

Starfield Resources Inc.

Ferguson Lake Project

Nunavut, Canada

STARFIELD RESOURCES INC.

Wildlife Management Plan



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May 2007



Wildlife Management Plan

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1. Wildlife Management Plan

Regional wildlife biologists and the Beverly and Qamanirjuaq Caribou Management Board (BQCMB) have identified areas in proximity of the Ferguson Lake Project site as being important for caribou. The Ferguson Lake area also may support a variety of valued ecosystem species, such as muskoxen and several species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Species at Risk Act (SARA). The following overview provides the general approach of the wildlife management plan that is proposed to mitigate potential negative impacts from winter trail operation, airfield construction, aircraft flights and exploration camp and activities. The methodologies being proposed within the monitoring plan will be reviewed with the regional biologist and other applicable regulatory authorities prior to its submission.

1.1 Internal Policies and Conditions

Approaching and feeding wildlife is prohibited. Starfield has made commitments to communities and regulatory agencies that wildlife will not be harassed or disturbed. This policy/regulation will be strictly enforced. Any employee or contractor who is found to be violating this rule will find their employment terminated and removed from site immediately.

Sightings of wildlife will be recorded by all Starfield employees and contractors on the wildlife sightings sheets provided by Starfield. This information will be reported in monthly reports to the Kivalliq Inuit Association and the regional biologist in Arviat. As well, the information will be reported in the annual reports provided to various regulatory agencies.

Firearms may be carried for safety reasons, but only if such firearms are properly registered and stored in accordance with applicable legislation. All firearm discharges must be reported to the Project Manager.

Hunting and fishing while conducting business on behalf of Starfield is strictly forbidden. There are no exceptions to this rule.

Any archaeological sites that are discovered will not be disturbed. Instead, the GPS coordinates will be recorded and reported to the Government of Nunavut and the Kivalliq Inuit Association according to the Archaeology Terms and Conditions of the Ferguson Lake Project (Appendix 1.1-1).

Special caribou protection measures are required for areas of Nunavut so as to avoid disturbance of migrating and calving herds. These measures are found in the DIAND Caribou Protection Measures (Appendix 1.1-2). Caribou protection areas designated by the Department of Indian Affairs and Northern Development in the Project area are shown in Appendix 1.1-3.

Low-level aircraft and helicopter flights must make efforts to avoid areas crucial to migration, as well as nesting and denning habitats. Prior to conducting any low-level airborne geophysical surveys the Kivalliq Inuit Association will be contacted and the following information will be

provided; dates of surveys, location of surveys, and expected completion times. To date, no airborne geophysical surveys are planned for 2007. As well, the locally hired wildlife monitors will be required to conduct a survey of the area to ensure no wildlife are present. Monitoring for wildlife will continue during the geophysical survey. If caribou and/or muskoxen are seen in the area, the aerial geophysical survey will not occur until they have moved a safe distance from the area to be surveyed.

Proper food storage and handling of cooking wastes will prevent problems with attracting wildlife. Any nuisance wildlife will be reported immediately to the Kivalliq Inuit Association and the regional biologist in Arviat who will describe an approved action plan if necessary.

Starfield contractors have received Bear Safety Training. Bear safety information and material is kept in a binder in the office at the camp. All human-bear interactions are to be reported immediately to the KIA, the Government of Nunavut Department of Environment, Environment Canada, HTO's and the Government of Nunavut Wildlife Biologist.

No eggs or nests are to be disturbed by any activities. If any employee or contractor comes across any active nests, they are to cease all activities immediately to ensure that the nest is not disturbed. Coordinates are to be recorded on the wildlife sighting sheets and these coordinates are to be reported to Environment Canada.

1.2 Winter Trails

Two winter trails are proposed for over-land hauling of equipment, one running north from Churchill to Arviat and NNW to Ferguson Lake and the second running west from Rankin Inlet to Ferguson Lake. Both winter trails pass through areas used seasonally by the Qamanirjuaq caribou herd. Data from collaring studies indicate the most likely area of interaction between vehicles on the winter trail and caribou is the area inland from Arviat. Pregnant caribou have been located in this area in past years moving towards calving grounds.

It is generally accepted that caribou are particularly susceptible to visual and auditory disturbance. Caribou will typically avoid areas with disturbances and can suffer increased energetic costs as a result. High energy costs or stress levels in caribou have been linked to reduced over-winter survival and reduced reproductive success.

The winter trails wildlife management plan will attempt to minimize any potential negative interactions to caribou and muskoxen by:

Use of lakes for the trail – The Cat trail will be located as much as possible over level ground – lakes, along rivers and over flat ground. Use of these areas will minimize the potential impacts on caribou habitat (e.g. damage to vegetation).

Cat Train Scout – A Cat Train Scout will travel on snowmobile at least 5 km in advance of the Car Train while it is in operation. If migrating caribou are travelling within 5 km of the Cat Train, operations will be ceased until the migrating caribou have moved beyond 5 km.

Operations of Cat train – Cat trains may pass through corridors used by migrating caribou, particularly on the southern route from Arviat to Ferguson Lake. Cat drivers will stop whenever groups of travelling caribou are encountered and will allow the caribou to proceed.

Avoidance of “bumping” behaviour – Many wildlife species, and ungulates in particular will display a “bumping” behaviour when vehicles or disturbances are encountered. Typical “bumping” behaviour involves a vehicle approaching a group of animals that are not in the process of moving and causes these animals to move away from the vehicle, in line with the vehicles movement. As the vehicle continues, it then repeatedly encounters the same animals, which can cause particularly high levels of stress for the animals concerned. If Cat drivers identify that animals are being “bumped”, drivers will allow the animals to move away and out of the path of the Cat train by stopping until caribou have moved.

Recording all wildlife observations - All caribou and muskoxen encounters will be recorded and data compiled to identify areas of particular concern. Data sufficient to calculate caribou density will be collected and shared with the Kivalliq Inuit Association and the regional biologist in Arviat. Drivers will undergo a training program on data collection to improve the quality of data collected. Draft data forms are attached.

1.3 Airfield Construction

Starfield Resources Inc. plans to build an all-season runway on the western shore of Ferguson Lake. The construction of this airstrip could have several potential impacts to wildlife, including: disturbance of breeding birds nesting on or adjacent to the runway, disturbance of COSEWIC-listed species (Table 1.3-1), and disturbance to caribou and muskoxen. The Project will mitigate potential impacts to species of concern along the airstrip by:

Table 1.3-1
Species of Special Concern within the
Ferguson Lake Project Area Currently Listed by COSEWIC

Species at Risk that may be encountered	COSEWIC Designation	Schedule of SARA	Government Organization with Primary Management Responsibility
Peregrine Falcon (subspecies <i>tundrius</i>)	Special Concern	Schedule 3	Government of Nunavut
Short-eared Owl	Special Concern	Schedule 3	Government of Nunavut
Grizzly Bear	Special Concern	Pending	Government of Nunavut
Wolverine (Western Population)	Special Concern	Pending	Government of Nunavut
Polar Bear	Special Concern	Pending	Government of Nunavut

Avoiding Breeding Birds – Construction of the airstrip will be conducted outside the typical breeding bird period at Ferguson Lake. Where construction cannot be avoided in this period, extensive breeding bird surveys will be conducted in the construction area. Areas with breeding birds will be avoided as per CWS guidelines.

Caribou and Muskoxen Monitoring – Ground-based caribou and muskoxen surveys will be conducted. During the May 15 to July 15 calving period, work will be suspended if caribou are detected in the construction area.

Recording Incidental Wildlife Observations – As per the Environment Canada recommendations, all COSEWIC and SARA-listed species observed on the Project site and by Cat train drivers will be recorded on an Incidental Wildlife Observation Form. Project personnel, vehicles and the Cat train will avoid these species. Other mitigation measures will be identified from recommendations in SARA species-at-risk reports. Sighting data and mitigation measures conducted will be recorded by environmental technicians and reported to the Kivalliq Inuit Association and the regional biologist in Arviat.

1.4 Aircraft Flights

Aircraft overflights can disturb caribou, particularly during the sensitive calving and post calving periods when caribou have both high stress levels and low nutritional reserves. Disturbances by aircraft are due to three principal variables: proximity to takeoff and landings, elevation of aircraft during horizontal flight, and flight frequency. The methods for controlling the first two issues will be addressed below:

Takeoffs/Landings – Ferguson Lake has been identified as a movement route for caribou from calving to post calving areas. DIAND caribou protection measures (Appendix 1.1-2) and BQCMB recommendations require proponents to stop all activity during the sensitive caribou calving and post calving periods of May 15 – July 15 unless permission has been granted to continue operations. These regulations include aircraft taking off and landing. Operations may be permitted to continue if no caribou are in the area. The Project will undertake two monitoring programs and mitigation strategies for caribou:

- The takeoff and landing route for the Project is over Ferguson Lake. This fact significantly reduces the potential impact, since it is very unlikely caribou will be directly below aircraft (*i.e.* below the regulated 300 m height). However, evidence indicates Ferguson Lake is a lake-crossing area for caribou. Hence, a visual lake-crossing survey will be conducted before every aircraft takeoff and landing. If caribou are observed crossing the lake or milling on the shore in preparation to cross, then overhead flights will be delayed until caribou have left the area.
- The Project will initiate a caribou monitoring program in the vicinity of Ferguson Lake to monitor the number and behavior of caribou in the area. Caribou will be monitored by a wildlife technician from an ATV using standard ground-based survey techniques as well as incidental observations from aircraft pilots using an incidental encounter data form. When caribou are observed within the May 15 to July 15 period, the Project will cease activities that may disturb caribou, including blasting in the vicinity. All data from caribou surveys will be shared with the Kivalliq Inuit Association and the caribou biologist in Arviat.
- The Project will continue an aerial caribou and muskoxen monitoring program with the objective of evaluating the number and habitat use of these species. Surveys will follow

a “Limited Aerial Reconnaissance” methodology using fixed-wing aircraft and aerial photos. These surveys are being coordinated in collaboration with Kivalliq area biologist Mitch Campbell in Arviat, and data will be shared to evaluate caribou use of the area.

Elevation of Horizontal Flight – Regulations require all aircraft to maintain a minimum altitude of 300 m above caribou, particularly during the sensitive calving and post calving periods. Disturbances from aircraft increase as the size and noise produced by aircraft increases. Starfield will record fixed-wing aircraft flights to and from the project and the pilots of aircraft will be required to supply the company with flight logs including altitude data.

