassland management practices and bird communities. Pages 38-47 in "Management of western forests and grasslands for nongame birds". USDA Forest Service General Technical Report INT-85, Ogden, Utah.
- Kuijt, J. 1982. A flora of Waterton Lakes National Park. University of Alberta Press, Edmonton.
- Kusler, J. 1985. Model riparian habitat protection statute. Pages 515-521 in "Proceedings of the First North American Riparian Conference, April, 1985, Tucson, Arizona". USDA Forest Service General Technical Report RM-120, Fort Collins, Colorado.
- Longmore, L. and C. Stenton. 1981. The fish and fisheries of the South Saskatchewan River basin. Planning Division, Alberta Environment, Edmonton.
- Meehan, W., T. Merrell, and T. Hanley (editors). 1984. Fish and wildlife relationships in old-growth forests -- proceedings of a symposium sponsored by American Institute of Fishery Research Biologists, the Wildlife Society, and Alaska Council on Science and Technology, Juneau, Alaska, April, 1982. American Institute of Fishery Research Biologists, Morehead City, North Carolina.
- Moss, E. 1944. The prairie and associated vegetation of southwestern Alberta. Canadian Journal of Research C 22: 11-31.
- Moss, E. 1983. Flora of Alberta, second edition, revised by J. Packer. University of Toronto Press, Toronto.
- Packer, J. and C. Bradley. 1984. A checklist of the rare vascular plants in Alberta. Provincial Museum of Alberta Natural History Occasional Paper 5. Alberta Culture, Edmonton.
- Platts, W. 1978. Livestock interactions with fish and their environments. California-Nevada Wildlife Transactions 1978, pages 92-96.
- Platts, W. 1979. Livestock grazing and riparian/stream ecosystems - an overview. Pages 39-45 in "Proceedings, Forum -- grazing and riparian/stream ecosystems". Trout Unlimited.
- Power, T. 1985. Economic valuation of the natural environment: profaning the sacred? Pages 37-44 in "Economy and ecology - the economics of environmental protection", a symposium sponsored by the Canadian Society of Professional Biologists, February, 1985, Edmonton. Canadian Society of Professional Biologists, Edmonton.
- Price, R. 1962. Fernie Map-area, east half, Alberta and British Columbia, 62C E1/2. Geological Survey of Canada Paper 61-24.

- Sait, W. and J. Sait. 1978. Birds of Alberta. Hurtig, Edmonton.
- Severson, K. and C. Soldt. 1978. Cattle, wildlife and riparian habitats. Pages 91-102 in "Management and use of northern plains rangeland", regional rangeland symposium, Bismarck, North Dakota, February, 1978. North Dakota State University, Dickinson.
- Smith, R. and L. Flake. 1981. The effects of grazing on forest regeneration along a prairie river. Prairie Naturalist 1981: 41-44.
- Wallis, C. 1983. Wilderness and economics. Unpublished manuscript.
- Wallis, C. 1985. The extravagance of wilderness - whose values, whose dollars and sense? Pages 45-51 in "Economy and ecology - the economics of environmental protection", a symposium sponsored by the Canadian Society of Professional Biologists, February, 1985, Edmonton. Canadian Society of Professional Biologists, Edmonton.

9.0 ENVIRONMENTALLY SIGNIFICANT AREA CHECKSHEETS

The ESA's are arranged in alphabetical order. Each is located on the Environmentally Significant Areas (Natural Sites) Map and photographs representing most areas have been supplied. Also provided are details of the site location, major features, other biophysical features, level of significance, criteria for significance rating, major management considerations, and pertinent references.

