WHC Nomination Documentation

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SITE NAME ("TITLE") Waterton Glacier International Peace Park

DATE OF INSCRIPTION ("SUBJECT") 9/12/95

STATE PARTY ("AUTHOR") USA and CANADA

CRITERIA ("KEY WORDS") N (ii)(iii)

DECISION OF THE WORLD HERITAGE COMMITTEE:
19th Session
The Committee took note of the evaluation presented by IUCN and that the site meets criteria (ii) and (iii) because of its distinctive climate, physiographic setting, mountain/prairie interface and tri-ocean hydrographical divide as well as its scenic values and the cultural importance of its International Peace Park designation. IUCN further recommended that a single "Biosphere Reserve"should be created from the three Biosphere Reserves already existing in the area. The Committee decided that the site be listed under criteria (ii) and (iii) and requested the World Heritage Centre to write to the States Parties with respect to the Biosphere Reserve proposal. In addition, the Committee recommended that the site be eventually expanded to include the adjacent protected area in the Akamina/Kishinena.

BRIEF DESCRIPTION:
These two National Parks were designated by law the world's first International Peace Park in 1932. Located on the Canada/US border and offering outstanding scenery, the parks are exceptionnally rich in plant and mammal species as well as in alpine and glacial features.

1.b. State, province or region: Province of Alberta, Canada; State of Montana, USA

1.d Exact location: Canada: Long.113°40’ to 114°10’W ; Lat.49°00’ to 49°12’
USA: Long. 113°15’ to 114°30’W ; Lat.48°15’ to 49°00’

CONVENTION CONCERNING THE PROTECTION OF

THE WORLD CULTURAL AND NATURAL HERITAGE

WORLD HERITAGE LIST NOMINATION

WATERTON-GLACIER INTERNATIONAL PEACE PARK

BY

THE UNITED STATES OF AMERICA

AND

CANADA

1985

REVISED 1993

AMENDED 1994

Waterton Lakes National Park
Glacier National Park

Joint Nomination to the World Heritage List
by
Canada
and
The United States of America
1985
Revised 1993
Amended 1994

On June 30, 1932, the citizens and governing bodies of Canada and the United States of America, by Act of Royal Assent and Presidential Proclamation, commemorated the friendship and good will of Canada and the United States through the joint establishment and management of Waterton-Glacier International Peace Park, the first in the world.

Mutual coordination and consultation between Waterton Lakes National Park, Alberta, and Glacier National Park, Montana, are essential for the continued protection of the rich diversity of our natural and cultural resources.

The basic principles underlying the World Heritage Convention can be strengthened by joint actions of member nations in the identification and recognition of complementary and/or contiguous resources which are judged to be of World Heritage quality.

The unique balance of natural resources constitutes an international ecological unit which is vital to the integrity of the two parks as a whole.

Accordingly, Canada nominates Waterton Lakes National Park to the World Heritage List and the United States of America nominates, as its companion, Glacier National Park; however, the two governments submit one nominating form, containing joint documentation for both properties.

TABLE OF CONTENTS

I.	SPECIFIC LOCATION:	Waterton Lakes National Park	Glacier National Park
A.	COUNTRY:	Canada	United States of America
B.	STATE, PROVINCE OR REGION:	Province of Alberta, Canada; M.D. of Cardston (No. 6) and M.D. of Pincher Creek (No. 9)	State of Montana, United States A. Flathead and Glacier Counties
C.	NAME OF PROPERTY:	Waterton-Glacier International Peace Park Waterton Lakes National Park Glacier National Park	
D.	EXACT LOCATION AND GEOGRAPHIC COORDINATES		
	- Latitude Longitude	N 49°00′ to 49°12′ W 113°40′ to 114°10′	N 48°15′ to 49°00′ W 113°15′ to 114°30′
	- Universal Transverse Mercantor Grid	Zone 11 U 707000 m. E to 719000 m. E 5431000 m. N to 5454000 m. N Zone 12 U 281000 m. E to 306000 m. E 5431000 m. N to 5454000 m. N685000 m. E to 719000 m. E 5345000 m. N to 5431000 m. N Zone 12 U 281000 m. E to 335000 m. E 5345000 m. N to 5431000 m. N	Zone 11 U

E. MAPS

See Map in Part IV.A. of this document and the enclosed Waterton-Glacier International Peace Park Brochure

II. JURIDICAL DATA

A. Owner

Government of Canada Department of Environment Parks Canada; under the Authority of the National Parks Act (R.S.C. 1970; C. N-13)	United States Government Department of the Interior National Park Service

B. Legal Status

All lands within the boundaries of Waterton Lakes National Park are Crown land administered under the jurisdiction of the Government of Canada. Waterton Lakes National Park was originally set aside as the "Forest Park" in 1895 (Dominion Lands Act; P.C. 1621, May 30, 1895) and subsequently reclassified as a Dominion Park (P.C. 1338, 8 June, 1911) and National Park (National Parks Act, Ch. 33, R.S.C. 1930).	The United States Government, through the Department of the Interior, holds title to all but 0.09% of the land within Glacier National Park. A few private inholdings remain from pre-existing claims, which are gradually being acquired. On May 11, 1910, the United States Congress passed "An Act to establish Glacier National Park" (36 Stat. 354). The National Park Service Organic Act of August 25, 1916, (39 Stat. 535) established the National Park Service (United States N.P.S.) which administers Glacier National Park. Other legislative and administrative constraints are listed in the Statement for Management 1990.

C. Responsible Administration

Waterton Lakes National Park is administered by Parks Canada.

Parks Canada
Ontario Regional Office
111 Water Street East
Cornwall, Ontario, Canada
K6H 6S3

and
Regional Director
Parks Canada
Western Region
P.O. Box 2989, Station M
Calgary, Alberta, Canada
T2P 3H8
OR
220 4th Avenue Southeast
Calgary, Alberta, Canada
T2P 3H8

Glacier National Park is administered by the United States National Park Service, Department of the Interior.

National Park Service
Washington Office
P.O. Box 37127
Washington, D.C. 20013-7127
OR
800 North Capital
Washington, D.C. 20002

and
National Park Service
Rocky Mountain Region
P.O. Box 25287
Denver, Colorado, United States A.
80225-0287
OR
12795 West Alameda Way
Denver, Colorado, United States A
80225

D. Not applicable

III. IDENTIFICATION

A. Description and Inventory

1. Biogeographic Province

Glacier and Waterton Lakes National Parks are situated along the eastern margin of the Rocky Mountains Biogeographical Province (Nearctic Realm) as defined by Udvardy (1975) and at the extreme western edge of the Interior Grasslands of North America. The resulting overlap of biotic and abiotic features has brought about a landscape of great variety within a comparatively small area, a situation which is unique within the context of both National Park systems. Many of the features of the two parks are of high aesthetic, recreational, and scientific value.

2. Climate

The region's Cordilleran climate is rigorous and is generally characterized by short, cool summers and comparatively mild, snowy winters. The climate is influenced by two opposing systems, the Arctic Continental and the Pacific Maritime. The latter system is the more dominant of the two, and during the winter months frequently breaks through the Arctic Continental air mass, producing warm "Chinooks". A Pacific storm track associated with this Maritime system brings heavy precipitation to the area and tends to moderate temperatures. This is particularly evident in that portion of Glacier National Park lying west of the Continental Divide. Annual precipitation, often in the form of snow, varies from 480 mm to 2,500 mm annually.

Precipitation distribution within the parks is quite variable as a result of physiography and local climate conditions. A rain shadow effect combines with frequent high winds to produce a drier, more extreme climate on the eastern side of the Divide. Here, wind is the single most important climatic factor. Strong winds are predominantly southwesterly to westerly and may reach gale force velocities. These winds affect every feature of the eastern slopes, and are of particular importance to vegetation and wildlife. Many plant communities exist in a near xeric condition due to the drying effect, while exposed areas are often blown clear of snow even during the hardest of winters, providing excellent winter range for ungulates.

3. Landforms

Glacier National Park is a rugged mountainous preserve encompassing some 405,089 ha of peaks along both sides of the Continental Divide, inter-mountain basins west of the Divide, prairie and semi-arid foothills of the Rocky Mountain Front Ranges to the east. Great extremes in elevation exist between peaks and valley floors. Elevations range from 967 m to 3,190 m, with eight peaks higher than 3,000 m, and 32 above 2,800 m. The Livingston and Lewis Mountain Ranges trend from northwest to southeast through the park. The Continental Divide follows the jagged crest of the more easterly Lewis Range.

Waterton Lakes National Park includes 52,525 ha of prairie, lakes and mountains lying to the

east of the Continental Divide. Local relief is dominated by the 2,500 m peaks of the Border and Clark Ranges, which are generally less rugged than their Glacier National Park counterparts. The elevation range is from 1,280 m (prairie portion) to 2,939 m (Mt. Blakiston). The park is centered around a long, narrow "glacier trough" lake which straddles the 49th Parallel, effectively joining the two parks.

The most immediately obvious feature of Waterton Lakes National Park is the sudden transition from prairie to mountain landscape, a contrast which is emphasized by the virtual absence of intervening foothills. The result is a landscape consisting of small tracts of rolling prairie from which the mountains rise abruptly, forming the basis for the park theme, "Where the Prairies Meet the Mountains".

The dominant landforms of both parks are of glacial origin. Some fifty small alpine glaciers of relatively recent (post-Pleistocene) origin dot the higher elevations of Glacier National Park. The Waterton Lakes portion contains no active glaciers but does contain permanent snow fields plus erosional and deposition features typical of both Cordilleran and Continental glacial action. The southwestern margin of the Laurentide ice advance lies nearby.

Soils belonging to the Chernozemic order are associated with the grassland portion of

Waterton Lakes National Park. They are the only sizeable example of this soil order which is presently preserved within the Canadian National Parks system. Paleosols (fossil soils) are also known to occur within the park.

4. Hydrology

The Waterton-Glacier Park complex is situated at the junction of three of the continent's major drainage systems. Headwater streams flow west into the Columbia drainage, east into the Missouri, and north into the Saskatchewan (Pacific Ocean, Gulf of Mexico, and Hudson Bay, respectively). Two rivers (the Waterton and the Belly) as well as a number of smaller drainages are shared by the two parks. Both parks contain large, deep glacial trough lakes, numerous smaller alpine lakes, and many small marshes. Glacier National Park alone has a 2,414 km network of streams and rivers. The Upper Waterton Lake is the deepest in the Canadian Rockies at 147 m.

5. Geology

The joint Waterton-Glacier properties contain a stratigraphic record spanning more than 1,250 million years of sedimentary and tectonic evolution. Features typical of the North American Cordilleran region are well represented (i.e. major fold belts and fault lines). However, the most note-worthy and unique aspect of the area's geology is the relative age and method of formation of its major features.

The bedrock of the two parks is composed of a layered series of Precambrian sedimentary formations overlying much younger Cretaceous sediments. This extremely complex geological structure came about as a result of a major thrust fault, known as the Lewis Overthrust. Uplifted sedimentary layers were displaced some 40 km to the east during the late Paleocene/early Eocene eras. These rocks, known as the Precambrian Belt Supergroup, were forced toward and over the much softer Cretaceous formations of the Great Plains Region. Paleozoic and Mesozoic era sediments, which form the mountains of the northern Rockies, are absent from the region, having been eroded away. The remaining Precambrian formations, known as the Purcell Supergroup, contain some of the oldest exposed formations known from the Rocky Mountains. Limestones and dolomites of the Waterton Formation, the base of the Precambrian Lithology, are in evidence along Cameron Creek in Waterton Lakes National Park, at which point they disappear beneath the surface. Similar well-preserved examples of Proterozoic (i.e. recent Precambrian) sedimentary rock formations can also be found. Igneous rock deposits appear in the two parks as basalt flows and diorite sills and dikes (Siyeh Formation) which form a conspicuous black cliff band. They are the only formations which have been effectively dated (Potassium-Argum dated 1073-1100 million years) and thus serve as reliable strategraphical and age markers of the Purcell Supergroup.

Glacial landforms dominate the landscape. These are complemented by fifty alpine glaciers of post-Pleistocene origin.

The Precambrian formations also contain a number of very early fossil assemblages, mud cracks, oscillation ripple marks and raindrop impressions. By far the most important are the fossil stromatolites formed from blue-green algae colonies, also of the Siyeh Formation. Three genera and six species are represented. These are the most diverse and best preserved stromatolites to be found on the continent.

Both Waterton Lakes and Glacier National Parks contain examples of richly coloured argillites and mudstones formed by differing environmental conditions acting on small amounts of iron minerals at the time of formation. This is particularly well illustrated by the bright red and green argillites of the Grinnell Formation.

6. Vegetation

The Waterton-Glacier area is at the center of what has been described as a major floristic discontinuity or "botanical watershed", which occurs at approximately 49° N latitude and which divides the southern ranges of the Rocky Mountains from the more northerly ranges (Kuchar 1973). This change in species composition is thought to be related to the presence of a major Pacific storm track centered on or just below the 49th Parallel. This storm track has created a peninsular-shaped route along which some Pacific plant

species have migrated and spread through the eastern slopes of the Rocky Mountains. Approximately 100 species have made this transition, resulting in a regional flora which has a strong affinity with the flora of the Pacific coast (Daubenmire 1942). In addition to plants typical of the southern Rocky Mountains, numerous Boreal species and Pacific slope species reach their eastern and southern limits in the two parks, and are found adjacent to species typical of the prairie biome to the east. At least 1,258 vascular plants and 275 lichens have been identified within Glacier National Park (Lesica 1973), while Waterton Lakes harbours some 870, plus 182 bryophytes and 218 lichens. Twenty-six rare Montana plants have been recorded in Glacier National Park, of which 18 (69%) are found only in the park and its immediate environs. Approximately 113 vascular plant species in Waterton Lakes National Park or 10% of the provincial total are listed as rare within the Province of Alberta (Argus et al 1978). Thirty-four species are unknown to the Province outside of the park, while six species are classified as being rare nationally (Canada). These latter species include *Stellaria americana*, *Townsendia condensata*, *Gryophytum racemosum*, *Papaver pygmaeum*, *Douglasia montana*, and *Aquilegia jonesii*.

Recent studies have indicated that the parks may be an important center for various species of moonwort (*Botrychium* spp.). These plants, also known as grapeferns, are now quite rare.

The world center of diversity for moonworts is western North America, with the highest diversity occurring in a zone stretching from Oregon to Montana and southern Alberta. A new species (*Botrychium watertonense*) has recently been discovered in the area. It is of an exceptional nature as it represents a notho-species or hybrid (Wagner et al 1983).

A number of vegetation types which have been identified for this area are undescribed elsewhere. These include the extensive Fir-Whitebark forests, large areas of Limber Pine scrub, and "intermediate" alpine meadow associations. This latter type has been referred to as being a natural-occurring but ecologically unnatural assemblage of plants. The slopes on which it is found are treeless, and prairie species have extended upslope to mix with alpine and subalpine species.