1.5 Caribou Crossings

Starfield will employ a wildlife biologist to work with locally hired wildlife monitors hired by the KIA to monitor the caribou migration crossings that have been identified by the KIA (see Appendix 1.1-3). The monitoring program will be conducted on the ground from a distance that is sufficient to prevent disturbance to the caribou movements. The data collected will provide information on the numbers, group composition and dates caribou are seen utilizing and moving through these crossings. No blasting will be conducted within 10 km of an identified caribou crossing when caribou are present within the 10 km buffer of that crossing between May 15 and September 1 as per the DIAND Caribou Protection Measures (Appendix 1.1-2). No drilling will be conducted within 5 km of the crossing during caribou presence as described above.

1.6 Wildlife Observations in the Field - Employees

Wildlife sightings will be recorded on wildlife sighting sheets provided by Starfield to all employees and contractors. These sightings will be entered in to a monthly wildlife report to be submitted to the KIA and will be included in the annual reports to be submitted to the KIA, NWB, DIAND and NIRB.

As per the Environment Canada recommendations, all species listed formerly under COSEWIC that are being considered for inclusion under SARA (see Table 1.3-1) that are observed on the Project site will be recorded on a wildlife sighting sheet. Project personnel will avoid these species and sightings will be reported to the Kivalliq Inuit Association and the regional biologist in Arviat. Other mitigation measures will be identified from species-specific background information (Appendix 1.6-1).

1.7 Wildlife Monitoring Program

Starfield-Rescan will conduct a wildlife monitoring program in 2007 to build on the previous baseline data collected in studies and surveys conducted by EBA in 2001 and 2002. Baseline information will be collected in 2007 and 2008 to evaluate the existing status of wildlife populations in the Project area. The major components of the 2007 program include:

- Compilation of existing baseline information
- Identification of wildlife Valued Ecosystem Components (VECs) within the Project area
- Assessment of wildlife populations within the Project area

Caribou monitoring – The caribou monitoring program will include aerial surveys and ground surveys. The methodology of the aerial surveys will be reviewed with the regional biologist in Arviat to ensure that it does not conflict with any protection measures in place and will enhance the work being conducted by the Government of Nunavut and others.

Muskox – All sightings of muskoxen will be recorded on the wildlife sightings sheets. If muskoxen approach an area of activity, all work will cease until they have moved through the area.

Carnivores – Dens are focal points of activity for various carnivores including grizzly bears, wolves, wolverine, and foxes. Dens are relatively easy to locate by helicopter. The status of dens can be verified by detection of recent activity signs including scat, scratches, carcass remains, hairs and wildlife observations. Assessment of potential den habitat for carnivores within the Project area will be surveyed by helicopter (at an altitude that will not disturb any wildlife) and by ground observations.

1.8 Species at Risk

Currently, several wildlife species within the Project area are either on a SARA schedule or their status is pending (Table 1.3-1). These species have been identified previously by COSEWIC as species of special concern. Rescan will determine the presence and/or absence of each of these species and will record any signs and/or sightings. All Starfield employees and contractors will record any sightings of these listed species, including the GPS coordinates, in the wildlife sheets provided and these sightings will be reported in the monthly wildlife reports to the Kivalliq Inuit Association and the regional biologist in Arviat. Every effort will be made to avoid contact with each of these species and with all wildlife. If the number of sightings becomes frequent, and the species becomes a regular visitor, the Kivalliq Inuit Association and the regional wildlife biologist will be consulted for advice on further mitigation measures.

APPENDIX 1.1-1
ARCHAEOLOGICAL AND PALAEOONTOLOGICAL RESOURCES
TERMS AND CONDITIONS FOR LAND USE PERMIT HOLDERS



ARCHAEOLOGICAL AND PALAEOONTOLOGICAL RESOURCES TERMS AND CONDITIONS FOR LAND USE PERMIT HOLDERS

BACKGROUND

Archaeology

As stated in Article 33 of the Nunavut Land Claims Agreement:

The archaeological record of the Inuit of Nunavut is a record of Inuit use and occupancy of lands and resources through time. The evidence associated with their use and occupancy represents a cultural, historical and ethnographic heritage of Inuit society and, as such, Government recognizes that Inuit have a special relationship with such evidence, which shall be expressed in terms of special rights and responsibilities. [33.2.1]

The archaeological record of Nunavut is of spiritual, cultural, religious and educational importance to Inuit. Accordingly, the identification, protection and conservation of archaeological sites and specimens and the interpretation of the archaeological record is of primary importance to Inuit and their involvement is both desirable and necessary. [33.2.2]

In recognition of the cultural, spiritual and religious importance of certain areas in Nunavut to Inuit, Inuit have special rights and interests in these areas as defined by Article 33 of the Nunavut Land Claims Agreement. [33.2.5]

Palaeontology

Under the Nunavut Act¹, the federal government can make regulations for the protection, care and preservation of palaeontological sites and specimens in Nunavut. Under the *Nunavut Archaeological and Palaeontological Sites Regulations*², it is illegal to alter or disturb any palaeontological site in Nunavut unless permission is first granted through the permitting process.

Definitions

As defined in the *Nunavut Archaeological and Palaeontological Sites Regulations*, the following definitions apply:

“archaeological site” means a place where an archaeological artifact is found.

¹ s. 51(1)

² P.C. 2001-1111 14 June, 2001

“archaeological artifact” means any tangible evidence of human activity that is more than 50 years old and in respect of which an unbroken chain of possession or regular pattern of usage cannot be demonstrated, and includes a Denesuline archaeological specimen referred to in section 40.4.9 of the Nunavut Land Claims Agreement.

“palaeontological site” means a site where a fossil is found.

“fossil” includes:

- (a) natural casts
- (b) preserved tracks, coprolites and plant remains; and
- (c) the preserved shells and exoskeletons of invertebrates and the eggs, teeth and bones of vertebrates.

Terms and Conditions

- 1) The permittee shall not operate any vehicle over a known or suspected archaeological or palaeontological site.
- 2) The permittee shall not remove, disturb, or displace any archaeological artifact or site, or any fossil or palaeontological site.
- 3) The permittee shall immediately contact the Department of Culture, Language, Elders and Youth (867) 934-2046 or (867) 975-5500 or 1 (866) 934-2035 should an archaeological site or specimen, or a palaeontological site or fossil be encountered or disturbed by any land use activity.
- 4) The permittee shall immediately cease any activity that disturbs an archaeological or palaeontological site encountered during the course of a land use operation, until permitted to proceed with the authorization of the Department of Culture, Language, Elders and Youth, Government of Nunavut.
- 5) The permittee shall follow the direction of the Department of Culture, Language, Elders and Youth and DIAND in restoring disturbed archaeological or palaeontological sites to an acceptable condition.
- 6) The permittee shall provide all information requested by the Department of Culture, Language, Elders and Youth concerning all archaeological sites or artifacts and all palaeontological sites and fossils encountered in the course of any land use activity.
- 7) The permittee shall make best efforts to ensure that all persons working under authority of the permit are aware of these conditions concerning archaeological sites and artifacts, and palaeontological sites and fossils.
- 8) The permittee shall avoid the known archaeological and/or palaeontological sites listed in Attachment 1.

9) The permittee shall have an archaeologist or palaeontologist perform the following functions, as required by the Department of Culture, Language, Elders and Youth:

- a) survey
- b) inventory and documentation of the archaeological or palaeontological resources of the land use area
- c) assessment of potential for damage to archaeological or palaeontological sites
- d) mitigation
- e) marking boundaries of archaeological or palaeontological sites
- f) site restoration

The Department of Culture, Language, Elders and Youth shall authorize by way of a Nunavut Archaeologist Permit or a Nunavut Palaeontologist Permit, all procedures subsumed under the above operations.

APPENDIX 1.1-2 DIAND CARIBOU PROTECTION MEASURES

DIAND Caribou Protection Measures

1. (a) The Permittee shall not, without approval, conduct any activity between May 15 and July 15 within the Caribou Protection Areas depicted on the map certified by the Engineer as the “Caribou Protection Map” and annexed to this Land Use Permit.
- (b) A Permittee may, upon approval by the Land Use Inspector, operate within the said Caribou Protection Areas beyond the May 15 deadline set out in 1(a), provided that, when monitoring information indicates that caribou cows are approaching the area of operation, the Permittee will implement 1(c).
- (c) On cessation of activities pursuant to 1(a) or 1(b), the Permittee will remove from the zone all personnel who are not required for the maintenance and protection of the camp facilities and equipment, unless otherwise directed by the Land Use Inspector.
- (d) The Permittee may commence or resume activities prior to July 15 within those parts of the Caribou Protection Areas released by the Land Use Inspector for the reason that caribou cows are not expected to use those parts for calving or post-calving (note 1).
2. (a) In the event that caribou cows calve outside of the Caribou Protection Areas, the Permittee shall suspend operations within the area(s) occupied by cows and/or calves between May 15 and July 15.
- (b) In the event that caribou cows and calves are present, the permittee shall suspend:
 - (i) blasting;
 - (ii) overflights by aircraft at any altitude of less than 300 meters above ground level; and
 - (iii) the use of snowmobiles and ATVs (all-terrain vehicles) outside the immediate vicinity of the camp.

NOTE

1. The Land Use Inspector’s decision will be based on the existing caribou information.
2. Concentrations of caribou should be avoided by low-level aircraft at all times.

3. (a) During migration of caribou, the Permittee shall not locate any operation so as to block or cause substantial diversion to migration.
 - (b) The Permittee shall cease activities that may interfere with migration, such as airborne geophysics surveys or movement of equipment, until the migrating caribou have passed.
4. (a) The Permittee shall not, between May 15 and September 1, construct any camp, cache any fuel, or conduct any blasting within 10 kilometres of any “Designated Crossing” as outlined on the map certified by the Engineer as the “Caribou Protection Map” and annexed to this Land Use Permit.
 - (b) The Permittee shall not, between May 15 and September 1, conduct any diamond drilling operation within 5 kilometres of any “Designated Crossing” as outlined on the map certified by the Engineer as the “Caribou Protection Map” and annexed to this Land Use Permit.