Site Name: ALLISON CREEK

Site Location:

- 2 km north of Savanna
- Twp. 8 - Rge. 4 and 5 - 15M

Description:

- diverse habitat mosaic of grassland, deciduous and coniferous woodland, ravines, and a permanent stream
- areas of very large mature spruce, Douglas fir, alder, and aspen
- key Mule Deer and Elk habitat
- marl wetland in NE14 and NE15 - Twp. 8 - Rge. 5 - WSM
- portions of Allison Creek valley bottom and southern portion of Section 13 are heavily disturbed by cattle
- productive trout habitat along Allison Creek

Significance: Regional

- the combination of habitat diversity and variety of species of large, mature trees is rare and local within the study area
- key ungulate and trout habitats are important features of the region
- marl wetlands are very local in the region

Management Considerations:

- maintenance of wildlife diversity is dependent on maintaining a variety of forest types including burned-over areas and old-growth forest
- stream pollution from subsurface or surface sources and erosion and siltation can have significant impacts on fisheries
- heavy grazing reduces the suitability of these habitats for a variety of native plants and animals

References:

- 1987 field program notes
- Fish and Wildlife key area maps
- Longmore and Stenton (1981) for fisheries
- Meehan et al. (1984) for wildlife management in forests

Site Name: BELLEVUE WETLANDS

Site Location:

- ponds and immediately adjacent natural land in the vicinity of Bellevue
- Twp. 7 - Rge. 3 - 15M

Description:

- garter snake hibernaculum (over-wintering den) in SE29 and nearby feeding habitat in wetlands in NE20 and NW21
- large, undisturbed permanent pond in NE29 -- breeding habitat for Ring-necked Duck, and stands of yellow pond-lily (Nuphar variegatum),

Significance: Regional

- large ponds are rare in the region
- snake hibernacula are of local occurrence and are critical to the survival of snakes
- Ring-necked Duck and yellow pond-lily are uncommon species in the region

Management Considerations:

- snakes are very vulnerable to human disturbance at den sites; at some locations in Alberta snakes have been killed and dens destroyed
- adjacent wetlands provide important feeding habitat for snakes
- maintenance of natural cover adjacent the wetlands is important for breeding birds

References:

- 1987 field program notes
- Butler and Roberts (1987) and Cottonwood Consultants (1987) for snake hibernacula
- Moss (1983) for yellow pond-lily

Site Name: BYRON HILL

Site Location:

- 2 km southwest of Burmis
- Twp. 7 - Rge. 3 - W5M

Description:

- diverse montane ridges
- key habitat for Elk and Mule Deer
- rare plant, linear-leaved scorpion-weed (Phacelia linearis)
- unit extends into M.D. of Pincher Creek

Significance: Regional

- key ungulate habitats are important features of the region

Management Considerations:

- heavy grazing reduces the suitability of these habitats for a variety of native plants and animals

References:

- 1987 field program notes
- Fish and Wildlife key area maps
- Packer and Bradley (1984) for rare plant status

Site Name: COLEMAN

Site Location:

- north of Coleman along north boundary of study area, between McGillivray Creek and Blairmore Creek
- Twp. 8 - Rge. 4 - WSM

Description:

- key Mule Deer and Elk habitat

Significance: Regional

- key ungulate habitats are important features of the region

Management Considerations:

- heavy grazing reduces the suitability of these habitats for a variety of native plants and animals

References:

- Fish and Wildlife key area maps

Site Name: CROWSNEST RIVER - BURMIS

Site Location:

- land along Crowsnest River from Bellevue downstream to the eastern boundary of the study area
- Twp. 7 - Rge. 3 - W5M

Description:

- shallow valley of the Crowsnest River with a variety of rock outcrops, grassland, shrubbery and coniferous woodland
- premium quality trout fishery
- large mature riparian (riverside) poplar and white spruce woodland
- diversity of breeding birds in woodland and adjacent shrubbery
- key White-tailed Deer habitat
- Moose habitat
- stands of yellow monkey flower (Minulus outtatus), a rare plant, along Byron Creek
- population of Western Painted Turtle, an endangered species in Alberta, in pond southeast of Hillcrest Mines
- unit extends into the M.D. of Pincher Creek

