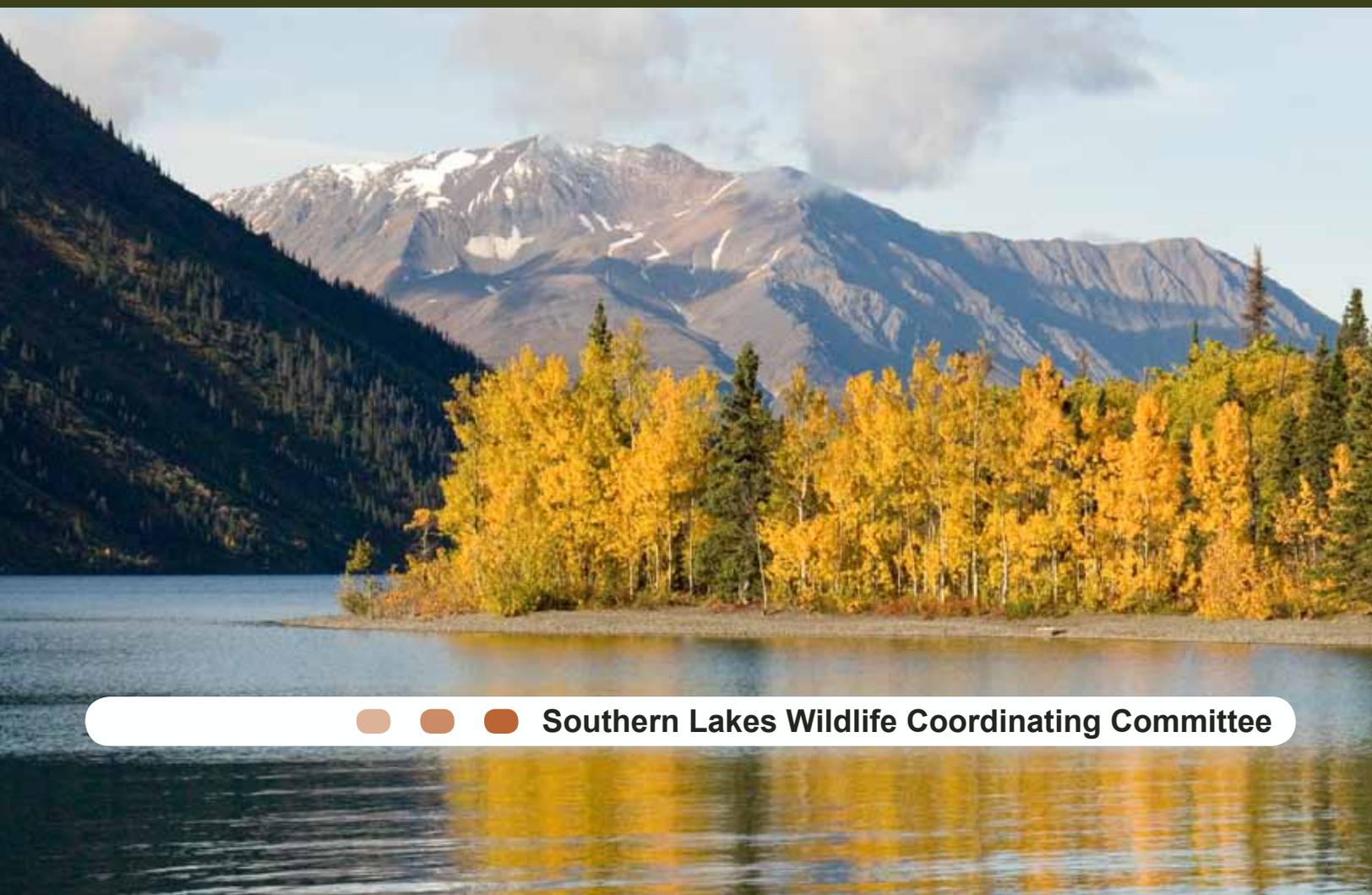




Regional Assessment of Wildlife in the Yukon Southern Lakes Area

Volume 2: Species Status Assessment



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Prepared by:
Southern Lakes Wildlife Coordinating Committee

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Disclaimer

This report describes the results of work by the Southern Lakes Wildlife Coordinating Committee. The Southern Lakes Wildlife Coordinating Committee recommendations shall not create any commitments or obligations that are legally binding or create or affect any legal rights of the Parties. Without limiting the generality of the foregoing these recommendations shall not create, affect, define or interpret any roles, responsibilities, rights, or interests under the First Nation Final or Self-Government Agreements.

Copies available from:

Yukon Department of Environment
Fish and Wildlife Branch, V-5A
Box 2703, Whitehorse, Yukon Y1A 2C6
Phone (867) 667-5721, Fax (867) 393-6263
E-mail: environmentyukon@gov.yk.ca

Also available online at www.southernlakeswildlife.ca

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Summary

The Southern Lakes Wildlife Coordinating Committee was established on April 1, 2008. Its composition, mandate and duties are set out in Schedules B and E, respectively, of Chapter 16 of the Kwanlin Dün and Carcross/Tagish First Nations' Final Agreements.

Nine committee members represent government parties that have authority and responsibilities for land and wildlife management. These governments include Kwanlin Dün First Nation, Carcross/Tagish First Nation, Ta'an Kwäch'än Council, Teslin Tlingit Council, Champagne and Aishihik First Nations, Taku River Tlingit First Nation, Canada, Yukon and British Columbia.

The Committee's objectives are:

1. To coordinate management of caribou, moose, sheep and other wildlife populations and their habitats in the Southern Lakes area to promote the recovery and conservation of these populations, with consideration for the future subsistence needs of the First Nations in the Southern Lakes area, as well as the future needs of other users, both consumptive and non-consumptive; and
2. To coordinate the involvement of and improve communications among the First Nations, governments of Yukon, Canada, British Columbia, and others with regard to all aspects of the recovery and management of caribou, moose, sheep and other wildlife populations and their habitats in the Southern Lakes area.

The Committee's duties are:

1. To make recommendations to the parties on any matters affecting caribou, moose, sheep and other wildlife and their habitat, including recommendations concerning legislation, policies, and programs; and
2. To prepare and submit a regional wildlife assessment taking into account past and present status of wildlife populations and habitats, harvest, subsistence needs, existing regulations, programs, policies and plans, and scientific, traditional and local knowledge.

The Regional Wildlife Assessment

The Southern Lakes regional wildlife assessment and recommendations is the first joint effort by all governments (Canada, Yukon, British Columbia and First Nations) to recover and conserve wildlife populations and their habitat in this area. The authority, structures and objectives of First Nation final and self-government agreements made this collaboration possible.

Governance in the Southern Lakes area is complex, with governing parties in the Yukon, boards and councils with wildlife responsibilities, and transboundary management with British Columbia and the Taku River Tlingit First Nation. Open communication and cooperation will be needed to effectively manage wildlife and their habitats. This is the purpose of the Southern Lakes regional wildlife assessment and recommendations.

Scope

The most comprehensive assessment of wildlife knowledge and concerns to date, the assessment compiles all relevant and current information on wildlife populations and their habitats in the area. The responsible parties, Yukon Fish and Wildlife Management Board, Renewable Resources Councils and the public provided extensive input. The recommendations guide and enable the parties to coordinate their efforts in the public management of wildlife and habitats in the Southern Lakes area.

The Southern Lakes regional wildlife assessment has two volumes:

- Volume 1 provides the context and the recommendations. It describes the committee and its work, the Southern Lakes area, the current wildlife management regimes, and includes the committee's recommendations.
- Volume 2 (this volume) provides a status assessment of each species (or groups of species) and their habitats.

The regional wildlife assessment is a summary of all available information for birds, mammals and amphibians in the Southern Lakes area. It is a snapshot in time of our current knowledge and reports information gaps. The assessment is focused on reporting species distribution, abundance, status, and trends. The assessment was not intended to provide detailed notes on species biology.

Organization

Independent authors were hired to compile technical information for the status assessments of birds, mammals, and amphibians. First Nation governments assembled relevant traditional information to incorporate into the assessment through workshops and interviews. A professional editor was engaged to ensure chapters were concise and consistent.

Volume 2 of the regional wildlife assessment is divided into the following sections:

- Ungulates
- Large Carnivores
- Furbearers
- Small Mammals
- Upland Game Birds
- Birds of Prey
- Migratory Birds
- Resident Birds
- Waterfowl
- Amphibians

Each section addresses the following information:

- *Introduction* – lists all species considered in the chapter, including common and scientific names.
- *Significance* – outlines the general significance of the species including traditional use, human values, and ecological values.
- *Distribution and Abundance* – provides a brief overview of the species distribution and abundance, including a summary of surveys done for these species and methods used to inventory of monitor the species.
- *Harvest Trends* – describes the trend in harvest and includes method of tracking harvest and reliability, accuracy and completeness of the harvest records.
- *Species Assessment* – summarizes the status of each species and includes territorial, national and global status rankings.
- *Stressors and Threats* – notes the stressors and threats to the species and includes harvest, habitat loss and fragmentation, human disturbance, diseases and parasites, as appropriate. Measures in place to lessen the impact of these stressors are included.
- *Key Habitats* – describes the key habitats for the species and outlines if any key habitats are identified and/or protected.

- *Species Management* – assesses which governments have management authority for the species and the nature of management actions taken.
- *Education and Outreach* – offers an overview of education and outreach activities focused on the species, and identifies potential activities for furthering management goals.

Audiences

The main audience for the regional wildlife assessment is the parties who are responsible for wildlife and habitat management in the Southern Lakes area. The federal, territorial and First Nation governments collectively have legislative powers for land use and disposition, wildlife management, and harvest management.

Another important audience includes the Yukon Fish and Wildlife Management Board, local Renewable Resource Councils, and other bodies involved in land use planning and resource management.

It is anticipated that this assessment and associated recommendations may also be of interest to non-governmental organizations and associations and academic institutions that have an interest in delivering wildlife-related programs that focus on monitoring, research, education or outreach in the Southern Lakes area.

Ungulates

Introduction

The Southern Lakes area is home to 7 ungulates: bison (*Bison bison*), woodland caribou (*Rangifer tarandus*), mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), mountain goat (*Oreamnos americanus*), moose (*Alces americanus*) and thinhorn sheep (*Ovis dalli*).

Bison

Wood bison are the largest land mammal in North America. These social, herd animals were once widespread in the Yukon and across Canada. By the 20th century only a few hundred wood bison remained in North America. Elders in southeast Yukon report that bison were in the Teslin, Ross River and Liard area until the 1900s.

The discovery of a small, isolated population of wood bison in 1959 in the Northwest Territories led to a nationwide effort to conserve the species and

reintroduce them to their historical range. Between 1986 and 1992 the Yukon government released 170 wood bison into the Nisling River watershed. This recovery effort successfully established a wood bison herd in the Aishihik area of southwestern Yukon.

Caribou

Southern Lakes caribou are part of the northern mountain woodland caribou population which range through northern British Columbia, Northwest Territories, Alaska, and the Yukon. The Southern Lakes caribou form three distinct and relatively independent herds: Carcross, Ibex and Atlin.

Caribou are associated with old growth forests and they are sensitive to habitat alterations and human activities on their range. In the past 100 years woodland caribou across Canada have declined significantly and some populations have been extirpated. These declines are due to changing landscapes from both human and natural factors.

In 1992, community concern over declining caribou numbers in the Southern Lakes area led to the formation of the Southern Lakes Caribou Steering Committee. The community-based Southern Lakes Caribou Recovery Program stopped most hunting through a season closure for licensed Yukon hunters, and First Nations encouraged a voluntary harvest ban. During the program caribou numbers from the Carcross and Ibex herds have roughly doubled.

Deer

Deer are relatively recent arrivals in the Yukon. Sightings of deer date back as far back as the late 1890s. Mule deer are somewhat common in the Southern Lakes area. Although less common than mule deer, sightings of white-tailed deer (*Odocoileus virginianus*) have been reported from several Yukon locations, including the Whitehorse area.

Deer are at the northern edge of their range in the Yukon. Likely the Alaska Highway and river corridors facilitated their movement into the territory. The Southern Lakes region has good natural deer habitats in the form of south-facing, grassy slopes, burnt areas, as well as abundance of human-created habitats such as agricultural fields, gardens and seeded road allowances. Climate is probably a constraining factor for deer in the region.

Elk

Elk are the second largest species of deer in the world. Only moose are larger. Elk in the Southern Lakes area descend from animals introduced from Elk Island National Park in Alberta. In the late 1940s, the Yukon Fish and Game Association successfully lobbied the Commissioner of Yukon to introduce free-ranging elk in the southwestern Yukon. The intent was to provide new hunting opportunities and reduce pressure on other ungulates.

Elk in the Yukon are at the northern extent of their range. The two populations of elk in the Southern Lakes area – the Takhini Valley herd and the Braeburn herd – are the result of introductions that began in 1951 and 1954 when 49 elk were released near Braeburn. An additional 119 animals were released in the Braeburn Lake, Hutshi Lakes and Takhini River valley areas in the late 1980s and early 1990s.

Mountain Goats

Found only in western North America, mountain goats reach the northern extreme of their distribution in the Yukon. Numbers are low and relatively few areas of the territory support their populations. In the Southern Lakes region, the area between Kusawa Lake and Taku Arm, generally along the B.C.-Yukon border, supports goat habitat.

Moose

Moose are widely distributed in the Yukon, including the Southern Lakes area. Local knowledge from the Southern Lakes area suggests that moose populations have declined in the last fifty to sixty years. Today the moose population in some parts of the Southern Lakes is less than one-third of the population prior to 1980.

Sheep

Thinhorn sheep are found in all but a few sub-zones of the Southern Lakes region in varying densities. Dall's sheep (*O. d. dalli*) is the most abundant thinhorn sub-species in the Southern Lakes. Small pockets of Fannin sheep (a variation of Dall's sheep with darker-coloured coats) can be found east of Lake Laberge. No Stone sheep (*O. d. stonei*) are known to regularly occur in the area.

Species Assessments

Environment Yukon maintains a database of observations of species at risk in Yukon, as part of the Yukon Conservation Data Centre. Committee on the Status of Endangered Wildlife in Canada (COSEWIC), General Status, NatureServe global, and territorial, and the International Union for Conservation of Nature (IUCN) rankings for ungulates of the Southern Lakes area are summarized in Table 1.

Table 1. COSEWIC, General Status, NatureServe global, and IUCN rankings for ungulates of the Southern Lakes area.

Common Name	COSEWIC	General Status (2010) Yukon	NatureServe	IUCN
Wood bison	Threatened	At risk	G4T2Q (Imperiled)	Near threatened
Woodland caribou (northern mountain population)	Special Concern	Sensitive	G5T4 (Apparently secure)	Least Concern
Mule deer	Not listed	Sensitive	G5	Least Concern
White-tailed deer	Not listed	Undetermined	G5	Least Concern
Elk	Undetermined	Secure	G5S5 (<i>Secure</i>)	Least Concern
Moose	Not assessed	Secure	G5S5 (<i>Secure</i>)	Least Concern
Mountain goat	Not listed	Secure	G5N4S3S (Vulnerable)	Least Concern
Thinhorn sheep	Not listed	Secure	G5N4N5S4 (Apparently secure)	Least Concern

In 1978 COSEWIC classified wood bison as endangered. In 1988 COSEWIC downlisted it to threatened, and in 2000 they re-affirmed the designation. In 2002 COSEWIC re-examined and designated woodland caribou as special concern.

Wood bison and woodland caribou (northern mountain population) are listed under Schedule 1 of the federal *Species at Risk Act* (SARA). Yukon

ungulates and their habitat are protected by the *Yukon Wildlife Act* and *Environment Act*, and they are classified as a big game species in the *Yukon Wildlife Act*.

The Takhini and Braeburn elk herds were classified as an exotic species in the 2005 conservation ranking of Yukon wildlife. The Yukon First Nations Umbrella Final Agreement exempts elk from First Nations subsistence harvesting rights.

Wood bison is listed as an Appendix II species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which regulates and monitors international trade of wood bison or their parts and products. The United States Fish and Wildlife Service lists the wood bison as Endangered in Canada under the *U.S. Endangered Species Act* which means that wood bison, including parts and products cannot be imported into the U.S. without a permit from the U.S. government.

Stressors and Threats

Hunting

Licensed hunting closures and a voluntary First Nation harvest ban have been critical to the success of the Southern Lakes Caribou Recovery Program. Caribou harvest requires appropriate management to maintain populations at sustainable levels.

Over-harvest is the most significant threat to moose in the Southern Lakes area. Without complete harvest reporting, wildlife managers are unable to fully assess the impact of harvest on moose numbers. However, data suggest that easy access to moose along with the past liberal harvest regulations resulted in unsustainable harvest rates and local population declines.

Mountain goats are also vulnerable to overharvest. Researchers showed that annual harvest rates above 1 per cent are not sustainable for many populations, and that small populations cannot sustain harvest. Female goat harvest and inadequate inventory information can make populations even more susceptible to overharvest.

While the annual licensed harvest of mule deer is small, averaging fewer than 6 deer per year, it is known that First Nations also harvest deer for subsistence. The combined impact on deer populations is unknown but considered sustainable. Hunters are asked to voluntarily refrain from killing white-tailed deer because they are especially rare and even a small harvest could be harmful to their population.

Habitat loss and fragmentation

The Southern Lakes caribou ranges are adjacent to the most populated areas of the Yukon, making them particularly vulnerable to habitat loss, degradation, and fragmentation.

Roads remove habitat and may act as a barrier to movement or change the migration patterns of caribou. Recreational vehicle use can cause habitat loss and degradation. For example, summer all terrain vehicle (ATV) traffic in key Ibex winter concentration areas is causing extensive braiding of trails.

Developments that alter habitats have less direct impact on moose, since moose do well in early-successional habitats. However, development often results in increased access to moose habitats, which may increase hunting. Areas with easy access have the potential to be exploited quickly.

Disturbance

Off-road vehicles (ORV) such as ATVs and snowmobiles can displace and disturb ungulates. Few tools are available to mitigate the increasing effects of ORV and skidoo access.

Growing trail networks that access important ungulate habitats is a concern. Disturbances can trigger a flight response by ungulates that leads them to use important winter energy reserves and spending time looking out for human activity when they should be feeding and watching for predators. Even without obvious signs of stress, disturbance may affect ungulate fitness. Given that ungulates show strong fidelity to specific sites, activities that alter habitat in important seasonal ranges will likely impact ungulate productivity.

Collisions with vehicles

Ungulate species most at risk of collisions with vehicles are elk, caribou, bison, deer, and moose. Road mortalities in the Southern Lakes could rise as a result of increased traffic, particularly larger vehicles associated with industrial development and mining projects.

While the number of Carcross caribou lost to vehicle traffic is relatively low, many are pregnant females. This mortality can reduce future growth and is significant in relation to the ongoing herd recovery.

Though the number varies greatly between years, about 15 deer are killed in vehicle collisions in the Yukon each year. Two-thirds of these are in the Southern Lakes area. The loss of mule deer to road traffic exceeds the hunter harvest.