KIA Sample Land Use Permit Caribou and Muskox Protection Conditions

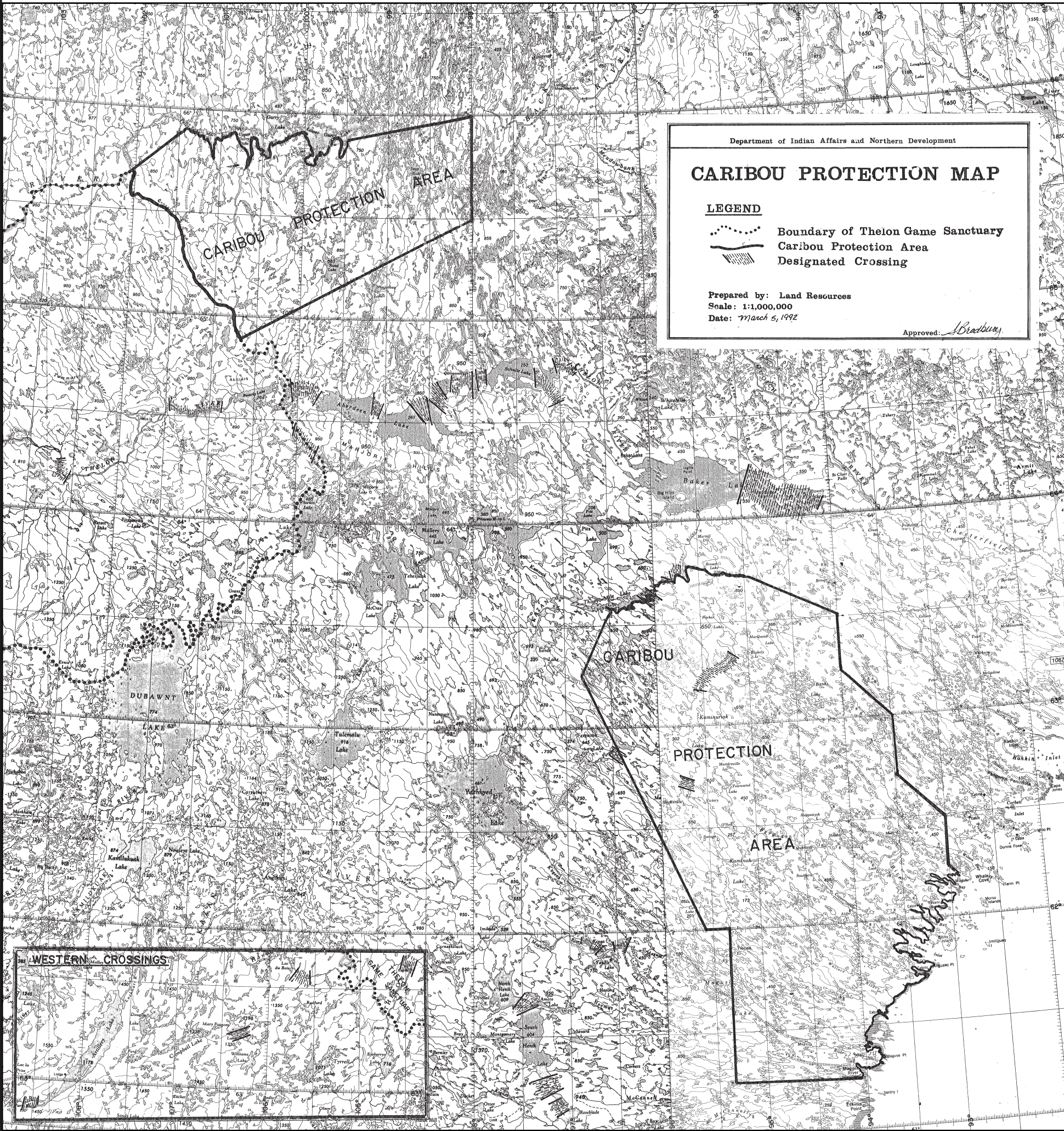
35. The Permittee is given permission to conduct the approved land use operations between May 15 and July 15, provided that when caribou and muskox cows are approaching the area of operation, the Permittee shall cease blasting, overflights by aircraft at any altitude less than 300 meters above ground level, and the use of snowmobiles and ATVs (all-terrain vehicles) outside the immediate vicinity of the camp. Other activities shall also be suspended if caribou approach the immediate vicinity of the specific operation and the monitoring work (described in another clause) indicates that there is stress on the animals.
36. During the presence of caribou and muskox within sight and sound of a camp, all personnel will remain quietly in camp.
37. The Permittee may resume activities prior to July 15 if the caribou and muskox cows have ceased to use the area for calving and post-calving.
39. The Permittee shall not locate any operation so as to block or cause substantial diversion to migration of caribou.

40. The Permittee shall cease activities that may interfere with migration or calving, such as airborne geophysics surveys or movement of equipment, until the migrating caribou have passed.

41. The Permittee shall not conduct any operation within 5 km of any “Designated Crossing” as outlined on the map annexed to this Land Use Permit.

From KIA Land Use Permit BHP 197C141

APPENDIX 1.1-3
DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN
DEVELOPMENT CARIBOU PROTECTION MAP



APPENDIX 1.6-1
SPECIES AT RISK FACT SHEETS

HINTERLAND WHO'S WHO



GRIZZLY

The grizzly ranges in colour from nearly white or ivory yellow to black.

Grizzly

This bear

- is a solitary animal whose home range may be as large as 1 800 km² for males
- is a true wilderness creature that can survive only in relatively undisturbed areas
- is considered to be a meat-eater but on the whole relies on vegetation for food
- is very small when born, weighing about 400 g and measuring less than 22.5 cm

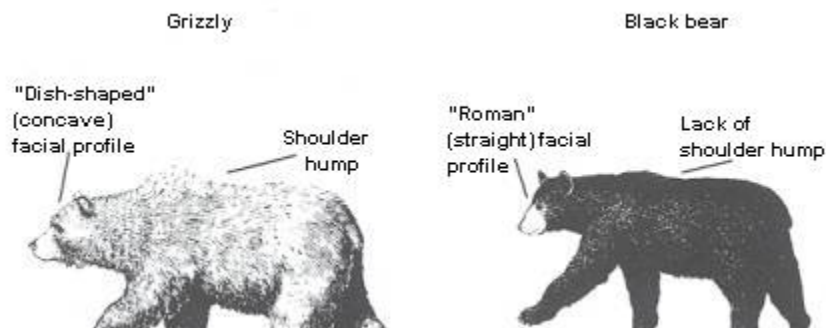


Description

The grizzly *Ursus arctos horribilis* Ord is the second largest North American land carnivore, or meat-eater, and, like the larger polar bear, has a prominent hump over the shoulders formed by the muscles of its massive forelegs.

The grizzly's unique features are its somewhat dished face and its extremely long front claws (see sketch). Its colour ranges from nearly white or ivory yellow to black. Generally, grizzlies have light or grizzled fur on the head and shoulders, a dark body, and even darker feet and legs. The body shape and long fur tend to make grizzlies look heavier than they actually are. Although grizzly bears have been known to weigh as much as 500 kg, the average male weighs 250 to 350 kg and the female about half that.

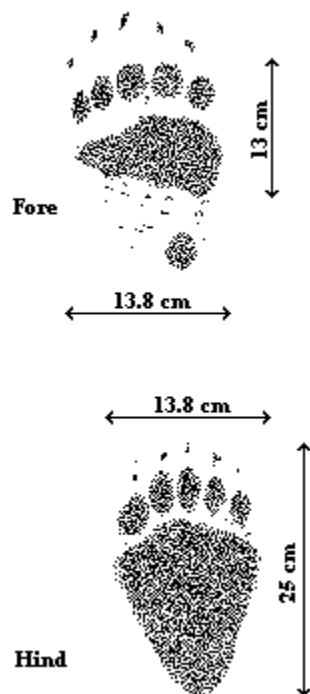
The bear family includes seven species found in the northern halves of both the western and eastern hemispheres, and in South America. The brown bear *Ursus arctos* is one of the three species of bear found in North America. The other two are the polar bear *Ursus maritimus* Phipps and the black bear *Ursus americanus* Pallas. The grizzly



has certain unique characteristics, and at first scientists thought that it was a different species from the very similar European brown bear. But, in 1953, they assigned it to the same species as the European and Asiatic brown bear.

There are two recognized subspecies of the circumpolar brown bear *Ursus arctos* in North America. The Kodiak bear found on the Kodiak Islands of Alaska *Ursus arctos middendorffi* is one. All the rest, though they may differ in size because of geographic differences in the quantity and quality of food, are grizzlies.

Signs and sounds



Grizzly Tracks

Habitat and habits

The grizzly is a solitary animal. Its home range varies in size but usually is 200 to 600 km² for females and 900 to 1 800 km² for males. Generally, the more plentiful the food supply, the smaller the home range. However, the movements of adult males are also influenced by searches for receptive females during the breeding season. Grizzly movements can be traced by attaching small transmitters to the animals, usually in a collar. These devices have shown that male grizzlies sometimes travel as far as 250 km, as the crow flies, over the course of a year. They have also shown that bears that have been relocated after becoming addicted to garbage will return from distances of more than 100 km to a dump where they have previously learned to feed.

The nature of the terrain in a bear's home range can significantly affect distribution. For example, in some mountainous regions, females with young, and independent subadults, mainly inhabit the rugged terrain of upper slopes and basins where adult males are not likely to travel. The latter tend to occupy valley bottoms of major drainages, travelling on the best trails and over the most accessible passes. Adult males are known to kill cubs and subadult bears; this is the reason why females and subadults endeavour to minimize

contact with males.

The grizzly has always been something of an enigma. A large body of folklore and tales has grown up around this much talked about and feared, but little understood, animal. The first white explorer to see grizzly bears and to record them in his journal was Henry Kelsey. On 20 August 1691, Kelsey mentioned seeing "a great sort of bear" near what is now The Pas, in west-central Manitoba. After their many dangerous encounters with individual grizzlies, Lewis and Clark thoroughly described this animal in their journals of 1805. But not until the 1960s did extensive studies in Canada and the United States begin to make the grizzly bear and its habits better known.

Unique characteristics

The grizzly matures late and produces young only every third or fourth year. Its size enables it to rule over our native wildlife without challenge from other animals. It has no natural enemies apart from people, except when young.

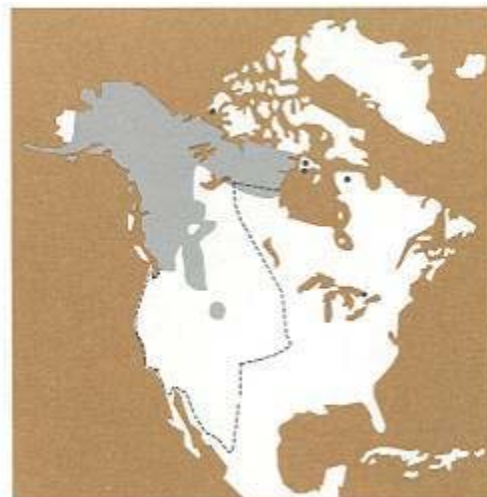
Unlike black bears, which have largely adapted to people and their activities, grizzly bears have not fared well in the face of civilization. History shows us that there is a threshold of human interference beyond which grizzlies just do not survive. Their keen sense of personal space and their occasional depredation of crops and livestock have brought this proud animal into conflict with people, inevitably to the grizzlies' detriment. Thus, their total range in North America has shrunk by more than half, while the black bear has held its own.