Five large ecoregions are found within the joint properties, namely Alpine Tundra, Subalpine Forest, Montane Forest, Aspen Parkland, and Fescue Grassland (Strong et al 1981).

a. <u>Alpine Tundra Ecoregion</u>

Above 2,100 m on the west slope, and 1,800 m on the east, arctic-alpine tundra vegetation covers much of the terrain. Plant communities in Glacier National Park include fell-field lichen (Cushion plant communities), alpine meadows, and alpine bog areas. Dryas tundra (*Dyras octopetala*) dominates the alpine region

of Waterton Lakes National Park along with cushion plant tundra (*Potentilla nivea - Silene acaulis*). Absent from Waterton Lakes National Park are the extensive stands of wet "heather" (*Cassiope* spp.) tundra that are common in the northern Rocky Mountains. Expanses of bare rock make up much of this zone. The rare Dwarf Alpine Poppy (*Papaver pygmaeum*) is found within the two parks. The distribution of this species is almost entirely restricted to the Waterton-Glacier area and the adjacent Wall Lake area of British Columbia. Other species occurring in the parks, such as Mountain Sorrel (*Oxyria digyna*), are at a transition point between arctic and alpine ecotypes.

b. Subalpine Forest Ecoregion

Roughly analogous to the Hudsonian life zone (Nielsen 1973), the subalpine forests support the single most extensive vegetation cover of the two parks. A strong boreal element is present within this region typified by species such as Dwarf Birch (*Betula glandulosa*) and Fireweed (*Epilobium angustifolium*). Glacier National Park contains subalpine forest stands to the west of the Continental Divide which have a strong affinity with the flora of the northern Pacific coast. Trees are larger and grow in denser stands than do those of the east side. They are typified by species such as Western Red Cedar (*Thuja plicata*), Western Hemlock (*Tsuga heterophylla*) and Grand Fir (*Abies grandis*) which occur along with Alpine Fir (*Abies lasiocarpa*), Whitebark Pine (*Pinus albicaulis*), Englemann Spruce (*Picea*

englemannii), and Lodgepole Pine (*Pinus contorta*), the latter group occurring on both sides of the Divide. A cedar-hemlock component of this forest occurs on the eastern edge of its continental range, as does the Western Larch (*Larix occidentalis*), Alpine Larch (*L. lyalli*), and Western White Pine (*Pinus monticola*). At higher elevations, stunted Krummholz stands result from high winds, short growing season, and ice shear.

A number of plants which occur in the meadow portions of this ecoregion provide classic examples of western and coastal mountain species having made the transition to the eastern slopes of the Rocky Mountains. Beargrass (*Xerophyllum tenax*) and *Sausurea americana* are two such species. This former plant reaches the northeast margin of its distribution here while the latter is known from only this one locality east of the Continental Divide.

c. Montane Ecoregion

The Montane Ecoregion (Canadian zone) occurs at low to mid-elevations in both parks, but is largely restricted to the dry foothills and major river valleys of the eastern slopes. It is typified by species including Douglas Fir (*Pseudotsuga menziesii*), Ponderosa Pine (*Pinus ponderosa*), Lodgepole Pine (*P. contorta*), and Limber Pine (*P. flexilis*). These dry eastern slopes support a vegetation similar in physiognomy and composition to the Rocky Mountain regions further south and west. Aside

from the tree stratum, this ecoregion has little in common with the more northerly east slope montane forests of Alberta. Understory species such as Ninebark (*Physocarpus malvaceus*) and Mountain Maple (*Aceraceae glabrum*) are typical of the far western Douglas Fir forests of Idaho and Washington. Much of the key ungulate winter range found in the two parks is located in this zone, as is the bulk of human activity.

d. Aspen Parkland Ecoregion

This ecoregion consists of a broad band of forest and groveland which stretches across the three Canadian prairie Provinces and south along the mountains into Glacier County, Montana. Ecologically, it serves as an "ecotone" or transition belt between the prairie grasslands and the coniferous forest zone. The dominant tree cover is Trembling Aspen (*Populus tremuloides*) along with some Balsam Poplar (*P. balsamifera*). Aspen forests are common throughout the eastern half of Waterton Lakes National Park, but virtually restricted to valley bottoms in Glacier National Park. Shrub wetlands and marsh habitats are a common constituent of this ecoregion.

e. Fescue Grasslands Ecoregion

Known commonly as "bunchgrass prairie", the fescue grassland region is a narrow band of prairie which stretches along the plains and foothills from southern Alberta into Montana. It is typified by the Festuca/Danthonia grass

association (*F. scabrella* and *Danthonia parryi*) along with plants typical of the dry grasslands to the east. Within Glacier National Park, fescue grasslands occur as outliers on the exposed southern slopes and valley bottoms of the major drainages along the eastern periphery of the park. Waterton Lakes National Park contains a 33 square km area of prairie which is the only example of this particular plant association preserved within the Canadian National Park system. The abrupt transition that occurs between mountain and prairie has produced some unusual plant assemblages. In some areas the intervening forest zone has been breached, leading to the occurrence of prairie species above timberline in association with alpine species.

7. Wildlife

The Waterton-Glacier property is noted for its abundant wildlife. The wide diversity of habitat types present within the two parks (25 have been mapped in Waterton Lakes National Park alone) is reflected in a similar diversity of fauna. Over 300 terrestrial wildlife species, including several endangered or threatened birds and mammals, and many rare species are found here. The Waterton-Glacier area offers a de facto international sanctuary and a corridor for wildlife interaction, migration, and genetic exchange between the two countries. It is also note-worthy that, due to the distinct ecological setting, a number of southern and prairie subspecies make their appearance in this area.

a. Mammals

Sixty-one mammalian species have been reported for the two parks. The area provides excellent habitat for the Grizzly Bear (*Ursus arctos*), a species listed as threatened in the continental United States. A self-sustaining population in excess of 200 are found here, along with approximately twice that number of Black Bear (*U. americanus*). The Gray Wolf (*Canis lupus*), which is listed as an endangered species in the United States, is present in four established wolf packs with home ranges in the transboundary area of Waterton-Glacier. The area has provided habitat for the first successful wolf reproduction in Montana in over 50 years.

Bighorn Sheep (*Ovis canadensis*) and Mountain Goat (*Oreamnos americanus*) are indigenous to the region, and Glacier National Park is the only National Park in the United States which harbours both native species. The Mountain Goat found here is a southern subspecies (*O. a. missoulae*) as is the Moose (*Alces alces shirasi*). Nationally or regionally rare species occurring in one or both parks include the Lynx (*Lynx canadensis*), Bobcat (*Lynx rufus*), Mountain Lion (*Felis concolor*), River Otter (*Lutra canadensis*), Wolverine (*Gulo gulo*), Least Weasel (*Mustela nivalis*), Long-tailed Weasel (*Mustela frenata*), Fisher (*Martes pennanti*), Hoary Marmot (*Marmota caligata*), and Northern Bog Lemming (*Synaptomys borealis*).

The grasslands and windswept ridges on the eastern margins of the area are very important ungulate winter range, and the seasonal migrations to and from these areas provide an outstanding wildlife spectacle. The most notable of these migrations is that of the "International" elk herd (*Cervus elaphus*) which undergoes an annual migration from mountain summer ranges in Glacier National Park, Montana, to winter on the prairies of Waterton Lakes National Park.

b. Birds

A total of 269 avian species have been reliably observed within Glacier and Waterton Lakes National Parks. The Bald Eagle (*Haliaeetus leucocephalus*) and the Peregrine Falcon (*Falco peregrinus*) are classified as endangered in North America. Both species pass through the area while on migration, and the bald eagle nests in both parks. Additional species which are also considered rare or threatened include the Trumpeter Swan (*Olor buccinator*) and the Ferruginous Hawk (*Buteo regalis*). Waterton Lakes National Park is located on the margin of two major waterfowl migratory flyways, the Central and the Pacific. As a result of this overlap, the marsh and lake areas of the park are used extensively as staging areas and migratory stop-over points.

c. Aquatic Species

The aquatic resources of the two parks have been examined in some detail (Anderson 1976; United States Fish and Wildlife Service 1980). Many drainages originally barren of fish were stocked at an early date, often with non-native species. So far as is known, native fish species were restricted to the main drainages and those portions of tributary streams that lie below waterfalls and other migration barriers. Twenty-seven species of fish are known from Waterton and Glacier. Native fish include the Cutthroat Trout (*Salmo clarki*), Bull Trout (*Salvelinus confuentus*), Lake Whitefish (*Coregonus commersoni*), Mountain Whitefish (*C. culpeaformis*), Lake Trout (*Salvelinus namaycush*) and Northern Pike (*Esox lucius*). Two native fish species found in the main Waterton Lakes are considered unique as they are relic species whose distribution and occurrence are linked to refugia of deep, cold, preglacial lakes. The Pygmy Whitefish (*Proscopium coulteri*) is only known from the Waterton Lakes in the Hudson Bay drainage, while the presence of the Deepwater Sculpin (*Myoxocephalis thompsoni*) is unique in Alberta. Glacier National Park provides one of the last strongholds for the native subspecies of Westslope Cutthroat Trout. It contains approximately 98% of the remaining genetically pure stock in existence.

Several hundred aquatic invertebrate taxa have been identified within the parks, and scientists believe that numerous undescribed

plankton species are yet to be discovered. Researchers have recently discovered two amphipod species new to science, the first troglobites (aquatic cave dwelling insects) to be identified within Glacier National Park. The presence of the Caddisfly species (*Homophylax baldur*) is unusual as it is so far only known from the Waterton Lakes National Park and the State of Utah. Likewise, the Mollusk (*Sphaerium nitidum*), which is generally considered to be rare within the Canadian National Parks, is found here. Another naturally occurring feature of the Upper Waterton Lake is the presence of the Opossum Shrimp (*Mysis relicta*). This shrimp is a "relic species" which owes its presence here to the pattern of continental glaciers and the glacial lakes associated with them. As the southern margin of the ice retreated, the shrimp were left stranded in a series of freshwater lakes, and slight differences were fixed so that they are now known as separate species.

Recently, work on the aquatic insects of the area has shown that the parks have a very complex insect fauna (Smith, in preparation). Three basic insect communities have been identified, including Nearctic fauna, elements of West Coast fauna, and representatives of the Great Basin Biogeographical Province. Of particular significance are the aquatic mites, which have a very restricted distribution in western North America. One new species of the genus *Morimotacarus* has recently been

identified here, the only representative of this genus known from North America.

8. Cultural Resources

Human influence has created a wide range of cultural resources in Waterton and Glacier National Parks. These include archeological sites; modern Native American ceremonial sites and ethnographic uses; nineteenth century homesteads, timber, mining and oil operations; historic park administration structures; and concession operations with a network of historic hotels built in the early 1900s unifying the two parks. Additionally, the parks maintain historic records, museum and photographic collections.

All of these resources enhance the quality of the National Park experience by providing natural and cultural images and associations for visitor enjoyment and understanding, as well as preserving historical and biological information of importance to park managers.

a. Historic Structures

The exploration of Marias Pass by John F. Stevens and others led to the establishment of a railroad route through the Rocky Mountains, which was utilized by the Great Northern Railway in the early 1900's. This railroad route made the eastern side of the mountains much more accessible to travelers and the railroad became interested in the development of this scenic area to promote passenger travel on its railway system. Although not active in

promoting the establishment of the park, the railroad favored it and became very deeply involved in park development soon afterwards. Under the leadership of Louis and James Hill, the Glacier Park Company built a system of luxury hotels and chalets.

This system of historically and architecturally significant hotels and chalets is still in use today, serving visitors to Glacier and Waterton. These historic landmark hotels include Many Glacier Hotel in Glacier National Park, completed in 1915, and the Prince of Wales Hotel in Waterton completed in 1926. One year later, in 1927, the 73 foot passenger boat "International" began operation on Waterton Lake. The "International" still carries passengers from Canada, Waterton and the Prince of Wales Hotel, across the international boundary, and into the United States, landing at Goat Haunt in Glacier National Park.

While the Prince of Wales Hotel is unquestionably Waterton Lakes' finest architectural landmark, the park contains a wide range of other early buildings that illustrate a distinction between the national parks in Canada and those in the United States. The United States parks restricted private development to tightly-regulated resort systems such as the one developed by the Great Northern in Glacier National Park. All other commercial development occurred outside the park boundaries. Canadian park officials took a different tack. They created townsites within

the parks, using the rationale that they could more effectively regulate park-related private development if it was under their jurisdiction. The Waterton Lakes Townsite is a product of this policy. Notable examples of historic buildings include the 1927 Royal Canadian Mounted Police barracks, a 1935 cinema, the auto campground established in the 1920's, and summer cottages built by leaseholders during the 1920's and 1930's.

The 80 km Going-to-the-Sun Road, a National Historic Engineering Landmark, was constructed over Logan Pass by the United States National Park Service from 1921 through 1932. This scenic drive stands as a monument to early road engineering and automobile touring. It is currently under review as a National Historic Landmark and is commonly cited as among the top ten most scenic drives in the United States.

b. Archeological and Ethnographic Resources

Archeological sites and artifacts indicate that Waterton-Glacier International Peace Park provided important base locations for Native American hunting and gathering camps as much as 10,000 years ago. More recently, the mountain passes provided travel corridors for Blackfoot hunting parties, and for Kutenai migrations across the North American Continental Divide to the eastern plains for seasonal bison hunts.

Glacier National Park encompasses over 200 known prehistoric sites, some dating back to 10,000 B.C (Reeves, 1994). Archaeological

artifacts and other evidence indicate that Glacier National Park served as a base for Native American hunting and gathering camps, particularly along the shores of St. Mary and McDonald Lakes. Similar patterns were evident in Waterton Lakes National Park, where 212 archaeological sites have been identified. Twelve of these date back to at least 8,000 years B.C. This is the highest density of sites of any single small valley system in the northern Rocky Mountains (Reeves 1971). Components of the cultural mosaic dating from the first occupation are complete and they appear to be in sequence. The Chief Mountain and Two Medicine areas continue to be important ceremonial and religious focal points for members of the Blackfoot Nation.

Contemporary Blackfoot are made up of three tribes: the Piegans, the Bloods, and the Blackfeet proper. Most of the aboriginal peoples living south of the border adjacent to Glacier National Park are descendants of the Piegans, while the Bloods and others settled north of the United States-Canadian border near Waterton Lakes National Park.

Other tribes who historically used the western side of Glacier National Park are the Kutenai, Couer d' Alene (Kalispel), and the Flathead (Salish). The Kutenai historically claimed much of the area which follows the North Fork of the Flathead River, which is indicated by the number of scarred trees along their route. The Salish primarily used the areas of the

South and Middle Forks of the Flathead River for hunting and travel routes. The Kutenai in contrast to the Salish wintered in the western Montana valley rather than on the plains.

Members of the Blackfoot Nation from both Canada and the United States use Chief Mountain and other vision quest locations as ceremonial focal points. Chief Mountain is both a cultural landmark and symbol. The massif of Chief Mountain spans the boundary between the Blackfeet Reservation and Glacier National Park, less than 8 km from the international border as it passes through Waterton-Glacier International Peace Park. The International Peace Park idea has grown to become one park of three nations--Canada, the United States, and the Blackfoot Confederacy.

B. Land Use History

Both Glacier National Park and Waterton Lakes National Park are significant natural areas. The combined parks cover an area of 4,670 square miles. A major feature of the parks is their international relationship which is expressed formally as the Waterton-Glacier International Peace Park.

In 1931 the Rotary Clubs of Alberta and Montana recognized that although the parks were separate administratively, they were indeed one large wildland area. Additionally, this area sits astride the world's largest undefended international border. The Rotarians passed a resolution that same year to "establish the two

parks as a permanent International Peace Park". Negotiations began and by May of 1932 Waterton-Glacier International Peace Park had been established by the governments of Canada and the United States of America.