Elk that use the Alaska and North Klondike highways pose a hazard to motorists and animals. The Aishihik wood bison herd also uses the Alaska

Highway between Mendenhall River and Canyon village. Grasses that are planted or naturally colonize along the roadside are attractive forage.

Disease

Various diseases can afflict Yukon ungulates. Some are of concern, while others are not. Disease control in wild populations is very difficult and attention needs to be placed on disease prevention and early detection.

Diseases affecting wood bison are tuberculosis, brucellosis, and anthrax. These diseases have hampered conservation efforts for wood bison in other areas. Wood bison transplanted to the Yukon were considered disease-free, and efforts are made to keep the herd free of these diseases of concern.

Diseases like chronic wasting disease, tuberculosis, malignant catarrhal fever, paratuberculosis (Johne's disease) and winter tick can seriously impact elk and other wildlife. Winter ticks appear to be established in elk in the Southern Lakes area. A warming climate may support increased tick numbers and distribution. Elk are able to groom winter ticks off their hides before they become a problem. Very high numbers of ticks are generally only present on animals that are already physically stressed.

Diseases that can cause mortality in mountain goats include contagious ecthema, West Nile virus, and Johne's disease. Thinhorn sheep are susceptible to bacterial infections that can lead to pneumonia and other diseases. Yukon sheep have not experienced significant disease or predator-related declines to date.

Historically, diseases and parasites played a minor role in moose population dynamics in the Yukon. Diseases and parasites may become more of a problem for moose in the future, as a warming climate permits the establishment and growth of parasite populations.

Conflict with people

In the Southern Lakes area, access to hay fields, forage crops and vegetables gardens means that ungulates may come into conflict with landowners and local residents. Communities are concerned about how wood bison affect other wildlife populations, especially moose, caribou, Dall's sheep, and muskrats. In addition, rare plants in the area's relict boreal grasslands may be trampled and grazed by wood bison. First Nations want to discourage wood bison from parts of their traditional territory until the effects of wood bison on the land and ecosystems are better known.

Predation

Predation by wolves and grizzly bears is a natural limiting factor on moose populations. However, predation may have an impact on ungulate recovery when populations are at very low densities. This may be part of what is occurring in the Whitehorse South and Carcross survey areas, where past over-harvest of moose resulted in low moose population numbers. Predators may be reducing the recovery potential of these low-density moose populations.

There are some concerns about recruitment rates in both the Atlin and Carcross caribou herds. While climate likely has some influence on caribou calf survival rates, interactions with predators such as wolves and bears could also have some impact in the early post calving period.

Typically, mule deer are prey for a host of predators. Predation can limit population growth, especially if deer already occur in small populations and are weakened by severe winters.

Climate

Data from a number of Yukon caribou herds demonstrate a relationship between severe late winter snow depths and delayed snow pack on the calving range (poor spring weather) and the survival of calves to the rut period. Unknown pressures associated with climate change, such as changes to habitat or disease and parasites, may also impact calf survival and herd growth. Communities are concerned that caribou are changing their rutting patterns which may be caused by climate change.

Although the potential impacts from climate change on moose and their habitats are uncertain, some First Nations are concerned that ruts are changing and starting later than they used to. Traditionally, elders knew and understood rutting patterns from the weather, but climate change is changing this.

Deer are at the very northern edge of their range in the Yukon, and are susceptible to severe winters with deep snow and very cold temperatures. Deer populations may be dramatically reduced in years with harsh winters or deep snow. Deer appear to benefit from the warming of climate which could be one of the factors allowing them to increase their population size and expand their range north, although warmer winters may be accompanied by deeper snow.

Researchers believe that severe winters may be a primary mortality factor in mountain goats. Severe winters have been correlated with low reproduction in mountain goats. Sheep are also susceptible to severe winter snow conditions.

Education and Outreach

Ungulates are among the most frequently spotted wildlife in the Southern Lakes region. Residents and tourists enjoy viewing ungulates since they are observable and highly valued as symbols of wilderness. Over the years many educational and outreach activities involving ungulates have been offered in the Southern Lakes area including guided walks, school talks, interpretive panels, and wildlife viewing brochures.

Yukon's Wildlife Viewing Guide includes many good locations and information for viewing ungulates. Interpretive signs near a trailhead at Mount White describe its mountain goat populations, and signage in the Takhini and Aishihik areas promote bison and elk viewing. The Environment Yukon wildlife viewing program runs a guided tour during the elk rutting season that is very well attended by Yukoners and visitors.

Environment Yukon publishes the Wood Bison Banter pamphlet twice a year to inform the public about population survey results, harvest statistics and regulation changes. Each year, some Yukon schools participate in a bison hunt where students learn hunting techniques, ethics, wilderness camping, and survival. Signage is posted at trailheads leading into the bison core range area to provide information and advice to bison hunters.

Elk have become familiar sights along the Alaska and North Klondike highways. There is an interest in maintaining elk viewing opportunities while minimizing the risk of vehicle collisions. Approaches may include using more signage, reducing grasslands along highways, or developing elk viewing areas away from the highways.

The Southern Lakes Caribou Steering Committee has dedicated many years to the recovery of these caribou herds, including education and outreach programs. First Nation game guardians deliver community information and education in local schools. The recovery program has worked with the Department of Highways to develop road signs to help reduce vehicle collisions with caribou. To minimize the risk of disturbance by recreational snowmobiles, they educate the public about the 500 metre guideline and remind snowmobilers to remain on trails in caribou ranges.

Consistent sheep and goat viewing opportunities depend on protection from hunting and other disturbances. Sheep Mountain at Kluane Lake, and the range supporting Fannin sheep east of Faro, are good examples of such opportunities. Excellent goat viewing opportunities in the Southern Lakes area occur at Mount White. No established sheep viewing sites currently exist in the Southern Lakes area, although several likely sites occur.

Moose are large animals that are highly valued as an important part of Yukon's natural heritage and wilderness. Seeing moose along roads and in the backcountry is a highlight for residents and visitors. Though moose are included in various wildlife publications and guides, no area has specifically been established for moose viewing.

Bison

Species Significance

Yukon First Nations

Before their decline, wood bison were likely harvested by Yukon First Nations in the Southern Lakes area for food, clothing materials, tools and weapons. Today, Champagne and Aishihik First Nations, Little Salmon/Carmacks First Nation, and Kluane First Nation work with the Government of Yukon to balance bison recovery, with community concerns about bison, and provide bison hunting opportunities to Yukoners.

Other Significance

The Yukon population is the second largest, disease-free herd of wood bison in the world. As such, it is of critical importance for the recovery of wood bison globally. The size and growth of the population allows for bison to be hunted in the Yukon, and the herd provides food for many families. Occasionally non-residents hunt bison with outfitters. Some Yukon schools conduct annual bison hunts to teach children about hunting practices, ethics and wilderness camping.

Distribution and Abundance

Between 1986 and 1992, 142 bison were brought to the Yukon and were kept in an enclosure before being released. By 1992, a total of 170 bison had been released into the Nisling river watershed. Wildlife managers identified a target herd size of 500 bison to maintain a viable population.

In the early years, the herd grew by about 18 per cent each year and expanded its range south. Predators have not played a key role in limiting the growth of the herd, but hunters have. From March 1998 to March 2011, hunters harvested over 1100 animals from the population, substantially reducing the population growth rate. A July 2011 census estimated the Aishihik herd at approximately 1,230 bison. The herd appears to continue to grow at a rate of about 5 per cent per year.

Bison Surveys

Researchers have conducted a number of surveys of the Aishihik herd, and monitoring continues as a vital component of assessing and managing the recovery and harvest of wood bison (Table 2).

Table 2. Summary of Environment Yukon Bison Surveys in the Southern Lakes area.

Date	Survey Objectives	Key Outcomes
1998-2011	Composition counts of Aishihik herd	Determines the number of calves in the population in July of each year. These numbers are used to assess the number of new bison in the population each year and set harvest targets needed to keep the herd from growing. Results vary from between 13% and 21%, with an average of about 17%.
1998-2011	Telemetry surveys of radio-collared bison	Determines the distribution of the bison on the landscape and survival of animals. Results are used to monitor for range expansion, provide inputs into annual allowable harvest calculations, and establish bison locations for use in maps to hunters and planning field operations such as censuses.
2007, 2009, 2011	Mark-resight surveys of Aishihik herd	Provides and estimated population size for the herd. Done every other year. Results used to confirm the status of the herd, evaluate the success of management actions, and as the key piece of information to use in the developing an annual allowable harvest.

Survey Methods

The Aishihik herd has been monitored regularly by radio collaring individuals and aerial census. Collared individuals are located by a fixed-wing aircraft allowing for composition counts, census and capture surveys to be conducted via helicopter. As of March 2011, there were 30 collared bison in the Aishihik herd.

Composition counts are conducted by aerial surveying a small portion of the bison range in July and counting the number of calves in the population.

In 2007, 2009 and 2011, biologists conducted a mark-resight survey using paint-balls from a helicopter to mark individuals. In the following days, helicopter flights over the core range area allowed biologists to estimate how many bison are using the area in the population.

Harvest Trends

Harvest has been the primary means of regulating Aishihik wood bison population size since 1998 (Table 3). Since their release in 1988, bison numbers grew at a rate of 10-20 per cent a year due to a lack of predation by wolves. Evidence of wolves preying on the Aishihik herd was first confirmed in 2007, however wolf predation alone is likely not yet sufficient to control population growth.

For the first eleven years, hunting was managed through a limited entry hunt. In 2009 the hunt was expanded to allow all hunters to receive a permit. In 2010-2011 managers extended the bison season to reduce bison numbers, keep bison in the core range area, and reduce traffic accidents. Hunting is used as a tool to manage the size and distribution of bison. The primary goal is to harvest enough bison to offset new calves entering the population. In 2009 to 2011 this was believed to require the harvest of about 150 bison. However, up to 300 bison are allowed to be harvested because the management goal was to slowly reduce the herd to 500 animals.

The current harvest season in the Bison Management Area is from November 1 to December 31 and February 15 to March 31. Hunting is also permitted in the Extended Season Area to help keep bison within their core range. Bison harvest has been increasing since 2005, but dropped slightly in 2010. More bulls were harvested than cows, except in 2001.

Table 3. Harvest of the Aishihik Wood Bison Herd 1997-2010.

Year	Male	Female	Unknown	Total
1997	6	0	0	6
1998	29	16	0	45
1999	48	28	0	76
2000	36	28	0	64
2001	35	39	0	74
2002	28	15	0	43
2003	38	29	0	67
2004	39	21	0	60
2005	47	26	0	73
2006	58	33	0	91
2007	64	39	2	105
2008	87	63	1	151
2009	104	51	0	155
2010	74	45	0	119

Key Habitats

Key habitats for wood bison include wet sedge meadows, small patches of boreal grasslands (normally associated with south-facing slopes), and alpine meadows and plateaus. River corridors, such as the Nisling, Nordienskoild and West Aishihik, are used as travel paths between key seasonal habitats. Bison make seasonal altitudinal migrations; but can be found over a range of elevations any time of the year.

Important bison habitats are mapped in Environment Yukon's Key Wildlife Area database.

Species Management

The Aishihik wood bison herd is managed co-operatively by the Government of Yukon, Champagne and Aishihik First Nations, and Little Salmon/Carmacks First Nation. These governments have a committee that works together to make decisions about how to manage the Aishihik wood bison herd. The Yukon Wood Bison Technical Team provides technical advice and support to the management committee.

Bison hunters must have a valid hunting licence and must obtain a big game seal (\$50) for each bison they plan to hunt. To hunt bison, all non-residents must be guided by a registered Yukon outfitter. Hunters must report their bison harvest to an Environment Yukon office within 72 hours. They record the kill location, sex of the animal, and date of the kill. If the annual allowable harvest is reached, the bison season will be closed.

Under the Umbrella Final Agreement wood bison are considered a transplanted species, so Yukon First Nations do not have subsistence hunting rights.

Government of Yukon has management authority over wood bison. Bison are managed under an adaptive management regime, which allows the Minister of Environment to make necessary changes in the harvest of bison in a timely manner.

The Yukon Wood Bison Technical Team provides advice and recommendations to the Yukon Wood Bison Management Committee on the conservation, management and sustainable use of elk in the Yukon. The technical team is comprised of affected First Nations and Renewable Resource Councils, along the territorial and federal governments. Others, such as the Yukon Fish and Game Association and the Yukon Outfitters Association, have observer status on the technical team. The management committee is comprised of relevant senior officials from Environment Yukon, Champagne and Aishihik First Nations and Little Salmon/Carmacks First Nation.

The *Yukon Bison Management Plan* was prepared in 1998, it guides management of bison in the Yukon; although a new plan is currently (2012)

under review by the Yukon Fish and Wildlife Management Board. The 1998 management plan recognized community-based concerns with the impact of reintroduced bison on other valued species (e.g. moose, caribou), and established an upper threshold of 500 bison post-harvest to limit any potential impacts. The new management plan will address whether this upper threshold is to remain at 500.

Caribou

Species Significance

Yukon First Nations

For thousands of years, caribou have been a vital component of First Nation culture in the Southern Lakes area. Caribou figure prominently in stories and legends that capture the linkages with the land, wilderness, and animals.

Archaeological findings show that caribou ranged in large numbers throughout the region. Elders recall when the mountains moved with caribou and “Caribou Crossing”, now Carcross, was a traditional hunting camp. People used caribou for winter food, fat, clothing material, tools, and weapons. Caribou skins were used to make toboggans and provided for a range of cultural and spiritual needs.

Other Significance

Caribou are a symbol of northern wilderness as evidenced by their long tenure on the Canadian 25 cent piece. Caribou are appreciated for their economic value to recreational hunting, and they contribute to tourism as an attraction for wildlife enthusiasts, naturalists, and photographers.

Woodland caribou tend to decline in the face of human development and loss of old forest. Woodland caribou play an important ecological role in ecosystem function and health. They are prey for wolves and bears, as well as eagles, foxes, and wolverine. If caribou numbers decline, it is an indication that the forests they inhabit and other forest species are also in trouble.

Distribution and Abundance

Carcross Herd

Fall rut counts of the Carcross herd have been conducted annually since 1992 to monitor herd composition. Three population surveys were also conducted in 1997, 2003 and 2008. The herd has responded well to the Southern Lakes

Caribou Recovery Program and curtailed hunting. Estimates of the caribou population have increased from 402 in 1997 to about 775 in 2008.

This herd increase represents an average annual growth rate of 6.1% per year. This growth appears to have been accompanied with an increase in herd range. Local information from communities, elders and surveys suggests that caribou are re-colonizing winter ranges that have been vacant for many years.

Ibex Herd

The Ibex herd occupies alpine ranges southwest of Whitehorse year-round. The herd winters along three key winter transportation corridors: Coal Lake trail, Mud Lake trail and Watson River trail.

Composition surveys for the Ibex herd have been conducted annually since 1983 when the herd size was believed to be less than 100 caribou. Recruitment, as measured in the fall, between 1983 and 1993 was very high, ranging between 40 and 60 calves per 100 cows.

Population estimates conducted in 1998 and 2008 found that the herd increased from about 420 to 850. This represents an estimated annual average increase of 7.3%.

Atlin Herd

The Atlin herd range extends south to the Silver Salmon River and Bell, Paddy and Ruth Lakes, north into the Southern Lakes area to Snafu Lake, east to Teslin Lake and west to Atlin Lake. In some years the Atlin herd crosses Teslin Lake and winters on the north shore.

Researchers started composition surveys in 1984, but regular counts were not done until 1994 when 12 caribou were radio-collared. An additional 10 caribou were collared in 1995. Until 1997 these caribou were monitored with fall and winter telemetry flights and composition counts.

In 1998 the British Columbia Ministry of Environment initiated fall and spring surveys. The fall surveys found calf per 100 cow ratios were highly variable, ranging from 22 calves per 100 cows in 2007 to 40 calves per 100 cows in 1998.

Spring surveys also showed calf per 100 cow ratios were highly variable, ranging from a low of 8 calves per 100 cows in 1996 to a high of 32 calves per 100 cows in 2003. B.C. uses spring calf per cow ratios as an index of recruitment, and indices suggest that recruitment rates into the Atlin herd have been relatively poor. Population estimates obtained in 1999 and 2007 show no significant difference in population size (809 in 1999 and 777 in 2007).

Caribou Surveys

Surveys and monitoring continue to be a vital component of assessing and managing recovery of Southern Lakes caribou (Table 4).

Table 4. Summary of Caribou Surveys in the Southern Lakes area.

Date	Agencies	Survey Objectives	Key Results
1991	Environment Yukon	Population dynamics and prey relationships of an exploited and recovering wolf population in southern Yukon.	Wolves rarely prey on Ibex caribou when herd size was about 150 animals during the mid-1980s.
1994- 1997, 2000	Environment Yukon	Radio-collar monitoring of Atlin caribou herd.	Population estimates in 1999 and 2007 show no significant growth in population size.
1996	Environment Yukon	Southern Lakes Caribou Recovery Program: Progress Report 1992-1996. VHF radio-collars establish seasonal range use patterns.	Carcross and Atlin herds winter in coniferous forest where snow cover is relatively light, similar to other Northern Mountain Caribou herds.
1998	Environment Yukon	The status of <i>Rangifer tarandus caribou</i> in Yukon.	Composition surveys are the primary method used to assess the annual health and status of Yukon caribou herds.
1999	BC Ministry of Environment	Atlin herd fall and spring population surveys.	Recruitment rates into Atlin herds relatively poor. Population estimates from 1999 and 2007 were not significantly different.
2007	Environment Yukon	The effects of human land use on winter habitat of the recovering Carcross woodland caribou herd (2002-2008).	Human Zone of Influence covered 16% of the Carcross caribou winter habitat.
2008a	Environment Yukon	Population status of the Carcross caribou herd.	Overlap between caribou and moose ranges is common in Yukon.
2008b	Environment Yukon	Population status of the Ibex caribou herd.	Herd remained stable but drastic decline in calf cow ratios between counts.

Survey Methods

Minimum total population counts, conducted over rutting ranges in the fall, are the primary method used to assess the annual health and status of Yukon caribou herds. A benefit of fall surveys is that the composition of the herd can be determined when all age and sex classes are represented in rutting aggregations. In the past, herds were considered stable where fall counts identify between 26 and 30 calves per 100 cows. New guidelines indicate that 20-25 calves per 100 cows in the fall provides for a stable population.

For Yukon herds, similar surveys conducted during the following March have shown calf/cow ratios comparable to the fall results. These observations suggest that most calves that survive to the rut period will survive at rates similar to adult animals.

Studies in B.C. have shown that this is not the case for most B.C. herds, where overwinter mortality of calves is high and highly variable among years and herds. For this reason B.C. uses late-winter composition surveys as a measure of recruitment.

Fall composition surveys also provide indications proportion of the population made up of bulls and document key rutting areas and habitats.

The stratified random block method has been used to count caribou. The total winter range is subdivided into smaller survey units and assessed for caribou density based on habitat features and observations of caribou and caribou sign using a fixed wing aircraft. Survey units are selected randomly and sampled until an estimate with acceptable variation or precision is reached. This second phase is conducted using a helicopter, generally over several days.