A grizzly seldom looks for trouble. Its size allows it to avoid fights with other animals and, if at all possible, a grizzly will avoid contact with people. The grizzly is not as persistent around garbage dumps as the black bear, but occasionally its taste for garbage will give rise to trouble. If surprised at close range, a grizzly can ferociously defend itself, its young, and its territory.

Range

Historically the grizzly was numerous south into California and Mexico and ranged across the western half of North America, approximately to the eastern boundary of Manitoba. As human populations have grown, the grizzly's range has gradually shrunk and is now limited to northwestern North America.

In 1985, estimated populations of grizzly bears were 1 200 in Alberta, 6 500 in British Columbia, 4 000 to 5 000 in the Northwest Territories, 5 000 to 8 000 in the Yukon, 15 000 in Alaska, and fewer than 1 000 in Montana, Wyoming, and Idaho.



Feeding

Although it is considered to be a meat-eater, the grizzly is generally omnivorous—it eats a wide range of foods. Plants make up 80 to 90 percent of its diet. Grizzlies prey on mammals and migrating salmon, where they are available, but on the whole rely on vegetation for food.

On emerging from their dens in the spring, grizzlies tend to frequent avalanche slides and meadows where the vegetation is first exposed, and there they are often observed digging for roots of the legume *Hedysarum*. In fact, this root, rich in proteins, carbohydrates, and minerals, is perhaps the single most

important food in much of the grizzly bear range. Not only is it widely consumed in April and May, but it is an adequate substitute for berries in late summer and autumn during years when berries are scarce. As spring progresses into summer, hair-grass, horsetails, mountain sorrel, and other leafy plants form an important part of the bears' diet.

For a brief time in spring, grizzly bears are significant predators of newborn elk, moose, deer, and caribou, but once these young animals are a few weeks old they are too nimble for a bear to catch. On rare occasions, grizzlies kill full-grown elk, moose, deer, caribou, and cattle. Grizzly bears have an excellent sense of smell and can locate a dead animal from tremendous distances. A grizzly that finds this type of food generally remains nearby until it is completely gone.

Where they occur in sufficient quantities, grubs of insects and adult insects such as ants, ladybird beetles, and bees are eaten. During salmon migrations, coastal grizzlies gorge themselves on fish. Similarly, grizzly bears that live on the arctic tundra feed heavily on arctic ground squirrels in late summer.

Over most of the grizzly bear range, however, berries are the most important item in the bears' diet. They are the food most often responsible for a bear attaining the fat deposits necessary for survival through the denning period. Some of the more important ones are buffalo berries, blueberries, huckleberries, cranberries, saskatoons, and crowberries.

Grizzly bears will take advantage of food and garbage carelessly made available by people. Bears learn quickly and can become habitual visitors to campsites and dumps, if rewarded by the easy availability of food. Although such foods may be nutritious and plentiful, the practice often leads to a confrontation between bear and human, and the results can be tragic for both. Wildlife managers and the public should see that bears do not have access to our foods.

Breeding

Young grizzlies are born in a winter den, usually during January and February. They are very small, weighing about 400 g and measuring less than 22.5 cm. The common litter size is two, but it can range from one to four. The young grow rapidly, and when they leave the den with the mother in spring they weigh about 8 kg. They continue gaining weight rapidly in the summer and enter the winter den approaching 45 kg. Usually they remain with the mother until June of their third year.

Grizzly bears have a low reproductive rate. A female grizzly does not have her first litter until she is five to seven years old, and she breeds at three- to four-year intervals. Because most do not breed beyond age 20, female grizzlies will bear no more than four or five litters in a lifetime. Age can be determined by the number of layers in the cement holding a bear's tooth in the socket. Counting these layers—one layer appears for each year of the grizzly's life—has established that bears in the wild will live up to 25 years.

The grizzly is less active after the breeding season and grows fatter on the abundant summer foods, which help it to survive the winter in its den. The females usually den first, entering around mid-November, depending on the weather and their condition. The males are likely to stay outside the den until late November or early December and emerge from it as early as March. The females, especially those with offspring, tend to stay in the dens until the young are fairly well grown in late April or early May.

Contrary to popular belief, grizzlies are not true hibernators. True hibernation requires a significant drop in body temperature and respiration rate, whereas the grizzly's body temperature drops only a few degrees and its respiration rate is only slightly below normal. Also, true hibernating animals, such as ground squirrels, fall into a deep winter sleep, but grizzlies, like black bears, do not. At most they are lethargic and can even be active all winter.

Conservation

Grizzlies are hunted primarily as game animals throughout western Canada in both spring and fall. In addition, each year conservation officers capture or kill some as predators or when they become a threat to people.

On the whole, grizzlies are not reliable hosts for parasites. Their few internal tapeworms and roundworms are mostly eliminated during the winter dormant period when the bear's digestive system is inactive, and the animal usually carries only a few external fleas and ticks. Moreover, infections from wounds received either in hunting or fighting are rare, and the grizzly living in the wild is relatively free of diseases. But captive bears can suffer from diarrhoea, tuberculosis, typhus, and arthritis.

A true wilderness animal, the grizzly can survive only in relatively undisturbed areas. People are the biggest threat to the grizzly. It suffers the greatest impact not from hunting, but from the continual increase of our population and the resulting erosion of grizzly habitat. Only through better understanding of the grizzly's requirements can Canadians ensure that this bear will remain part of our living heritage and not just a picture in a book.

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Catalogue number CW69-4/36-1991E

ISBN 0-662-18620-6

Text: K. Mundy

Revision: R.H. Russell, 1990

Photo: Robert McCaw

HINTERLAND WHO'S WHO



Photo: Richard Fyfe

PEREGRINE FALCON

The Peregrine Falcon has been the favourite of falconers for over 3 000 years.

Peregrine Falcon

This bird

- has been the favourite of falconers for over 3 000 years
- returns regularly to favourite nesting sites—one pair after another has used the same spot near England since 1243
- can dive at over 300 km per hour when attacking
- has a system of baffles in the nostrils to enable it to breathe during dives
- is a species at risk in Canada



Description

The Peregrine Falcon *Falco peregrinus* is a sturdy crow-sized falcon. The female, traditionally known as the “falcon,” is larger than the male or “tiercel.” Adult males are 38 to 46 cm long and weigh about 570 g. Females are 46 to 54 cm and weigh about 910 g. Their most reliable distinguishing features are the blackish malar, or cheek, stripe, below the eye and the dark bluish-grey or slate-coloured crown, back, and upper surface of the wings. The throat is white and the under parts are white to buff, with blackish brown bars on the sides, thighs, abdomen, underwings, and lower breast area.

A toothlike projection near the tip of the upper half of the beak distinguishes falcons from other birds of prey. Generally smaller and more streamlined than hawks, peregrines have small heads, firm compact plumage, and long pointed wings—adaptations that allow them to fly at great speed. In flight they use quick, powerful wing strokes. Their strong, hooked beak and powerful talons mark the falcons as highly specialized predators.

Flight silhouette of a Peregrine Falcon



Signs and sounds

Peregrines become excited and some become aggressive when humans approach the nest, particularly if young are present. Aggressive birds may dive within a metre of intruders, screaming a high-pitched *cack-cack-cack*. Because the calls often become more intense the nearer one gets to the nest, the peregrine may

unknowingly aid rather than intimidate the nest seeker. Although similar, the voices of the two sexes can be distinguished; that of the male is more wheezy and high-pitched, that of the female is grating and coarser.

Habitat and habits

The peregrine nests mostly on precipitous cliffs. In fact, an extraordinary feature of peregrines is their traditional use of certain ledges for nesting. For example, successive pairs have nested on the island of Lundy, off the coast of southwest England, since at least 1243. In remote relatively undisturbed areas such as the Canadian Arctic, they also choose steep slopes, river cutbanks, and even low rocks and mounds. In North America, they nest only rarely on flat ground or in trees, but such sites are more common in other parts of the peregrine's range. In southern Finland, for example, there were large ground or bog-nesting populations, which now nest only in northern Finland but at lower densities. In Germany, large tree-nesting populations have apparently vanished.

A recent departure from the tradition of nesting on cliffs is the peregrine's use of tall buildings. The most famous of such birds was the "Sun Life falcon," a female that appeared as a yearling in 1937 outside the twentieth floor of the Sun Life headquarters building in Montreal. An aggressive bird, she remained for 16 breeding seasons, had three successive mates, and reared 21 young. Her readily observable nest site gave rise to a host of admirers and considerable newspaper coverage. Her breeding record remains unmatched in the annals of bird study. Some more recent city nestings, a direct result of introductions of captive-raised falcons, occurred in Edmonton, Calgary, Winnipeg, Quebec City, Saint John, Toronto, Red Deer, and Ottawa.

The peregrine's speed and size make it an excellent hunter, able to prey on some of the larger birds. The long-winged raptor specializes in direct pursuit in the open. As a result, it favours non-forested areas, particularly shores, marshes, river valleys, open moors, and tundra. Even though its level speed of flight exceeds that of most birds, the peregrine usually takes advantage of height when attacking. When it stoops, or dives, at prey, it can reach speeds of over 300 km per hour.

A stooping peregrine is a hurtling wedge of streamlined feathers. Its feet lie back against the tail and the wings are half closed. Its usual method of disabling or killing medium-sized and large prey is to deliver a fierce blow with a half-closed foot during a dive. If the quarry is too heavy to carry, the peregrine allows it to fall to the ground, then lands beside it to feed. It snatches small prey such as swallows or sandpipers in mid-flight with the talons or it strikes the prey down and then retrieves it. The peregrine's flights at intended prey are often unsuccessful. The ability of the falcon, agility of the prey, and availability of escape cover affect the success of each stoop. As is usual in predator-prey relationships, the aberrant or weaker prey individuals are singled out.

Individuals have lived 18 or 20 years, but the average lifespan is probably much shorter.

Unique characteristics

The Peregrine Falcon has been the favourite of falconers for over 3 000 years, ever since the nomads of central Asia first pursued game with trained hawks and falcons.

Falcons have a system of baffles in the nostrils to enable them to breathe during dives. Ancient falconers attempted, probably without much success, to judge a bird's speed by the number of baffles. Extremely acute eyesight, even in dim light, allows falcons to be very effective hunters around dawn and dusk.