The international boundary divides this protected area leaving the border ranges, Upper Waterton Lake, and the St. Mary, the Belly, and the Milk Rivers both Canadian and American. Migrating wildlife know no political dividing line and move from one country to the other within this vast wilderness as they have for centuries.

In the beginning, the Peace Park commemorated the peace and goodwill of two nations sharing a common boundary and heritage. Today, Waterton-Glacier International Peace Park reflects not only peace and goodwill, but also the need for cooperation in a world of limited shared resources. A thought voiced at the dedication ceremony best describes Waterton-Glacier yesterday, today, and tomorrow: "The whole region has about it something indescribable. Perhaps the imminent presence which broods over it, and which is universally felt, may best be described as Peace."

In 1976, Glacier National Park was designated by the United Nations Education, Scientific, and Cultural Organization (UNESCO) as a Biosphere Reserve under the Man and Biosphere Program (MAB). Waterton Lakes National Park received this designation in 1979. It has been

recommended that the two Biosphere Reserves, along with the Coram Experimental Forest (United States Forest Service), be redesignated as the Rocky Mountain International Biosphere Reserve.

The remoteness of the area, plus the presence of a strong Blackfoot Confederacy, effectively prevented exploration of the area by Europeans until the nineteenth century. Hudson Bay Company surveyor, Peter Fidler, was probably the first European to approach the area, and made the first recorded observation of Chief Mountain in early January of 1793. Meriwether Lewis, with the returning Lewis and Clark Expedition, viewed the Rocky Mountain east front of Glacier National Park in 1806, without entering it. The International Boundary (49th Parallel) agreed upon in 1846 was not formally marked until 1872. Native land claims in the area were resolved by both treaty and purchase in the latter part of the 1800's.

The early part of the nineteenth century saw a progression of itinerant trappers, traders, prospectors and survey parties enter the area and utilize the mountain passes. Two such expeditions are worthy of special mention as they made the first recorded exploration of the respective areas. In May of 1854, a party of American surveyors under the leadership of James Doty travelled from the falls of the Missouri River to the 49th Parallel and beyond, camping briefly near St. Mary Lake in what is now Glacier National Park. Captain John

Palliser, in his exploration of British North America, passed just to the east of what is now Waterton Lakes National Park in 1858, and camped in the vicinity of Chief Mountain. Lt. Thomas Blakiston, of the same expedition and in the same year, entered the Waterton area via the South Kootenay Pass and camped in the vicinity of Middle Waterton Lake. Various British and American boundary survey parties traversed the area during the 1860 - 1880 period. The American Naturalist, Dr. Elliot Coues, participated in one of these surveys, and made collections in the area, as did George Mercer Dawson of the Geological Survey of Canada.

Settlement began in the Waterton Lakes area in the 1880's with the advent of cattle ranching. Previous to this, the area was the site of a trading post operated by J.G. "Kootenay" Brown, the area's first permanent European resident and homesteader. This local character was to be of some importance in the formation of Waterton Lakes National Park and would become its first guardian and superintendent. Concern on the part of Brown and other local residents for the protection of the natural resources of the area led to the establishment of the "Kootenai Lakes Forest Reserve" in 1895. This designation was subsequently changed in 1911 to that of Dominion Park.

The first permanent settlers of European descent arrived in the Glacier National Park area in 1892, the year after the Great Northern

Railway crossed the summit at Marias Pass. Most of these settlers established themselves in the Lake McDonald area within the newly created Lewis and Clark Forest Reserve. Many of these homesteaders turned to feeding and housing the tourists who began arriving soon after the railroad was completed. Early visitors to the area, such as George Bird Grinnell and Lyman B. Sperry, urged the creation of Glacier National Park, which was realized in 1910.

Some mineral and forest exploitation occurred in the two parks during the early part of the century. Since then, both parks have been free of commercial resource extraction. A small townsite exists within the boundaries of Waterton Lakes National Park, and both parks have a well-developed system of roads, trails and camping facilities.

C. Photographical Documentation

See Appendices B and C. Color transparencies and 8" x 10" black and white photos were enclosed with the 1993 Joint Nomination of Waterton Lakes National Park and Glacier National Park.

D. Bibliography

A list of principle references used in this nomination is set out in Appendix A.

IV. STATE OF PRESERVATION/CONSERVATION

A. Diagnosis

The majority of lands within the Waterton Lakes and Glacier National Parks are natural areas protected by the United States National Park Service and by Parks Canada. There are no privately held lands within the boundaries of Waterton Lakes National Park, and the United States Government, through the Department of the Interior, holds title to all but 0.09% of the land within Glacier National Park. The few private inholdings remaining from pre-existing claims are gradually being acquired by the park as parcels and funds become available. A large percentage of the two parks (95% of Glacier and 95% of Waterton Lakes) are managed as *de facto* wilderness or natural environment areas. No commercial resource extraction -- logging, mining, oil and gas development -- has occurred in Glacier National Park or in Waterton since the early decades of this century.

The creation of the Waterton-Glacier International Peace Park in 1932--the first such area in the world--contributed more than symbolism to the development of regional preservation efforts. On

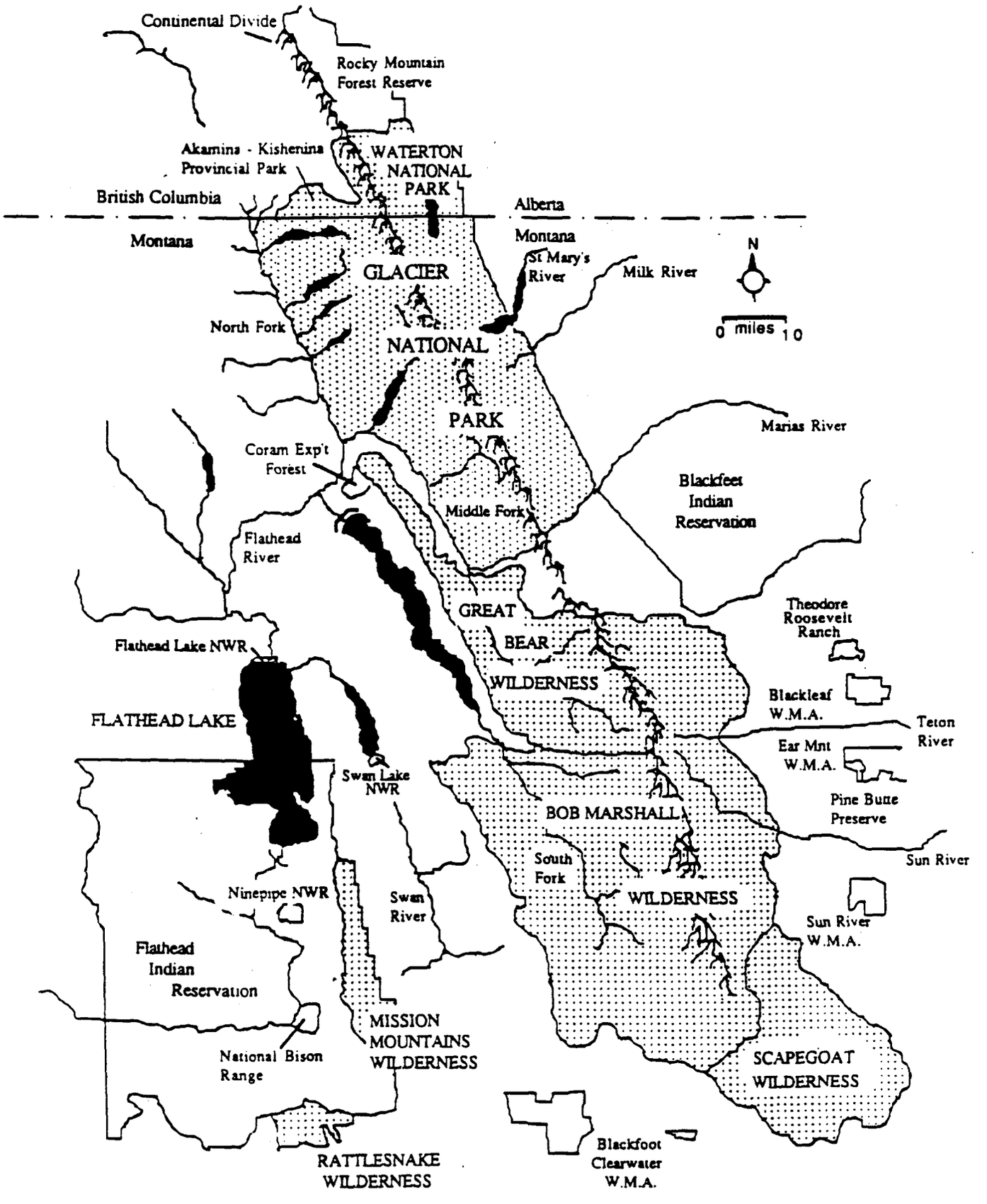
the operational level, the two parks now engage in cooperative projects including staff exchanges, joint staff meetings and training sessions, and mutual assistance arrangements. The parks share a single information brochure and use the same backcountry signage. They offer some combined interpretive programs and jointly host visiting dignitaries. Exhibit areas in both parks interpret the International Peace Park designation. Rotary Clubs in Canada and the United States hold an International Peace Park Assembly alternating annually between the two parks to commemorate this example of friendship across the border. The Peace Park designation was the result of petitions made to their respective governments by Rotary Clubs on either side of the International Boundary.

Glacier National Park was designated as a Biosphere Reserve under the UNESCO Man and Biosphere Program in 1976, followed three years later by Waterton Lakes National Park. As a result of these designations, research has been expanded, local involvement encouraged; thus the parks have been aided in their joint attempt to preserve one of the largest intact natural areas of the central Rockies. In the area of research, biologists work

cooperatively on international wildlife studies aimed at restoring, protecting and enhancing endangered or threatened populations. An active research division within Glacier National Park currently conducts and oversees approximately 30 projects. Within Waterton Lakes National Park, research is coordinated through the Biosphere Reserve Technical Committee, of which Glacier National Park is a member. Committee members have the responsibility for reviewing research proposals and making recommendations to the Management Committee.

Ecologically, the joint properties remain remarkably intact. The two parks are surrounded by large areas of public lands, reservations, and small tracts of privately-owned lands. The Flathead National Forest borders the western and southwestern boundaries of Glacier National Park, with the Lewis and Clark National Forest located on the southeastern boundary. Both of these areas are managed by the United States Forest Service. The Great Bear Wilderness, Bob Marshall Wilderness and Scapegoat Wilderness Areas lie adjacent to Glacier National Park. These three Wilderness Areas more than double the legislatively protected lands within the

ecosystem. (See map on following page.) On the eastern margin of Glacier National Park are reservation lands under the ownership of the Blackfeet Indian Tribe. Both the North Fork and the Middle Fork of the Flathead River, bordering Glacier National Park on the west and south, are protected by the United States Wild and Scenic Rivers Act of 1968. The Canadian portion of the joint properties is bordered to the north and west by Crown lands of the Flathead and Crowsnest Provincial Forests. Privately-owned ranchlands, grazing leases, and the Blood Indian Reserve lie to the north and east of the park. The Akamina-Kishenina Provincial Park bounds Waterton Lakes National Park on the west. The Waterton Biosphere Reserve includes some of this peripheral land including private holdings as part of the "zone of cooperation" (Lieff 1985).



Drainages and preserves within the Crown of the Continent Ecosystem. Stippled areas indicate pristine areas designated as parks or wilderness by the U.S. and Canada.

A number of external threats exist which have the potential to adversely affect wildlife populations, air and water quality, and aesthetic values of the two parks. Logging and hydrocarbon exploration is occurring along the area's periphery. Approximately ten years ago a coal strip mining operation in the Province of British Columbia, close to Glacier National Park's western boundary was proposed. This development would have eventually included two large open pit mines on Cabin Creek, a tributary of the Flathead River which flows through Glacier National Park. Canada and the United States agreed to refer the issue to the International Joint Commission. Their 1989 report advised that the mine not proceed.

Today, Glacier and Waterton National Parks pursue multiple ecosystem management initiatives to preserve the spectacular natural resources of the area. Many of these successful initiatives are described in part V.B.3. of this document which addresses the integrity of this natural area.

Not all threats originate outside the parks. Continuing growth in visitation levels have resulted in demands for new overnight accommodation, sewage disposal facilities, and administrative expansion.

Development is kept to a minimum, and necessary construction is now restricted to existing road and corridor clusters as defined in park plans.

B. Agent Responsible for Preservation/Conservation

Identical to Section II.C.

C. History of Preservation/Conservation

Additional information pertaining to the formation and legal status of the joint properties is contained in Section II.B. Protection is afforded to the individual parks via the respective legislation of the two countries.

The United States National Park Service Organic Act of August 25, 1916, (39 Stat. 535) established the National Park Service (United States N.P.S.) which administers Glacier National Park. The stated purpose of the United States N.P.S. is to "conserve the scenery, and the natural and historic objects, and the wildlife therein, and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations".

The Canadian Dominion Forest Reserves and Parks Act of 1911 served to distinguish between the various types of Canadian Parks and Reserves which had been established, and to provide for their management. The term "National Park" came into official use in 1930 with the passage of the National Parks Act. Parks were "hereby dedicated to the people of Canada for their benefit, education, and enjoyment...and shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations".

D. Means for Preservation/Conservation

Enforcement of regulations under the respective National Parks Acts are the responsibility of park personnel who operate throughout the two parks. Each park is managed by a Superintendent who is assisted by both full-time and seasonal staff. Protection and conservation is being accomplished by regular patrols of the area by rangers and wardens, and by the preparation of Park Management Plans and related documents. A new Resources Management Plan was completed for Glacier National Park in 1993. Glacier National Park began preparation of a new General Management Plan in 1994. The 1990 Statement for Management will be applied until the new General

Management Plan is complete.

Within Glacier National Park, the management objectives for natural resources, as stated in the Resources Management Plan (1993) seek:

> "To conserve and protect the integrity of Glacier's naturally functioning ecosystem, recognizing man as a part of this system. These objectives will be met through the protection and perpetuation of natural processes whenever possible. However, active management strategies involving resource manipulation will be utilized when necessary to achieve or to improve success.
>
> To conduct and encourage scientific research that contributes to the understanding and management of ecological and cultural systems.
>
> To identify and develop mutually beneficial relationships with others who affect or are affected by the park and to strengthen our role as a positive force that contributes to the well-being of the region, the state, the nation, and the world."

An ecosystem based management approach for national parks in Canada is described in the Guiding Principles and Operational Policies for Parks Canada (1994).

> "National park ecosystems will be given the highest degree of protection to ensure the perpetuation of natural environments essentially unaltered by human activity ....

> National park ecosystems will be managed with minimal interference to natural processes. However, active management may be allowed when the structure or function of an ecosystem has been seriously altered and manipulation is the only possible alternative available to restore ecological integrity."

All new and proposed activities/developments within the parks are subject to the Federal Environmental Assessment and Review Process in Canada, or the National Environmental Policy Act assessment process in the United States, which ensure that all environmental impacts are evaluated and that development proceeds only when suitable mitigation measures are employed or when natural resources are not significantly impacted.