Past surveys have corrected for animal sightability by resurveying portions of a sample of survey units with greater search effort. Alternate means have also been used to correct for missed animals on a survey. One method estimates the proportion of marked (radio-collared) caribou missed on the survey to correct for caribou missed over the entire survey. Another method uses estimates, for each caribou observed during the survey, of how obscured the caribou was by surrounding vegetation. Those estimates are entered into a program that calculates a Sightability Correction Factor that is then applied to the survey estimate.

Radio-collaring has been important for understanding the seasonal and regional distribution of the Southern Lakes caribou and identifying them as three distinct herds. Between 1994 and 2007, 31 VHF radio-collars were placed on (predominantly) female caribou allowing for the seasonal distribution in the Carcross, Ibex and Atlin herds to be monitored. The radio-collars were monitored from one to five times annually to establish the seasonal pattern of range use.

Thirty-seven GPS collars have also been deployed on Carcross caribou since 1999. Some of these GPS collar datasets were used with a classified satellite image to assess winter habitat preference in the Carcross herd. Four of these collars remain on caribou east of Lake Laberge. GPS datasets are currently being analyzed to further understanding of the herd's seasonal range use and movement pathways.

Harvest Trends

In 1992, due to concerns about declining caribou numbers in the Southern Lakes area, most hunting was stopped through a closure for licensed hunters in Yukon, and First Nations in Yukon and British Columbia implemented a voluntary harvest ban.

Harvest on the Carcross caribou herd has continued in British Columbia where the regulations permit harvest by licensed residents and non-resident hunters. B.C. regulations limit harvest on Carcross caribou to bulls with five-point antlers. The harvest of bulls in B.C. averaged 7 bull caribou per year between 1997 and 2006.

Since 1980 the harvest of Atlin herd caribou in B.C. has been managed through a bulls only season with a bag limit of one through a limited entry hunting draw system for resident hunters and quotas for non-resident hunters. Over the past ten years, an average of 28.5 caribou per year has been harvested from the Atlin herd by licensed hunters.

The Taku River Tlingit First Nation supported the voluntary caribou hunting closure between 1993 and 2006, but indicated that their hunters began to harvest from this herd in 2007. B.C. implemented amendments to the hunting regulations for the Atlin herd that reduced the total annual licensed harvest to no more than 5 bulls.

Key Habitats

Yukon caribou use two contrasting winter habitats: alpine ranges and lowland forests. The Carcross and Atlin herds winter in coniferous forest habitats where snow cover is relatively light. They winter at low elevation in mature lodgepole pine and mixed pine/spruce habitat types where they feed primarily on terrestrial lichens.

The Ibex herd's winter habitat remains closely associated with alpine and subalpine summer ranges. Caribou remain on lower subalpine slopes where wind action reduces snow accumulation and allows access to lichens. During some periods caribou will also make use of the lightly forested valley bottoms.

During spring, summer and fall, caribou tend to occupy alpine and subalpine meadows on the mountain blocks scattered around the Southern Lakes area. Due to these seasonal movement patterns, caribou require a range

which retains interconnected web of mature forest cover types, lakes and other movement corridors on the landscape, permitting caribou unimpeded access to seasonal habitats.

Species Management

The Government of Yukon has the authority to manage caribou in the Southern Lakes area under the *Yukon Wildlife Act*. Caribou are considered a big game species. The Southern Lakes area is currently closed to licensed caribou hunting.

First Nation hunters have supported the recovery program through a voluntary harvest ban since 1993. Since the program's inception, First Nation game guardians have ensured that hunters were aware of recovery program efforts.

Deer

Species Significance

Yukon First Nations

Deer are a relatively new arrival and there are no records of traditional use or cultural significance of deer by First Nations in the Southern Lakes area. Some First Nation people currently harvest deer for food.

Other Significance

Deer are commonly observed along Yukon's highways in the Southern Lakes area. A permit hunt allows 12 people per year to harvest deer. Deer are also preyed upon by Yukon's large predators.

Distribution and Abundance

Researchers do not know how many deer live in the Yukon because no population surveys have been conducted. Sightings since the 1940s suggest that deer numbers have increased and expanded their range. Mule deer have been recorded as far north as Dawson City with the most northerly sighting at Chapman Lake along the Dempster Highway.

White-tailed deer are rare. White-tailed deer were not recorded in the territory until 1975. The furthest north they have been recorded is at Moose Creek along the Klondike Highway.

The largest concentrations of mule deer in the Southern Lakes area are around Whitehorse, especially in agricultural areas along the Takhini Hotsprings Road, Takhini River Road, north along the Klondike Highway, and along roads near Teslin, Atlin, Carcross and Tagish.

A recent published opinion on Yukon deer numbers suggests that the population ranges between 500 and 800 animals. The mule deer population may be slowly increasing as suitable habitat is being created through expanding agriculture, and winters are generally warmer, but evidence is lacking.

Deer Surveys

Most Yukon deer data is from sightings reported to the government by the public, landowners and government staff. Road kills are reported by highway maintenance staff and the Royal Canadian Mounted Police.

Records show that 7 deer were reported in 1940-50, increasing to 60 in the 1960s, 111 in the 1970s, 428 in the 1980s and 501 in the 1990s (Figure 1). Approximately 80 per cent of recorded observations were of mule deer with just 19 observations of white-tailed deer.

Although this data likely reflects an overall increase in deer numbers between the 1940s and the 1990s, it is insufficient for determining accurate and current population numbers.

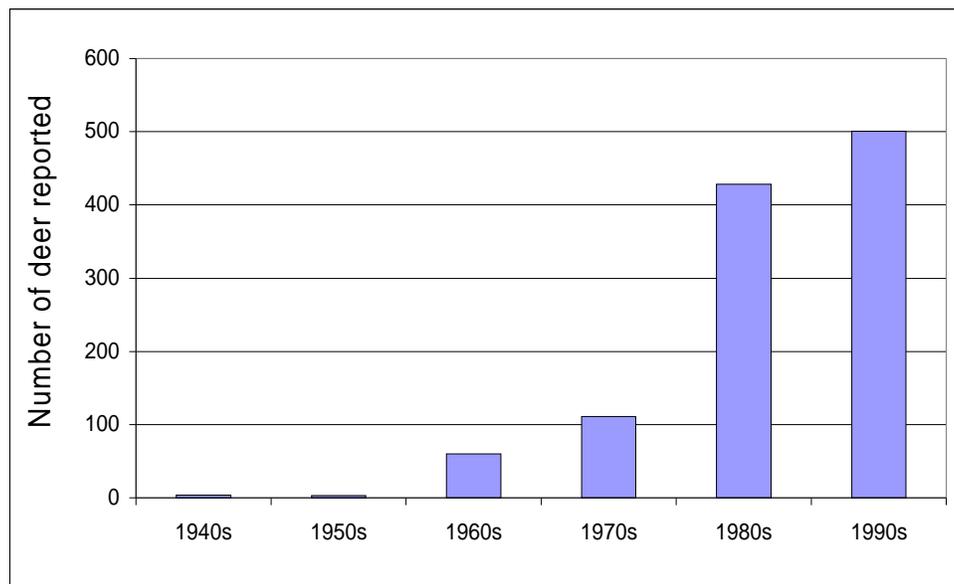


Figure 1. Number of deer reported to Environment Yukon (Hoefs, M. 2001).

Survey Methods

Deer population studies have not been a priority for wildlife managers. Observations of deer are recorded when they are seen during surveys of other species, road mortality records and interviews with elders and other long-time residents. A pellet group count was conducted in 1996 and 1997 to determine habitat preference and to estimate an index of relative abundance.

Harvest Trends

Because deer came to the Yukon naturally and are not a transplanted species, First Nation beneficiaries are entitled to harvest deer under their subsistence rights as of the effective date of their settled final agreement.

Licensed hunting of deer in the Yukon was not permitted until 2006 when a lottery system was introduced allowing resident hunters to apply for one of ten permits drawn per year. In 2010, two additional permits were issued each year specifically to young hunters.

Between 4 and 9 deer have been harvested each year in the Yukon since the hunt began in 2006. Most harvested deer are in the Southern Lakes area, and the annual deer harvest has averaged 3.6. This does not include a small number of deer taken by First Nations subsistence hunters.

Key Habitats

Mule deer prefer south-facing, open, grassy slopes bordered by aspen, along rivers and lakes and other open areas such as forest fire sites, seeded road allowances, and areas cleared for agriculture or grazing.

In the Southern Lakes area good deer habitats are found around Whitehorse and in the Carcross and Tagish areas. Key deer habitats have been identified at Lake Laberge near Shallow Bay and Jackfish Bay, along the Alaska Highway in the Takhini River drainage, and at Kusawa Lake at the delta of Primrose River and in the Takhini burn area west to the Kusawa Lake Road.

Species Management

For many years deer could not be hunted in the Yukon because they were protected under the *Yukon Act* as black-tailed deer and the *Yukon Wildlife Act* as a specially protected species. This changed when First Nations signed final agreements.

Following changes to the act, the first deer hunting season in the Yukon was implemented in 2006 for a two-year trial permit hunt. This was successful with over 400 applicants entering the permit draw. A public review in 2008 led to an indefinite hunt through the permit system.

The Government of Yukon has the authority to manage deer in the Southern Lakes area. Hunters who are granted a permit hunt authorization through the lottery system must also obtain a big game licence (\$10) and a deer hunt seal (\$50). Big game seals are provided free of charge to First Nation citizens and Yukon residents 65 years of age or older. Deer cannot be hunted by non-resident aliens or by non-resident Canadians.

Hunters are asked to report all deer sightings to Environment Yukon to help track the health and distribution deer populations throughout Yukon. From 2009 to 2010 hunters were also requested to deliver complete deer hides to Environment Yukon to be tested for the presence of winter ticks.

Elk

Species Significance

Yukon First Nations

Elk introduced to the Southern Lakes area are classified as a transplanted population in the Yukon First Nations Umbrella Final Agreement. They are exempt from First Nations subsistence harvesting rights.

Other Significance

Southern Lakes elk are a high profile ungulate species due to their potential for wildlife viewing, opportunities for harvest, conflicts with agriculture, and their confirmed infestation with winter ticks (*Dermacentor albipictus*).

Elk are large, attractive, and gregarious animals living relatively close to human settlements and highways. Yukoners and visitors appreciate the opportunity to view elk along the Alaska and North Klondike highways.

Regulation changes in 2009 enabled an elk hunt. In addition to increasing public appreciation of elk by providing hunting opportunities, the hunt is intended to help meet the goal of maintaining healthy elk populations and addressing concerns identified in the management plan.

Distribution and Abundance

Takhini Valley Herd

The Takhini Valley elk herd ranges west of Whitehorse as far as the Aishihik River. The herd has been surveyed periodically since it was introduced to the Yukon, but the first systematic and intensive survey did not occur until 2007

when researchers estimated between 150 and 200 elk (Table 5). Biologists calculated 58 bulls for every 100 cows and 24 calves per 100 cows in the herd. These ratios are within the range generally seen in healthy and stable ungulate populations.

Herd growth was enhanced between 2008 and 2009 when Environment Yukon captured most females in late winter and held them in captivity in an effort to reduce winter ticks on the animals. The animals were released from captivity in summer after the ticks had fallen off and the calves were strong enough to follow their mothers. There was almost 100 per cent survival of captive born calves and these provided an additional 100 elk to the herd. In 2010 the Takhini Valley herd was estimated at 200 to 250 animals.

The 2011 survey results estimated approximately 275 elk in the Takhini herd. The survey revealed a low proportion of bulls and a very low number of larger breeding bulls. This is consistent with the high harvest success rate for bulls over the previous two years. Calf survival was relatively low at 16 calves per 100 cows.

Braeburn Herd

The Braeburn elk herd ranges along the North Klondike Highway between Fox Lake and Carmacks. Previous estimates for this herd, based largely on opportunistic observations, have been as high as 100 animals.

In 2007 Environment Yukon estimated between 50 and 75 elk in the Braeburn herd (Table 5). Biologists calculated 20 calves for every 100 cows and 40 bulls for every 100 cows. Repeat aerial and ground based surveys of the Braeburn herd conducted in October 2011 counted between 42 and 55 elk. Allowing for elk missed during the surveys, the herd is believed to currently contain between 50 and 60 elk.

Elk Surveys

Table 5. Summary of Elk Surveys in the Southern Lakes area.

Date	Survey Objectives	Key Results
2002	Ground-based counts	160 elk documented
2007	Takhini herd census	Population estimate between 150 and 200
2007	Braeburn herd census	Population estimate between 50 and 75
2010	Takhini herd census	Population estimate between 200 and 250
2010	Braeburn herd census	Population estimate between 50 and 100
2011	Takhini herd census	Population estimate 256 to 326 elk
2011	Braeburn herd census	Population estimate 42 to 55 elk

Survey Methods

Elk monitoring in the Yukon has not been intensive or systematic. In 2002 the Yukon Fish and Game Association with help from Yukon College sponsored a project to assess the status of the Takhini herd using ground-based counts. This project was successful with over 160 elk documented, though it was very labour intensive.

In 2007, 15 conventional VHF radio collars were deployed on elk in the Takhini area; 12 on cows in March 2007 and 3 on bulls in September 2007. Also in March 2007, conventional VHF radio collars were deployed on six female elk in the Braeburn area.

Inventory of the two herds were conducted in September-October 2007. Mark-resight methods were used to estimate elk abundance in the Takhini herd. A low intensity total count of the Braeburn herd was done on October 1, 2007.

In March 2011 a mark-resight census was completed for the Takhini Valley elk herd to estimate the population size and determine the age-class composition. Marked animals included those already with radio-collars (25 animals) plus an additional 24 animals that were marked with paintballs.

In October 2011 a mark-resight census was completed for the Braeburn elk herd. The purpose of this census was to estimate population size, and age and sex class composition and herd distribution during the rut. Between April 2007 and April 2010 radio telemetry collars were deployed on female elk in the Braeburn herd to monitor movement and range use. Thirteen of these collars were operational in October 2011 and served as the marked sample for conducting mark-resight surveys.

Harvest Trends

Harvest is one tool used to achieve the goals described in the *Management Plan for Elk (Cervus elaphus) in the Yukon* (2008). Regulations were passed in 2008 to enable an elk hunt. The hunt was delayed until 2009 to ensure it did not conflict with efforts to address winter ticks in the Takhini and Braeburn herds.

All Yukon residents eligible to purchase a hunting licence are able to apply for an elk hunt permit. The elk hunt is very popular, with as many as 1,200 individuals applying for permits each year. Any licensed Yukon hunter requesting an elk permit in the exclusion area will be issued one. These permits will also be issued to any hunter receiving a permit to hunt elk in the core and buffer areas.

During the first two years of administering the hunt, the approach was heavily influenced by the objective of addressing and understanding winter ticks in the ranges of the two elk herds.

A relatively high number of permits were issued in 2009 (80 permits), 2010 (89 permits), and 2011 (90 permits) in attempt to achieve elk population objectives for the Takhini herd (about 200 animals) and the Braeburn herd (50-60 animals). To March 2011, a total of 101 elk (63 cows and 35 bulls) have been harvested in the core and buffer areas. Three additional bulls were harvested from the exclusion area. An additional 18 elk died as a result of handling mortality and vehicle collisions.

Key Habitats

Elk need range that includes habitats to provide food (e.g. south facing slopes, post-fire areas where shrubs are regenerating, and grasslands), as well as hiding and escape cover from predators. Elk rely on grasslands, shrubs, and early successional forests that grow after wildfires. These different habitats need to be relatively close, providing abundant food and cover for females to hide their calves in summer and early green vegetation on the slopes to feed on in early spring, after a long Yukon winter.

Important elk habitats include mixed south-facing slopes, grasslands, new vegetation following fire, and dense aspen and willow re-growth that provides summer hiding cover. Elk continue to use the traditional winter range and nearby aspen forests but have also ranged to the west, and eastward to Whitehorse.

One recommendation from the management plan was to determine the carrying capacity – or the number of animals an area can sustain – of both elk herds. Environment Yukon carried out a study to identify the major habitats present, the distribution of elk forage, and the differences in the amount of elk forage among major habitat types in the Braeburn herd range.

Results show that the habitat could sustain more elk than the current herd size, and that the habitat in the Braeburn area could sustain more elk than the Takhini Valley area. A similar study was completed in the Takhini Valley range where it was determined the study area could only support between 72 and 144 elk. The results of the study should be interpreted with caution because of the many assumptions made about elk forage and the error associated with the land cover classification used.

Species Management

Government of Yukon has management authority over elk. The *Management Plan for Elk (Cervus elaphus) in the Yukon* (2008) was prepared by the Yukon Elk Management Planning Team and it guides management of the Takhini and Braeburn elk herds. The Yukon Elk Technical Team provides advice and recommendations to the Yukon Elk Management Committee on the conservation, management and sustainable use of elk in the Yukon.

Winter tick numbers in elk are monitored through the ungulate hide collection program which started in 2007. Ungulate hides from harvested animals or road kills in the Southern Lakes area are processed with chemicals so that ticks can be counted and the amount per animal determined. Yukon government captured and intensively managed the Takhini and Braeburn elk herds starting in 2007 in order to reduce winter tick loads, with some success.

The harvest is designed to prevent elk from spreading ticks to new areas. Efforts have also been made to monitor elk for chronic wasting disease. This disease has never been detected in Yukon and the nearest known case is at the Saskatchewan-Alberta border.

Some Yukoners feel that elk numbers in southwest Yukon have reached an upper threshold in terms of social acceptability and should not be permitted to increase. This is based on the view that there are enough elk to provide reasonable viewing and limited harvesting opportunities, and allowing the herds to continue to grow would conflict with community interests. The 2008 elk management plan recommends holding the Takhini herd at about 200 elk and Braeburn herd at 100 elk until at least 2013. Currently, harvest is the primary management tool used to achieve this population goal.

Goats

Species Significance

Yukon First Nations

Goats were traditionally hunted for subsistence in the Yukon. The horns were used to make ladles, and the hair was used to weave blankets. First Nations people made coats and hats out of hides.

Other Significance

Viewing mountain goats is popular from the South Klondike Highway next to Montana Mountain. Noteworthy in the Southern Lakes is the successful re-introduction of goats to White Mountain, where they had been extirpated after the construction of the Atlin Road in 1949. This population also offers viewing opportunities. Few harvest opportunities exist for mountain goats in the Yukon.

Distribution and Abundance

In the Southern Lakes, goat populations occupy the mountains along the B.C. border from the Haines Highway in the west to Taku Arm of Tagish Lake in the east.

Researchers conduct mountain goat surveys by helicopter, flying elevational contours counter-clockwise within drainages until suitable habitat has been completely covered. A 1978 survey of mountain goats in the Southern Lakes area estimated a population of 110 goats. A similar survey in 2007 estimated a population of 235 goats. These study areas were not comparable because the 2007 study went further south into B.C. (Table 6).

Mountain goat populations were substantially reduced during the Gold Rush period into the 1950s. Southern Lakes population trends in more recent times are less apparent. For example, mountain goats on the Bennett Range appear to have significantly increased over the past thirty years, while nearby areas such as around Kusawa Lake have shown strong declines.