Range

With the exception of Antarctica, New Zealand, and Iceland, the peregrine is found around the globe. Twenty-two races are recognized throughout the

Breeding range



Falco peregrinus anatum



world. Their great powers of flight have enabled them to establish nesting populations in the Arctic, and as far south as Tasmania, South Africa, and the Falkland Islands.

As the map shows, three subspecies of peregrine nest in North America: Peale's *Falco peregrinus pealei*, anatum *Falco peregrinus anatum*, and tundra *Falco peregrinus tundrius*. Peale's peregrines are large dark birds that nest on the coast of Alaska and British Columbia, mostly resident or only slightly migratory. The anatum are medium-sized peregrines richly pigmented with buffy salmon on the breast; they often have black cheeks. They nest south of the tree line throughout the remainder of continental North America and are migratory in northern areas and resident farther south. The tundras are smaller, paler on the breast, and highly migratory arctic peregrines. Peregrines banded in the Northwest Territories have been recovered in Argentina; most arctic nesters apparently leapfrog their more southern North American relatives to winter in South America.

The name "peregrine," from the Latin adjective *peregrinus*, means "coming from foreign parts" or "wanderer." The peregrine was so named as a result of the lengthy migrations of some populations.

Feeding

Peregrine's prey species vary greatly from region to region and even from one nesting site to the next. For example, in parts of the Queen Charlotte Islands, British Columbia, peregrines feed almost entirely on the Ancient Murrelet, a small seabird plentiful there. On the east coast of Labrador, peregrines eat Black Guillemots, another common seabird, and small mammals such as mice and voles. At Rankin Inlet, on the west shore of Hudson's Bay, peregrines eat mostly lemmings and shorebirds. In southern Canada, they eat a variety of birds that live in wetlands, including Franklin's Gulls, Black Terns, Lesser Yellowlegs, Eared Grebes, Common Flickers, Green-winged Teal, and Sora. In cities, peregrines eat some pigeons, but these rarely account for more than 20 percent of their diet.

Breeding

Peregrines reach sexual maturity at about two years of age. The falcons are territorial during the breeding season. Even in areas where nests are most numerous, nesting pairs are usually more than 1 km, and often much farther, apart. This ensures adequate food for all nesting pairs and their offspring. They defend the immediate nest site against other peregrines, and often against eagles or ravens. Within a breeding territory of several square kilometres a peregrine pair may have several alternate nesting ledges. The number used by a pair or its successors can vary from one or two to seven in a 16-year period.

Most cliff nests are on ledges with vegetation and under an overhang. Sites with a southerly exposure are generally favoured. Females scrape a shallow hollow (usually in the loose soil, sand, gravel, or dead vegetation on cliff ledges) in which to lay their eggs. They add no nest materials. In remote, relatively undisturbed areas, such as the Canadian Arctic, steep slopes, river cutbanks, and even low rocks and mounds may be used.

In spring the male courts his larger mate with aerobatics and loud repeated wick calls. Soon after, the female lays three or four mottled brick-red or mahogany eggs, one every second day. Both adults incubate, or warm the eggs until they hatch, beginning when the last or second-to-last egg is laid and continuing for about 32 days. Re-nesting following loss of the first clutch is rare in the Arctic owing to the short summer season, but is common further south. As a result of some infertile eggs and natural losses of nestlings (eyases), the average number of young found in nests is 2.5, and the average number that fledge, or fly, is about 1.5.

Newly hatched eyases are awkward bundles of creamy white down with disproportionately large feet. At about three weeks, their first juvenile feathers start to appear, and feathering is complete in about three more weeks. The young spend 35 to 45 days in the nest, and males usually make their first flights a few days ahead of females. Eyases are fed regularly by both parents, who pluck the feathers from the prey at a nearby plucking perch before taking the food to the nest. When the nestlings begin to fly, the parents fly

past with prey in their talons and the young attempt to snatch it from them in midair. After several weeks of such instruction, the young begin to catch their own prey.

The young peregrines wear juvenile plumage for a year with only slight changes due to wear and fading. Adults moult and replace the wing feathers, one at a time, during the summer.

Conservation

Peregrine Falcon populations were long noted for their stability. In Great Britain, for example, where a host of birdwatchers and falconers studied them, the breeding population of some 600 pairs changed little from Elizabethan days until the 1940s. During the Second World War, peregrines were eliminated in some areas to protect homing pigeons. Although these populations recovered after the war, from about 1945 onward many once-vigorous peregrine populations suffered widespread, unprecedented declines, particularly in Europe and North America. In the eastern United States, where at least 300 nests were once known, peregrines were nearly extinct by the 1960s.

A decline of such rapidity, magnitude, and distribution at first puzzled ornithologists. Direct human intervention, such as nest robbing, trapping, or shooting, was ruled out as the primary cause, as falcons were subjected to these onslaughts for hundreds of years. Research studies strongly suggested that persistent chemical pesticides or industrial pollutants were the major cause of the decline. Not only did the peregrine decline correspond closely in its timing and geographical extent with intensive post-war use of pesticides, but high pesticide residue levels were found in the falcons and their eggs.

In 1969 in Canada and in 1972 in the United States, restrictions were placed on the use of DDT, a persistent pesticide that contributed to the peregrine's decline. Nevertheless, Canadian falcons probably acquired contaminants on their wintering grounds in Central and South America. Also, contamination reaches all North American falcons in prey that has migrated from those regions.

With few enemies and a long lifespan, peregrines, like other predators, are at the top of a food chain. Because they eat birds that may have eaten grain or insects containing pesticides, they are exposed to much higher levels of pesticide residues than are found in the air or water, and they accumulate pesticide residue levels many times higher than the levels in their prey species. At high levels these chemicals may cause reproductive failure by interfering with breeding behaviour, eggshell formation, and hatching success. Thus peregrine populations may gradually dwindle due to the lack of breeding success.

Peregrine Falcons, like virtually all birds of prey, now receive legal protection in most parts of North America. In other parts of the world, however, protection is much less complete, and populations are endangered by adults being shot and young being taken from nests.

In Canada the anatum peregrine is currently designated as "[threatened](#)" by the Committee on the Status of Endangered Wildlife in Canada, and the Peale's and tundra peregrines are considered species of "[special concern](#)". Previously the anatum had been classified as "endangered" and the tundra as "[threatened](#)" but recovery efforts such as captive breeding and release programs have improved their status. Captive breeding and release has been the chief recovery method.

More than 1 650 peregrines have been bred in captivity at the Canadian Wildlife Service breeding facility at Wainwright, Alberta, and at university-based facilities in Saskatchewan and Quebec and a private facility in Alberta. Wildlife agency and non-government staff released the captive-raised falcons from natural cliffs and tall buildings at over 60 sites from southern Alberta to the Bay of Fundy. During 2000, more than 110 pairs of peregrines bred in southern Canada, over 300 pairs in Yukon and the Mackenzie valley, and several thousand pairs across the Arctic. A similar reintroduction program in the United States has resulted in over 200 pairs in the eastern and midwestern states. Over 7 000 pairs of peregrines are now thought to breed in North America, including Mexico.

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[Canadian Wildlife Service, Species at Risk](#)

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Catalogue number CW69-4/32-2001E

ISBN 0-662-30087-4

Text: Don Blood

Revision: Ursula Banasch, 2001

Photo: R. Fyfe

HINTERLAND WHO'S WHO



POLAR BEAR

The polar bear is the largest land meat-eater—it can weigh up to 800 kg, about as much as a small car.

Polar Bear

This bear

- weighs less than one kilogram at birth
- has translucent hair and black skin to absorb and preserve body heat
- can slow down its metabolism to conserve energy at any time of the year
- can detect seal breathing holes up to a kilometre away and covered by layers of ice and snow 90 cm or more thick



Description

With its distinctive massive body and long neck, the polar bear *Ursus maritimus* is the largest land carnivore, or meat eater. The white coats of the adults often appear cream to yellow against the dazzling whiteness of their home, the arctic pack ice. Adult males measure from 240 to 260 cm in total length and usually weigh from 400 to 600 kg, although they can weigh up to 800 kg—about as much as a small car. They do not reach their maximum size until they are eight to 10 years old. Adult females are about half the size of males and reach adult size by their fifth or sixth year, when most weigh from 150 to 250 kg. Pregnant females can weigh up to 400 or 500 kg just before entering their maternity dens in the fall.

The bodies of polar bears are longer than the bodies of brown bears; their necks and skulls are also longer, but their ears are smaller. Instead of having the characteristic “dished” or concave facial profile of brown bears, polar bears possess a more prominent or “Roman” nose. Their canine teeth are large, and the grinding surfaces of their cheek teeth are jagged, which is an adaptation to a carnivorous diet. Polar bear claws are brownish in colour, short, fairly straight, sharply pointed, and non-retractable.

Signs and sounds

Polar bears use a deep growl to warn off other bears, particularly when defending a food source. They also hiss and snort to show aggression, accompanied by a lowered head and ears laid back. Angry polar bears communicate their displeasure with loud roars and growls. They also emit a “chuffing” sound in response to stress. Mother bears scold their cubs with a low growl or a soft cuff.

Habitat and habits

Polar bears prefer areas of annual ice, which they use for a hunting platform and protective cover, interspersed with snow-drifted pressure ridges, refrozen cracks, and polynyas, or areas of open water surrounded by ice. This habitat preference is closely linked to the presence of their favourite food, ringed seals.

In areas such as eastern Baffin Island and Hudson Bay, where most or all of the pack ice melts by mid- to late summer, the whole bear population is forced to come ashore for two to four months in summer and early fall to wait for the ice to freeze again.

Polar bears are wonderfully adapted to their arctic surroundings. Their thick winter coats, with glossy guard hairs and dense underfur, and the thick layer of fat beneath their skin protect them against the cold. The guard hairs also shed water easily, so that after a swim the polar bear can shake itself like a dog to decrease chilling and speed the drying process. Polar bear hair is translucent and reflects the heat from the sun down to the base of the hair, where it is absorbed by the black skin.

The white colour of the polar bear also serves as camouflage. Polar bears are clever in their use of cover, be it land, water, or ice. This aids both their hunting of seals and their own escape from human hunters. The bears' feet have small bumps and cavities on the soles that act like suction cups, helping to keep the bears from slipping on the ice.