Certain areas of both parks which are subject to high levels of visitor use or which contain resources of particular sensitivity have been subject to specific land use and resource management plans. These include but are not limited to bear management, wildland fire management, and backcountry plans.

E. Management Plans and Supporting Documents

1. Glacier National Park Approved Master Plan, 1977.

2. Park Management Plan, Waterton Lakes National Park, 1992.

3. Resources Management Plan: Glacier National Park, 1993
This combined and updated the Natural Resources Management Plan and Environmental Assessment, Glacier National Park, 1983, and the Cultural Resources Management Plan, Glacier National Park, 1986.

4. Statement for Management, Glacier National Park, 1990.

5. Cultural Resource Management Policy, Canadian Parks Service, 1990.

6. Statement for Interpretation and Visitor Services, Glacier National Park, 1992.

V. JUSTIFICATION FOR INCLUSION IN THE WORLD HERITAGE LIST

A. Cultural Heritage

Not applicable.

B. Natural Heritage

1. The reasons for which the property is considered to meet one or more of the criteria (i) (ii) (iii) and (iv).

The Waterton-Glacier International Peace Park is one of the outstanding natural areas of the world. Located astride the Continental Divide, the two parks encompass spectacular mountain landscapes, active glaciers, rich flora and diverse wildlife. This property constitutes the biogeographical center of an extensive mountain chain extending from the Brooks Range in Alaska southward through Canada and the United States, and is situated on the western margin of the Interior Great Plains of North America.

The joint properties merit consideration for World Heritage List status by meeting all of the criteria established for natural area nominations:

a. **(i) Waterton and Glacier are an outstanding example representing major stages of the earth's history, including the record of life and significant on-going geological processes in the development of landforms.**

Waterton-Glacier International Peace Park contains well preserved fossil assemblages -- which are found in a number of forms including most notably six species of stromatolites, "cabbage heads" and algal reefs, as well as mud cracks, ripple marks and raindrop impressions extensively evident in Precambrian foundations. The joint properties have the best examples of Precambrian rock formations in North America. These formations represent some of the oldest exposed rock outcrops known from the Rocky Mountains. The Lewis Overthrust, a horizontal displacement fault of major proportions, is centered on the property and is exceptionally well displayed here.

The bedrock of the two parks is composed of a layered series of Precambrian sedimentary formations overlying much younger Cretaceous sediments. This extremely complex geological

structure came about as a result of a major thrust fault, known as the Lewis Overthrust. Uplifted sedimentary layers were displaced some 40 km to the east during the late Paleocene/early Eocene eras. These rocks, known as the Precambrian Belt Supergroup, were forced toward and over the much softer Cretaceous formations of the Great Plains Region. Paleozoic and Mesozoic era sediments, which form the mountains of the northern Rockies, are absent from the region, having been eroded away. The remaining Precambrian formations, known as the Purcell Supergroup, contain some of the oldest exposed formations known from the Rocky Mountains. Limestones and dolomites of the Waterton Formation, the base of the Precambrian lithology, are in evidence along the Cameron Creek in Waterton Lakes National Park, at which point they disappear beneath the surface. Similar well-preserved examples of Proterozoic (i.e. recent Precambrian) sedimentary rock formations can also be found.

Glacial landforms dominate the landscape. These are complemented by fifty alpine glaciers

of post-Pleistocene origin. These glaciers, in context in the landscape and accessible to park visitors, demonstrate on-going geologic processes of erosion and development of topographic features. The parks' numerous hanging valleys, cirques, aretes, moraines and glacial lakes are evidence of the glacial action that has shaped and continues to shape the topography of the region.

The geological features of Waterton-Glacier have significant universal value from a scientific, educational, and aesthetic point of view because they are accessible yet well-preserved; and because in combination they have resulted in a dynamic landscape of exceptional scenic beauty where on-going geologic processes -- glaciation, erosion and deposition, avalanche and landslides -- continue unabated in a setting where they can be observed against evidence of past events in the earth's history.

b. **(ii) Waterton and Glacier are an outstanding example of significant on-going ecological and biological processes in the evolution and development of terrestrial and fresh water communities of plants and animals.**

The Waterton-Glacier International Peace Park occupies a pivotal position in the western Cordillera of North America which has resulted in the evolution of plant communities and ecological complexes that occur nowhere else in the world. Four major forces converge to yield the exceptional biological diversity and unique ecological assemblages that typify the Park:

- the Columbia Plateau to the southwest funnels Pacific weather systems inland, unimpeded, into the Rocky Mountain Cordillera within Waterton-Glacier International Peace Park.
- the Rocky Mountains pinch out into their narrowest width here, giving way abruptly to the interior plains of North America
- pronounced recurring winds on the eastern slope of the Peace Park create steep environmental gradients and microclimatic diversity

- three continental watersheds draining through significantly different biomes to different oceans provide dispersion links among diverse flora and fauna.

(1) Pacific Weather Systems at the Continental Divide

Prevailing westerlies result in repeated movements of weather systems from the Pacific Ocean inland across the North American Cordillera. Both to the south and the north of the Waterton-Glacier International Peace Park, these systems are intercepted by major mountain ranges trending northwest to southeast. Adiabatic effects result in these systems becoming increasingly dry as they penetrate eastward towards the Rocky Mountains.

Southwest of the Peace Park, however, the broad Columbia Plateau creates a gap in the Cordillera, allowing maritime weather systems to penetrate inland to the Rocky Mountains unimpeded. This geographic anomaly coincides with the Latitudes 45 to 50 degrees North, where the prevailing westerlies are most pronounced. The Waterton-Glacier International Peace Park lies astride the 49th parallel.

Consequently, plants and animals more characteristic of the moist Pacific Northwest extend inland to, and in many cases across, the Continental Divide in the Waterton-Glacier International Peace Park because of the strong maritime influence. These species include beargrass, western red cedar, whitebark pine, tailed frog, and Vaux's swift.

Both Ogilvie (1963) and Kuijt (1982) make reference to what is described as a major floristic discontinuity or a botanical watershed which occurs at approximately 50° North latitude and which divides the southern ranges of the Rocky Mountains from the more northerly ranges. This change in species composition is thought to be centered on or just below the 49th parallel (Kuchar 1973). This storm track has created a peninsular-shaped route along which some Pacific plant species have migrated and spread along the eastern slopes of the Rocky Mountains (MacKenzie 1973; Kuchar 1973). According to Daubenmire (1942) approximately one hundred species have made this transition. The Pacific maritime forest community dominated by western red cedar and hemlock reaches its easternmost extent in the Peace Park further contributing to the floristic diversity of this area.

(2) Narrowest point in the Rockies

Because of the Lewis Overthrust, the location of the Waterton-Glacier International Peace Park coincides with the narrowest portion of the Rocky Mountains. The range is approximately 80 km in width, compared to 100 to 150 km in the vicinities of Banff, Jasper and Yellowstone National Parks.

The western prairie communities of North America lie close to the Continental Divide in Waterton-Glacier International Peace Park. Indeed, Waterton National Park's theme is "Where the prairie meets the mountains." Both Waterton and Glacier National Parks contain extensive expanses of prairie especially in the St. Mary and Cutbank areas of Glacier and much of Waterton east of the townsite. The interface of prairie, montane, and alpine communities within a narrow geographical zone adds further diversity to Waterton-Glacier International Peace Park.

(3) Steep environmental gradients/microclimatic diversity

Frequent, intense winds are a recurring feature on the eastern slope of the mountains in this area due to the release of pressure from the maritime weather

systems as they are forced across the narrow range. Heavy precipitation, strong winds and complex topography result in a complex mosaic of microclimates.

The net effect of uninterrupted incursions of maritime air along a westerly storm track across the Columbia Plateau, and the narrowing of the Rocky Mountains at the location of the Peace Park, is to create a unique assemblage and high diversity of vegetation and wildlife concentrated in a small area.

That Waterton-Glacier International Peace Park is unique even from other relatively nearby Rocky Mountain sites is supported by P.L. Achuff's work in the Cardinal Divide area, Banff, and Jasper National Parks, in 1984 and 1989.

> "Several species (of plants) reach their northern limits in or just north of Waterton Lakes National Park and several species occur in the other four parks but do not extend south to Waterton Lakes National Park. None of these species are trees and, while most are quantitatively scarce, a few are significant understory components of forest types that occur in Waterton Lakes National Park (eg. *Physocarpus malvaceus* [ninebark], *Xerophyllum tenax* [beargrass], and *Luzula hitchcockii* [Hitchcock's woodrush])." (Acuff 1989)

> "The Cardinal Divide area is most similar to Banff and Jasper National Parks and probably to the White Goat Wilderness area, although substantial differences exist among them. The areas south of about 50° N, especially Waterton Lakes National Park, are most dissimilar due to differences in climate, flora and vegetation." (Acuff 1984)

(4) Three watersheds connecting different biomes

Waterton-Glacier International Peace Park includes the headwaters of three major watersheds -- the Saskatchewan drainage, Mississippi/Missouri and Columbia. Each watershed connects Waterton-Glacier to different biotic regions -- the Saskatchewan to the aspen parkland and boreal regions of Canada; the Mississippi to the mixed and tall grass prairie and elements of the eastern deciduous region of the United States; and the Columbia River system to the Pacific Northwest and Great Basin regions.

The biogeographical significance of the Waterton-Glacier three-way watershed is increased by the many vegetated connections between the headwaters which offer possibilities for unimpeded dispersion of plants and animals, and the narrowness of the Rocky Mountains here which brings interior continental biota into close association with Pacific and Great Basin biota. Because the mingling of biota in a region of steep environmental gradients makes the

ecosystem of Waterton-Glacier International Peace Park particularly sensitive to climatic change, Glacier National Park has been selected for ecosystem monitoring and modelling studies under the National Park System Global Climate Change Program.

The presence of disjunct (eg: big sagebrush, deepwater sculpin), range-marginal (eg: beargrass, ninebark, bull trout, gray wolf) and endemic species (eg: peculiar moonwort, *Botrychium paradoxum* and Jones columbine, *Aquilegia jonesii*) in a site of environmental complexity and geographic discontinuity renders Waterton-Glacier highly significant as a center of genetic diversity and ecological community development, especially in the context of global climate change and scientific research.

Waterton-Glacier International Peace Park is thus extremely important as a continental-level meeting ground of major biota. The mixing of biota in an area of steep environmental gradients and microclimatic complexity has resulted in development of biological communities that occur nowhere else in North America.

c. **(iii) Waterton and Glacier contain areas of exceptional natural beauty and aesthetic importance.**

Glacier National Park and Waterton Lakes National Park were originally designated as national parks in 1910 and 1911 by their respective nations because of their superlative mountain scenery, their high topographic relief, glacial landforms, pristine lakes, and an abundant diversity of wildlife and wildflowers. Indeed, more species of wildflowers are found in Waterton and Glacier than either Banff and Jasper to the north, or Yellowstone to the south. Waterton and Glacier are also well-known for their solitude, peace, and quiet in the undeveloped backcountry.

Opportunities for solitude and quiet contemplation of nature abound. Over 800 miles of primitive trails beckon visitors to Waterton and Glacier. More than 95% of Glacier National Park, equalling 963,290 acres, is managed as wilderness.

> "Where the earth and its community of life are untramled by man, where man himself is a visitor who does not remain, ... [and] which has outstanding opportunities for solitude." (NPS, 1988)

The full protection of the Wilderness Preservation and Management Policies of the National Park Service

(1988) apply the principles of the Wilderness Management Act of 1964, United States Code 16. 1131 to Glacier's backcountry. A similar 95% of Waterton is also managed for its undeveloped character.

The natural beauty of the parks is exceptional as are opportunities for solitude. These take on increased aesthetic importance when the values inherent in this International Peace Park are added to the whole.

The Waterton-Glacier International Peace Park was established in 1932 by Canada and the United States to "permanently commemorate the relationship of peace and goodwill between the peoples and governments of Canada and the United States" thereby dedicating existing national parks on both sides of the international boundary to peace between nations and establishing the world's first International Peace Park. The World Heritage Nomination - IUCN Technical Evaluation of Glacier and Waterton Lakes National Parks noted this dimension and called this

> "an added positive feature of the revised nomination is its cross boundary and inter-jurisdictional nature. This is especially in keeping with the concept of World Heritage as they remind us that ecological values and processes are independent of legal and political boundaries." (Thorsell, 1994)

The integrity of Waterton-Glacier's claim as the world's first international peace park is addressed in part V B.3 of this section.

The aesthetic construct of peace among nations and the peaceful solitude available within these parks is closely drawn and best expressed by Swanson (1959) on the occasion of a re-dedication of Waterton-Glacier International Peace Park.

> "Here indeed are riches. There are other canyons as deep, other mountains as high, but those who have roamed the world with open eyes say earnestly that there is no other place where nature has so condensed her wonders and run riot with such utter abandon ....
>
> The whole region has about it something indescribable. Perhaps the imminent presence which broods over it, and which is universally felt may best be described as peace."

The natural beauty of Waterton-Glacier is made meaningful by the freedom and friendship shared by Canada and the United States. It is a real example of what conservation and cooperation can achieve, tangible evidence of goodwill between nations. The aesthetic constructs of peace and solitude are indivisible from the natural beauty and international location of the Waterton-Glacier landscape.

d. **(iv) Waterton and Glacier contain the most important and significant natural habitats for in-situ conservation of biological diversity including those containing threatened species of universal value.**

The contrast of climate and topographical relief, and the presence of two major drainage divides in the region which serve to direct the property's rivers into three separate oceans, contribute to the complexity and diversity of the area's flora and fauna. The two parks are in the unique position of being at the "interface" of five major vegetation zones or ecoregions. Species typical of the Northern Boreal Forest and Alpine Tundra are found adjacent to prairie and southern Rocky Mountain types, while a strong "Pacific Coast" element also overlaps the region. Many plants and animals exist at the extremities of their respective ranges. Northern and southern, as well as eastern and western, limits on distribution are found in the vicinity.

The area is further distinguished by its role as a genetic link between the northern and southern Rocky Mountains and by its value as a genetic reservoir.

This provides the potential material for re-establishing indigenous species into surrounding ecosystems. It is also noteworthy that the property serves as a corridor for the movement of wildlife and gene flow in both directions across the International Boundary.

The diversity of habitat types found here, and the protection afforded, provide optimum conditions for the survival of many endangered, threatened or rare plant and animal species. Endangered birds and mammals native to the area include the Bald Eagle, Peregrine Falcon, and Gray Wolf. Threatened and rare species include the Trumpeter Swan, Ferruginous Hawk, Wolverine, Long-tailed Weasel and Grizzly Bear. The Grizzly population of the property is one of the most dense on the continent. Seasonal concentrations in places like the Apgar Mountains are rivalled only by those reported on several Alaskan spawning streams. Glacier National Park also contains 98% of the world's remaining genetically pure Westslope Cutthroat Trout.

At least 1,258 vascular plants and 275 lichens have been identified within Glacier National Park (Lesica 1973), while Waterton Lakes harbours some 870, plus

182 bryophytes and 218 lichens. Twenty-six rare Montana plants have been recorded in Glacier National Park, of which 18 (69%) are found only in the park and its immediate environs. Approximately 113 vascular plant species in Waterton Lakes National Park are listed as rare within the Province of Alberta (Argus et al 1978). Thirty-four species are unknown to the Province outside the park, while six species are classified as being rare nationally in Canada. These latter species include *Stellaria americana*, *Townsendia condensata*, *Gryophytum rasecosum*, *Papaver pigmaeum*, *Douglasia montana*, and *Aquilegia jonesii*.