Comparable population surveys in Southern Lakes areas show highly variable estimates. Given the difficulties associated with estimating goat populations, it is likely that survey error accounts for some of this variability.

Table 6. Mountain goat population estimates from comparable areas surveyed between 1978 and 2009.

Study Area (GMS)	1978	1987	2007	2009
Montana Mountain (7-36)	68	48	26	68
Bennett (7-35)	25	n/a	24	150
East of Windy Arm (9-06)	17	n/a	n/a	n/a

Population Reintroduction at Mount White

Before construction of the Atlin Road in 1949, residents of Jake's Corner reported seeing 10 to 30 goats. During construction, crews could legally shoot game, since it often was their only source of fresh meat. The last time people saw goats before the extirpation from Mount White was in the late 1960s.

In 1983 and 1984, 7 female and 5 male goats were captured from Kluane Game Sanctuary and reintroduced to the Mount White area. The transplant was successful; the greatest count recorded by recent ground-based monitoring is a minimum of 24 goats in 2010. The actual number of goats may be higher because some goats have been observed further east of where ground-based viewing was conducted. This reintroduction is the first and only time that a transplant of a native ungulate has been attempted in the Yukon.

Harvest Trends

Mountain goat hunting in the Yukon is limited to game management zones 11 and 7. The only licensed areas for hunting goats in the Southern Lakes are game management sub-zones 7-34 and 7-35, which are currently on permit. The annual harvest has averaged 1.7 goats per year over the past 24 years.

Most states and provinces manage mountain goat populations at harvest rates of 3-7 per cent and try to minimize female harvest. However, recent population modeling suggests that goat populations are more sensitive to overharvest than previously believed, and 1 per cent annual harvest rates were recommended.

Harvest may have played a role in population declines in areas adjacent to the Southern Lakes. For example, population surveys near the Devil Hole area southwest of Kusawa Lake showed substantial declines in goat numbers. Surveys suggest at least a 3-fold decline in mountain goat numbers in that area over the past two decades. Seven goats were harvested from that area in 1998 and 1999 before licensed harvest was restricted in 2000.

Key Habitats

Researchers conducted the first winter goat surveys in February and March of 2007, allowing for specific mapping of Yukon goat winter range. This mapping helped identify wildlife key areas for Yukon mountain goats.

Species Management

Yukon government and Carcross/Tagish First Nation are responsible for goat management. Several goat ranges are on Category A lands of Carcross/Tagish First Nation. Licensed goat harvesting is limited in the Southern Lakes region to three permit opportunities. Wildlife managers periodically monitor goats by aerial surveys and regulate permits as needed to maintain herd stability.

Moose

Species Significance

Yukon First Nations

Moose have always been an important part of the First Nation subsistence lifestyle. Consequently, moose have a unique place in the traditions and culture of First Nations people in the Southern Lakes. Moose provide an important source of meat, while hides were used for shelter and clothing

materials. Moose ear skins were used to make robes and moose legs were used to make skin toboggans.

Traditionally, First Nations in Teslin did not hunt moose after February. Hunting would commence in June or July when moose were in good condition. Because First Nations hunted for the table and not for the trophy, they were not killing the big moose.

Other Significance

Moose are a valued part of northern culture and an important source of food for many people. Moose are widely distributed, are abundant relative to other ungulates, and have a large body size. Each year more moose are harvested than any other big game species in the Yukon.

Yukoners value the experience of viewing moose on the land. Moose also play a role in Yukon's economy. Many visitors come to the Yukon in search of opportunities to view large mammals like moose, and some visitors take part in moose hunting through Yukon outfitters.

Moose are one of the most important members of large mammal communities in the Yukon, as many large carnivores rely on moose for food. Moose must be maintained on the landscape in sufficient numbers to promote biodiversity conservation.

Distribution and Abundance

Moose are widespread and stable in most of the Yukon. Local knowledge from the Southern Lakes area suggests that moose populations in the Southern Lakes area have declined in the last fifty to sixty years. Today the moose population in some parts of the Southern Lakes is less than one-third of the population prior to 1980.

By 2000 the moose population declined to nearly half of the 1981 to 1986 size. It is now considered a low density population. The most recent estimates of sex ratios and recruitment indicate that the population should be increasing. Observations from a 2009 wolf population survey suggest that the moose population may be recovering. Results from a 2010 survey of the Whitehorse south area showed no significant increase in moose abundance since 1995.

Environment Yukon has been conducting moose surveys through most of the Southern Lakes area since the late 1970s. Six areas have been surveyed including Whitehorse North, Whitehorse South, Carcross, M'Clintock, Teslin Burn, and the southern portion of South Canol West.

Whitehorse North

The most recent population estimate for Whitehorse North (383 moose in 2011) is a little more than half of the original 1982 survey estimate of 533 moose. The density of moose in the area was average in 1982 and low in 1993 and 2011. The bull:cow ratio in the survey area during 2011 was about average at 70 bulls/100 mature cows.

Carcross

Also known as the Mount Lorne survey area, the Carcross area has been surveyed five times. Survey results from 1980 and 1982 suggest the habitat could support a relatively high density of moose. Results indicated the population was in rapid decline in the early 1980s, and the decline continued into the 1990s. Results from the most recent survey in 2010 indicate that moose abundance in the area has stabilized and possibly increased somewhat since the low observed during the 1994 survey. Moose abundance in the area is currently estimated to be near the Yukon average.

Teslin Burn

An extensive fire in 1958 changed the area to an early-successional forest dominated by shrubs. The type and quantity of food available allowed for high moose densities. In the late 1970s and early 1980s, the Teslin Burn survey area contained one of the highest densities of moose ever recorded in the Yukon with 500 moose per 1,000 km². The area was subject to heavy harvest pressure in the late 1970s when up to 10 per cent of Yukon's total moose harvest was taken from the Teslin Burn.

When the moose population was near or approaching its peak size, one of the first intensive wildlife surveys in the Yukon was done. The 1978 survey estimated the Teslin Burn population at about 1,100 moose, with a recruitment of 33 calves per 100 cows, and a sex ratio of 60 bulls per 100 cows. The population seemed to be growing, and this conclusion was supported by the 1982 population estimate, which indicated a population of about 1,400 moose.

By 1984 the population looked like it was in rapid decline, dropping by about 25 per cent in a two year period. Changing habitat, harvest pressure and high predation rates likely all played roles in the moose population decline. The current moose population size in the Teslin Burn survey area is unknown.

M'Clintock

2011 survey results indicate that moose abundance in the M'Clintock area remains similar to when the area was previously surveyed in 1999. Moose density in the area is currently estimated to be about 280 moose/1,000 km²,

well above the Yukon average. Sex ratio (90 bulls/100 cows) and recruitment level (33 yearlings/100 cows and 26 calves/100 cows) also remain healthy.

South Canol West

The South Canol West area has been surveyed once in 2007. The census suggests a relatively high density of moose, and sex ratio and recruitment data indicate a stable or growing moose population. Because data are limited, current population trends in the area are not known.

However, the density of moose (260 moose/1,000 km²), sex ratio (76 bulls/100 cows) and recruitment (18 yearlings/100 cows and 22 calves/100 cows) in the area are consistent with a high density, stable moose population exposed to limited harvest.

Moose Surveys and Methods

Since 1999, Environment Yukon has used an intensive aerial survey method to estimate moose population size. Field sampling methods for this technique are similar to those used in the stratified random block (SRB) method used prior to 1999, except that survey blocks for counting moose are square rather than irregularly shaped.

A study area is stratified into blocks that are estimated to likely contain high or low numbers of moose. A sample of both types of blocks is then flown by helicopter along regularly-spaced flight paths, in an effort to count all moose present. A total population estimate is calculated from the information gathered.

These intensive surveys provide an estimate of moose abundance and population composition. They are time-consuming and expensive, and generally not done more than once every 5 to 10 years.

The sightability correction factor (SCF) is a correction for moose not observed during a given SRB survey. The number of undetected moose is estimated by re-flying a portion of some blocks at a higher search intensity. Earlier population estimates in the Southern Lakes area were made without applying a SCF, while more recent population estimates in Whitehorse North, Whitehorse South and Carcross have included a SCF.

Stratification surveys are primarily conducted as part of an intensive population survey as described above. However, they can be flown as independent surveys at much higher intensity to collect general information on moose population. These surveys provide a quick, relatively inexpensive means of estimating relative abundance and distribution. However, they are not precise enough to estimate population size, trend or composition.

Composition surveys are used to gather information on the make-up (how many bulls, cows and calves) of moose population. They are generally flown during early winter when age and sex differences between individuals are easier to identify because bulls still retain their antlers. Recruitment surveys are flown in late winter to determine how many moose calves have survived to nine months of age. The information is used to determine whether there are enough calves to maintain a stable or increasing moose population.

Harvest Trends

Whitehorse South

In the 1980s the annual moose harvest rate by licensed hunters was high, at 5 to 7 per cent of the moose population. A lethal wolf control program between 1982 and 1985 also substantially reduced the wolf population each year. The annual licensed harvest declined quickly between 1979 and 1989, partly due to hunting restrictions imposed in the mid 1980s. A permit hunt authorization system implemented in 1989 severely restricted hunting in the area. Since 1989, the licensed harvest has been low and relatively stable (average 2.5, min 0, max 6).

Whitehorse North

Between 1979 and 2008 licensed harvest in the Whitehorse North survey area was quite variable between years (averaged 11, range 2-19). Licensed harvest regularly exceeded the 2 per cent Annual Allowable Harvest (AAH). In some years licensed harvest has exceeded the 4 per cent AAH. The average harvest over the last five years was 9.8 moose per year.

Carcross

Licensed harvest in the Carcross survey area was about 20 moose per year between 1979 and 1983, and annual harvest rates were between 4.5 and 7 per cent. Moose hunting in the area by resident non-first nations hunters has been limited through a permit hunt authorization system since 1989. Since then only 4 moose have been harvested in the area by licensed hunters (annual average 0.19, min 0, max 2).

Teslin Burn

The Teslin Burn was subject to heavy harvest pressure during the late 1970s. While the absolute number of moose harvested in the Teslin Burn area was high, the harvest rate by licensed hunters was relatively low at 4.1 and 2.3 per cent compared to other areas during similar years. Between 2006 and 2010 an

average of 7.8 moose per year (range 6 to 11) were harvest in the area by licensed non-First Nation hunters.

M'Clintock

Increasing access and reports of increased hunting pressure in the southern portion of the area are cause for concern. Even in 1999, moose abundance in the more remote northern portions of the area was substantially higher than in the more accessible south. Licensed harvest in the area has remained stable at about 19 moose per year (average 18.8, range 10-31).

South Canal West

Licensed harvest in the South Canal West survey area has remained stable at about 7 moose per year (average 7.3, range 1-15) since 1979.

Key Habitats

Moose habitat selection is influenced by a range of factors including forage availability, snow depth and hardness, plant phenology, predator avoidance, the availability of minerals and temperature. Key habitat types include calving sites, mineral licks, special aquatic areas and relatively snow-free winter habitats. Calving areas include wetlands, islands, peninsulas and other areas that minimize the risks of predation.

Standing water can fulfill the needs for thermal relief in summer, sodium-rich aquatic food, and protection from predators. In some areas, deep snow restricts access to food, impairs movements to preferred habitats during late winter, and can predispose moose to wolf predation. Dense conifer habitats that moderate accumulation of snow can reduce these effects. Access to these habitats requires effective movement corridors.

Willows and other shrubs and saplings are a preferred food of moose and generally make up the bulk of their diet during winter. Where snow depths do not exceed critical thresholds (about 70-80 cm), areas with extensive shrubs and saplings are often good winter moose habitat. Habitat use during spring and summer include areas that provide suitable food and geographic features that allow regulating body temperature. When temperature rise above about 15°C, heat stress can be a problem for moose. Habitat features that allow cooling are important and may include shaded forests, snow patches, rivers, creeks, lakes and ponds.

Moose use young and older forests for different purposes, so areas with a variety of habitat types at small scales are best for moose. Moose use important habitats seasonally for critical life functions and loss of these habitats may result in a population decline. Important habitats for moose may include late-winter range such as forested river valleys, calving areas like islands and

peninsulas, post-rut aggregation areas like sub-alpine shrub communities, mineral licks, and aquatic feeding areas.

Late winter is a critical time for moose when they have difficulty traveling through deep snow to find forage and avoid predators. Areas where moose gather between January and April with relatively shallow snow and abundant browse are considered key late-winter habitat.

Moose are generally not limited by habitat disturbances. In fact, disturbances such as fire, logging, and insects are important agents of forest renewal that may increase habitat diversity and abundance of forage for moose.

Species Management

Moose are a big game species and the Government of Yukon has the authority to manage moose. Non-First Nations hunters must have a valid hunting licence to hunt moose and must obtain a big game seal (\$5). Licensed hunters are limited to one male moose per year.

Hunters must report their moose harvest to an Environment Yukon office no later than 15 days after the end of the month in which the animal was killed. The kill location, sex of the animal, and date of the kill are recorded.

First Nation citizens have the right to hunt moose for subsistence purposes within their traditional territory. First Nation citizens can harvest male or female moose, at any time of the year, with no bag limits. Some First Nations governments have the authority to further restrict these rights. First Nations governments also work with the YFWMB and RRCs to administer Basic Needs Level harvest, including issuing of permits, licences or tags, and the setting of fees.

First Nation citizens hunting moose outside their traditional territory must have a valid Yukon hunting licence and must comply with the *Yukon Wildlife Act* and hunting regulations that apply to all hunters. With written consent from another First Nation with a Final Agreement, citizens may hunt for subsistence purposes in non-overlap areas of another First Nation traditional territory.

Sheep

Species Significance

Yukon First Nations

Sheep were traditionally very important to Yukon First Nations. Evidence of this is found in hunting artifacts preserved in mountain ice patches and by the remnants of old rock shooting blinds found along old sheep paths in mountain passes. Sheep provided people with meat, material for blankets and clothing, and horns to make ladles.

Other Significance

To many people, sheep symbolize mountain wilderness. They play an important part in tourist perceptions and in non-consumptive values of wildlife. In alpine areas of the Southern Lakes, sheep share their habitat with goats and caribou, and to a lesser degree with bison.

Sheep are also highly sought North American trophy animals. Thinhorn sheep are a mainstay of many Yukon hunting outfitters. The Southern Lakes area is known for having a wide distribution of sheep, relatively good densities, and good trophy qualities.

Distribution and Abundance

In 2009 the total minimum population of sheep in the Southern Lakes region was 2,689. The Yukon sheep population has been deemed relatively stable over the past 35 years, since a 1985 status assessment estimated the total Southern Lakes sheep population at 2,520.

Anecdotal evidence suggests that sheep were more abundant and more widely distributed prior to Gold Rush times. Authors give first-hand accounts of low densities of sheep and other big game in specific Southern Lake areas after the turn of the century. The historic low abundance of sheep and other wildlife in the Wheaton River and Watson River areas is likely due to mining activity in 1904. A high level of commercial hunting also continued into the 1950s. In the 1970s sheep began to slowly recolonize these areas.

Today, populations are monitored primarily by aerial surveys during the post-lambing period in late June or early July. Surveys are conducted by helicopter, and elevational contours are flown counter-clockwise within drainages until survey mountain blocks have been completely covered. Surveyors classify the sheep as nursery sheep, lambs, or rams.

Harvest Trends

In 1980 the Yukon government began collecting sheep harvest information from licensed hunters. Since then 40 to 50 rams are harvested annually by licensed hunters in the Southern Lakes area.

GMZ 7 is home to approximately 60 per cent of the sheep in the Southern Lakes. In the 1980s, this zone experienced a relatively high combined harvest of non-resident and resident hunters. At the time two outfitting concessions operated in GMZ 7. Yukon government bought out and closed outfitting concession 18 and implemented a permit hunt in eight subzones in that area. Non-resident hunting continued in outfitting concession 17 until 1998, when it was suspended for legal reasons.

The 1990s marked the beginning and rapid growth of ATV use for sheep and other hunting. In the past decade only residents and First Nation people have harvested sheep in GMZ 7.

In the permit area the harvest has declined by about 20 per cent during this 30-year assessment period. In the open areas the harvest has remained stable, with resident hunters making up for the non-resident pull-out. In both the permit and open areas, resident hunting significantly increased in 1991-2000 over the previous decade, which can be explained by rapid increased use of ATVs for sheep hunting.

Sheep are also regularly harvested in the Southern Lakes portion of GMZ 5. Being near Whitehorse, they have been subjected to heavy use by ATVs since the late 1980s. The ram harvest has been high, averaging 4 to 5 per year. An investigation of the Pilot Mountain population showed that for almost a decade the average harvest exceeded the 4 per cent ceiling stipulated in the Sheep Management Guidelines. On the recommendation of the Laberge Renewable Resources Council, the government imposed a permit hunt on this population in 2009. This step appears to be reducing ATV use and harvest in the area.

The Southern Lakes portion of GMZ 8 contains a small population of Fannin sheep. These sheep are difficult to count, and estimates have varied from 20 to 50. They have been harvested at a modest rate of one to two rams per year, and in the recent decade, only 0.5 ram per year.

With the exception of subzone 9-03, which is a bow-only permit area, sheep hunting is closed to licensed hunters in all of GMZ 9.

Key Habitats

Key sheep habitats have been mapped and are available through Environment Yukon's Wildlife Key Area map set. Habitat protection guidelines for thinhorn sheep have been used in the review of land-use, land disposition and development proposals on sheep range.

Species Management

Sheep are managed for sustainability and to emulate naturally-regulated populations. Sheep are managed relatively conservatively in the Yukon, with hunting restricted to rams with full-curl horns or a minimum of 8 years of age. In addition, harvest on about half of the sheep populations in the Southern Lakes region are subject to permits, which limit the total number of sheep that can be harvested.

While large negative impacts by licensed hunting are unlikely, impacts by the increasing numbers of ATVs are not controlled and can lead to population declines and range abandonment. There is a general concern that as areas become permitted, disturbance pressure from hunting becomes more focused in remaining open hunt areas.

Large Carnivores

Introduction

The Southern Lakes area is home to 3 large carnivores: wolf (*Canis lupus*), American black bear (*Ursus americanus*) and grizzly bear (*Ursus arctos*, also known as brown bear). Cougars also occur incidentally or at low densities in the region. Large carnivores are indicators of healthy ecosystems and biodiversity. They prey on ungulate populations and help herbivores stay in balance with their own food supplies. Large carnivores also keep small and mid-sized carnivores in check, allowing smaller prey species like birds and rodents to flourish. Large carnivores are considered umbrella species because management strategies that conserve these species are often beneficial for many species in the same area.

Species Assessments

Environment Yukon maintains a database of observations of species at risk in Yukon, as part of the Yukon Conservation Data Centre. COSEWIC, General Status, NatureServe global, and territorial, and IUCN rankings for large carnivores of the Southern Lakes area are summarized in Table 7.

Table 7. COSEWIC, General Status, NatureServe global, and IUCN rankings for large carnivores of the Southern Lakes area.