Probably the most significant adaptation of polar bears to the uncertainties of food availability in the Arctic is their ability to slow down their metabolism to conserve energy at any time of year. This occurs after seven to 10 days of not being able to feed and lasts until food becomes available again. In comparison, black or brown bears can slow down their metabolism only in response to not feeding in the late fall, just before they enter their dens for the winter. If food is removed from black or brown bears in spring or summer when they are not in their winter dens, they will simply starve to death.

Although polar bears of both sexes and all ages may occupy temporary dens or shelters during periods of cold or stormy weather, only pregnant females remain in dens throughout the winter.

The bears' normal gait is a slow, lumbering walk of about 5 to 6 km per hour. They may gallop when chased, but they usually do not like to run for long. Immature bears can run as far as 2 km, but older bears tire quickly because they are fat and well insulated, which causes them to overheat fairly quickly.

Polar bears will usually not attack humans except to protect their cubs or because they are starving.

Male polar bears commonly live to about 25 years of age. Females often live into their late twenties.

Unique characteristics

When hunting, polar bears rely mainly on their keen sense of smell. They can detect seal breathing holes covered by layers of ice and snow 90 cm or more thick and up to a kilometre away. Their eyesight and hearing are probably similar to those of a human.

Polar bears are excellent swimmers. They use their large front paws as powerful oars when they swim, while their rear paws trail behind and act like rudders. Underwater, they keep their eyes open. A polar bear may remain submerged for over a minute.

Range

Polar bears are most common along the coastal areas of the Arctic and the between-island channels of the various archipelagos, or groups of islands, in the Arctic. Small numbers of bears enter the permanent pack ice that lies over the central polar basin, and some have been recorded as far north as 88°N latitude. (The North Pole, which gives the "polar" bears their



name, is at 90°N latitude.) A few polar bears regularly appear as far south as Newfoundland and Labrador, and they have occasionally been noted in the Gulf of St. Lawrence in years when heavy pack ice drifts further to the south than normal.

One of the three largest maternity denning areas for polar bears worldwide is in Canada, near Churchill, Manitoba, on the western coast of Hudson Bay. The others are on Wrangel Island, in Russia, and in Kong Karls Land in Svalbard, Norway, in the Arctic Ocean.

Feeding

Polar bears are considered to be marine mammals because they depend upon seals and the marine environment for their existence. They feed mostly on ringed seals, but they also catch bearded seals, harp seals, hooded seals, and harbour seals. Occasionally, they may also kill walruses, belugas or white whales, and narwhals.

During the winter and spring, adult ringed seals maintain breathing holes in the fast ice by constantly scratching the ice with the heavy claws on their foreflippers. Younger seals are more abundant in areas where there is some open water during winter, such as adjacent to shore leads and polynyas, or stretches of areas of open water surrounded by ice, because it is easier to breathe there and they are able to avoid dominant adult seals that are more abundant in the fast ice.

The polar bears' large front paws are useful for hunting seals. When the seal comes up to the breathing hole for air, the polar bear kills it and flips it out of the water with a single blow of its paw.

During April and May, polar bears, especially females accompanied by dependent cubs, hunt for newborn ringed seals, or whitecoats, in their birth lairs in the underside of the snowdrifts that cover the seals' breathing holes. After smashing into the lairs and killing the seals, the bears eat mainly the fat and skin, often leaving much of the meat for scavengers. Seal pups and their mothers constitute the main part of the spring diet of polar bears, except for the nursing cubs.

Bears also stalk basking seals on land-fast ice or ice pans. During spring and early summer, when seals are most accessible, a bear may catch one every four to five days. The bear eats the fat as quickly as possible before another bear smells the kill and comes to compete for some of the carcass.

When the bears come ashore in areas where the pack ice melts during the summer, they can no longer hunt seals. They live mainly on their fat stores and conserve energy by remaining inactive over 80 percent of the time. They will scavenge on carcasses if they find them, and adolescents and females accompanied by dependent young, in particular, will occasionally eat grasses and berries. Bears have even been seen diving for seaweed and trying to catch seabirds sitting on the water by swimming underwater and coming up beneath them. Very few cases of bears killing and eating caribou and muskoxen are known.

Breeding

Males and females become sexually mature when they are four or five years old. Although the females may mate then and produce cubs, it is unlikely that many males breed until they are eight to 10 years old. Because cubs usually stay with their mothers for two and a half years, the most often a female is normally capable of having a litter is every three years. This is a very slow breeding rate, which explains why depleted populations take so long to recover.

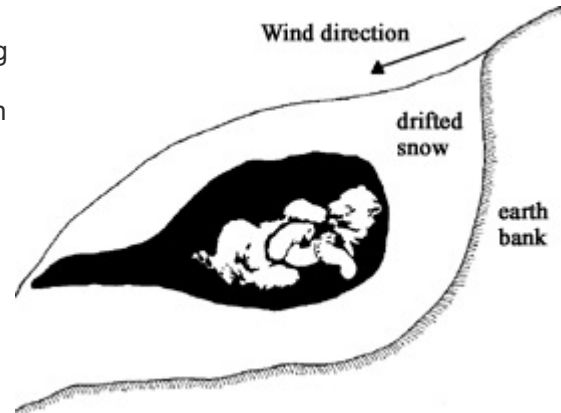
Mating occurs in April and May, when polar bears are out on the pack ice hunting seals. However, the fertilized egg does not implant in the uterus and begin to grow until mid-September to mid-October. Through most of the Arctic, maternity denning begins about mid-October. The pregnant females search for deep snowdrifts near the coast. Often they excavate their dens on the south-facing slopes of hills or valleys, where prevailing northerly winds pile up deep snowdrifts.

Dens vary in size, but the maternity denning chamber, at the upper end of an entrance tunnel 1 to 2 m long, averages a diameter of 1.5 m and a height of 90 to 100 cm in the middle. The opening to the entrance

tunnel is sealed with drifted snow shortly after the female excavates her den. The chamber is higher than the entrance tunnel, trapping any warmer air from the bears there. As a result, when the den is occupied, the inside temperature remains only a few degrees below 0°C throughout the winter, regardless of how cold the outside air temperature becomes.

The young are born after about two months of gestation, or pregnancy, from late November to early January, depending on latitude. The most common litter size is twins, followed by singletons. Triplets are born periodically, especially when feeding conditions have been good and the females are able to put on a lot of fat before denning; quadruplets have also been recorded, although this is extremely rare.

At birth, the cubs are only about 25 cm long and weigh less than one kilogram. Their eyes are closed at birth, and they are covered with hair so fine that in some early descriptions the cubs were reported to be hairless.



Most family groups in lower Hudson Bay break out of their dens from late February to mid-March, and up to one month later in the High Arctic. The family remains at the den site for one to two weeks, getting used to the cold and exercising. If the subsequent journey to the sea ice is more than a few kilometres, the females may stop two or three times a day to rest, feed the cubs, and warm them. Once back on the sea ice and hunting continuously, the female periodically digs resting pits in the snow, sheltered from the prevailing wind, where she nurses the cubs and where they can all sleep.

The family group breaks up when the cubs are about two and a half years old. Occasionally, cubs remain with their mothers until they are three and a half years old, and in western Hudson Bay, some mothers wean, or stop nursing, their cubs only when the cubs are one and a half years old. The most difficult time in a polar bear's life is probably its first year of independence. It is still learning to hunt proficiently, and, when it does catch a seal, it is likely to have the carcass taken away by larger bears.

Conservation

Untanned polar bear pelts sell for \$500 to \$3 000, depending on their size and quality. This can make up a significant portion of an Inuk hunter's cash income. Within the annual quota assigned to each coastal village in the Northwest Territories and Nunavut, hunters are also allowed to allocate a number of hunting tags to non-resident sport hunters, who are guided on a polar bear hunt by local Inuit hunters for fees that are normally in the range of \$18 000 to \$20 000 per hunt. This is an important source of cash income for small settlements in northern Canada. The annual economic value of the guided sport hunt and the hides is about \$1 million in Canada.

The tags from unsuccessful guided sport hunts cannot be reallocated to different hunters, and one consequence of that practice is that fewer bears are killed in total than would be the case if all the tags were allocated to subsistence hunters, or people who hunt in order to provide food for their families. Also, because most sport hunters seek large males, fewer adult females are killed overall, which provides some additional protection for the reproductive component of the population.

Polar bears are also highly valued as display animals in zoos and are one of the central attractions of the famous Moscow circus.

Bear meat may be eaten by humans and is often used as dog food. However, polar bear meat is sometimes infected with trichinosis, so it should be cooked thoroughly before being eaten. Polar bear liver can also be dangerous to humans and dogs because of its high vitamin A concentrations.

Although polar bears are not in immediate danger of extinction, they face threats common to all large predators: human encroachment on their habitat, illegal hunting, and chemical contaminants in their prey. A new threat appears to be global warming or climate change, which is affecting the polar bear's habitat by reducing the total ice cover in the Arctic, thinning the permanent pack ice of the central polar basin, and changing the timing of freeze-up and breakup in more southerly areas, such as Hudson Bay. The

Committee on the Status of Endangered Wildlife in Canada has designated the polar bear as a species of special concern in Canada because of characteristics that make it particularly sensitive to human activities or natural events.

The current world polar bear population is probably 25 000 to 30 000. The Canadian population likely exceeds 15 000. The human hunter is the primary predator of the polar bear. In recent years, hunters throughout the world have killed fewer than 1 000 yearly. Between 500 and 600 of these are taken by Inuit and Amerindian hunters in Canada under a system of annual quotas that is reviewed annually in Nunavut, the Northwest Territories, Yukon, Ontario, Manitoba, Quebec, and Newfoundland and Labrador.

The Canadian Wildlife Service has been studying the ecology of polar bears since 1961. This research provides information on population size, growth rates, reproduction rates, movements, levels of toxic chemical contamination, and the effects of long-term climatic and ecological change. The Canadian Wildlife Service is also represented on two permanent national polar bear committees (one comprising scientists and the other senior administrators), each of which meets annually to review new research results and management problems within Canada.

Conservation of polar bears requires international cooperation, as several populations are shared between countries and as problems such as contaminants and climatic change are affecting the whole Arctic. Since 1965, an international group of scientists specializing in studying polar bears has been coordinating research and management of polar bears throughout the Arctic under the auspices of the International Union for Conservation of Nature and Natural Resources (IUCN), also known as the World Conservation Union. Five countries—Canada, Denmark, Norway, the United States, and the U.S.S.R.—igned an International Agreement on the Conservation of Polar Bears in Oslo, Norway, in 1973. The agreement came into effect in 1976. The Canadian Wildlife Service is represented on the IUCN/Species Survival Commission Polar Bear Specialists Group, which meets every three or four years and provides advice on international aspects of research and conservation to the IUCN and to the nations that signed the Polar Bear Agreement.