Recent studies have indicated that the parks are an important center for various species of moonwort (*Botrychium* spp.). These plants, also known as grapeferns, are now quite rare. The world center of diversity of moonworts is western North America, with the highest diversity occurring in a zone stretching from Oregon to Montana and southern Alberta. A new species (*Botrychium watertonense*) has recently been discovered in the area. It is of an exceptional nature as it represents a notho-species or hybrid (Wagner et al 1983).

The Waterton-Glacier property is noted for its abundant wildlife. Over 300 terrestrial wildlife species, including endangered or threatened birds and mammals, and many rare species are found here. The Waterton-Glacier area offers a de facto international sanctuary and corridor for wildlife interaction, migration, and genetic exchange between the two countries. It is also note-worthy that, due to the distinct ecological setting, a number of southern and prairie subspecies make their appearance in this area.

Sixty-one mammalian species have been reported for the two parks and a total of 269 avian species have been recorded in Glacier and Waterton. The area provides excellent habitat for the Grizzly Bear (*Ursus arctos*), a species listed as threatened in the continental United States. A self-sustaining population in excess of 200 are found here, along with approximately twice that number of Black Bear (*U. americanus*). The Gray Wolf (*Canis lupus*), which is listed as an endangered species in the United States, is present in four established wolf packs with the home ranges in the transboundary area of Waterton-Glacier. The area has provided habitat for the first successful wolf reproduction in Montana in

over 50 years.

Bighorn Sheep (*Ovis canadensis*) and Mountain Goat (*Oreamnos americanus*) are indigenous to the region, and Glacier National Park is the only National Park in the United States which harbours both native species. The Mountain Goat found here is a southern subspecies (*O. a. missoulae*) as is the Moose (*Alces alces shirasi*). Nationally or regionally rare species occurring in one or both parks include the Lynx (*Lynx canadensis*), Bobcat (*Lynx rufus*), Mountain Lion (*Felis concolor*), River Otter (*Lutra canadensis*), Wolverine (*Gulo gulo*), Least Weasel (*Mustela nivalis*), Long-tailed Weasel (*Mustela frenata*), Fisher (*Martes pennanti*), Hoary Marmot (*Marmota calgata*), and Northern Bog Lemming (*Synaptomys borealis*).

The grasslands and windswept ridges on the eastern margins of the area are very important ungulate winter range, and the seasonal migrations to and from these areas provide an outstanding wildlife spectacle. The most notable of these migrations is that of the "International" elk herd (*Cervus elaphus*) which undergoes an annual migration from mountain summer ranges in Glacier National Park,

Montana, to winter on the prairies of Waterton Lakes National Park.

V.B.2. An evaluation of the property as compared with similar properties [Canadian Rocky Mountain Parks and Yellowstone].

There are marked differences that exist between the World Heritage Sites of the (1) Canadian Rocky Mountain Parks, (2) Yellowstone National Park, and the nomination (by Canada and the United States) of (3) Waterton-Glacier International Peace Park. These differences are basic in the geological history and topographic formations, soils, weather regimes and resulting biological communities. In response to the Bureau's specific request that the Waterton-Glacier authorities prepare a revised nomination with comparison to other World Heritage Sites in the surrounding regions, the following specific comparisons are provided.

a. Geologic Comparisons

Waterton-Glacier International Peace Park is part of a continental mountain corridor that extends from the Brooks Range in Alaska to the Sierra Madre in Mexico (Thorsell 1994). The

nature of the geologic processes that formed various portions of this great Cordillera of mountains reflect significant differences in the timing of geological events, different aspects of geological formation, and great geological differences that exist in the rock formations and outcroppings comprising the surface topography today. To consider this vast mountain corridor as a single geologic feature is parallel to considering all of the European Alps (occupying a much smaller geographic area) as a single geologic feature worthy of only a single site of interpretation. The following briefly highlights the extent of geologic and land form differences among Waterton-Glacier and its two neighboring World Heritage Sites.

Yellowstone World Heritage Site: The Yellowstone region of the Rocky Mountain Corridor is largely composed of volcanic rocks. The region can best be described as a high plateau of three major geologic origins. The first of these is a Precambrian igneous formation which uplifted approximately two billion years ago along with the major portion

of the southern Rocky Mountains. These Precambrian basement rocks form the western end of the Beartooth Plateau. The second of these is the Absaroka volcanic formation which occurred approximately 50-60 million years ago. This period of high volcanic activity resulted in the formation of the Absaroka Mountain range transacting the region. The third and most recent is the Yellowstone volcanic eruptions which occurred in the last 2 million years and formed the extensive light colored rhyolite deposits of the Yellowstone Plateau. Calderas are common in the Yellowstone region. The whole region is still geologically active with frequent earthquakes. It is a land of active geysers and hot springs which reflect the continued cooling off process of the Yellowstone eruptions. Today portions of this composite plateau have been carved to different degrees by stream, river and some glacial erosion.

Waterton-Glacier International Peace Park: Waterton-Glacier is composed of Precambrian and Cretaceous sedimentary rock formations. Its geological history lies in the movement of an

enormous slab, several thousand feet thick, of Precambrian sedimentary rocks which were uplifted and slid eastward a distance of about 35 miles across much younger Cretaceous sedimentary formations. The sliding movement is believed to have occurred about 50 million years ago. The surface across which the older rocks moved as they slid eastward is called the Lewis Overthrust Fault. How such large-scale sliding could take place has been a puzzle to geologists, and the Lewis Overthrust continues to be the subject of many geologic studies. A visual line of outcropping of the Lewis Overthrust runs generally parallel to the eastern and southern margins of Waterton and Glacier National Parks where an abrupt rise of mountains, extending several thousand feet in elevation, adjoin the vast interior plains of the North American Continent. Along this mountain front, Cretaceous sandstones and mudstones beneath the Lewis Overthrust outcrop as gently rolling hills covered with aspen while the Precambrian rocks rise above as bold cliffs. These cliff faces reveal the famous layering of Siyeh Limestone, Purcell basalt, Grinnell red and green mudstones, Appekuny

sandstones, and Altyn Limestone, documenting a geologic history going back 600 million years.

The extremely rugged landscape of Waterton-Glacier today reflects the work done by glacial erosion on the uplifted Precambrian formations. Spoon-shaped cirque basins on the flanks of high peaks, deep valleys with wide flat floors and steep walls, scraped into shape by the glacial ice that flowed through them, and gnarled pinnacle peaks abound to create a scenic landscape of unparalleled beauty.

Canadian Rocky Mountain Parks World Heritage Site: Although more similar to Waterton-Glacier in its geologic history than Yellowstone is to Waterton-Glacier, substantial differences exist between the Canadian Rocky Mountain Parks site and that found within Waterton-Glacier. The Canadian Rocky Mountain Parks site occurs along a transition zone between the mountain formations in the region of Waterton-Glacier and those of the more northern Rockies of Canada. The geologic history of the northern Canadian Rockies has differed in the following ways: (1) Long before

the creation of the modern Rocky Mountain corridor there were several periods of strong uplift in the northern region (Precambrian, Cambrian, Ordovician times) leaving unconformities in the rock sequence that are not seen in Waterton-Glacier. (2) There is a greater portion of shale in the northern Rockies indicating a much longer and continuous submergence period. However, when the more southerly rockies were gathering the middle Cambrian limestones, the northern region was above sea level. Thus, in the northern Rockies, there is a middle Cambrian gap in the geologic record. (3) During the uplifting and eastward movement of Precambrian strata that created the mountains of Waterton-Glacier, the more northern regions of predominantly shaley rock was inclined to fold rather than break into thrust sheets. Thus there are more folds and fewer thrust strata. (4) While the region of Waterton-Glacier was greatly compressed during the uplifting process (more than 200 km), the northern Rockies were pushed only about 50 km. The foothills were not overridden by the front ranges, and the western edge of the foothills turned up against the front

ranges rather than down. Thus an entirely different formation of rock strata, tilting to the east, is found in the foothill formations. The abrupt meeting of mountain and plains characteristic of Waterton-Glacier is not found within the Canadian Rocky Mountain Parks site. (5) Exposed glacial erosion is generally lighter in the more northern Rockies than in Waterton-Glacier. This may reflect a lesser degree of present day recession or historically less glacial ice formation. This may seem odd initially, but is logical when considering the known lack of glaciation over much of the Yukon region to the north.

(References: Alt and Hyndman 1972; Fritz 1985; Gadd 1986; Baird 1967; 1964; 1963; 1962)

b. Climatic Comparisons

Along all of the Rocky Mountain Corridor, the weather pattern is influenced strongly by the barrier-like nature of the high mountains. The eastern slope is noticeably cooler and drier than the western slope, and often strong westerly winds (Chinooks) warm the eastern

slope suddenly in winter. However, both Yellowstone and the Canadian Rocky Mountain Parks sites experience little effect from the Pacific weather front which strongly influences Waterton-Glacier International Peace Park.

When Pacific storms roll in across the coast of British Columbia, they drop much of their moisture on the coastal mountain and Columbia Mountain ranges which lie west of the Rockies in this region. Typical annual precipitation for the Canadian Rocky Mountain Parks site is 400 - 500mm. Western slopes of Waterton-Glacier receive an annual precipitation of 700 mm at elevations between 900 and 1,000 m. At upper elevations, 300 to 500 cm of snow is common. The eastern slopes of Waterton-Glacier International Peace Park is under the influence of Continental air masses and average only between 500 - 600 mm of precipitation per year. Exposure to Arctic air masses flowing down from the central plains of Canada, result in more severe winter conditions than in the protected western valleys of the Canadian Rocky Mountain Parks. Average January temperature is (-) 6° C at West Glacier and (-) 8° C at Waterton.

Moreover, 80 percent of the winter days in the western portion of Waterton-Glacier are overcast, a condition almost identical to that of Seattle, Washington, on the Pacific coast.

The Yellowstone ecosystem receives considerably less precipitation than does Waterton-Glacier which is a reflection of strong influences of the Intermountain Plateau Region. Its average annual precipitation ranges from approximately 260 mm per year along the eastern park boundary to about 360 mm per year in the western portions. Portions of Yellowstone vegetation approach that of semi-arid climates found widely throughout the Middle Rocky Mountain Ecoregion. Much of this region is colder during the winter than Waterton-Glacier and warmer during the summer. Average temperatures range from (-) 5° C (winter) to 22° C (summer) within the Yellowstone region.

(References: Baldwin 1973; US Dept. of Agriculture 1941; Finklin 1986; Gadd 1986)

c. Biotic Comparisons

The above differences in geologic, physiographic, and climatic conditions within these three sites -- Canadian Rocky Mountain Parks, Yellowstone National Park, and Waterton-Glacier International Peace Park have led to basic differences in their soils, vegetative community compositions, and animal species occurrences.

(1) Plant Communities and Species Occurrence

Because of the compressed nature of the Rocky Mountain corridor within the region of Waterton-Glacier National Parks and the north-south latitudinal position of these parks, they are in a unique position of being at the "interface" of five major vegetative (floristic) provinces. Waterton-Glacier is at the center of what has been described as a major north-south floristic discontinuity which occurs at approximately 50° north latitude (Kuchar 1973). Here the species typical of the Northern Boreal Forest and Alpine Tundra are found adjacent to those species more typical of the southern Rockies. This discontinuity is thought to occur because of a major Pacific

storm track along the 49th Parallel that greatly influences the weather of this region. This storm track has also created a route along which over 100 Pacific Province species have found their way east into the region (Daubenmire 1942). In Waterton-Glacier they abut and provide genetic exchange with those species of the Prairie Province to the east, the Northern Boreal Forests, the Alpine Tundra, and the Southern Rockies.

At least 1,258 vascular plant species occur in Glacier National Park (Lesica 1973). The Canadian Rocky Mountain Parks list a vascular taxa of 996 species (Holland and Coen 1982, and Holland and Coen in prep). The Canadian Rocky Mountain Parks have approximately 25% fewer vascular plant species than Waterton-Glacier despite covering four times more geographical area. Yellowstone has recorded 1,000 species of vascular plants, including two endemics, *Arabis fruticusa* and *Agrostis rossae*. Glacier National Park has recorded the occurrence of 26 rare Montana plants, of which 18 are found only in the park and its immediate environs. Approximately 113 vascular plant species in

Waterton Lakes National Park are listed as rare within the Province of Alberta and six of these are rare nationally in Canada (Argus et al 1978).

In their World Heritage Site nomination, the Canadian Rocky Mountain Parks listed the occurrence of three major ecoregions typical of the Northern Rocky Mountain Cordilleran; Montane, Subalpine and Alpine. The Yellowstone World Heritage Site is comprised almost entirely of the Montane ecoregion with the Lodgepole Forest type dominating. Also included in Yellowstone are small areas of Semi-arid Grassland, Artemisia Shrub Steppe, and Alpine Tundra. Five large ecoregions are found within Waterton-Glacier International Peace Park; these are Alpine Tundra, Subalpine Forest, Montane Forest, Aspen Parkland, and Fescue Grassland (Strong et al 1981). Within these major ecoregions, three vegetation types have been identified in Waterton-Glacier that are undescribed elsewhere. These include the extensive Fir-Whitebark Pine forests, large areas of Limber Pine scrub, and an "Intermediate" Alpine Meadow association in

which prairie species have extended upslope to mix with alpine and subalpine species.

(2) Faunal Comparisons

Faunal comparisons, at the fishes, birds and mammals level, among Yellowstone, Canadian Rocky Mountain Parks, and Waterton-Glacier International Peace Park reveal similarities and differences that are most reflective of the inter-mixing of ecoregions that occurs in such close proximity at Waterton-Glacier.

Fishes: There are 27 recorded species of fishes in Waterton-Glacier National Parks and 22 species in the Canadian Rocky Mountain Parks (Table 1, Appendix D). Of these, 17 species occur in common in both areas. Waterton-Glacier has ten species that do not occur within the Canadian Rocky Mountain Parks and the Canadian Rocky Mountain Parks World Heritge Site has five species that do not occur within Waterton-Glacier. The Sorensen Coefficient of community similarity between the Canadian Rocky Mountain Parks and Waterton-Glacier is 0.69387.

The Sorensen index of community similarity between Yellowstone and Waterton-Glacier was found to be only 0.40816. Yellowstone has a recorded 18 species of fishes while Waterton-Glacier has 27 species. Only ten species were found in common between these areas. When comparing all three areas, only one species was found in Yellowstone that did not occur in either the Canadian Rocky Mountain Parks or Waterton-Glacier; this was the Utah Chub (*Gila atraria*) Five species are found in Waterton-Glacier that do not occur in either the Canadian Rocky Mountain Parks or Yellowstone; these are the Streamline chub (*Hybopsis dissimilis*), the Northern squawfish (*Ptychocheilus oregonensis*), the Fathead minnow (*Pimephales promelas*), the Deepwater sculpin (*Myoxocephalus thompsoni*), and the Peamouth chub (*Mylochelius caurinus*). No species were unique to the Canadian Rocky Mountain Parks.

(References.: Greater Yellowstone Conservation Data Center; Yellowstone Center for Resources; K. Van Tighem (Waterton N.P.) pers. comm.; Alan Dibb (Kootney N.P.) pers. comm.; Ward Hughson (Jasper N.P. Pers. comm.; Scott and Crosman

1973; Glacier N.P. Science Center Checklist; Bill Michels and Leo Marnell (Glacier N.P.) pers. comm.)