Common Name	COSEWIC	General Status (2010) Yukon	NatureServe	IUCN
Wolf	Not at Risk	Secure	G4S4 (Apparently Secure)	Least Concern
Black bear	Not at Risk	Secure	G5S5 (Secure)	Least Concern
Grizzly bear	Special Concern	Sensitive	G4S3 (Apparently Secure, Vulnerable)	Least Concern

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (2010) lists wolves, black bears, and grizzly bears on Appendix II as look-alikes of related species that are listed on Appendix I for conservation reasons. CITES export permits are required for the export of products of these species out of Canada. CITES commitments have had little direct impact on the local harvest or management of the species. Management agencies must provide a Non Detrimental Finding to show that the trade of wolf products is not detrimental to their survival, if requested by the CITES office in the importing country.

The NatureServe ranking for the wolf is G4/N4/S4 (apparently secure globally, in Canada and in the Yukon. There is some cause for long-term concern due to population declines in the species range.

COSEWIC assesses the Northwestern population of grizzly bear as special concern in April 1991 and re-confirmed it in May 2002. In April 2012 grizzly bear status will be reassessed.

Key Habitats

Large carnivores are wide-ranging species with few key habitats. They require features found across the landscape, such as prey and cover, but they have few site-specific habitat requirements. Few wildlife key areas (WKAs) for large carnivore have been identified in the Yukon, and none have been identified in the Southern Lakes area. This is in part because we do not have much information on habitat use of these species in this area, and in part because the WKAs database does not work well for the life history characteristics of such a wide-ranging set of species.

In general, key habitats for bears are berry patches and areas with lush vegetation. Key forage species for bears include soapberry, bear root, loco weed,

horsetails, and blueberries. Ground squirrels and ants are also an important part of bear diets.

Security habitat is also important for bears. These are areas where females can raise their cubs with little or no disturbance from people. These areas have good hiding cover and adequate terrain while being close to good food sources.

Fire is an important way to regenerate habitat for many species. The large fires in the 1958 Teslin burn generated some of the best moose habitat in the Southern Lakes area. In turn, this provided an important food source for wolves. The decrease in wildfires may have a long term impact on moose populations, in turn affecting wolf populations.

Escapement from salmon spawning streams in the Southern Lakes area is not high enough to attract bears, other than to a few reaches, but salmon management may change the situation in the future.

Riparian areas are known to be important for all large carnivores. These areas are used as travel corridors and often have some of the best foraging habitat.

Researchers are recording grizzly bear den locations and creating a map of suitable denning habitat to guide land use applications and environmental assessments.

Stressors and Threats

Habitat loss and fragmentation is an important stressor on large carnivores in the Southern Lakes area. Homes on the fringes of wilderness cumulatively displace bears and wolves from large tracts of land. The Southern Lakes area has a high concentration of human values, and as a result, much of the area is zoned for fire action. Resource extraction industries can also permanently or temporarily alter habitat suitability for large carnivores. Black bears and grizzly bears are somewhat tolerant of human activities and habitat changes, and can adapt to a small amount of change. Changes to habitat can often bring unmanaged bear attractants, however, that can promote bear habituation. Bears that become habituated are often destroyed.

The Yukon government is helping to reduce human-bear conflicts by managing attractants, for example by providing bear-proof refuse bins and fencing landfill stations in the Southern Lakes area. There is also responsibility for individuals to manage attractants around their property. Bears involved in human-bear conflicts may be relocated if circumstances permit, but this often does not work. Where preventative measures fail, bear shepherding and aversive conditioning are the best ways to deal with bears in conflict. These are very labour and resource intensive options.

Wolves may also be impacted by human-wildlife conflicts. Wolves may begin to prey on dogs and cats that roam at large and may become accustomed to killing domestic animals. This may eventually escalate to where wolves kill animals on leashes. At this point wolf packs must be removed to prevent further loss of pets.

Environment Yukon uses habitat protection guidelines to evaluate development proposals for potential impacts on large carnivores and their habitat, and to facilitate informed decisions on impact mitigation. Human settlement and linear developments (roads, transmission lines, White Pass and Yukon Route Railroad, etc.) are prominent land uses in the Southern Lakes area.

The wolf guidelines, drafted in 1996, will be updated following the revision of the *Yukon Wolf Conservation and Management Plan*. The grizzly and black bear habitat protection guidelines are being updated in 2011.

Education and Outreach

Large carnivores are charismatic megafauna that have widespread public appeal. Residents and tourists focus on these species when viewing wildlife, since they are large and observable and are highly valued as symbols of wilderness. Over the years many educational and outreach activities involving large carnivores have been offered through the Southern Lakes area including events such as wolf howling field trips, school talks, public talks, interpretive panels in parks and campgrounds, wildlife viewing brochures, and other outreach.

Bears

Education in bear safety and avoiding human-bear conflicts is a major component of Yukon bear management. Conservation officers present bear safety talks to public, school and industry groups. Environment Yukon has resources available online and in print, including brochures in English, French and German.

- *Stay Safe in Bear Country*
(<http://www.env.gov.yk.ca/camping/bearsafety.php>).
- *Bear Awareness for Kids*
(<http://www.env.gov.yk.ca/camping/bearaware.php>).
- *Tips for Homeowners*
(<http://www.env.gov.yk.ca/camping/tipshomeowners.php>).
- *Industrial Activity in Bear Country*
(<http://www.env.gov.yk.ca/camping/tipscamps.php>).

A series of videos, *Staying Safe in Bear Country*, *Working in Bear Country* and *Living in Bear Country*, was produced by the Safety in Bear Country Society in cooperation with the International Association for Bear Research and Management. The videos discuss how to reduce chances of encountering and attracting bears and how to understand bear behaviour and respond to encounters. The video series is available at bookstores.

Wolves

Species Significance

Yukon First Nations

Wolves are highly respected and culturally important to First Nations peoples. Many traditional stories convey this long relationship, such as how wolves helped people to find caribou and how wolves taught people to be better hunters. The Wolf is a major clan of First Nations in the Southern Lakes area, playing an important role in life events such as births, marriages, and death. First Nations people revered wolves and considered them brothers.

Wolves were not traditionally hunted or trapped, but Yukon First Nations have a tradition of removing wolf pups from dens to manage wolf predation on ungulates. First Nations people believed that disrespecting the wolf would result in hard times for the community.

Other Significance

Wolves are a significant source of predation on some species of ungulates in the Yukon. Wolf predation is a major factor in controlling the population dynamics of ungulates, such as moose and caribou. They help maintain the health of prey populations, and over the long-term have played an important role in the evolution of prey species. Wolves are symbolic of wilderness and they help attract tourists to the Yukon who seek wild places with free roaming large carnivores.

As non-First Nations people populated the southern Yukon, intense competition for moose and caribou led to over a century of wolf control by bounty, poison, trapping, aerial shooting, and fertility control. The intention of wolf control was to increase prey species for big game outfitters and resident hunters and increase the wolf pelt harvest for trappers. However, the social structure and high reproductive capacity of wolves make population control efforts labour intensive and costly. Today more is also known about the impacts of these control efforts on the entire ecosystem.

Wolves have dual status as both a furbearer and a big game species. They are harvested by trappers and resident and non-resident hunters.

Distribution and Abundance

Wolves inhabit the entire Yukon including the Southern Lakes area from valley bottom to the alpine tundra.

There are approximately 4,500 to 5,000 wolves in the Yukon. The total number fluctuates depending on prey populations, primarily moose, caribou, and Dall's sheep. Wolf densities range from 3 wolves per 1,000 km² in poor habitat to 18 wolves per 1,000 km² in good habitat, with average densities of 7.7 per 1,000 km².

Wolf distribution and abundance is mainly limited by ungulate densities, human-caused mortality, and habitat loss and fragmentation. Wolves have survived decades of efforts to control their numbers in the Yukon. Their ability to recover is based on their flexible social structure which allows pack splitting and the colonization of vacant territories, their ability to travel long distances, and their reproductive capabilities which are greatest at low wolf densities.

Since 1983 researchers have done 4 wolf surveys between the Atlin Road, Alaska Highway and Kusawa Lake in the Southern Lakes area: in 1983, 1988, 2004 and 2009. The wolf population estimate for the area has declined from 94.6 in 1983 to 48.9 in 2009.

In addition to regular hunting and trapping, between 1982 and 1987 wildlife manager shot wolves from helicopters in an effort to increase moose numbers. Coincidentally, moose numbers did not increase. Grizzly bear predation and continued hunting may have been possible reasons.

Wolves recovered rapidly following aerial hunting. The number of packs is a significant indicator of predation rates, since packs kill prey at a relatively constant rate regardless of pack size. Ten wolf packs lived in the area in 1983, rising to 14 packs following wolf control in 1988, and dropping to 9 packs in 2009.

Wolf surveys in the Nisutlin River-Wolf Lake area east of the Southern Lakes serve as a useful comparison with the other surveys areas where wolves were controlled. In 1987 wolf density in the Nisutlin River area was 9-11 wolves per 1,000 km², mean pack size was 5.3 and pack density was 1.6 packs/1,000 km². In the adjacent Wolf Lake study area, 1985 wolf density was 9-11 wolves per 1,000 km², mean pack size was 5.8-6.7 and pack density was 1.5 packs/1,000 km². The area was resurveyed in 2011, and results showed similar densities to 1980s data. These figures are slightly above Yukon averages, and are similar to those in the Aishihik area (pre-treatment) and lower than the Coast Mountains area (pre-treatment).

Trappers' perceptions of wolf populations are that wolves are common and relatively stable in the Southern Lakes region.

Wolf Surveys

The standard wolf survey method uses aerial snow-tracking to identify packs and count the numbers of wolves in each pack. Researchers find wolf trails from the air, in winter, and follow them until they find the pack or lose the trails. If the pack is not found they estimate the number of wolves from trail "splits."

Ideal conditions for snow tracking is about 3 days after a 5-10 cm snowfall before late February when breeding begins and packs temporarily split. They complete the survey quickly, usually within a week, to avoid duplicate counting. In 2010 poor weather conditions affected surveys in the Coast Mountains so the technique was modified by using multiple passes over the area. Radio-collared wolves have also been used to locate packs during wolf control and wolf surveys.

Harvest Trends

Wolves are harvested primarily by trappers. Environment Yukon staff have occasionally done control kills, and they sometimes issue permits under the *Yukon Wildlife Act* to mitigate wolf-livestock conflicts.

Since pelt sealing became mandatory in 1988, the total wolf harvest has averaged 11 wolves per year in the Southern Lakes area. Interestingly, no wolves were harvested by either resident or non-resident hunters during the same period, explained in part by the closure of outfitting areas.

Species Management

The wolf trapping season is November 1 through March 31. Neck snares must be used during the March 11-31 extended trapping season to prevent the capture of non-target furbearers. There is no limit on trapped or snared wolves, but the registered trapping concession system limits the number of trappers and fosters a sense of stewardship.

The wolf hunting season is August 1 through March 31. Resident hunters in the Southern Lakes area can harvest 7 wolves per year, and non-resident hunters can harvest 2 wolves. To obtain accurate harvest data, since 1988 all harvested wolf pelts are required by law to be sealed before they are sold or transferred by a trapper. Pelts leaving the territory must have an export permit, and wolf products leaving Canada must have an additional CITES permit.

Wolf management is guided by the *Yukon Wolf Conservation and Management Plan* (2012). The plan recognizes the diverse priorities, interests, and concerns throughout the Yukon for the conservation and management of wolves and their prey.

Two wolf control programs occurred in the Southern Lakes area in the past. In the Coast Mountain, wildlife managers removed more than 60 per cent of the wolves by aerial hunting for five years. In the Aishihik program, they removed wolves by shooting from helicopters and trapping. The Aishihik program was the first to experiment with non-lethal sterilization of wolves.

Currently the Yukon has no wolf control programs. Large-scale wolf control programs are discouraged for financial, social and ethical reasons. Future wolf management may involve small-scale programs such as trapping.

A recent study by Environment Yukon concluded that trapping can be an effective way to manage wolf populations if trappers have wolf-trapping skills, an interest in harvesting wolves, and access to wolves across several adjacent traplines. With enough access, trappers can establish multi-year sites over areas large enough to affect several packs. Any targeted wolf trapping or predator control needs to be done in partnership with affected communities.

Black bears

Species Significance

Yukon First Nations

Yukon First Nations believed that black bears and grizzly bears possessed great spiritual powers and ascribed human attributes to them, which influenced some people to avoid hunting them. There was a limited traditional harvest of black bears by First Nations, primarily for the grease, which was eaten or used to preserve dried meat and fish.

Other Significance

Black bears are the most viewed and most frequently encountered large carnivore in the Southern Lakes area. Although considered a carnivore due to its lineage, it is primarily an herbivore, taking meat through opportunistic predation or scavenging. Since it does not have a fermenting chamber in its digestive tract like strict herbivores, food requirements are substantial.

Black bears are an important spring predator of moose calves in the Southern Lakes area.

Trappers are permitted to harvest black bears (by shooting) and sell the pelts on the fur market. Resident and non-resident hunters take black bears primarily for the pelts.

The black bear is behaviourally flexible and curious, adapting well to habitat changes and human activities and leading to frequent human-bear conflicts. Black bears attracted to garbage are usually conditioned and ultimately killed or relocated. Black bear management strongly focuses on reducing human-bear conflicts. Black bears rarely injure people in the Yukon and fatal predatory attacks, rare elsewhere, have not occurred here.

The possession of bear galls or bile and other parts used in traditional Chinese medicine is not illegal in the Yukon. This illegal trade is believed to be insignificant but could become a conservation concern if demand increases.

Distribution and Abundance

The black bear population of the Yukon has been estimated at 10,000 and is believed to be stable (Table 8). They are found throughout the Southern Lakes area, occupying the more productive forests in the valley bottoms and making forays out for seasonally abundant foods. A black bear population estimate is not available for the Southern Lakes area, but researchers believe the area contains a high abundance of black bears.

Black bear densities are limited by food supplies which affect reproductive success independent of bear densities. Stable fall food supplies are essential to population stability. Grizzly bears may be significant competitors with black bears where they overlap.

Black Bear Surveys

There have been no black bear population surveys in the Southern Lakes area. There is no immediate need for black bear population surveys as the population is suspected to be stable.

Harvest Trends

The total annual reported black bear mortality in the Southern Lakes area since 1980 has averaged 22 and has ranged from 8 to 42. The majority of bears are harvested by resident hunters (59.2%) followed by control kills (29.2%), other kills (8.0%), and non-resident hunters (3.6%). The number of control kills is underestimated and the resident harvest is overestimated, since some are tagged by hunters to avoid investigation.

The total harvest shows no clear trend, but the harvest by resident hunters was higher in the 2000s (155) than in either of the 2 previous decades (117 each). Some of the resident harvest might be control kills, which are

expected to increase as the human population in the area increases. Control kills of bears involved in human-bear conflicts are more pronounced in years of berry failures.

Table 8. Summary of Bear Surveys and Population Assessments in the Southern Lakes area.

Date	Reference	Survey Objectives	Key Results
1979 to present	MacHutchon and Smith 1990; S. Marshall and R. Maraj, unpubl. data, 2011	Monitor black bear population status using age composition of harvest (compulsory submissions)	Confirmation of a stable population
1990	MacHutchon and Smith 1990	Estimate relative abundance of black bears in Yukon ecoregions. No field studies involved	Black bears abundance high in Southern Lakes area, relative to most Yukon ecoregions
1985	Larsen and Markel 1989; Larsen <i>et al.</i> 1989a, 1989b	Estimate grizzly bear density in Coast Mountains based on live capture, radio telemetry, and resulting estimates of female bear density and home range size	Estimate of 16 grizzly bears per 1,000 km ²
1990	B. Smith and E. Osmond-Jones, unpubl. data, 1990	Estimate grizzly bear density in Yukon ecoregions using expert assessment of habitat components and benchmark comparisons. No field studies involved	Estimate of 15.4 grizzly bears per 1,000 km ²
2009 to about 2014	R. Maraj and S. Marshall, pers. comm., 2011	Radio-collaring grizzly bears to determine home range size, seasonal movements, survival, productivity and population size. DNA mark-recapture using hair snagging in conjunction with movement data from radio-collared bears, to estimate population	In progress

Species Management

Black bears are listed as big game under the *Yukon Wildlife Act*. Black bear hunting is divided into 2 seasons: Spring (April 15 – June 21) and Fall (August 1 – November 15). Two bears may be taken per hunter per year. Yukon residents may guide a non-resident Canadian to hunt black bears. Compulsory reporting of black bear kills began in 1979. The bear skull must be submitted to a conservation officer or wildlife technician no later than 15 days after the end of the month in which the animal was killed, or at the request of a conservation officer.

Female black bears with cubs, and all cubs under 2 years old, are protected from hunting. The resulting harvest is likely male-biased. Overharvest is indicated by the depletion of older bears. The law does not require hunters to save black bear meat, but it is encouraged.

Trappers are permitted to sell legally harvested black bear pelts at fur auctions. Statistics are compiled on black bear harvest, control kills, and all other forms of bear mortality such collisions with vehicles. Poaching rates are not estimated or included in mortality statistics. Part of the reported harvest by resident hunters is believed to be control kills which have been tagged after the fact to avoid investigation by Conservation Officer Services. As a result, the number of control kills is underestimated and the resident hunter harvest is overestimated.

Black bears were implicated as an important predator of moose calves in the Coast Mountains in the 1980s. Wildlife managers relaxed black bear hunting regulations in some areas, increased bag limits from 2 to 3 bears, and adopted a year-round season. The annual average black bear kill in that area increased from 6 to 15, but they could not detect any effect on the moose population.

Grizzly Bears

Species Significance

Yukon First Nations

Yukon First Nations believed that grizzly and black bears possessed great spiritual powers and ascribed human attributes to them, which influenced some people to avoid killing or eating them. Grizzly bears were traditionally hunted for pelts and food, but less so than the black bear.

Other Significance

The grizzly bear is more symbolic of wilderness than any other wild species in North America. Their sensitivity to habitat changes and low resilience to human-related mortality factors makes them strong indicators of environmental health.

Because of their large land requirements and complex interactions with many other species, grizzly bears are considered an umbrella species. By conserving grizzlies, a vast array of habitats and other species are also conserved. Environmental groups employ the grizzlies' symbolic role in their campaigns to conserve wilderness. They are the most popular and sought after wildlife viewing species in the Yukon. Grizzly bears live in all habitats of the Southern Lakes area.

Like the black bear, grizzly bears are carnivores with a high proportion of vegetation in their diet, sometimes known as opportunistic omnivores. Grizzly bears were found to be the primary cause of adult moose mortality in the Coast Mountains of the Southern Lakes.

Grizzly bears are hunted by resident and non-resident hunters. Grizzlies are not well-adapted to habitat degradation and human activities, and their search for food often results in human-bear conflicts. Camp and household garbage, livestock, and unsecured human food are frequent targets. Grizzly bears have occasionally injured or killed people, in defense of cubs or ungulate carcasses; however, attacks are very rare.