At present, the polar bear is one of the best managed of the large arctic mammals. If all the arctic nations continue to abide by the terms and intent of the Polar Bear Agreement, the future of this magnificent species should be secure.

Resources

Print resources

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Catalogue number CW69-4/18-2003E-HTML

ISBN 0-662-34995-4

Text: I. Stirling

Photo: Bev McMullen

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Short-eared Owl

Scientific name:	<i>Asio flammeus</i>
Taxonomic group:	Birds
Range:	YT NT NU BC AB SK MB ON QC NB PE NS NL
Status under SARA*:	Special Concern, on Schedule 3
Last COSEWIC** designation:	Special Concern (April 1994)

*SARA: The Species at Risk Act

**COSEWIC: The Committee on the Status of Endangered Wildlife in Canada



Description

The Short-eared Owl is a medium-sized, buffy-white owl with very short ear tufts. The upper parts are broadly but softly streaked. Brown streaks on the abdomen are narrow and more sharply defined. Flight feathers and tail are barred with brown. It has poorly defined blackish areas, which frame the owl's yellow eyes. The owl displays a black patch near the wrist under the wing in flight. It is more buffy than the Long-eared Owl, with no cross-barring on its abdomen.

Distribution and Population

The Short-eared Owl breeds or winters in North, South and Middle America, Europe, Asia and Africa, for a nearly global range. In Canada, it breeds in every province and territory, from the southern border to the low Arctic. It is absent from the Boreal Forest and other heavily forested areas. In the winter it withdraws from the northern parts of its range, and remains only in the southern parts of most provinces. The historical distribution of the Short-eared Owl is probably similar to today's. The owl was likely found in open habitats and marshlands of southern Ontario, Quebec, British Columbia, Newfoundland and the Maritimes. Larger populations probably

occurred in the Prairies and across the north. Forest clearing in eastern Canada created new habitat, allowing populations to increase. Destruction of marshes and native grasslands, coupled with intensive agricultural practices, resulted in the species' decline. During the 20th century, population sizes were thought to have decreased in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario and Quebec. However, they remained stable in Newfoundland, Labrador and the Maritimes. The owl now occurs in small numbers throughout its Canadian range. Exact numbers are not known.

Habitat

The owl prefers extensive stretches of relatively open habitat. It is primarily a bird of marshland and deep grass fields. It likes to hunt and roost in abandoned pastures, fields, hay meadows, grain stubble, airports, young conifer plantations and marshes in the winter. It frequents prairies, grassy plains or tundra in the summer.

Biology

Atypically for an owl, the Short-eared Owl builds a new nest instead of claiming an abandoned one. Nests are usually slight depressions in the ground. In Ontario, some nests are cups of dried weeds or flattened grasses. Nests are often hidden under low shrubs, reeds and grasses, and are often located near water. When prey is plentiful, the breeding season begins sooner, and the clutch size is larger. Canadian populations usually raise one brood per year. Females may renest if nests or eggs are destroyed. The average clutch size is 5 eggs, but clutches of 4-14 eggs have been recorded. The young leave the nest at 24 to 27 days. Breeding begins at one year or younger. The species roosts in grass fields where its plumage blends in. The owl is nomadic, and wanders extensively within its winter and breeding ranges hunting for prey. In areas with lots of prey, individuals congregate and roost in groups in the winter. In the winter of 1984-85, 300-400 birds were reported at Toronto's Pearson International Airport. Most congregations consist of fewer than 10 birds. Like other raptors, the owl tends to flush from the nest at the last minute when approached. It has been known to attack human intruders near the nest, but will usually rely on distraction tactics, such as circling overhead using deep wing-beats or playing out its broken-wing act.

Threats

Large-scale destruction of native prairie grasslands has been particularly hard on this species. Natural succession, wetland drainage, urban expansion and increasingly intensive farming have contributed to its decline. The species is exposed to danger from predators and agricultural machinery since it nests on the ground. Effects of environmental contamination are not known. Shooting, collisions with aircraft, trains, cars, barbed wire and farm machinery are added factors. The species' attraction to open airport habitats is another problem.

Protection

Species that were designated at risk by COSEWIC prior to

October 1999 must be reassessed against revised criteria before they can be considered for addition to Schedule 1 of the *Species at Risk Act* (SARA). To find out when re-assessment of this species is anticipated, please consult the [COSEWIC web site](#).

The Short-eared Owl is not protected by the federal Migratory Birds Convention Act, but provincial legislation in most provinces protects it from hunting, possession and selling. Considerable sums are spent keeping this species and others away from airport runways.

Recovery Initiatives

Status of Recovery Planning

Recovery Strategies :

Name Recovery Strategy for Species at Risk in the South Okanagan and Lower Similkameen Valleys of BC: Towards integrating the landscape-level and single-species approaches to conservation

Status Preliminary draft received by leads

Number of Action Plans 0

Population Estimates

unknown	Manitoba Unknown	2006
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Recovery Progress and Activities

Summary of Progress to Date

This species is included within the South Okanagan - Similkameen Conservation Program (SOSCP) multi-species association.

The goals of the SOSCP are to (1) maintain a diversity of habitats that will sustain ecosystem function; (2) maintain viable populations of all native species in the ecosystem; and (3) balance the ecological, economic, and social needs of local communities in the area. The draft strategy (www.soscp.org/media/Sokrecovery.pdf) integrates a landscape-level approach to conservation planning with species-specific recovery planning.

Since the SOSCP started in the 1980s substantial progress has been made in the protection and restoration of natural habitat, including landowner awareness of stewardship practices that protect habitat for species at risk. Knowledge has been gathered on local species at risk, the ecosystems upon which they depend, and conservation practices that can protect them. However, over the same twenty years, a great deal of habitat has been lost, as urban and agricultural developments have grown. The need to protect remaining parcels of natural habitat and to improve stewardship of agricultural and other modified lands is as urgent as ever.

Summary of Research/Monitoring Activities

Research projects conducted under SOSCP's "umbrella" have attempted to answer questions at the ecosystem level, the habitat level and the species level. For example, one project is evaluating the use of a computer modeling technique for identifying sets of areas across the landscape that, if protected, would provide the greatest contribution of biodiversity to existing conservation networks. This project is helping to prioritize areas to focus conservation effort. A project at the habitat level is comparing the effect of several cattle grazing prescriptions on plant communities that provide habitat for endangered or threatened plants and animals. Results from this research will be used to produce recommendations for "biodiversity friendly grazing practices". Research at the species level includes assessments of endangered species' habitat requirements as well as other projects informing species-level recovery planning.

The result of years of research, the Habitat Atlas for Wildlife at Risk in the South Okanagan and Lower Similkameen

(<http://wlapwww.gov.bc.ca/sir/fwh/wld/atlas/index.html>) includes 32 species accounts with descriptions of threats and management recommendations. The Habitat Atlas also describes broad habitat types, activities that degrade these habitats and stewardship options available to landowners.

Many SOSCP conservation initiatives include a research and monitoring component in order to continually improve the techniques used for habitat protection and restoration. For example, the Nature Trust is currently testing the relative effectiveness of chemical, mechanical and biological agents for controlling invasive weeds on its properties.

Summary of Recovery Activities

SOSCP partners facilitate private land stewardship in numerous ways. Stewardship information is provided on-line, at habitat restoration workshops and other public events, and outreach also takes place at the habitat interpretation centre operated by the Osoyoos Desert Society. Landowners and land trusts work together to establish stewardship agreements, conservation covenants, and management prescriptions that conserve and restore habitat on their property. Several organic farms, orchards and vineyards have signed agreements with The Land Conservancy (TLC) as "Conservation Partners". In recognition of their protection and enhancement of habitat, these producers receive a Conservation Partners label for their products. Similarly, the Nature Trust of BC has worked with ranches in this region to integrate conservation activities with grazing.

TLC, the Nature Trust and the Nature Conservancy of Canada also acquire properties for conservation and restoration by donation or purchase. Public involvement is necessary for such initiatives and fundraising by land trusts is on-going.

The En'owkin Centre (Okanagan Indian Educational Resources Society) has embarked on a land-use planning and restoration project for First Nations Lands, which provide crucial habitat for many species at risk. Input will also be provided to recovery teams based on the work of Traditional Ecological Knowledge councils and

traditional conservation practices.

In 2005, the SOSCP began a two-year project to support local decision makers in the development of environmental policy for the Regional Growth Strategy. The SOSCP provides expert knowledge in conservation science and conservation policy, and will identify knowledge gaps that need to be filled to evaluate policy options.

HINTERLAND WHO'S WHO



Photo: Parks Canada

WOLVERINE

The wolverine has been described as the fiercest creature on earth.

Wolverine

This animal

- generally prefers remote areas, far away from humans and development
- can travel up to 40 km during its daily hunting activities
- is known by a variety of descriptive names, including “skunk-bear,” because it marks its food and various landmarks with urine and musk
- has one of the most striking pelts of all fur-bearing animals



Description

Although the wolverine *Gulo gulo* belongs to the weasel family, Mustelidae, it is not long and lean like a weasel, but short and thick, like a small bear. Its head is broad and round, with small eyes and short rounded ears. Its legs are short and sturdy, with five toes on each foot. Its long, curved claws are semi-retractile, which means they can be partly drawn back in, and they are used for climbing and digging. Its teeth are strong, and its head, neck, and shoulder muscles are well developed. These adaptations allow the wolverine to feed on frozen flesh and bone, and they provide a clue as to how wolverines survive.

An adult wolverine is about the size of a medium-sized dog. Adult males weigh about 12 to 18 kg, adult females about 8 to 12 kg. Wolverines that live in the north of their range are usually larger than those living farther south.

The wolverine has one of the most striking pelts of all fur-bearing animals. Its fur is typically a rich, glossy, dark brown. Two pale yellow stripes originate at the nape of its neck and sweep along each flank to merge at the base of its long, bushy tail. White or orange patches are common on the chest or throat. The wolverine's toes, forepaws, or legs may occasionally be marked with white.

Habitat and habits

Within its range, the wolverine occupies many different kinds of habitats. Wolverines generally prefer remote areas, far away from humans and their developments. However, the specific characteristics of the

wilderness that the wolverine depends upon are not yet known. Labrador and Quebec, for example, have not been recolonized by wolverines, despite the abundance of caribou and undisturbed habitat. This lack of knowledge about wolverine habitat makes it difficult for wildlife managers to manage the species and protect its habitat.