Birds: We found an 86 percent overlap in bird species between Waterton-Glacier and Yellowstone and an 88 percent overlap between Waterton-Glacier and the Canadian Rocky Mountain Parks (Sorensen's community correlation coefficients of 0.86225 and 0.8844 respectively). Waterton and Glacier National Parks are used by 269 known bird species, Yellowstone reports 290 species and the Canadian Rocky Mountain Parks jointly list 285 species. (Table 2, Appendix D) Waterton-Glacier and the Canadian Rocky Mountain Parks have 245 bird species in common while Waterton-Glacier and Yellowstone have 241 species in common. Yellowstone has 30 species that are not known to occur in either Waterton-Glacier or the Canadian Rocky Mountain Parks, and the Canadian Rocky Mountain Parks list 22 species that do not occur in either Waterton-Glacier or Yellowstone. Waterton-Glacier has 7 species that are not known to occur in either of the two World Heritage Sites. These species are

thought to be reflections of the close affinity that Waterton-Glacier has with both the Pacific Northwest ecoregion and the interior prairies of the North American continent.

(References: Follett 1976; Shea 1990; Holroyd and Van Tighem 1983; Gniadek pers. comm.; Greater Yellowstone Conservation Data Center; Yellowstone Center for Resources; McEneaney 1988; Cottonwood Consultants in prep.)

Mammals: There are currently 61 species of mammals known to occur in Waterton-Glacier while there are 69 species occurring in Yellowstone and 59 occurring in the Canadian Rocky Mountain Parks (Table 3, Appendix D). The Sorsensen Community Similarity Index between Yellowstone and Waterton-Glacier is 0.8153 while community similarity between Waterton-Glacier and the Canadian Rocky Mountain Parks was found to be 0.883. Fifty-three species occur in common between the Canadian Rocky Mountain Parks and Waterton-Glacier, and 53 species also occur in common between Yellowstone and Waterton-Glacier. There are 12 species found in Yellowstone that

do not occur in either Waterton-Glacier or the Canadian Rocky Mountain Parks. All of these mammals represent near northern range limits of more southern and arid species that extend into Yellowstone. Glacier is known to have three mammal species that are not known to occur in either Yellowstone or the Canadian Rocky Mountain Parks while the Canadian Rocky Mountain Parks list three species that do not occur in either Waterton-Glacier or Yellowstone. Differences between Waterton-Glacier and the Canadian Rocky Mountain Parks are largely due to the more northern boreal influences found in the Canadian Rockies.

(References: Holroyd and Van Tighem 1983; Shea 1986; Ulrich 1986; Gniadek pers. comm.; C. Nielsen (Glacier National Park) pers. comm.; Greater Yellowstone Conservation Data Center; Yellowstone; Cottonwood Consultants in prep.)

V.B.3. Indications as to the authenticity or integrity of the property.

The Waterton-Glacier International Peace Park contains extensive tracts of the core habitat for threatened species of animals of outstanding universal value. These include the southernmost naturally-occurring population of gray wolf in the North American cordillera and the most productive grizzly bear population in the interior of North America. Nesting bald eagles and migratory peregrine falcons -- two additional endangered species -- are found in Waterton-Glacier.

The integrity of the protected area is inextricably linked with the quality of the stewardship of other, adjacent areas within the international Crown of the Continent Ecosystem. Ecosystem-based management initiatives have been undertaken on both sides of the United States-Canada border in order to enhance the integrity of the ecosystem, with considerable success. The protection of park integrity through ecosystem-based initiatives is not an ephemeral or passing management fad. The 1994

Guiding Principles and Operational Policies for Parks Canada, a national policy document that guides managers of Canadian national parks, has codified this approach. Similarly, the Management Policies of the National Park Service (1988) provide clear direction to park managers to participate and lead ecosystem management initiatives especially in regional land use planning, to protect migratory species, to preserve scenic views, and to maintain air and water quality.

The following is a summary of selected initiatives and events that have enhanced the integrity of the Waterton-Glacier International Peace Park within the larger ecosystem that sustains it, and is provided to illustrate the use of ecosystem-based management approaches to secure the integrity of the Peace Park:

a. International Joint Commission: Coal Mining in North Fork Flathead Watershed

Proposed coal strip mining in Cabin and Powell Creeks, both in British Columbia, posed a potential threat to the integrity of the Flathead watershed in the 1980s. The

International Joint Commission was charged with studying the issue and reporting back to the two national governments. Their 1989 report, based on four years of study, advised that the mine not proceed because of the uncertainty of mitigation and potential for long-term degradation. The commission also emphasized the need for a bi-national initiative to develop sustainable management strategies for the whole watershed.

The proposed coal strip mine has consequently not gone ahead, and the International Joint Commission recommendations have been instrumental in driving ecosystem-based management on both sides of the border.

b. Flathead Basin Commission

The Flathead Basin Commission was established by Montana Statute in 1983 to study, report on, and make recommendations regarding the protection of the Flathead River Basin's natural resources and in particular its waters. In addition to Glacier National Park, virtually all land managing agencies in the drainage encompassing the Park, west of the Continental

Divide, are represented on the Commission. The Premier of British Columbia appoints a liaison to the Commission. Important accomplishments include presenting to Montana's state and national leaders the case for having the International Joint Commission assess the transboundary impacts of a large surface coal mine in British Columbia. Subsequently the Commission established the North Fork Steering Committee to help implement the International Joint Commission's recommendations (see below). Other accomplishments include a successful effort to have legislation passed allowing counties to restrict the use of phosphate detergents and the enactment of such restrictions in the Flathead Basin within Montana; implementation of a Water Quality Monitoring Master Plan for the Flathead Basin; and a three year public education effort regarding the linkage between water quality and economic growth in the Flathead Basin.

c. Strategic Planning: North Fork of the Flathead River Valley

A conceptual strategy to achieve a number of progressive land use goals was developed in

1992 based on the work of the North Fork Steering Committee. The committee was organized by the Flathead Basin Committee and contained representatives from major landowner groups, the major federal, state and local government management agencies, and major conservation and industry interests in the area. The conceptual strategy is a consensus document that relied in part on public consultation, and represents a significant step in assuring sustainable land use planning for the Flathead Basin.

d. Land Use Planning: Montana Highway 2 Corridor

Glacier National Park continues to play a key role in providing technical support and actively participating in land use planning along the highway and railroad corridor that defines the southern boundary of the Waterton-Glacier International Peace Park.

e. Burlington Northern Environmental Stewardship Area, Montana

The Burlington Northern Railway forms part of the southern boundary of the Waterton-Glacier

International Peace Park and was historically a source of ecosystem degradation. Problems with grain spills led to the development of a mortality sink for grizzly and black bears. Glacier National Park provided leadership in having the Burlington Northern Environmental Stewardship Area established in 1991 and, subsequently, obtained funding for a grizzly bear management specialist to work with Burlington Northern and other stakeholders in the area to coordinate grizzly management and habitat issues in the area. The net result is to turn an ecological liability into an ecosystem management asset and enhance the long-term prospects of wildlife populations that use Waterton-Glacier International Peace Park.

f. Commission on Resources and Environment, British Columbia

The Province of British Columbia is undertaking an comprehensive regional land use planning initiative that will lead to the legislated designation of various categories of public land throughout the province. The process to establish these plans is based on consensus

negotiations by representatives of a variety of interest sectors. Both Glacier and Waterton Lakes National Parks' representatives have succeeded in bringing ecosystem protection issues to the table. Based on these interventions, the Commission of Resources and Environment is recommending enhanced protection for the Kishinena Creek watershed, and restrictions on industrial activities along the Flathead River corridor in British Columbia. The draft report was released to the Provincial Cabinet in 1994.

g. Natural Resources Conservation Board, Alberta

The Natural Resources Conservation Board is quasi-regulatory environmental review board established under Alberta legislation. In 1993 the Natural Resources Conservation Board was commissioned to review a proposed four-season resort in the Castle River watershed north of Waterton-Glacier International Peace Park. Based on scientific evidence and public review, the Natural Resources Conservation Board approved a modified version of the resort on condition that a large protected area be

established taking in most of the Castle watershed as well as the headwaters of the tributaries of the Waterton River. In its report the Natural Resources Conservation Board presented a strong argument for ecosystem restoration and protection, which is now being used by Waterton Lakes National Park and other interests to support arguments for more sustainable land use planning.

h. Municipal District of Pincher Creek General Municipal Plan

Private property north of Waterton has been protected since 1987 by the Pincher Creek General Municipal Plan which provides for a Park Vicinity Protection Area. This zoning applies to private lands adjacent to the park for seven miles north of the park adjoining Alberta Highway 6. It prohibits any land uses other than extensive agriculture (ranching) specifically to protect and conserve the natural scenic attributes of the area. This special land use zone has been instrumental in protecting the area from real estate speculation and subdivision and for maintaining habitat quality for large carnivores, trumpeter

swans and other species.

i. Waterton-Glacier International Peace Park

Waterton-Glacier International Peace Park is the first international park in the world dedicated specifically to commemorate lasting peace between two contiguous nations. Glacier, designated a national park in 1910; and Waterton Lakes so designated in 1911, were jointly proclaimed an International Peace Park by the United States and Canada in 1932. There are earlier transboundary protected areas extant, notably the Tatra Mountains along the present border of Czechoslovakia and Poland. However, the Krakow Protocol of 1925, which provided for the creation of protected areas along the Czech-Polish border, does not specify the theme of the protected areas as peace between nations, nor does it clarify the Tatras' status as adjacent National Parks. Tatrzanski Park Nardowy in Poland was not designated as a National Park until 1954, and Tatra National Park in Czechoslovakia did not receive that designation until 1948. Although Waterton-Glacier International Peace Park may not be the first transboundary protected area,

> it is indeed the world's first international park to commemorate lasting peace between the peoples and governments of two adjacent nations.

Park authorities continue to dedicate staff time and resources in support of land use planning, development interventions, ecosystem education, habitat protection, and other initiatives that promote the stewardship of public and private lands throughout the ecosystem beyond park boundaries. Significant threats have been, and continue to be, headed off at the same time as the public is becoming increasingly educated about ecosystem issues. The high level protection offered ecosystem elements contained within the borders of the Waterton-Glacier International Peace Park is complemented by continuing ecosystem-based management initiatives external to park borders.

SIGNED (ON BEHALF OF STATE PARTY):

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Date:	14 October, 1994	October 27, 1994

APPENDIX A

III. B. Bibliography

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APPENDIX B

III. C. Black and White Photographs

1. View of Mt. Oberlin Cirque and Birdwoman Falls, from Going-to-the-Sun Road. Photographer unknown. Glacier National Park, #7577.

2. Glacial lake in Swiftcurrent Valley. Photo copyright by R.J. Horodyski.

3. Garden Wall and Mt. Gould from Going-to-the-Sun Mountain summit. Photo by Richard Johnson, Glacier National Park, #7939.

4. Bighorn Ram in Glacier National Park. Photo by Jim Bellingham. Glacier National Park, #9087.

5. Highly elongate stromatolites. Altyn Limestone near Appekunny Falls. Photo copyright by R.J. Horodyski.

6. Grizzly Bear, a threatened species. Photographer unknown. Glacier National Park, #1945.

7. Giant Western Red Cedar near Avalanche Creek, Trail of the Cedars. Photo by Beatty. Glacier National Park, #5869.

8. Mountain Goat. Photo by Danny On. Glacier National Park, #2505.

9. Grinnell Glacier, with Mt. Gould in background.

Photographer unknown. Glacier National Park, #0960.

10. Mt. Gould from Mt. Siyeh, showing two of the parks' major aretes. Photo copyright by R.J. Horodyski.

11. Folded, stratified argillite near Sperry Glacier. Photo by B.R. McClelland. Glacier National Park, #8688.

12. Three glacial lakes in down-valley sequence. Aerial view from above Upper Two Medicine Lake, looking eastward. Photo by Corson. Glacier National Park, #7962.

13. Bighorn Ram near Altyn Peak, showing glaciated Swiftcurrent Valley in background. Photo by Danny On. Glacier National Park, #8531.

APPENDIX C

III. Natural Features of Glacier National Park

*Note: Photographed by Danny On unless otherwise indicated.

1. View of the Garden Wall arete and surrounding mountains at the head of Lake McDonald on the west side of Glacier National Park.

2. Red argillite mudstone layer with ripple marks from early shallow sea. Now found at Logan Pass, elevation 4,120 m.

3. Stromatolites: Fossil forms created by blue-green algae in sedimentary argillite layers.

4. Springtime in Glacier: A glacier lily (Erthrionium grandiflorum) breaks through the snow.

5. A mule deer (Odocoileus hemionus) bachelor band with antlers in velvet, grazing on a mountainside in the park.

6. A grizzly (Ursus arctos horribilus) mother leads her cubs, born during hibernation in late winter, across a grassy meadow.

7. Reynolds Creek near its source, high in alpine meadow. Lewis monkey flowers (Mimulus lewisii) decorate the banks.

8. Avalanche Creek flowing through the Lake McDonald Valley, Western Red Cedar and Western Hemlock Forest has sculpted a narrow plant-lined gorge.

9. Summer on Logan Pass, a vast wildflower garden in bloom.

10. Glacier's Rocky Mountain peaks as seen from near St. Mary.

11. A park visitor enjoys the view across an alpine field of wildflowers.

12. Autumn comes to the deciduous woodlands near lower St. Mary Lake on Glacier National Park's east side.

13. A bull moose (Alces alces), one of the many large mammals that occur in Glacier National Park.

14. A mountain lion (Felix concolor) hunts from a remote cliff in Glacier National Park.

15. Bald eagle (Halieetus leueocephalus) close-up. A year-round resident in Glacier National Park.

16. An endangered species in the United States, gray wolf (Conis lupus) populations are slowly recovering within the boundaries of Glacier National Park.

17. A pair of mountain goat kids (Oreamnos americanus) in their heavy winter coats.

18. A mountain sheep (Bighorn) (Ovis canadensis) ram rests quietly in the winter sun.

19. A white-tailed ptarmigan (Lagopus lagopus) with its all-white winter plumage is well camouflaged during winter in Glacier's high country.