Distribution and Abundance

About 6,000 to 7,000 grizzly bears inhabit the entire Yukon. The territory-wide population is stable but numbers in the Southern Lakes area are thought to be declining. In 1990 grizzly bear density for the Southern Lakes area was estimated at approximately 15.4 bears per 1,000 km².

Environment Yukon is currently studying grizzly bears in the Yukon Southern Lakes region. The study began in June of 2009 and will take at least five years to complete. This study is being done in collaboration with First Nation governments. The study area covers the important grizzly bear ranges between Tagish Lake and Kusawa Lake, from the Alaska Highway south to the British Columbia border.

Grizzly bears are difficult to manage because of their solitary nature, low reproductive potential and difficulty to monitor. Poaching is difficult to determine and is not accounted for in bear mortality rates in the Yukon.

Where grizzly bear densities are not limited by people, they are limited by food supplies. Late summer and fall is an important time grizzly bears when consume large quantities of high-caloric food such as berries and carcasses to prepare for denning. Population growth rates are limited by the low

reproductive rate of females, which on average have their first litters at 6 years of age and subsequent litters every 3 to 4 years.

Grizzly Bear Surveys

A grizzly bear population estimate for the Coast Mountains in 1985 relied on adult female grizzly bear population and home range size. Researchers radio-collared and monitored 8 female bears to determine mean home range size and home range overlap, from which an estimate of the number of adult females was made. They used another 19 captured bears to derive an adult male : adult female ratio and an adult : non-adult ratio to determine the bear population at emergence from dens in 1985.

Following advances in grizzly bear survey techniques, the grizzly bear study initiated in 2009 is using radio-collaring to determine home range size, seasonal movements, survival, productivity, and population size. They are also using a DNA mark-recapture technique using hair snagging. Researchers are also collecting samples from radio-collared bears to assess bear health in the Southern Lakes region.

Harvest Trends

The total annual reported grizzly bear mortality in the Southern Lakes area since 1980 has averaged 11 and has ranged from 1 to 21. The majority of bears are harvested by resident hunters (54.3%) followed by non-resident harvest and control kills (19.6% each), and other kills (6.3%). The number of control kills is underestimated and the resident harvest is overestimated, since some are tagged by hunters to avoid investigation. The total reported grizzly bear harvest declined each decade due to a declining non-resident harvest as some outfitting concessions closed.

Some of the resident harvest might represent control kills, which are expected to increase as the human population in the area increases. Control kills of bears involved in human-bear conflicts are more pronounced in years of berry failures. At least 12 control kills of grizzly bears occurred following the electric fencing of the Whitehorse landfill in 1995/96 which redirected them to forage for garbage in residential areas. The long-term effect of the fencing has been to reduce human-bear conflicts in the area.

Species Management

Grizzly bear hunting is divided into 2 seasons: Spring (April 15 – June 21) and Fall (August 1 – November 15). Only one bear may be taken per resident hunter every 3 license years. Compulsory reporting of grizzly bear kills began in 1979. The bear skull and hide with evidence of sex (vulva or baculum) must be submitted to a conservation officer or wildlife technician no later than 15 days

after the end of the month in which the animal was killed, or at the request of a conservation officer.

Female grizzly bears with cubs, and all cubs less than 3 years old, are protected from hunting. Wildlife managers provide educational materials to help hunters distinguish sex in the field, charge disproportional trophy fees to resident and non-resident hunters, and use a sex ratio based system for big game outfitters to discourage the harvest of females.

Harvested grizzly bears are aged from tooth cementum annuli, and the age structure is monitored over time as an index of harvest pressure. Overharvest is indicated by the depletion of older bears. Sex ratio is also monitored, with the depletion of either sex indicative of an unsustainable harvest strategy.

Managers compile statistics on grizzly bear harvest, control kills and all other forms of bear mortality such as collisions with vehicles. Harvest pressure in neighbouring jurisdictions such as British Columbia should also be factored into local management, especially near the border.

Grizzly bears were implicated as an important predator of moose calves in the Coast Mountains in the 1980s. Managers relaxed grizzly bear hunting regulations in some subzones as an ungulate management tool. The annual average grizzly bear kill in that area increased marginally from 3 to 6, reducing the population by 0 to 11 per cent (mean 4%), with little effect on the moose population.

Furbearers

Introduction

The Southern Lakes area is home to 13 of the Yukon's 14 furbearing animals. These include 3 rodents [red squirrel (*Tamiasciurus hudsonicus*), beaver (*Castor canadensis*) and muskrat (*Ondatra zibethicus*)], and 10 carnivores [coyote (*Canis latrans*), wolf (*Canis lupus*), red fox (*Vulpes vulpes*), wolverine (*Gulo gulo*), river otter (*Lontra canadensis*), marten (*Martes americana*), fisher (*Martes pennanti*), ermine (*Mustela erminea*), mink (*Neovison vison*), and lynx (*Lynx canadensis*)].

The only Yukon furbearer absent from the area is the arctic fox (*Vulpes lagopus*). Wolves are assessed in a separate section.

Species Significance

Yukon First Nations

Trapping is an important social, cultural, traditional, and economic activity for many Southern Lakes residents, especially First Nation people. Before the fur trade was established in the early 19th century, First Nation people ate furbearing animals as part of a subsistence diet and used furs for clothing and blankets. First Nations people in Teslin used lynx ears in gopher blankets because of the pretty colours (black, white and grey), and this made the blankets valuable.

Today the fur trade contributes \$200,000 to \$1.7 million annually to the Yukon economy. The industry has employed 300 to 500 trappers over the past 3 decades. Seventy per cent (70%) of trappers are of First Nation ancestry.

Of 350 open traplines in Yukon, 65 are in the Southern Lakes area. In 2010, 37 of these traplines had been assigned to trappers, 6 were group-trapping areas around communities, and 22 were unassigned.

Marten and lynx are the most economically valuable furbearers, followed by wolverine, wolf, muskrat, and beaver. Furs not sold on the international fur market are used locally in the cottage garment industry or for personal clothing.

Other Significance

Furbearers occupy a wide range of ecological niches. Many furbearer species have been proposed as focal species for the conservation of biodiversity and the design of protected areas.

Beavers are ecosystem engineers, capable of modifying their environment by cutting trees and building dams, canals, and lodges. They alter forest hydrology by creating wetlands, raising water tables, slowing current velocity, and changing stream discharge rates. The effects of beaver on fish and fish habitat vary. Barriers built by beavers can negatively affect Chinook salmon, but beavers can also improve fish habitat. They have positive effects on mammals such as moose, otter, mink, and muskrat and increase bird species richness for waterfowl, shorebirds, and insectivorous forest birds.

Furbearers provide excellent wildlife viewing opportunities. Coyotes and red fox are often seen as they are relatively tolerant of human activity. Lynx is a cyclic species commonly observed in the Southern Lakes area during snowshoe hare population peaks. Red squirrels are common and active during the day in the forest, while muskrat and beaver are seen in wetland habitats.

Distribution and Abundance

Most furbearer species are common and widespread in the Southern Lakes area. Habitat generalists such as red fox may occur from valley bottom to mountaintop, while others are limited to preferred habitats. Marten are most common in old growth forests. Semi-aquatic furbearers (beaver, muskrat, mink, otter) are found in wetlands and water bodies.

Southern Lakes furbearer populations appear to be healthy and within the normal range of population fluctuations. Exceptions are river otter and wolverine, which naturally occur at low densities, and fisher and marten, which are rare or absent from some areas (Table 9).

Red Squirrel

This common tree squirrel is found in pine and spruce forests throughout the Southern Lakes area. Red squirrel populations have been studied intensively at Squirrel Camp, 35 km northwest of Haines Junction, since 1988. Squirrel abundance is closely tied to abundance of conifer seeds, fluctuating dramatically and lagging one year behind spruce cone production. Recent years of high cone production were noted in 1993, 1998, 2005, and 2010.

Beaver

Found in wetlands up to the subalpine, the beaver eats stems, leaves and bark from terrestrial and aquatic plant species. Its most important foods in the Southern Lakes area are willows and trembling aspen (poplar). Beavers are abundant where burns and wetlands meet, as in the Teslin, Takhini, and Braeburn burns.

In 2008 researchers found very high beaver densities on the Haunka, Snafu, Tarfu, and Teenah Creek systems with a total of 148 beaver colony sites (most in Agay Mene Territorial Park). Beaver densities in this area were high in 1982 and even higher in 2008. Beavers were live-trapped and tagged in a pilot study on Tarfu Lake in 2009.

Muskrat

The muskrat is a semi-aquatic rodent that requires deeper wetlands that will not freeze yet have an abundance of aquatic vegetation for food. Spring push-up surveys in 1982 and 1983 revealed low densities of muskrats in about 30 wetlands throughout the Southern Lake area. Hutshi Lakes had the highest density of pushups in the Yukon River Basin.

Muskrats are common in the Lewes River marsh, but they thrived in even greater numbers before flow control altered seasonal water levels since

1922. The Lewes Dam is used to control the water level in Marsh Lake and the Southern Lakes system.

Table 9. Summary of furbearer surveys in the Southern Lakes area.

Date	Survey	Key Result	References
1950	Traplines registered	Area-specific harvest data compiled by Yukon Government	Yukon fur harvest data
1977	Trapper questionnaire	Grouse and snowshoe hare monitored	Slough 2009
1979-82	Marten research	Evelyn Creek, South Canal Road; marten population dynamics and food habits	Archibald and Jessup 1974 Slough et al. 1989
1980/81 to present	Fur harvest monitoring improved	Data considered reliable from this date forward	Yukon fur harvest data
1981 to present	Trapper questionnaire	14 furbearer species added	Slough 2009 Environment Yukon 2010
1981-83	Yukon River Basin studies	Winter track-counts, beaver food cache surveys and muskrat pushup surveys	Slough and Jessup 1984
1984-87	Marten transplant	171 marten released in SW Yukon, including 120 in Southern Lakes area	Slough 1987, 1989, 1994
1985	Winter track-counts	Repeated some 1981-83 Yukon River Basin transects in Southern Lakes area	Slama 1985
1980s	Beaver studies	Flat Creek, Klusha creek. Live trapping to determine colony size; unsuccessful	File notes
1986-94	Lynx research	Teslin Burn, based at Snafu Lake; lynx population dynamics in an untrapped refugium	Breitenmöser et al. 1993; Mowat et al. 1996a, 1996b; Mowat and Slough 1998, 2003; Slough and Mowat 1996; Slough 1999
2007	Beaver food cache surveys	Nordenskiöld River	Flynn 2008 (draft report)
2008	Beaver food cache surveys	Teslin burn, Mandanna/ Nordenskiöld River	Jung and Kukka 2008
2009	Beaver studies	Tarfu Lake, live-trapping	Pilot studies, discontinued

Coyote

Coyotes expanded northward into the Yukon in the early 20th century. Livestock, land clearing, and roads and trails assisted the coyote's expansion across North America. The most significant factor though, especially in the North, was the removal of the coyote's main predator and competitor, the wolf.

Coyotes have expanded into most Yukon habitats, and they are common at lower elevations where snow is shallower in the rainshadow of the Coast Mountains. Because they depend on the snowshoe hare, coyote populations are also cyclic in the Yukon.

Red Fox

Red fox is the most widely distributed carnivore in the world and is found throughout the Yukon. Red foxes likely compete with coyotes for food. Coyotes are able to outcompete and even kill red foxes, so foxes are more numerous in the absence of coyotes, such as in areas with deep snow.

Wolverine

The wolverine is a large member of the weasel family strongly associated with intact natural ecosystems in remote wilderness areas. Its best habitats have a diversity of ungulates and an intact carnivore guild. Most of the wolverine's diet consists of carrion which they scavenge from natural mortalities and leftovers from other predators. Wolverine densities in Southwest Yukon were the highest estimated in the territory, up to 10.75 resident adults/1000 km² or 17.9/1000 km², including juveniles and transients. These densities may be overestimated based on current habitat availability.

Wolverines are sensitive to harvest, human disturbance, and habitat fragmentation. Monitoring this species is difficult because they are wide-ranging and occur in low densities. In the winters of 2008-09 and 2009-10, Environment Yukon ran a pilot project to estimate wolverine populations in the Coast Mountains. They used a DNA mark-recapture technique using hair snagging supplemented by aerial quadrat sampling of tracks in snow. Hair snagging failed to sample any wolverine for a variety of reasons, but both techniques warrant further evaluation.

River Otter

The river otter is a semi-aquatic member of the weasel family associated with fish-bearing streams, rivers, ponds, and lakes. Beaver ponds are favourite haunts where otters prey on fish and den in beaver lodges. Otters often cross land between water bodies in their territory, and may cross many kilometres of land when dispersing. They are most common in Yukon valleys and lowlands where fish and beaver are abundant.

Marten

Marten are habitat specialists for old-growth coniferous forests, but recent studies have found that they will occupy younger coniferous forests and burns. They feed on small mammals, birds, insects, and berries, but their favourite prey is red-backed voles, the most abundant small mammal in the area.

Marten research was conducted in the Evelyn Creek area east of the Teslin River from 1978 to 1981. The adult resident marten density there was about 6 marten/10 km².

In the 1980s the trapping regulations identified the Southern Lakes area as an area of marten scarcity known as the Marten Conservation Area (MCA). Between 1984 and 1987, 171 marten were transplanted to several release sites, including Braeburn Lake/Fox Lake (26 marten), Ibex River (12 marten), Takhini River (48 marten), Wheaton River (11 marten), Takhini Lake (20 marten), and near Whitehorse (3 marten).

Marten trapping quotas were established in 1985, though quotas have been increased or removed over the years on many Registered Trapping Concessions (RTCs). Overall, the marten population in the Southern Lakes area increased dramatically following the transplant, especially between Teslin and Yukon rivers and in the Kluane area.

Fisher

The fisher is a coniferous or mixed forest-dweller that preys and scavenges on a wide variety of animals, but may be most reliant on snowshoe hares, rodents, and carrion. Its relationship with porcupines has been exaggerated, although it is the carnivore best adapted to kill the porcupine.

The fisher is largely confined to the Liard River watershed in southeast Yukon, ranging west to the Teslin River. Several observations have been made west of the Teslin River, and incidental captures have been made near Whitehorse and Haines Junction. The species may be increasing in abundance and expanding its range into the Southern Lakes area.

Ermine

The ermine, or short-tailed weasel, is found in all habitats in the Southern Lakes area. It will prey on almost any small animal, but prefers small rodents such as mice, voles, and lemmings.

The least weasel (*Mustela nivalis*), a close relative of the ermine, is the smallest Yukon carnivore – not a furbearer. It has no commercial value and is rarely and incidentally trapped, but it is believed to bring good luck to the trapper.

Mink

The mink is a semi-aquatic member of the weasel family and, like the river otter, is rarely found far from water. They eat a wide variety of aquatic and terrestrial prey including small mammals, birds, fish, amphibians, and invertebrates. Mink is expected to be more abundant where its favorite prey, such as muskrats, is common.

Lynx

The lynx preys almost exclusively on the snowshoe hare, so it is abundant where and when hares are abundant and closely follows hare population cycles (average 9 years). The last snowshoe hare peaks in the Southern Lakes area were 1981-82, 1990-91, 1998, and 2007. The last two cyclic peaks have not had the amplitude of the previous two peaks. When hare populations are low, lynx take alternate prey like red squirrel and grouse.

The lynx-hare cycle is tracked using lynx pelt length measurements, taken when pelts are sealed at conservation offices. Data from the Southern Lakes area show extremely low lynx recruitment in 1992/93, 2000/01 and 2007/08.

A lynx study based at Snafu Lake in the Teslin burn documented the lynx/hare cycle in an untrapped area between 1986 and 1994. The results have been widely published and represent some of the most important lynx literature. The lynx population varied from about 2 lynx/100 km² during hare lows to 45 lynx/100 km² at the peak, the highest lynx density ever reported in North America. Another lynx habitat study was conducted in the Tarfu Lake area.

Winter Track Counts

Researchers use standardized winter track-counts to describe furbearer distribution and provide an index of abundance. Slough and Jessup conducted track transects in 1982 and 1983 in the Southern Lakes area. Snowshoe hare populations peaked in 1980-81 and were still relatively abundant in early 1982. The most abundant furbearers in 1982 were (from abundant to uncommon) red squirrel, coyote, lynx, ermine, marten, red fox, and mink. Wolverine and river otter were rare.

In 1983 they were red squirrel, lynx, weasel, marten, wolverine, coyote, red fox, and mink. Once again river otter was rare. Snowshoe hare tracks had decreased by over 80 per cent in a year, and lynx, coyote, and wolverine were probably making larger movements in search of prey.

In both years mink, lynx, and red squirrel tracks were more abundant in the Southern Lakes than either the Kluane or North Canol areas. Coyote tracks were much less common than in the Kluane area, and marten tracks were less

common than in the North Canol area. Most species except red squirrel and wolverine had declined even further by 1985 when snowshoe hares were at a population low.

Trapper Questionnaire

After each trapping season since 1977, questionnaires are mailed to all licensed Yukon trappers. The questionnaires seek local knowledge of population levels and trends of furbearers and some prey species. By 1981, all 14 furbearer species had been added to the questionnaire.

Responses are converted to numerical values which contribute to abundance and trend indices over time. Questionnaires are also useful for determining species' distributions. Potential problems with the questionnaire include misidentified tracks, low response rates, concentrations of sightings in populated and accessible areas, and lack of data standardization. These concerns are mitigated by Yukon trappers who have intimate local knowledge of their traplines, which are dispersed across the landscape.

A Yukon Trappers' Perspective on Wildlife Population Trends: A Preliminary Analysis of Trapper Questionnaires, 1992-93 to 2007-08 included regional analyses including the Southern Lakes regional management area. Some of the results were highlighted in a summary brochure.

Trappers' perceptions about furbearer population trends are believed to be more accurate for species with obvious population cycles and fluctuations such as lynx and coyote.

Perceptions of abundance may be affected by factors other than animal density, including weather and increased animal movements during seasonal or cyclical dispersals. Beavers are perceived as being common to abundant and relatively stable. The Southern Lakes area is second to the Liard Region (Watson Lake area) in terms of perceived beaver abundance. Muskrat, mink and river otter are common and stable.

Wolverines are relatively common and stable across the Yukon. Fisher remains scarce in the Southern Lakes area where an increase in numbers of observations and captures occurred. Ermine are common but exhibit some fluctuation. Marten abundance also shows wide variation, with most areas showing population decline in 2001 following mice/vole and snowshoe hare declines. The marten population in the MCA, which is primarily in the Southern Lakes area, is perceived as stable but scarce.

Coyote abundance varies greatly across regions, being most common in the Kluane region, followed closely by the Southern Lakes region. Dependence on the snowshoe hare is evident in these regions. Red fox is common, with some prey-dependent fluctuation as well.

Lynx and snowshoe hare population cycles are well-known to most observers and are highly correlated. After Kluane, the Southern Lakes region showed highest overall lynx densities. Both species showed population peaks in 1998, and hares peaked again in 2006 followed by lynx a year later. Red squirrels are consistently abundant but trapper-perceived population levels do not appear to track those observed in the Kluane study area.