One specific type of habitat wolverines need is the den used by the female to give birth and raise her kits. Finding such a den is difficult. Most dens that have been found are in tundra regions and consist of a complex of snow tunnels associated with boulders or rocks. The configuration of the rocks results in natural cavities under the snow, which form dens for the wolverines.

Studies are expensive and difficult to conduct because of wolverines' large home ranges and low densities. It is not surprising that we are still learning about the biology and behaviour of this species. Some of the mysteries have been dispelled with the help of studies in Alaska, Montana, British Columbia, Yukon, and Nunavut of wolverines equipped with collars that allow their movements to be monitored using satellites.

The home range of an adult wolverine extends from less than 100 km² for females to over 1 000 km² for males. These home ranges are the largest reported for a carnivore of this size, and in many areas they rival the home ranges of bears, wolves, and cougars. The size of the home range varies depending on the availability of food and how it is distributed across the landscape — the more food there is, the smaller the home range needs to be.

The density of wolverines ranges from one individual per 40 km² to one per 800 km². Those regions that have the most different kinds of habitat and prey, particularly those that include large ungulates, or animals with hooves, contain the most wolverines. The mountainous and forested areas of British Columbia and Yukon have the highest densities, although these numbers are still low compared with the densities of other carnivores. Densities of wolverines in Manitoba and Ontario are lower. The rarity of wolverines becomes readily apparent when their density is compared with the density of other solitary carnivores: one coyote per 0.5 to 10 km² and one grizzly bear per 1.5 to 260 km².

Wolverines can travel long distances during their daily hunting activities, up to 40 km, with males travelling farther than females. They have traditional routes, and they revisit the same places every year. Wolverines are constantly on the move, unless they have found a kill site. The young leave their home range, or disperse, when they become sexually mature, at about one or two years of age. These dispersal movements can be extensive, 300 km and more for young males. The young females settle within or next to the area where they were born.

The wolverine is known by a variety of descriptive names, including "skunk-bear," because it marks its food and various landmarks with urine and musk, a fluid secreted from its anal glands, and "glutton," because of its voracious appetite.

The wolverine has been described as the fiercest creature on earth and a fearless aggressive fighter that will drive bears away from their kills. It is, in fact, the wolverine's reliance on scavenging in order to survive that has given rise to exaggerations about its gluttony and ferocity.

The wolverine is also a creature important in the folklore of North American First Nations peoples and a mammal very well adapted for its way of life.

Because of its reputation and conflicts with trappers, the wolverine was considered a pest by European North Americans, an attitude that persisted into the 1960s. Today, wolverines' numbers are greatly reduced in some areas, and conservation biologists and wildlife managers consider wolverines to be animals in need of protection.

Unique characteristics

Few people, even those who spend a lot of time outdoors, have seen wolverines in the wild. This contributes to the animals' mysterious reputation and explains why they are probably the most misunderstood and one of the least known of Canada's wild animals.

Range

The wolverine is found throughout all northern regions of the globe. Wolverines are not abundant anywhere, even where they do well. The species is known for a large home range and low density, which is a measure of its numbers. The Committee on the Status of Endangered Wildlife in Canada considers wolverines found west of Hudson Bay to be of "special concern" and the eastern population, found in Quebec and Labrador, to be "endangered."

Historically, before the appearance of Europeans in North America, wolverines occurred throughout Canada and Alaska, with some small extensions of this range into the western United States and into the Great Lakes area. They occupied a wide variety of habitat types, excepting very dry, hot areas.

A portion of the wolverine's historical range has been lost. Wolverines have also disappeared from areas with relatively intact habitats. Eastern Canada and the western United States have been particularly hard hit. Wolverines disappeared most rapidly at the edges of their distribution and in Eastern Canada. We do not know if any wolverines still occur in Eastern Canada, although Labrador and Quebec are still considered part of the current distribution. Similarly, whether wolverines still occur on Vancouver Island is unknown.

There are two main reasons why wolverine populations disappeared from parts of North America. The first is that wolverines are scavengers—which means they feed on carrion, or dead animals—and are attracted to bait. Because the wolverines damaged traplines, early trappers used any means to kill them, including poison. The extensive wolf poisoning programs that occurred throughout Canada beginning in the late 1700s also killed many wolverines.

The second, and more important, reason for the decline of wolverine populations is that wolverines have a low resiliency because of their low densities and low reproduction, or the number of young that are successfully produced and raised. This means that wolverine populations have a difficult time rebounding once their numbers have been lowered by either nature or human-influenced factors.

Feeding

The wolverine is a carnivore, or flesh eater. It is more of a scavenger than a hunter, and is usually dependent on other carnivores, such as wolves, to kill the animals for it to eat. Leftovers from a wolf kill can be considerable. The wolverine has been known to carry away moose carcasses and caribou heads. Because of its great dependence on carrion, or dead flesh, from large mammal kills, the wolverine needs to be able to survive long periods without food. It will revisit old kills to consume frozen bones and pelts when it cannot find other food.

Some individual wolverines can become good hunters and can kill young and adult ungulates, or animals with hooves, such as caribou and even moose, if the prey is in poor physical condition or if the wolverine has manoeuvred it into a disadvantaged position, such as in heavy snow.

Since ungulates are not always available, wolverines must have a diversity of prey in their diet to survive. Female wolverines with young, or "kits," rely on small mammals, such as marmots and ground squirrels. As the movements of family groups are restricted, food must be found in a smaller area. Snowshoe hares, especially when they are particularly abundant, are an important food source for all wolverines. Wolverines hide excess food by burying it or stashing it in rock crevices or in trees.

Breeding

Wolverines mate in the summer and reproduce by what is known as "delayed implantation." The egg is fertilized, but its development temporarily stops. The egg floats around in the uterus and implants some time later, as early as November or as late as March. The active period of gestation, or pregnancy, lasts 30 to 40 days. Birth occurs between February and May.

The female gives birth to and raises her kits in a den. Most dens that have been found are in tundra regions and consist of a complex of snow tunnels that have formed naturally around rock configurations.

Wolverines can have as many as six kits, but they typically have three or fewer. Not all of the young survive

their first year: some die of starvation, others from predation. Wolverine kits grow quickly compared to the young of other mammals. This rapid rate of growth continues after the mother stops nursing her kits, which happens at nine or 10 weeks of age. Kits reach the size of adults by seven months of age.

When food is scarce, a high percentage of a population will not have young. In fact, some females may not reproduce even when food is apparently abundant, because raising young results in a large loss of energy for wolverine mothers. The mechanism of delayed implantation, which allows wolverines to have young when food is most abundant and to adjust the size of the litter to the availability of food, is an effective way of reproducing without sacrificing precious energy.

Conservation

Wolverines have few natural predators, but they are occasionally attacked and killed, although seldom eaten, by wolves and other large carnivores. Eagles have been known to take young kits. Wolverine mothers go to great lengths to find secure dens for their young, suggesting that predation may be important in some areas. During the mating season, fights between resident males and other males can occur as they compete for females. It may be this fighting that encourages the young males to disperse considerable distances.

Scavenging is a difficult way to survive. Many young, inexperienced wolverines and very old wolverines die from starvation, even if food is abundant. Transients, typically young adults passing through the territory, have a higher mortality rate than residents, because they do not benefit from hunting in a familiar home range.

The wolverine pelt remains one of the most prized furs because of its beauty and because frost brushes off easily. The Inuit and Dene of northern Canada use wolverine fur as trim and lining for their clothing, such as parkas, mitts, and moccasins. Over 80 percent of all wolverine pelts sold in Canada—about 400 to 600 each year—come from the Northwest Territories, Nunavut, Yukon, and British Columbia. Wolverine fur is consistently high in value: a well-handled and prime pelt sells for an average of \$400.

Roads that permit human access to wolverine habitat can be detrimental to wolverine populations, especially if the animals are also killed by trapping or hunting. In areas where logging occurs, wolverines may use the forested corridors adjacent to roads to get to other parts of their home ranges. This makes them vulnerable to trappers who use the same roads to set their traps. Major roads, like the Trans-Canada Highway, can also keep wolverines from reaching important parts of their habitat.

Denning females are sensitive to disturbance, particularly human activity. Even the presence of careful researchers has caused wolverines to abandon their dens. The increasing use of snowmobiles and skiing in the vicinity of wolverine dens, such as in subalpine mountainous regions, can harm wolverine populations. However, in tundra areas, female wolverines have tolerated human activity without abandoning their dens.

A number of zoological organizations and individuals have been successful in raising wolverines in captivity. Researchers have learned much about wolverine behaviour from studying these captive animals. It has been suggested that wolverines raised in captivity could be used in reintroductions, where wolverines are moved to a new region in order to increase or augment existing populations or assist in the recovery of endangered populations. The success of wolverine reintroductions depends on many factors. There must be a sufficient supply of animals, and reintroduced animals must originate from the same habitat, environmental conditions, and genetic stock (to protect those characteristics that have allowed them to adapt to those environmental conditions) as the animals they are joining.

A recovery plan is being written to examine the options for the survival of the eastern Canadian wolverine population and the measures necessary to achieve its recovery. In other regions of Canada, trapping can be a concern in areas where safe places or refuges for wolverines need to be maintained, especially if an increase in population numbers is required. Trapping must be excluded over a very large area to protect a sufficient number of resident wolverines. Protection of denning habitat from human disturbance may also be critical for wolverine survival.

Wolverines are subject to the same habitat threats that affect other large carnivores in Canada, like the grizzly bear. The wolverine does not appear to thrive in habitats that have been permanently altered by

land-based activities, such as agriculture, urban and industrial development, and human settlement. The problem does not appear to be the actual loss of habitat or the presence of humans. Instead, the problem seems to be the breaking up, or fragmentation, of the wolverine habitat, as well as the increased human access to the habitat. Studies of wolverine ecology do not suggest that wolverines cannot co-exist with certain land-use activities, such as forestry and mining. However, where such activities occur, especially if they are coupled with trapping, low-density wolverine populations can have a difficult time surviving or growing. Even higher-density populations, such as those in the mountainous areas of British Columbia, can be negatively affected by human access and trapping.

The future of the wolverine in Canada is of international importance. At present, Russia, Canada, and Alaska maintain the only large and relatively secure populations left in the world. Within North America, the species' long-term survival in the western United States is dependent upon maintaining continuity with wolverines in British Columbia and Alberta. Success at retaining wilderness in Canada may be the key to maintaining and restoring the wolverine throughout its range.

Resources

Online resources

[The Wolverine Foundation](#)

[Canadian Wildlife Service, Species at Risk](#)

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Catalogue number CW-69-4/100-2001E

ISBN 0-662-30271-0

Text: V. Banci

Photo: Parks Canada