20. Winter returns to the mountains of Glacier. Upper St. Mary Lake.

21. View of the main Waterton Lakes with a local landmark, the Prince of Wales Hotel, in the foreground. Built by the Great Northern Railroad in 1926-27 and largely responsible for promoting tourism in the park area in the 1920's and 1930's. Mountain peaks in the background are in Glacier National Park, Montana. (S. Lunn)

22. Mt. Blakiston. Highest peak in Waterton Lakes National Park. Cliffs of the Purcell Formation are evident as a conspicuous black cliff band. (S. Lunn)

23. Rock crystals (pPhenocrysts) is basalt. Purcell lava. Waterton Lakes National Park. (S. Lunn)

24. Chief Mountain, Montana. 9,080 feet. Classic example of Lewis Thrust Fault. An outpost of Precambrian rock formation on the eastern-most margin of the fault line. Isolated by erosion, it is now completely surrounded by Cretaceous rocks. (R. Watt)

25. "Where the prairies meet the mountains." Theme of Waterton Lakes National Park. Summertime bunchgrass prairie in the foreground melding with aspen groves and the banded sedimentary rock of Bellevue Ridge. (S. Lunn)

26. View of Mt. Vimy from the park entrance road. Knight's Lake in the foreground. (W.L.N.P. Collection)

27. Glacier lily (Erythronium grandiflorum), a common wildflower of subalpine areas in the spring and a highly valued food item for grizzly bear. (W.L.N.P. Collection)

28. Balsamroot (Balsamorhiza sagittata). Prairie grasslands in June. Waterton Lakes National Park is the only Canadian National Park in which this plant is found. (R. Watt)

29 Summer; prairie grasslands. Waterton Lakes National Park. (W.L.N.P. Collection)

30. Calypso orchid (Calypso bulbosa); one of the many wild orchids found in Waterton Lakes National Park. (S. Lunn)

31. Beargrass (Xerophyllum tenax). Subalpine forest along with trail to Lineham Basin. This species reaches the northern limit of its distribution in the Waterton area. (W.L.N.P. Collection)

32. Alpine tundra vegetation. Waterton Lakes National Park. (G. Horne)

33. Subalpine forest and avalanche paths. Prime grizzly bear habitat. (W.L.N.P. Collection)

34. Fall colours; Waterton Townsite. (S. Lunn)

35. Fall weather; Waterton Lakes. Calm waters may change suddenly. (S. Lunn)

36. Migratory waterfowl; early spring. (D. Barrus)

37. Plains bison (Bison bison bison). Waterton Lakes National Park. A small display herd is maintained in a fenced paddock. (A. Bull)

38. Elk (Cervus elaphus). Over 800 of these animals commonly winter on the low elevation grasslands of Waterton Lakes National Park. (D. Barrus)

39. Part of the "International" elk herd which winters in Waterton Lakes National Park and spends the summer in Glacier National Park, Montana. (R. Watt)

40. International cooperation. Park rangers and wardens exchanging information on aspects of the day-to-day operation. (S. Lunn)

APPENDIX D

Table 1. Comparison of fish species found within the Yellowstone World Heritage Site, Canadian Rocky Mountain Parks World Heritage Site and the proposed Waterton-Glacier World Heritage Site. (Ref.: Greater Yellowstone Conservation Data Center; Yellowstone Center for Resources; K. Van Tighem (Waterton N.P.) pers. comm.; Alan Dibb (Kootney N.P.) pers. comm.; Ward Hughson (Jasper N.P. pers. comm.; Scott and Crosman 1973; Glacier N.P. Science Center Checklist; Leo Marnell (Glacier N.P.) pers. comm.)

SPECIES	Y	WG	CRP
SALMONIDAE (TROUT)			
Lake Whitefish (Coregonus clupeaformis)		x	x
Pygmy Whitefish (Prosopium coulteri)		x	x
Mountain Whitefish (Prosopium williamsoni)	x	x	x
Kokanee (Sockeye) (Cncorhyncus nerka)		x	x
Westslope Cutthroat trout (Salmo clarki lewisi	x	x	x
Yellowstone cutthroat (S. clarki bouvieri)	x		x
Rainbow trout (Salmo gairdneri)	x	x	x
Brown trout (Salmo trutta)	x		x
Brook trout (Salvelinus fontinalis)	x	x	x
Bull Trout (Salvelinus confluentus)		x	x
Lake Trout (Salvelinus namaycush)	x	x	x
Artic grayling (Thymallus arcticus)	x	x	
PERCOPSIDAE (TROUT PERCHES)			
Trout perch (Percopsis omiscomaycus)		x	x
ESCCIDAE (PIKES)			
Northern Pike (Esox lucius)		x	x
CYPRINIDAE (MINNOWS & CARPS)			
Longnose Dace (Rhinichthys cataractae)	x	x	x
Speckled dace (Rhinichthys osculus)	x		
Northern pearl dace (Margariscus margarita)		x	
Redside shiner (Richardsonius balteatus)	x	x	
Streamline chub (Hybopsis dissimilis)		x	
Northern squawfish (Ptychocheilus oregonensis)		x	
Lake chub (Couesius plumbeus)	x		x
Spottail shiner (Notropis hudsonicus)			x
Flathead chub (Platygobio gracilis)			x
Utah chub (Gila atraria)	x		

(Table 1. Continued)	Y	WG	CRP
Fathead Minnow (Pimephales promelas)		x	
Peamouth Chub (Mylochelius caurinus)		x	
Deepwater Sculpin (Myoxocephalus thompsoni)		x	
CATOSTOMIDAE (SUCKERS)			
White sucker (Catostomus commersoni)		x	x
Largescale sucker (Catostomus macrocheilus)		x	
Longnose sucker (Catostomus catostomus)	x	x	x
Mountain sucker (C. platyrhynchus)	x		
Utah sucker (Catostomus ardens)	x		
June sucker (Catostomus liorus)	x		
GADIDAE (CODFISHES & HAKES)			
Burbot (Lota lota)		x	x
COTTIDAE (SCULPINS)			
Mottled sculpin (Cottus bairdi)	x	x	
Spoonhead sculpin (Cottus ricei)		x	x
Slimy sculpin (Cottus cognatus)		X	x
TOTAL SPECIES	18	27	22
(Species in Common)	(10)	(17)	

Table 2. Comparison of bird species found within the Yellowstone World Heritage Stie, Canadian Rocky Mountain Parks World Heritage Site and the proposed Waterton-Glacier World Heritage Site. (Ref.: Follett 1976; Shea 1990; Holroyd and Van Tighem 1983; Gniadek (Glacier National Park) pers. comm.; Greater Yellowstone Conservation Data Center; Yellowstone Center for Resources; McEneaney 1988; Cottonwood Consultants in prep.)

SPECIES	COMMONNAME	Y	WG	CRP
Gavia stellata	red-throated loon	X	X	X
Gavia pacifica	Pacific loon	X		
Gavia immer	Common loon	X	X	X
Gavia arctica	Arctic loon		x	x
Podilymbus podiceps	pied-billed grebe	x	x	x
Podiceps auritis	horned grebe	x	x	x
Podiceps grisegena	red-necked grebe	x	x	x
Podiceps nigricollis	eared grebe	x	x	x
Aechomophorus occidentalis	western grebe	x	x	x
Aechomophorus clarkii	Clark's grebe	x	x	
Pelecanus erythrorhynchos	American white pelican	x	x	x
Phalacrocarax auritis	Double-crested cormort	x	x	x
Botaurus lentiginosus	American bittern	x	x	x
Ardea herodias	great blue heron	x	x	x
Casmerodus albus	great egret	x	x	x
Egretta thula	snowy egret	x		
Bubulcus ibis	cattle egret	x		
Butorides striatus	green-backed heron	x		x
Nycticorax nycticorax	Black-crowned nte. her.	x	x	
Plegadis chihi	white-faced ibis	x		
Mycteria americana	wood stork	x		
Cygnus columbianus	Whistling (Tundra) Swan	x	x	x
Cygnus buccinator	trumpeter swan	x	x	x
Anser albifrons	white-fronted goose	x	x	
Chen caerulescens	snow goose	x	x	x
Chen rossi	Ross' goose	x	x	
Branta bernicla	Brant	x		x
Branta canadensis	Canada goose	x	x	x
Aix sponsa	wood duck	x	x	x
Anas crecca	Green-winged teal	x	x	x
Anas rubripes	American black duck	x		
Anas platyrhynchos	mallard	x	x	x
Anas acuta	northern pintail	x	x	x
Anas discors	blue-winged teal	x	x	x
Anas cyanoptera	cinnamon teal	x	x	x
Anas clypeata	northern shoveler	x	x	x
Anas strepera	gadwall	x	x	x
Anas penelope	Eurasian wigeon	x	x	x

(Table 2. Continued)

		Y	WG	CRP
Anas americana	American wigeon	x	x	x
Aythya valisineria	canvasback	x	x	x
Aythya americana	redhead	x	x	x
Aythya collaris	ring-necked duck	x	x	x
Aythya marila	greater scaup	x	x	
Aythya affinis	lesser scaup	x	x	x
Histrionicus histrionicus	harlequin duck	x	x	x
Clangula hyemalis	oldsquaw	x	x	x
Melanitta nigra	black scoter	x		
Melanitta perspicillata	surf scoter	x	x	x
Melanitta fusca	white-winged scoter	x	x	x
Bucephala clangula	common goldeneye	x	x	x
Bucephala islandica	Barrow's goldeneye	x	x	x
Bucephala albeola	bufflehead	x	x	x
Lophodytes cucullatus	hooded merganser	x	x	x
Mergus merganser	common merganser	x	x	x
Mergus serrator	red-breasted merganser	x	x	x
Oxyura jamaicensis	ruddy duck	x	x	x
Cathartes aura	turkey vulture	x	x	x
Pandion haliaetus	osprey	x	x	x
Haliaeetus leucocephalus	bald eagle	x	x	x
Circus cyaneus	northern harrier	x	x	x
Accipiter striatus	sharp-shinned hawk	x	x	x
Accipiter cooperii	Cooper's hawk	x	x	x
Accipiter gentilis	northern goshawk	x	x	x
Buteo platypterus	broad-winged hawk	x	x	x
Buteo swainsoni	Swainson's hawk	x	x	x
Buteo jamaicensus	red-tailed hawk	x	x	x
Buteo lineanus	Red-shouldered hawk		x	
Buteo regalis	ferruginous hawk	x	x	x
Buteo lagopus	rough-legged hawk	x	x	x
Aquila chrysaetos	golden eagle	x	x	x
Polyborus plancus	crested caracara	x		
Falco sparverius	American kestrel	x	x	x
Falco columbarius	merlin	x	x	x
Falco rusticolus	Gyrfalcon		x	x
Falco peregrinus	peregrine falcon	x	x	x
Falco mexicanus	prairie falcon	x	x	x
Dendragapus obscurus	blue grouse	x	x	x
Canachites canadensis	Spruce grouse		x	x
Lagopus leucurus	white-tailed ptarmigan	x	x	x
Lagopus lagopus	Willow ptarmigan		x	x
Bonasa umbellus	ruffed grouse	x	x	x
Centrocercus urophasianus	sage grouse	x		
Tympanuchus phasianellus	sharp-tailed grouse	x	x	x
Phasianus colchicus	Ringed-necked pheasant		x	x
Perdix perdix	Gray Partridge	x	x	x
Coturnicops noveboracensus	yellow rail	x		x
Rallus limicola	Virginia rail	x		x

(Table 2. Continued)

		Y	WG	CRP
Porzano carolina	sora	x	x	x
Fulica americana	American coot	x	x	x
Grus canadensis	sandhill crane	x	x	x
Grus americana	whooping crane	x		
Pluvialis squatarola	Black-bellied plover	x	x	x
Pluvialis dominicus	Golden plover			x
Charadrius alexandrinus	snowy plover	x		
Charadrius semipalmatus	semipalmated plover	x		x
Charadrius vociferus	killdeer	x	x	x
Charadrius montanus	mountain plover	x		
Himantopus mexicanus	black-necked stilt	x		
Recurvirostra americana	American avocet	x	x	x
Tringa melanoleuca	greater yellowlegs	x	x	x
Tringa flavipes	lesser yellowlegs	x	x	x
Heteroscelus incanus	Wandering tattler			x
Tringa solitaria	solitary sandpiper	x	x	x
Catoptrophorus semipalmatus	willet	x	x	
Atitis macularia	spotted sandpiper	x	x	x
Brtramia longicauda	upland sandpiper	x	x	x
Eolia alpina	Dunlin (Red-back SP)			x
Nmenius americanus	long-billed curlew	x	x	
Numenius borealis	Eskimo curlew			x
Limosa fedoa	marbled godwit	x	x	x
Arenaria interpres	ruddy turnstone	x		x
Arenaria melanocephala	Black turnstone		x	
Calidris alba	sanderling	x	x	x
Calidris pusilla	semipalmated sandpiper	x		x
Calidris mauri	western sandpiper	x	x	x
Calidris minutilla	least sandpiper	x	x	x
Calidris bairdii	Baird's sandpiper	x	x	x
Calidris malanotos	pectoral sandpiper	x	x	x
Micropalama himantopus	Stilt sandpiper			x
Tryngites subruficollis	Buff-breasted sandpiper			x
Limnodromus griseus	short-billed dowitcher	x		x
Limnodromus scolopaceus	long-billed dowitcher	x	x	x
Gallinago gallinago	common snipe	x	x	x
Phalaropus tricolor	Wilson's phalarope	x	x	x
Phalaropus lobatus	Northern phalarope	x	x	x
Phalaropus fulicarius	Red phalarope			x
Stercorarius parasiticus	Parasitic jaeger			x
Stercorarius longicaudus	Long-tailed jaeger			x
Larus hyperboreus	Glaucous gull		x	
Larus glaucescens	Glaucous-winged gull		x	
Larus californicus	California gull	x	x	x
Larus thayeri	Thayer's gull			x
Larus canus	Mew gull			x
Larus pipixcan	Franklin's gull	x	x	x
Larus philadelphia	Bonaparte's gull	x	x	x
Larus delawarensis	ring-billed gull	x	x	x
Larus argentatus	Herring gull	x	x	x

(Table 2. Continued)

		Y	WG	CRP
Xema sabini	Sabine's gull	x		x
Rissa tridactyla	Black-legged Kittiwake		x	
Sterna caspia	Caspian tern	x	x	
Sterna hirundo	Common tern	x	x	x
Sterna forsteri	Forster's tern	x	x	x
Chilidonias niger	black tern	x	x	x
Columba fasciata	Band-tailed pigeon		x	x
Columba livia	rock dove	x	x	x
Zenaida macroura	mourning dove	x	x	x
Coccyzus erythropthalmus	black-billed cuckoo	x		
Tyto alba	barn owl	x		
Otus asio	eastern screech-owl	x		
Otus kennicottii	western screech-owl	x	x	x
Otus flammeolus	Flammulated owl			x
Bubo virginianus	great horned owl	x	x	x
Nyceta scandiaca	Snowy owl		x	x
Surnia ulula	northern hawk-owl	x	x	x
Glaucidium gnoma	northern pygmy-owl	x	x	x
Athene cunicularia	burrowing owl	x	x	x
Strix varia	Barred owl		x	x
Strix nebulosa	great gray owl	x	x	x
Asio otus	long-eared owl	x	x	x
Asio flammeus	short-eared owl	x	x	x
Aegolius funereus	boreal owl	x	x	x
Aegolius acadicus	northern saw-whet owl	x	x	x
Chordeiles minor	common nighthawk	x	x	x
Aeronautes saxatalis	White-throated swift	x	x	
Cypesloides niger	Black swift		x	x
Chaetura vauxi	Vaux's swift		x	x
Stellula calliope	calliope hummingbird	x	x	x
Selasphorus platycercus	broad-tailed hummingbd	x	x	
Selasphorus rufus	rufous hummingbird	x	x	x
Archilochus alexandri	Black-chinned hummingb.		x	x
Archilochus colubris	Ruby-throated hummingb.			x
Ceryle alcyon	belted kingfisher	x	x	x
Melanerpes lewis	Lewis' woodpecker	x	x	x
Melanerpes erythrocephalus	red-headed woodpecker	x	x	
Sphyrapicus varius	yellow-bellied sapsuckr	x		
Sphyrapicus nuchalis	red-naped sapsucker	x	x	x
Sphyrapicus thyroideus	Williamson's sapsucker	x	x	
Picoides pubescens	downy woodpecker	x	x	x
Picoides villosus	hairy woodpecker	x	x	x
Picoides albolarvatus	white-headed woodpecker	x	x	
Picoides thidactylus	three-toed woodpecker	x	x	x
Picoides arcticus	black-backed woodpecker	x	x	x
Colaptes auratus	northern flicker	x	x	x
Dryocopus pileatus	pileated woodpecker	x	x	x
Contopus borealis	olive-sided flycatcher	x	x	x
Contopus sordidulus	Western wood-pewee	x	x	x
Empidonax trailii	Willow flycatcher	x	x	x