Other survey techniques

Beaver food cache surveys provide a census of all active colonies. The caches are most visible from the air in the fall after leaf-fall and before freeze-up when snow cover obscures them.

Muskrats at this latitude live in bank burrows and build pushups to extend their foraging range. Muskrat pushup surveys provide a rough index of population level, and pushups are best surveyed from the air in the spring. There are few options for muskrat population surveys in the Yukon other than intensive live-trapping studies.

Lynx pelt length is measured when the pelts are sealed by Conservation Offices or fur dealers, allowing wildlife managers to estimate the proportion of kits in the population. Ninety per cent of lynx pelts are aged correctly using pelt length data.

Other techniques used in the Yukon include DNA mark-recapture using hair snagging and an aerial quadrat sampling of tracks in snow to estimate wolverine populations. Using remote cameras is a non-invasive survey method for carnivores recently been used in the Yukon. Researchers often request furbearer carcasses from trappers to obtain biological information.

Harvest Trends

Yukon fur harvest statistics have been compiled since 1919; however, these records were not area-specific until the registration of traplines in 1950. The fur harvest monitoring system has been improved over the years, and the data since the 1980/81 trapping season is considered reliable.

Furbearer harvests are monitored through a system of mandatory export permits, fur dealer returns, and sealing of lynx and wolverine pelts. All of the harvest information is collected by area (RTC), though data is not released for individual trappers. Harvest from areas of interest, like the Southern Lakes area, can be compiled by special request.

In addition to the availability of furbearers, fur harvest is susceptible to many social, cultural and economic factors. This is evident by the Southern Lakes fur harvest and value of the fur harvest which declined dramatically after the lynx population peak in the early 1990s. Combined with the declining fur

market and increased costs to run a trapline, the economic incentives to trap have fallen off.

The market is showing signs of increase as buyers from China, Hong Kong, and Russia are paying higher prices for species like lynx, marten, and wolverine. Recent harvests of wolverine and marten in the Southern Lakes area have been strong. The return of lynx populations to historic peaks would be a significant incentive for trappers to increase their efforts.

Relative to the total Yukon fur harvest, the Southern Lakes area has significant harvests of coyote (26.1% of Yukon harvest), lynx and river otter (20%), red squirrel (19.7%), and wolverine (16.8%). The lowest harvest contributions are from muskrat (1.5%), marten (2.4%), and weasel (5.0%). The total value of furs harvested in the Southern Lakes area is 5 to 12 per cent of the Yukon total, or \$9,000 to \$85,000 per annum (since 1985).

Species Assessment

None of the Southern Lakes furbearers are listed nationally as endangered or threatened by COSEWIC (2010). Only two species, lynx and wolverine, have been assessed by COSEWIC. The lynx was assigned a status of not at risk, but the wolverine (western population) is listed as special concern.

The status of special concern was assigned because wolverine habitat is increasingly fragmented by industrial activity, and motorized access increases harvest pressure and other disturbances. The species has a low reproductive rate and requires vast secure areas to maintain viable populations. There is no evidence of a decline in wolverine harvest, and the only population trend data comes from local knowledge and harvest monitoring programs.

Environment Yukon uses standard general status rankings to highlight species that need a more detailed (i.e. COSEWIC) assessment. Most furbearers in the Southern Lakes area have national and territorial general status rankings of secure and the wolverine is considered sensitive. The fisher is ranked may be at risk in the Yukon (secure nationally), where they are very sparse across a limited range (Table 10).

CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) export permits are required for the export of lynx and otter out of Canada as both are look-alikes of other listed species.

Stressors and Threats

Overharvesting of furbearers has occurred in the past. Problems can arise if there is a strong economic incentive to overharvest, such as with lynx in the 1980s. Coyotes and wolverines are listed as both furbearers and big game under the *Yukon Wildlife Act*, allowing them to be taken under a big game hunting licence and a trapping licence.

Some species, such as wolverine, coyote, and red fox, may become conditioned to be near residences, farms, and camps. When wildlife-human conflicts occur, these animals may be live-trapped and moved, or destroyed. Beavers are routinely removed by trapping on property, roadways, and railways that are being inundated with water. Wolves generate carrion for scavengers such as wolverine, so reducing wolf population numbers can impact wolverine, marten, fisher, coyote, red fox, and other species.

Table 10. COSEWIC, General Status, NatureServe global and territorial, and IUCN rankings for furbearers that regularly occur in the Southern Lakes area.

Common Name	COSEWIC	General Status	NatureServe	IUCN
Red squirrel	Not assessed	Secure	G5S5 (Secure)	Least Concern
Beaver	Not assessed	Secure	G5S5 (Secure)	Least Concern
Muskrat	Not assessed	Secure	G5S4toS5 (Apparently secure)	Least Concern
Coyote	Not assessed	Secure	G5S5 (Secure)	Least Concern
Wolf	Not assessed	Secure	G4S4 (Apparently secure)	Least Concern
Red fox	Not assessed	Secure	G5S5 (Secure)	Least Concern
Wolverine	Special Concern	Sensitive	G4S3 (Vulnerable)	Near threatened
River otter	Not assessed	Secure	G5S4 (Apparently secure)	Least Concern
Marten	Not assessed	Secure	G5S5 (Secure)	Least Concern
Fisher	Not assessed	May be at risk	G5S2toS4 (Imperilled or Apparently secure)	Least Concern
Ermine	Not assessed	Secure	G5S5 (Secure)	Lower Risk – Least Concern
Mink	Not assessed	Secure	G5S5 (Secure)	Lower Risk – Least Concern
Lynx	Not at Risk	Secure	G5S4 (Apparently secure)	Lower Risk – Least Concern

Furbearer habitat loss and fragmentation can occur in areas of agriculture, forestry, mining, oil and gas development, linear developments, and human settlement. Each species has unique habitat requirements and

level of tolerance to disturbance. Human disturbance and activities including flying, backcountry recreation, and wilderness camps can disturb the behaviour of larger furbearers, though lynx appear quite tolerant.

The Yukon Fire Management Policy recognizes the need for maintaining natural ecosystems with uneven aged forests to sustain species such as beaver and lynx that depend on the fire cycle. However, the Southern Lakes area has a high concentration of human values and much of the area is zoned for fire action. Some of the best lynx and beaver habitat in the area was generated by the large 1958 fires. As fewer and smaller fires occur in the area the overall quality of beaver and lynx habitat continues to decline.

Environment Yukon uses habitat protection guidelines to evaluate development proposals for potential impacts on furbearers and habitat, and to facilitate informed decisions on impact mitigation. Human settlement and linear developments (roads, transmission lines, White Pass and Yukon Route Railroad) are prominent land uses in the Southern Lakes area. The original guidelines, drafted in 1996, are being updated in 2011.

Key Habitats

Beaver is the only furbearer with key habitats identified in the Yukon Wildlife Key Areas database. High quality beaver and muskrat habitats can be delineated with survey techniques. However, most furbearers are wide-ranging species that require features found across the landscape.

They do have some site-specific habitat requirements. For example, female lynx require dense overhead and lateral cover for denning. Most lynx dens in the Teslin burn were under dense deadfall in the regenerating burned area, while others were under dense shrubs or low canopies of young conifers. Wolverine dens are constructed either in boulders, under deadfall, under logs in avalanche debris or in snow tunnels at all elevations.

River otters den above spring flood water levels under tree roots and in beaver bank dens. Coyote and red fox dens may be reused year after year.

Significant Yukon wetlands are mapped as Wildlife Key Areas primarily for their value as migratory waterfowl habitats, though none are protected in the Southern Lakes area except as map notations. There is considerable overlap in the habitats of muskrat and migratory waterfowl on the Mendenhall River, Hutshi Lakes, Nordenskiöld River, Lewes Marsh, and in the Squanga Lake–Michie Creek corridor.

Lewes Marsh, an important muskrat habitat, is a Habitat Protection Area identified in the Carcross/Tagish First Nation and Kwanlin Dün First Nation Final Agreements. Environment Yukon tracks observations of fisher and maintains a Yukon species at risk database as part of the Yukon Conservation Data Centre. Biotics data is available for the evaluation of land use development proposals, under the *Yukon Environmental and Socio-*

Economic Assessment Act (YESSA), for potential impacts on tracked species and their habitats.

Furbearer habitats are protected in Kusawa and Agay Mene Parks (awaiting designation). Agay Mene has significant beaver and lynx habitats, and Kusawa contains some of the southwest Yukon's best marten habitat.

Species Management

The Government of Yukon, Yukon Fish and Wildlife Management Board, First Nation governments, and Renewable Resource Councils (RRCs) all have responsibilities in furbearer management. Furbearer trapping and hunting is regulated by the *Yukon Wildlife Act* and corresponding regulations. Furbearers may be harvested by registered trappers and, in the case of wolverine and coyotes, big game hunters.

In Yukon, trapping is managed under a registered trapline system. Individuals are given exclusive opportunities to trap in a defined area, and up to 70 per cent of traplines can be held by First Nation citizens and managed by the First Nation government (Category 1). Yukon government has authority over the rest of the traplines (Category 2).

RRCs advise on the management and use of furbearers. This authority includes making recommendations on the use of traplines and the reassignment of all new, vacant, and underutilized traplines. Yukon First Nations Final Agreements indicate that RRCs may establish bylaws under the *Yukon Wildlife Act* related to the management and use of furbearers in their jurisdiction. Currently, the act does not include legislative mechanism for such RRC-established bylaws.

First Nation traditional territories overlap in much of the Southern Lakes area. As a result, many traplines that fall into these overlap areas are not assigned.

Low fur prices over the last 25 years and the rising costs of getting out on the land means trapping is not an economically viable activity. Members of many Southern Lakes communities have expressed interest in a fur harvest support program similar to other resource use sectors like farming, fishing, forestry, and mining. Northwest Territories' fur harvest support program has been cited as a program that has successfully re-connected people with the land.

Mandatory trapper educational programs are an important aspect of furbearer management. Trappers receive current biological information that they can use to manage their harvests and furbearer populations on their RTCs. Furbearer harvest monitoring and population data contributes information to decisions about trapping regulations.

Continual improvement of trapping devices to ensure furbearers are trapped humanely remains important. Canada is a world leader in trap research through support of the Fur Institute of Canada which carries out a comprehensive trap research and development program. Trapping methods in the Yukon are regulated through this national program.

Education and Outreach

Over the years many educational and outreach activities involving furbearers have been conducted in the Southern Lakes area. Topics included furbearer biology, trapping, and species-specific presentations on popular species such as beaver, wolverine, and lynx.

The Southern Lakes area is one of the best places in the Yukon to view beaver. Snafu and Tarfu lakes in Agay Mene Territorial Park present good potential for developing interpretive opportunities focused on beavers, such as displays or a self-guided boat tour. Interpretative events could introduce aspects of their biology and ecology and how other species benefit from sharing habitat modified by beavers.

Currently Environment Yukon is involved in environmental education and wildlife viewing program events such as ‘animal tracks in the snow’, an event highlighting winter furbearer activity. Trapping presentations are usually given by members of the Yukon Trappers Association. Trapper education is a mandatory prerequisite for obtaining a trapping license.

Trappers can sell ecotourism packages on their traplines during winter for clients to experience nature and participate in the trapping lifestyle. The trapper also needs a wilderness tourism license, liability insurance, and first aid training. No Guided Trapping Permits have been issued, but some trappers are advertising.

Small Mammals

Introduction

The Southern Lakes area is home to at least 28 species of small mammals (Table 12), including 2 species that do not naturally occur here. Another 9 species may occur in the area. Not included in this chapter are the small carnivores (such as least weasel and ermine) and furbearing rodents (beaver, muskrat and red squirrel) which are discussed in the Furbearer chapter.

The small mammals fall into four orders, or major groupings: shrews (*Soricomorpha*), bats (*Chiroptera*), pikas and hares (*Lagomorpha*), and rodents

(*Rodentia*). We are still learning more about which species occur in the Southern Lakes area and expect to add new species to the list in the coming years.

Species Significance

Yukon First Nations

Small game species have a long history of use by First Nations people, and are important seasonal foods. For example, arctic ground squirrels were traditionally taken in spring and fall, porcupines were taken in the summer, and snowshoe hares were snared in the winter. Small game species were important survival foods in times of moose and caribou shortages. Because they feed on medicinal plants, their meat is considered important for people's health.

People use pelts and meat of snowshoe hares and arctic ground squirrels. Robes made from arctic ground squirrel pelts are highly valued because one robe requires many pelts to be collected (up to 132), and they take long time to tan. Porcupines are used for meat, and their quills are used for decorating artwork, such as baskets and blankets. Hoary marmots, woodchucks and pikas are also traditional subsistence foods for First Nations in the Southern Lakes area.

Trapping has traditionally been an important source of local information. Trappers have an intimate knowledge of the land which allows them to notice even subtle changes in wildlife populations and health. As fewer people are trapping, this knowledge is being lost.

Other Significance

Most of the small mammals are inconspicuous due to their size and need for cover from predators. Many are also nocturnal or crepuscular (active at dawn and dusk). As a result most are rarely seen and are not typically used by humans for food, clothing, or wildlife viewing. The larger species – pikas and hares, members of the squirrel family, and porcupines – are more visible, making them good subjects for wildlife viewing.

Snowshoe hares, arctic ground squirrels, and porcupines are small game animals that are legally hunted or snared. Small game species are an important part of the food chain. People are concerned about how declines in small game will impact other species.

The life history of northern populations of bats has recently been studied in the Yukon. In summer, they roost in buildings and bat houses, and at natural rock crevices. When using our buildings as their homes they often come into conflict with people. On the other hand, many people find bats

fascinating and enjoy learning more about them. They may respond strongly to climate change. Several species of bats are endangered.

Many of the small mammal species interact with humans in ways that result in conflict, often earning the label of 'pest.' To deal with these human-wildlife conflicts, people often trap, shoot, and exclude small mammals from property and dwellings. Terms like 'nuisance' or 'problem' wildlife are less common today, as people better understand the role that humans play in these interactions.

Some small mammals invade homes and businesses, such as northern flying squirrels, bats, and small rodents, deer mice, and the introduced house mouse near downtown Whitehorse. Some species like snowshoe hares and voles compete with us in our own gardens for edible and ornamental plants. Arctic ground squirrel burrows in open grassland habitats can be a danger to livestock that might suffer leg injuries from stepping into the holes.

The diverse groups of small mammals in this chapter have a wide-range of ecological values.

Distribution and Abundance

Numerous small mammal surveys have taken place in the Southern Lakes area (Table 11). Local people have noticed declines in small game and that there are regional differences in the abundance of small game.

Table 11. Summary of Small Mammal Surveys in the Southern Lakes area.

Date	Reference	Survey Objectives	Key Results
1899	Osgood 1900	U.S. Biological Survey travelled by boat on Bennett, Tagish and Marsh lakes, and down the Yukon River collecting specimens.	First collections of mammals in Yukon Southern Lakes, many new species and subspecies described.
1860-1969	Youngman 1975	Compendium of numerous biological surveys and specimen collections throughout the Yukon.	Described 64 species of mammals, of which 58 were native, 6 were introduced or accidental wanderers. Another 11 hypothetical species listed.
1979-1981	Beare 1984, Slough et al. 1989	Diversity and relative abundance of small mammals studied in habitat types in conjunction with a marten study.	Red-backed vole predominant of 14 species present and main marten food. Hares consumed by marten at cyclic hare peak.
1982-1983	Slough and Jessup 1984	Furbearer inventory of the Yukon River basin	Winter track-counts of snowshoe hare
1985	Slama 1985	Winter track-counts in Southern Lakes area	Winter track-counts of snowshoe hare
1986-1994	Slough and Mowat 1996, Mowat and Slough 2003	Lynx research in the Teslin Burn	Winter track-counts and snowshoe hare fecal pellet transect.
1997 to present	Slough and Jung 2008	Monitor bat populations and species diversity in the Southern Lakes area. Methods include live-capture and acoustic monitoring.	Little brown myotis maternity colonies common and stable. Bats use several roosts in a larger foraging area. Some long distance roost switching observed.
2000	CPAWS 2001	Baseline data in support of protecting the integrity of the ecosystem from Michie Lake south to the Snafu/Tarfu lakes.	Small mammal trapping and bat echolocation call recordings near Squanga Lake.
2005 to present (since 1973 in Kluane)	Krebs et al. 2011	Long-term monitoring to assess the health of the Yukon boreal forest ecosystem. Data collected on white spruce cone crops, ground berry production, small mammals, snowshoe hares, and arctic ground squirrels at 5 sites including Wolf Creek (Whitehorse).	Hare populations synchronous across sites, peaking in 2006-2007. Red-backed vole populations not synchronous, peaking in Whitehorse in 2005 and 2007.

Table 11. Continued.

Date	Reference	Survey Objectives	Key Results
2002	Withers 2002	Survey of melanistic arctic ground squirrels in the Yukon Southern Lakes area	Black ground squirrels found only at Jakes Corner.
2001	Lumley 2001	Invertebrate survey using pitfall traps	Shrews and rodents captured incidentally
2003	Slough and Jung 2003	Shrew surveys in Southern Lakes area, Takhini River to Marsh Lake	Captured 17 shrew specimens; 9 cinereus shrews, 5 dusky shrews and 3 pygmy shrews.
2006	Leung 2007	American water shrew live-trapping at McIntyre and Wolf creeks to study home range, abundance.	Minimum water shrew density 1/250 m of creek. Prefer overhead cover afforded by shrubs, deadfall and overhanging banks.
2007, 2008	Lausen et al. 2008	Bat surveys in Yukon, including 7 sites in Southern Lakes region.	Other bat species found in Teslin (big brown bat and/or silver-haired bat, northern bat and western long-eared bat) and Dalton Post (another <i>Myotis</i> species) areas.
2008	T. Jung et al., unpubl. data.	Small mammal survey of Agay Mene Park	10 small mammal species captured or observed.
2009	Slough 2009c	Field surveys for small mammals, to confirm presence and distribution of species in Kusawa Park, using small mammal trapping, bat echolocation call recording, and aerial and ground surveys of alpine mammals.	Aerial surveys helped identify collared pika habitats. Ground surveys confirmed presence of pikas, hoary marmots and arctic ground squirrels. Deer mice and red-backed voles common in forests, higher mammal diversity along streams. Bats common at north end of Kusawa Lake but not further south.
2010 to present	B. Slough, unpubl. data	Real time full-spectrum recording of bat calls at several Yukon sites, including Bennett Lake, Tagish Lake, Whitehorse area.	Possible recording made of long-legged myotis near Whitehorse, big brown bat or silver-haired bat at Bennett Lake, and western long-eared myotis or Keen's myotis at Bennett Lake and Dalton Post.

Shrews

At least 4 species of shrews occur in the Southern Lakes: cinereus (or common) shrew, American pygmy shrew, dusky (or montane) shrew, and American water shrew. Two other species have poorly documented distributions in the Yukon and may occur in the Southern Lakes area. The arctic shrew and tundra shrew are hypothetical species for the Southern Lakes area.