Significance: National or International

- the trout fishery is among the best anywhere

Management Considerations:

- stream pollution from subsurface or surface sources and erosion and siltation can have significant impacts on fisheries
- heavy grazing reduces the suitability of these habitats for a variety of native plants and animals
- clearing and cultivation eliminate many native plants and animals

References:

- 1987 field program notes
- Fish and Wildlife key area maps
- Packer and Bradley (1984) for rare plant
- Cottonwood Consultants (1986) for Western Painted Turtle status
- Longmore and Stenton (1981) and C. Bradley and J. Eisenhauer (personal communication) for fish

Site Name: CROWSNEST RIVER - SAVANNA

Site Location:

- Crowsnest River between Sentinel and Savanna
- Twp. 8 - Rge. 5 - WSM

Description:

- extensive riverine shrubbery and adjacent grassland and mature aspen
- high diversity and density of breeding birds
- extensive flower blooms in grasslands
- productive trout fishery

Significance: Regional

- habitats with diverse, dense populations of breeding birds are localized in the region
- productive trout fisheries along study area streams are important features of the region

Management Considerations:

- stream pollution from subsurface or surface sources and erosion and siltation can have significant impacts on fisheries
- heavy grazing reduces the suitability of these habitats for a variety of native plants and animals
- clearing and cultivation eliminate many native plants and animals

References:

- 1987 field program notes
- Longmore and Stenton (1981) and C. Bradley and J. Eisenhauer (personal communication) for fish

Site Name: CROWSNEST VOLCANICS

Site Location:

- west and north of Coleman
- E19 and NW20; Section 18; and W7 - Twp. 8 - Rge. 4 - W5M

Description:

- outcrops of volcanic rocks of the Crowsnest Formation; these are the largest exposures of this formation in Alberta

Significance: Provincial

- this formation occurs in Alberta only in the Crowsnest Pass
- exposures of volcanic rock are very local in the province

References:

- Price (1962)

Site Name: CROUSNEST SPRING

Site Location:

- immediately north of Crousest Lake
- NEB - Twp. 8 - Rge. 5 - USM

Description:

- large karst spring, flowing out of cave along north side of railway tracks

Significance: Provincial

- one of the largest, most spectacular karst springs in Alberta

Management Considerations:

- because circulation is fairly rapid in this spring system, protection has been recommended for the catchment area, including sinkholes 4 km to the northwest, immediately outside of the study area

References:

- Borneuf (1983)

Site Name: CROWSNEST WETLANDS

Site Location:

- wetlands north of Crowsnest Lake
- NWS and SE16 - Twp. 8 - Rge. 5 - LSM

Description:

- large permanent pond with some waterfowl production
- rare amphibian (Long-toed Salamander) collection site near small easternmost pond (possible breeding site)
- pond immediately north of the railway tracks is habitat for the endangered Western Painted Turtle

Significance: Regional

- ponds suitable for waterfowl production are rare in the study area
- Long-toed Salamander habitats are very localized
- natural populations of the Western Painted Turtle are considered endangered in Alberta; however, it is not known if Crowsnest Pass populations are natural

Management Considerations:

- maintenance of natural cover adjacent the wetlands is important for breeding birds

References:

- Butler and Roberts (1987) for Long-toed Salamander
- Cottonwood Consultants (1986) for Western Painted Turtle
- 1987 field program notes
- Fish and Wildlife key area maps

Site Name: DRUM CREEK

Site Location:

- Drum Creek valley west of Hillcrest Mines and ridges west and south of Hillcrest Mines
- Sections 17, 18 and 19 - Twp. 7 - Rge. 3 - WSM

Description:

- impressive gorge and cascade along Drum Creek 1 km west of Hillcrest Mines
- steep grassy ridges south of Drum Creek with extensive, showy flower blooms
- in Drum Creek valley, woodland with lush understory, containing some of the best stands of uncommon plants in the study area including: elderberry (Sambucus racemosa), mountain ash (Sorbus sp.) and mountain maple (Acer glabrum)
- Western Flycatcher, a scarce Alberta species, nesting in Drum Creek gorge
- key deer, Moose and Elk habitat

Significance: Regional

- impressive cascades are rare in the region
- key ungulate habitats are important features of the region

Management Considerations:

- heavy grazing reduces the suitability of these habitats for a variety of native plants and animals

References:

- 1987 field program notes
- Fish and Wildlife list of scarce avian species

Site Name: DRY CANYON

Site Location:

- immediately northeast of Phillips Pass
- Section 17 - Twp. 8 - Rge. 5 - W5M

Description:

- ephemeral stream in steep, rocky canyon
- rare and uncommon Alberta plants including the maidenhair fern (Adiantum pedatum) and holly fern (Polystichum lonchitis)
- scarce and uncommon bird species (Cassin's Finch and Rock Wren)
- diversity of flowering plants
- key Bighorn Sheep habitat

Significance: Provincial

- one of only three collection localities for maidenhair fern in Alberta; elsewhere in Alberta found only at Waterton National Park where it is considered uncommon

Management Considerations:

- quarrying is incompatible with maintenance of the rare plant populations

References:

- 1987 field program notes
- Fish and Wildlife key area maps and list of scarce avian species
- Kuijt (1982) and Packer and Bradley (1984) for rare plants

Site Name: FRANK SLIDE

Site Location:

- east and southeast of Frank
- Sections 29, 30, 31 and 32 - Twp. 7 - Rge. 3 - W5M

Description:

- large classic rock slide, a unique geological feature
- permanent wetland with some waterfowl production at Frank Lake

Significance: National

- recent rock slides of this magnitude are rare in Canada; the site has been studied by geologists from around the world

References:

- 1987 field program notes
- Beaty (1975) for geology

Site Name: GOLD CREEK - LIVINGSTONE RANGE

Site Location:

- northeastern portion of study area from north of Blairmore and Frank to northwest of Burmis
- Twp. 7 and 8 - Rge. 3 and 4 - W4M

Description:

- diversity of habitats including talus slopes, ephemeral and permanent streams, subalpine meadows and woodland, and montane woodland
- concentrations of rare plants including: Utah honeysuckle (Lonicera utahensis), sticky currant (Ribes viscosissimum), Alaska bog orchid (Habenaria unalascensis) and shrubby beard-tongue (Penstemon fruticosus) on Bluff Mountain; yellow monkey-flower (Mimulus outtatus) on small creek east of Gold Creek; and sticky laurel (Ceanothus velutinosus) and stands of big sagebrush (Artemisia tridentata) in Section 27 - Twp. 7 - Rge. 3 - W5M, previously unrecorded in the Crowsnest Pass
- scattered large mature Douglas fir and limber pine
- key ungulate area; a high density of Elk, Moose, and Mule Deer use was noted on the west slopes of Bluff Mountain
- habitat for Rock Wren, an uncommon bird in region
- productive trout habitat along Gold Creek
- cold water, calcium-sulfate bicarbonate (sulphur) springs in L.S. 12 - Section 36 - Twp. 7 - Rge. 4 - W5M

Significance: Regional

- apparently one of the most significant ungulate habitats in the study area
- key trout habitats are important features of the region
- only a few stands of big sagebrush are known for Alberta; the stands in the study area are smaller than other Alberta stands but represent a northern extension for this species
- sulphur springs are localized and this may be one of the best examples in Alberta

Management Considerations:

- maintenance of wildlife diversity is dependent on maintaining a variety of forest types including burned-over areas and old-growth forest
- stream pollution from subsurface or surface sources and erosion and siltation can have significant impacts on fisheries
- heavy grazing reduces the suitability of these habitats for a variety of native plants and animals

References:

- 1987 field program notes
- Fish and Wildlife key area maps
- Packer and Bradley (1984) for rare plants
- Longmore and Stenton (1981) and C. Bradley and J. Eisenhauer (personal communication) for fish
- Borneuf (1983) and Everdingen (1972) for springs

Site Name: ISLAND CREEK

Site Location:

- west and south of Island Lake, along the west and south boundaries of study area, east to Crowsnest Creek
- N1 and S12 - Twp. 8 - Rge. 6 - W5M and NW6 - Twp. 8 - Rge. 5 - W5M

Description:

- rare and uncommon plants including a significant stand of western larch (Larix occidentalis) and individual plants of western red cedar (Thuja plicata) on Island Ridge
- mature forest with large trees along Island Creek; this habitat continues to the southwest, outside of the study area, where the most extensive stands of the rare western larch are found
- beaver dam complex along Island Creek
- diverse community of breeding birds in woodland and shrubbery at west end of Island Lake
- bird species uncommon in the region (Varied Thrush, Winter Wren) along Island Creek
- key Moose and Elk habitat

Significance: Regional

- mature forest with large trees is restricted to small, localized areas within the region
- beaver ponds, local within the study area, are often very productive habitats for a large diversity of wildlife
- western larch is very local in Alberta; stands at Island Lake are smaller than those immediately to the west

Management Considerations:

- maintenance of wildlife diversity is dependent on maintaining a variety of forest types including burned-over areas and old-growth forest

References:

- 1987 field program notes
- Fish and Wildlife key area maps
- Packer and Bradley (1984) for rare plants

Site Name: MOUNT TECUMSEH

Site Location:

- northwest corner of study area from Mount Tecumseh south to Crowsnest Ridge
- Twp. 8 - Rge. 5 - WSM

Description:

- avalanche slopes and adjacent woodlands with concentrations of rare and uncommon plants including: sticky laurel (Ceanothus velutinus), Alaska bog orchid (Habenaria unalascensis), mountain lady's-slipper (Cypripedium montanum), Utah honeysuckle (Lonicera utahensis), and sticky currant (Ribes viscosissimum)
- forests of very large mature subalpine fir, Douglas fir, lodgepole pine, limber pine and spruce in the vicinity of the avalanche slopes
- uncommon bird species for the study area -- Hermit Thrush
- key Bighorn Sheep and Moose habitat

Significance: Regional

- forests of large mature trees are rare and local in the study area
- concentrations of rare plants are regionally significant
- key ungulate habitats are important features of the region

Management Considerations:

- old-growth forests are important to the maintenance of a variety of wildlife

References:

- 1987 field program notes
- Fish and Wildlife key area maps
- Packer and Bradley (1984) for rare plants

Site Name: REDFERN LAKE

Site Location:

- wetlands north of the Crowsnest River between Hillcrest and Burmis
- Twp. 7 - Rge. 3 - WSM

Description:

- permanent ponds used by waterfowl for breeding habitat
- key White-tailed Deer habitat

Significance: Regional

- ponds suitable for waterfowl production are rare in the region

Management Considerations:

- maintenance of natural cover adjacent the wetlands is important for breeding birds
- heavy grazing reduces the suitability of these habitats for a variety of native plants and animals

References:

- 1987 field program notes
- Fish and Wildlife key area maps

Site Name: SENTRY MOUNTAIN

Site Location:

- north slopes of Sentry Mountain south of Crowsnest Lake
- Twp. 8 - Rge. 5 - WSM

Description:

- key Bighorn Sheep habitat
- a few individual western larch (Larix occidentalis), a rare plant
- stand of white birch (Betula papyrifera) at west end of Crowsnest Lake

Significance: Regional

- key Bighorn Sheep habitat is local in the region
- white birch and western larch are scarce in the region

References:

- 1987 field program notes
- Fish and Wildlife key area maps
- Packer and Bradley (1984) for rare plants