(Table 2. Continued)

		Y	WG	CRP
Empidonax alnorum	Alder flycatcher		x	x
Empidonax minimus	least flycatcher	x	x	x
Empidonax hammondii	Hammond's flycatcher	x	x	x
Empidonax oberholseri	dusky flycatcher	x	x	x
Empidonax wrightii	gray flycatcher	x		
Empidonax difficilis	Cord. flycatcher	x	x	x
Sayornis saya	Say's phoebe	x	x	x
Sayornis phoebe	Eastern phoebe			x
Myiarchus cinerascens	ash-throated flycatcher	x	x	
Muscivora forficata	Sissor-tailed flycatchr		x	
Empidonax flaviventris	Yellow-bellied flycatch			x
Tyrannus vociferans	Cassin's kingbird	x		
Tyrannus verticalis	western kingbird	x	x	x
Tyrannus tyrannus	eastern kingbird	x	x	x
Eremophila alpestris	horned lark	x	x	x
Tachycineta bicolor	tree swallow	x	x	x
Tachycineta thalassina	violet-green swallow	x	x	x
Stelgidopteryx serripennis	N. rough-winged swallow	x	x	x
Riparia riparia	bank swallow	x	x	x
Hirundo pyrrhonota	cliff swallow	x	x	x
Hirundo rustica	barn swallow	x	x	x
Perisoreus canadensis	gray jay	x	x	x
Cyanocitta stelleri	Steller's jay	x	x	x
Cyanocitta cristata	Bue jay	x	x	x
Gymnorhinus cyanocephalus	pinyon jay	x		
Nucifraga columbiana	Clark's nutcracker	x	x	x
Pica pica	black-billed magpie	x	x	x
Corvus brachyrhnychos	American crow	x	x	x
Corvus corax	common raven	x	x	x
Parus atricapillus	black-capped chickadee	x	x	x
Parus gambeli	mountain chickadee	x	x	x
Parus hudsonian	Boreal chickadee		x	x
Parus rufescens	Chestnut-backed chickad		x	x
Sitta canadensis	red-breasted nuthatch	x	x	x
Sitta carolinensis	white-breasted nuthatch	x	x	x
Sitta pygmaea	pygmy nuthatch	x		x
Certhia americana	brown creeper	x	x	x
Salpinctes obsoletus	rock wren	x	x	x
Catherpes mexicanus	canyon wren	x		
Troglodytes aedon	house wren	x	x	x
Troglodytes troglodtyes	winter wren	x	x	x
Cistothorus platensis	sedge wren	x		
Cistothorus palustris	marsh wren	x	x	x
Cinclus mexicanus	American dipper	x	x	x
Regulus satrapa	golden-crowned kinglet	x	x	x
Regulus calendula	ruby-crowned kinglet	x	x	x
Polioptila caerulea	blue-gray gnatcatcher	x		
Sialia sialias	Eastern bluebird		x	x
Sialia mexicana	western bluebird	x	x	x
Sialia curricoides	mountain bluebird	x	x	x

(Table 2. Continued)

		Y	WG	CRP
Myadestes townsendi	Townsend's solitaire	x	x	x
Catharus fuscescens	veery	x	x	x
Catharus ustulatus	Swainson's thrush	x	x	x
Catharus guttatus	hermit thrush	x	x	x
Turdus migratorius	American robin	x	x	x
Ixoreus naevius	varied thrush	x	x	x
Hylochichla minima	Gray-cheeked thrush			x
Dumetella carolinensis	gray catbird	x	x	x
Mimus polyglottos	northern mockingbird	x	x	x
Oreoscoptes montanus	sage thrasher	x		
Toxostoma rufum	brown thrasher	x		
Anthus spinoletta	American (Water) pipit	x	x	x
Anthus spragueii	Sprague's pipit	x	x	x
Bombycilla garrulus	Bohemian waxwing	x	x	x
Bombycilla cedrorum	cedar waxwing	x	x	x
Phainopepla nitens	phainopepla	x		
Lanius excubitor	northern shrike	x	x	x
Lanius ludovicianus	loggerhead shrike	x	x	x
Sturnia vulgaris	European starling	x	x	x
Vireo solitarius	solitary vireo	x	x	x
Vireo gilvus	warbling vireo	x	x	x
Vireo olivaceus	red-eyed vireo	x	x	x
Vireo philadelphicus	Philadelphia vireo			x
Mniotilta varia	Black & White warbler		x	x
Vermivora peregrina	Tennessee warbler	x	x	x
Vermivora celata	orange-crowned warbler	x	x	x
Vermivora ruficapilla	Nashville warbler	x	x	x
Vermivora virginiae	Virginia's warbler	x		
Dendroica petechia	yellow warbler	x	x	x
Dendroica tigrina	Cape May warbler	x	x	x
Dendroica coronata	yellow-rumped warbler	x	x	x
Dendrocia magnolia	Magnolia warbler			x
Dendroica townsendi	Townsend's warbler	x	x	x
Dendrocia virens	Blk-throated green Warb			x
Dendrocia nigrescens	Blk-throated gray warb			x
Dendrocia castanea	Bay-breasted warbler		x	x
Dendroica striata	blackpoll warbler	x		x
Dendrocia palmarum	Palm warbler			x
Setophaga ruticilla	American redstart	x	x	x
Prothonotaria citrea	prothonotary warbler	x		
Seiurus aurocapillus	ovenbird	x	x	x
Seiurus noveboracensis	northern waterthrush	x	x	x
Oporonis tolmiei	MacGillivray's warbler	x	x	x
Geothlypis trichas	common yellowthroat	x	x	x
Icteria virens	Yellow-breasted chat		x	
Wilsonia pusilla	Wilson's warbler	x	x	x
Wilsonia canadensis	Canada warbler			x
Piranga olivacea	scarlet tanager	x		
Piranga ludoviciana	western tanager	x	x	x
Pheucticus ludovicianus	Rose-breasted grosbeak	x		x

(Table 2. Continued)

		Y	WG	CRP
Pheucticus melanocephalus	black-headed grosbeak	x	x	x
Coccothraustes vespertinus	Evening grosbeak	x	x	x
Passerina amoena	lazuli bunting	x	x	x
Calamospiza melanocorys	Lark bunting		x	x
Pipilo chlorurus	green-tailed towhee	x	x	
Pipilo erythrophthalmus	rufous-sided towhee	x	x	x
Passer domesticus	House sparrow	x	x	x
Spizella arborea	American tree sparrow	x	x	x
Spizella passerina	chipping sparrow	x	x	x
Spizella pallida	clay-colored sparrow	x	x	x
Spizella breweri	Brewer's sparrow	x	x	x
Spizella pusilla	field sparrow	x	x	
Spizella atrogularis	black-chinned sparrow	x		
Pooecetes gramineus	vesper sparrow	x	x	x
Chondestes grammacus	lark sparrow	x	x	
Amphispiza belli	sage sparrow	x		
Calamospiza melanocorys	lark bunting	x		
Passerculus sandwichensis	savannah sparrow	x	x	x
Ammospiza leconteii	LeConte's sparrow		x	x
Ammospiza caudacuta	Sharp-tailed sparrow			x
Ammodramus savannarum	Grasshopper sparrow	x		x
Ammodramus bairdii	Baird's sparrow	x		x
Passerella iliaca	fox sparrow	x	x	x
Melospiza melodia	song sparrow	x	x	x
Melospiza lincolnii	Lincoln's sparrow	x	x	x
Melospiza georgiana	swamp sparrow	x		x
Zonotrichia albicollis	white-throated sparrow	x	x	x
Zonotrichia leucophyrs	white-crowned sparrow	x	x	x
Zonotrichia atricapilla	Golden-crowned sparrow			x
Zonotrichia querula	Harris' sparrow	x	x	x
Junco hyemalis	dark-eyed junco	x	x	x
Calcarius mccownii	McCown's longspur	x	x	
Calcarius lapponicus	lapland longspur	x	x	x
Calcarius ornatus	Chestnut-collared longs		x	x
Plectrophenax nivalis	snow bunting	x	x	x
Dolichonyx oryzivorus	bobolink	x	x	x
Agelaius phoeniceus	red-winged blackbird	x	x	x
Sturnella neglecta	western meadowlark	x	x	x
Xanthocephalus xanthocephalus	yellow-headed blackbird	x	x	x
Euphagus cyanocephalus	Brewer's blackbird	x	x	x
Quiscalus quiscula	common grackle	x	x	x
Molothrus ater	brown-headed cowbird	x	x	x
Icterus galbula	northern oriole	x	x	x
Euphagus carolinus	Rusty blackbird		x	x
Leucosticte arctoa	rosy finch	x	x	x
Pinicola enucleator	pine grosbeak	x	x	x
Carpodacus purpureus	purple finch	x		x
Carpodacus cassinii	Cassin's finch	x	x	x
Carpodacus mexicanus	house finch	x		x
Loxia curvirostra	red crossbill	x	x	x

(Table 2. Continued)

		Y	WG	CRP
Loxia leucoptera	white-winged crossbill	x	x	x
Carduelis flammea	common redpoll	x	x	x
Carduelis hornemanni	hoary redpoll	x	x	x
Carduelis pinus	pine siskin	x	x	x
Carduelis tristis	American goldfinch	x	x	x
TOTAL SPECIES		290	269	285
(Species in Common)			(241)	(245)

Table 3. Comparison of mammal species found within the Yellowstone World Heritage Stie, Canadian Rocky Mountain Parks World Heritage Site and the proposed Waterton-Glacier World Heritage Site. (Refs.: Holroyd and Van Tighem 1983; Shea 1986; Ulrich 1986; Gniadek (Glacier National Park) pers. comm.; C. Nielsen (Glacier National Park) pers. comm.; Greater Yellowstone Conservation Data Center; Yellowstone Center for Resources; Cottonwood Consultants in prep.)

SPECIES	Y	WG	CRP
INSECTIVORA (SHREWS)			
Mask shrew (Sorex cinereus)	x	x	x
Vagrant shrew (S. vagrans)		x	
Dusky shrew (S. obscurus)	x		x
Pygmy shrew (S. hoyi)	x		x
Northern water shrew (S. palustris)	x	x	x
Prebles's shrew (S. preblei)	x		
Dwarf shrew (S. nanus)	x		
CHIROPTERA (BATS)			
Little brown bat (Myotis lucifugus)	x	x	x
Small-footed bat (Myotis leibii)	x		
Northern long-eared bat			x
Long-eared bat (Myotis evotis)	x	x	x
Long-legged bat (M. volans)	x	x	x
California bat (M. californicus)			x
Big Brown bat (Eptesicus fuscus)	x	x	x
Silver-haired bat (Lasionycteris noctivagans)	x	x	x
Hoary bat (Lasiurus cinereus)	x	x	x
Big-eared bat (Plecotus townsendii)	x		
Spotted bat (Euderma maculatum)	x		
CARNIVORA (CARNIVORES)			
Bobcat (Lynx rufus)	x	x	x
Lynx (Lynx lynx)	x	x	x
Mountain lion (Felis concolor)	x	x	x
Raccoon (Procyon lotor)	x	x	
Black Bear (Ursus americanus)	x	x	x
Grizzly Bear (U. arctos)	x	x	x
Red fox (Vulpes fluva)	x	x	x
Coyote (Canis latrans)	x	x	x
Wolf (C. lupus)	x	x	x
Striped skunk (Mephitis mephitis)	x	x	x
Spotted skunk (Spilogale gracilis)	x		
Badger (Taxidea taxus)	x	x	x
River Otter (Lontra canadensis)	x	x	x

(Table 3. Continued):	Y	WG	CRP
Wolverine (Gulo luscus)	x	x	x
Least weasel (Mustela nivalis)		x	x
Short-tailed weasel (Mustela erminea)	x	x	x
Long-tailed weasel (M. frenata)	x	x	x
Mink (M. vison)	x	x	x
Marten (Martes americana)	x	x	x
Fisher (M. pennanti)	x	x	x
LAGOMORPHA (RABBITS & PIKAS)			
Pika (Ochotona princeps)	x	x	x
Snowshoe hare (Lepus americanus)	x	x	x
White-tailed jackrabbit (Lepus townsendii)	x	x	
Mountain cottontail (Sylvilagus nuttallii)	x		
Desert cottontail (S. audubonii)	x		
RODENTIA (RODENTS)			
Porcupine (Erethizon dorsatum)	x	x	x
Beaver (Castor canadensis)	x	x	x
Northern pocket gopher (Thomomys talpoides)	x	x	
Hoary marmot (Marmota caligata)		x	x
Yellowbelly marmot (Marmota flaviventris)	x	x	
Woodchuck (Marmota monax)			x
Least chipmunk (Eutamias minimus)	x	x	x
Yellow pine chipmunk (E. amoenus)	x	x	x
Uinta chipmunk (Eutamias umbrinus)	x		
Red-tailed chipmunk (E. ruficaudus)		x	
Gold-mantled ground sqrrl. (Spermophilus lateralis)	x	x	x
Columbian ground squirrel (S. columbianus)		x	x
Thirteen-lined ground squirrel (S. tridecemlineatus)		x	
Richardson ground squirrel (S. richardsoni)		x	
Unita ground squirrel (S. armatus)	x		
Northern flying squirrel (Glaucomys sabrinus)	x	x	x
Red squirrel (Tamiasciurus)	x	x	x
Western Jumping mouse (Zapus princeps)	x	x	x
Bushy-tailed wood rat (Neotoma cinerea)	x	x	x
Deer mouse (Peromyscus maniculatus)	x	x	x
Muskrat (Ondatra zibethicus)	x	x	x
Northern bog lemming (Synaptomys borealis)		x	x
Red-backed vole (Clethrionomys gapperi)	x	x	x
Montane heather vole (Phenacomys intermedius)	x	x	x
Water vole (Arvicola richardsoni)	x	x	x
Long-tailed vole (Microtus longicaudus)	x	x	x
Meadow vole (Microtus pennsylvanicus)	x	x	x
Montane vole (M. montanus)	x		
Sagebrush vole (Lemmiscus curtatus)	x		

(Table 3. Continued):	Y	WG	CRP
ARTIODACTYLA (EVEN-TOED UNGULATES)			
White-tailed deer (Odocoileus viginianus)	x	x	x
Mule deer (Odocoileus hemionus)	x	x	x
American Elk (Cervus elaphus)	x	x	x
Moose (Alces alces)	x	x	x
Bighorn Sheep (Ovis canadensis)	x	x	x
Mountain goat (Oreamnos americanus)	x	x	x
Pronghorn (Antilocapra americana)	x		
Bison (Bison bison)	x		
Woodland Caribou (Rangifer caribou)			x
TOTAL SPECIES	69 (53)	61 (53)	59