Few surveys have been undertaken specifically for shrews or other small mammals in the Yukon, so the distribution and ecology of these species is poorly understood. Small mammal surveys of varying purpose, intensity and length have taken place in the Evelyn Creek area, South Canol Road, Squanga Lake, Agay Mene Territorial Park, Whitehorse area and Kusawa Lake. Most of these surveys used snap-traps or live-traps, which are effective for capturing rodents, but not shrews. Shrews are more efficiently captured in pitfall traps which are now being used in small mammal studies.

Four species of shrews (cinereus shrew, American pygmy shrew, dusky shrew and American water shrew) are relatively common and widespread in the Southern Lakes area. The most common shrew, the cinereus shrew, and the American pygmy shrew are found in a variety of habitats up to treeline. The dusky shrew is closely associated with the common shrew, but it also ranges into the alpine. The American water shrew inhabits forest and alpine, but is strongly associated with water. The four species are wide ranging elsewhere in the Yukon too, but the American water shrew is mainly restricted to the southern Yukon. The arctic shrew and tundra shrew have not been confirmed from the Southern Lakes area.

Bats

The little brown myotis is the most common bat in the Southern Lakes region. The long-legged myotis was detected acoustically near Whitehorse in 2010. Other species which may occur here are the big brown bat, silver-haired bat, and one or more of three long-eared bats found in this part of North America (northern myotis, long-eared myotis and Keen's myotis). More work needs to be done to document the presence and distribution of uncommon and hypothetical bat species.

Bats have been studied in the Southern Lakes area since 1997. Several research sites throughout the area, both natural and man-made, have been monitored for bat activity by live-capturing bats. Acoustic surveys, where bat calls are recorded and analyzed, have also been used extensively throughout the area.

Bats are found throughout the area below treeline, and are most abundant in the warmer and more productive lower elevations near wetlands where insects are abundant. Little is known about species other than the little brown myotis, since they occur in much lower densities. They are probably

found throughout the Southern Lakes area, but may be limited by specific habitat requirements such as rock crevices or tree cavities.

Pikas and Hares

The collared pika – sometimes called a ‘rock rabbit’ or ‘coney’ – is a small rabbit-relative that occupies primarily alpine talus boulder fields that are interspersed with meadow. Collared pikas may be the most sensitive species to global climate change in the Southern Lakes area.

The snowshoe hare – known locally as the ‘rabbit’ – is a key component of northern ecosystems. Hares are a dominant part of the biomass in the boreal forest: without hares, the vertebrate community would largely collapse. Some of the best hare habitats are early successional shrubs and trees found in recent burns (15 to 35 years post-fire) and riparian areas which are regularly disturbed by flooding. Snowshoe hare monitoring, initiated at the Kluane Project on ecosystem dynamics of the boreal forest, is ongoing as the Community Ecological Monitoring Project which has a study site at Wolf Creek in the Southern Lakes area.

Collared pikas have been surveyed in Kusawa Park and were found to be quite common on mountains that provided coarse talus adjacent to alpine meadows. They appear to be widespread in the Coast Mountains west of Whitehorse and in the Big Salmon Range east of the Teslin River. Pika populations that occupy mountains that are isolated from other mountains by extensive forested lowlands have a lower probability of being recolonized if they become extirpated.

The annual trapper questionnaire asks questions about snowshoe hare population level and trends. Snowshoe hare monitoring is ongoing with the Community Ecological Monitoring Project. Hare populations tend to be synchronous over northwestern Canada, so the population trends observed in the Kluane area should apply to the Southern Lakes area. Following the well documented and explosive hare population peaks in the 1980-81 and 1990-91, lower density peaks were observed in 1998 and 2006.

Two explanations for the low peak hare densities were proposed; predators can move long distances and could be moving into this area from other areas that are out of phase (there is no evidence to support this), or there could be new predators in the food web. Marten and fisher are both hare predators that have increased in the Southern Lakes area since the mid-1990s. A low density peak had been observed in 1998 in interior Alaska as well, but the recent 2006 peak was a very high density.

Rodents

Nineteen species of rodents are known from the Southern Lakes area. There are 5 squirrels (northern flying squirrel, hoary marmot, woodchuck, arctic ground squirrel and least chipmunk), 10 species of mice, voles and lemmings (nearctic brown lemming, long-tailed vole, root (or tundra) vole, meadow vole, northern red-backed vole, bushy-tailed woodrat ('packrat'), northwestern deer mouse, North American deer mouse, eastern heather vole and northern bog lemming), 2 jumping mice (meadow and western jumping mouse), and the North American porcupine. The singing vole is found in the St. Elias Mountains to the west of the Southern Lakes.

Two Old World rodents from Eurasia (house mouse and brown rat) were inadvertently transported around the world by humans and recently observed in Whitehorse.

Few surveys have been undertaken specifically for the non-game and small game rodents in the Yukon, so the distribution and ecology of these species is poorly understood.

Small Mammal Survey Methods

Shrews have been traditionally captured using standard methods used by biologists studying small rodents, such as live-or snap-trapping. They are much smaller than rodents and are therefore under-sampled using these methods. They are more efficiently captured in pitfall traps.

Bats are studied using two primary methods: acoustic surveys using bat detectors, and live capture using mist nets and harp traps. Bat detectors are used to monitor ultrasonic echolocation calls. Bats are also captured in mist nets and harp traps. Nets and traps are set in roost exits in cabins, in front of rock crevice roosts and bat houses, and in foraging habitats during the peak period of bat activity, usually 0.5 to 3 hours after sunset.

Surveying pikas is necessarily labour intensive, and potential habitats must be surveyed on foot to determine occupancy and population levels. Snowshoe hares have been monitored in the Southern Lakes area using winter track-counts, trapper questionnaire indices and fecal pellet counts.

Most of the larger rodents such as arctic ground squirrels, northern flying squirrels, woodchucks, bushy-tailed woodrats and porcupines have not been systematically surveyed or studied in the Southern Lakes area. Observations are recorded on an opportunistic basis, those being frequently submitted by members of the public. The majority of small rodents are trapped in various trapline configurations. Snap traps are designed to capture small rodents while pitfall traps target shrews, although either type of trap may capture either type (i.e., order) of small mammal. Live traps are used in the CEMP studies where population indices are being collected and specimens are not being retained for identification.

Harvest Trends

Small Game

Snowshoe hare, arctic ground squirrel and porcupine are harvested as small game animals, but harvest data is not collected for these species. Small game harvest is generally restricted to well-traveled roads and trails and is not likely to impact populations. These species all have cyclic populations which should be reflected in harvest trends. Harvest will also be dependent on socio-economic factors which are not related to their populations.

Protected Species

With the exception of small game species above, all small mammals are protected species under the *Yukon Wildlife Act*. Hoary marmots, woodchucks and collared pikas are harvested by Yukon First Nations people. Harvest levels are not known but are believed to be negligible.

These species all inhabit patchy habitats and their populations are extremely sensitive to harvest pressure. It is recommended that the harvest of these species be monitored and that information on patchy populations be shared.

Species Assessment

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES 2011) does not list any of the small mammals found in the Southern Lakes area.

Stressors and Threats

Harvest

Arctic ground squirrel, snowshoe hare and porcupine are subject to an unlimited harvest, and collared pika, woodchuck and hoary marmot are harvested for subsistence by First Nations. Harvests are probably sustainable at present levels in both cases. Without monitoring programs for populations or harvests, there is potential for overharvest of some local populations.

Habitat Alteration and Disturbance

Human settlement, agriculture, mineral exploration and development, and associated roads and utility corridors are the main types of disturbance in the Southern Lakes area. High elevation areas tend to receive little human activity and disturbance. Most of the species that occupy lowland habitats are fairly ubiquitous and will persist at moderate levels of disturbance.

Table 12. COSEWIC, 2010 General Status, NatureServe global, and territorial, and IUCN rankings for small mammals of the Southern Lakes area.

Common Name	Latin Name	COSEWIC	General Status (2010) Yukon	NatureServe	IUCN
Cinereus shrew	<i>Sorex cinereus</i>	Not assessed	Secure	G5S5	Least Concern
American pygmy shrew	<i>Sorex hoyi</i>	Not assessed	Secure	G5S5	Least Concern
Dusky shrew	<i>Sorex monticolus</i>	Not assessed	Secure	G5S5	Least Concern
American water shrew	<i>Sorex palustris</i>	Not assessed	Secure	G5S5	Least Concern
Little brown myotis	<i>Myotis lucifugus</i>	Endangered	Secure	G5S4S5	Least Concern
Long-legged myotis	<i>Moyotis volans</i>	Not assessed	Not assessed	G5SU	Least Concern
Collared pika	<i>Ochontona collaris</i>	Special concern (Nov. 2011)	Sensitive	G5S3 or S4??	Least Concern
Snowshoe hare	<i>Lepus americanus</i>	Not assessed	Secure	G5S5	Least Concern
Northern flying squirrel	<i>Glaucomys sabrinus</i>	Not assessed	Secure	G5S4S5	Least Concern
Hoary marmot	<i>Marmota caligata</i>	Not assessed	Secure	G5S4	Least Concern
Woodchuck	<i>Marmota monax</i>	Not assessed	Sensitive	G5S3	Least Concern
Arctic ground squirrel	<i>Spermophilus parryii</i>	Not assessed	Secure	G5S5	Least Concern
Least chipmunk	<i>Neotamias minimus</i>	Not assessed	Secure	G5S5	Least Concern
Nearctic brown lemming	<i>Lemmus trimucronatus</i>	Not assessed	Secure	G5S5	Least Concern
Long-tailed vole	<i>Microtus longicaudus</i>	Not assessed	Secure	G5S5	Least Concern
Singing vole (likely present)	<i>Microtus miurus</i>	Not assessed	Secure	G4G5S4S5	Least Concern
Root vole	<i>Microtus oeconomus</i>	Not assessed	Secure	G5S5	Least Concern
Meadow vole	<i>Microtus pennsylvanicus</i>	Not assessed	Secure	G5S5	Least Concern

Table 12. Continued.

Common Name	Latin Name	COSEWIC	General Status (2010) Yukon	NatureServe	IUCN
Northern red-backed vole	<i>Myodes rutilus</i>	Not assessed	Secure	G5S5	Least Concern
Bushy-tailed woodrat	<i>Neotoma cinerea</i>	Not assessed	Secure	G5S5	Least Concern
Northwestern deer mouse	<i>Peromyscus keeni</i>	Not assessed	Secure	G5S5	Least Concern
North American deer mouse	<i>Peromyscus maniculatus</i>	Not assessed	Secure	G5S5	Least Concern
Eastern heather vole	<i>Phenacomys ungava</i>	Not assessed	Secure	G5S5	Least Concern
Northern bog lemming	<i>Synaptomys borealis</i>	Not assessed	Secure	G4S4	Least Concern
Brown rat	<i>Rattus norvegicus</i>	Not assessed	Exotic	G5SNA	Least Concern
House mouse	<i>Mus musculus</i>	Not assessed	Exotic	G5SNA	Least Concern
Meadow jumping mouse	<i>Zapus hudsonius</i>	Not assessed	Secure	G5S5	Least Concern
Western jumping mouse	<i>Zapus princeps</i>	Not assessed	May be at Risk	G5S1S3	Least Concern
North American porcupine	<i>Erethizon dorsatum</i>	Not assessed	Secure	G5S5	Least Concern

Many species of wildlife depend on forests at various post-fire stages, from early to late successional. With increasing human values in the Southern Lakes, fire action zones are overtaking fire observation zones. Habitats for keystone species such as snowshoe hare are being lost. Species that favour older forests, such as northern red-backed voles, are increasing in abundance.

Unlike some furbearers and many large mammals, Environment Yukon does not have habitat protection guidelines for small mammals. Most of these species receive little to no attention during the evaluation of development proposals for potential impacts.

Climate Change

Climate-driven shifts in habitat and temperature at faster rates than elsewhere in Canada are being observed in the Yukon. The collared pika is the species that is most sensitive to these changes. Low snow accumulation, freeze-thaw events, icing following winter rains, and late winter snowfalls that delay spring vegetation growth are all occurring in this area and may be impacting collared pika survival.

Climate change is causing upslope migration of trees and shrubs. Alpine vegetation is likely to change in other ways, which might displace important forage plants. Distances among patches of habitats could increase, making dispersal between patches even more difficult. Finally, pikas have a limited ability to cope with high temperatures and must keep cool and moist under talus.

Other small mammal species, especially those occupying alpine environments, may also experience changes in distribution and abundance over the coming decades.

Key Habitats

Environment Yukon has no Wildlife Key Areas mapped for small mammals. Small mammal habitats will be protected in Kusawa and Agay Mene territorial parks (awaiting designation). Kusawa contains significant alpine mammal habitat (collared pika, hoary marmot and arctic ground squirrel). Agay Mene contains significant snowshoe hare habitat, however the productivity of the 1958 burn is now decreasing as it ages past 50 years.

Environment Yukon tracks observations of tundra shrew, northern myotis, collared pika, woodchuck and western jumping mouse as part of the Yukon Conservation Data Centre. Biotics data is available for the evaluation of land use development proposals, under the *Yukon Environmental and Socio-Economic Assessment Act*, for potential impacts on tracked species and their habitats.

Species Management

Small Game

Small game licences are available to residents and non-residents, without age restriction. Small game may also be hunted on big game licenses. There are no closed seasons or bag limits for small game. Game sanctuaries, National Parks and specified roadway corridors are the only areas closed to small game hunting. The Annie Lake Road (to km 20.5) and the Takhini Hotsprings Road (to 800 metres beyond the hot springs) are closed to hunting within 800 metres. It is also unlawful to hunt or set snares within 1 km of a residence without permission. The Yukon hunting regulations promote respect for small

game, and it states that they should not be regarded as vermin, that they are traditional foods, and that it is unlawful to waste the meat.

Harvest pressure tracks natural population cycles so that interest in hunting is low when populations are low. Arctic ground squirrels live in scattered colonies that are at risk of being locally overharvested. Restrictions on small game hunting are not required at this time, but the management agencies need to ensure that local overharvest of arctic ground squirrels in particular, doesn't occur.

Protected Species

It is unlawful to harvest protected species, but some, like hoary marmots, woodchucks and collared pikas, are traditionally harvested by First Nations under subsistence harvesting rights. These three species are vulnerable to local extirpations which might contribute to broader population declines.

Other species, such as bats and mice are often killed in defence of property, which is permitted under the *Yukon Wildlife Act*. Environment Yukon encourages the exclusion of unwanted bats before maternity colonies move in for the summer or after they have left in the fall. Artificial bat houses are promoted as alternative roosts for evicted bats.

Education and Outreach

Environment Yukon provides an information brochure on bats and the Yukon Mammal Series, which is several fact sheets about mammal species and species groups (such as shrews and voles). Environment Yukon also provides information on species at risk which includes the collared pika.

Yukon species at risk are tracked by the Yukon Conservation Data Centre (CDC). The CDC is able to provide data on species of conservation concern in the Yukon, and it solicits observations from the public. The vertebrate track list includes the tundra shrew, northern myotis, woodchuck and western jumping mouse.

Several local wildlife viewing guides provide information on more visible small mammals such as snowshoe hares, arctic ground squirrel, porcupine, collared pika and least chipmunk. The Wildlife Viewing Program has produced many interpretive panels with information on various mammal species. Interpretive talks at sites occupied by colonial species like arctic ground squirrels, collared pikas and hoary marmots could be considered. In particular sites like Kusawa Territorial Park would be an ideal location to highlight arctic ground squirrel biology and conservation, significance to First Nations, as well as the role climate warming may have on this and other hibernating species.

With the exception of bats and the occasional winter snow tracking interpretive walk, very few wildlife viewing events feature small mammals in the

Southern Lakes area. Researchers have shared their knowledge at many bat talks to school and public groups. The best example is the colony at a cabin at the Fireweed Camp at Chadburn Lake, where numerous talks have taken place since 1997. Bats are appealing because of their unique biology and behaviour. Nighttime bat talks at the Chadburn Lake cabins and bat house were initiated by the Yukon Conservation Society and have been adopted by Environment Yukon's Wildlife Viewing Program. Numerous other sites with bat houses and natural roosts could be used for interpretive talks.

Upland Game Birds

Introduction

Seven resident species of grouse and ptarmigan regularly occur year-round in the Southern Lakes area (Table 13). Though these species do not migrate long distances, the three species of ptarmigan spend summer at high elevations and often move to lower elevations in winter. The diversity of upland game birds in the Southern Lakes area is quite high compared to other jurisdictions in North America.

Ruffed Grouse, Spruce Grouse, and Willow Ptarmigan are widespread throughout the region where suitable habitat exists. Rock Ptarmigan, White-tailed Ptarmigan, and Dusky Grouse are relatively uncommon and occur primarily at higher elevations. Blue Grouse was recently split between the interior form (Dusky Grouse) and coastal form (Sooty Grouse). To date, only the interior form (Dusky Grouse) has been documented in the Yukon. Sharp-tailed Grouse are rare in the Southern Lakes.

Table 13. Resident bird species which regularly occur year-round in the Southern Lakes area.

Common Name	Latin Name	Occurrence	Distribution
Ruffed Grouse	<i>Bonasa umbellus</i>	Common	Widespread
Spruce Grouse	<i>Falciennis canadensis</i>	Common	Widespread
Willow Ptarmigan	<i>Lagopus lagopus</i>	Common	Widespread
Rock Ptarmigan	<i>Lagopus mutus</i>	Uncommon	Widespread
White-tailed Ptarmigan	<i>Lagopus leucurus</i>	Uncommon	Localized
Dusky Grouse ¹	<i>Dendragapus obscurus</i>	Uncommon	Widespread
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>	Rare	Localized

Species Significance

Yukon First Nations

Grouse and ptarmigan hunting is important to the culture of people in the Southern Lakes region. Upland game birds are subsistence food for First Nation and non-First Nation people. Historically, these species were often harvested by First Nations as they provided food when other forms of game were unavailable. Traditionally, they were not usually hunted after March to allow them to lay their eggs and for the young to fledge. Grouse and ptarmigan were harvested using a variety of methods. Hunters often caught ptarmigan with snares set in willows or fish nets to entangle the birds when the ground was covered with snow. Under traditional law ptarmigan must not be left to lie in the snow and are not to be cleaned outdoors. They must be taken into tents or homes to be cleaned by the campfire, otherwise they bring the northwind.

The feathers of grouse and ptarmigan were used to make down blankets, bed mats and coats. The grouse tail was used to decorate garments and regalia. Traditionally, the grouse taught people how to weave balrush to make snowshoes. Everytime a person made a mistake, the grouse would make a noise until the balrush was weaved right. When a grouse is plucked, the grouse skin has the pattern of the snowshoe weave on it.

Other Significance

Though current information is unavailable, it has been shown that from 1978 to 1994 hunters spent from 2,200 to 10,000 days hunting grouse and ptarmigan and harvested from 2,200 to over 20,000 birds each year.

These species provide year-round wildlife viewing opportunities for people interested in birdwatching. Visiting birders often seek out White-tailed Ptarmigan and Dusky Grouse.

Upland game birds in the Southern Lakes are an important food source for a wide range of other wildlife including other birds (such as Gyrfalcon and Northern Goshawk) and furbearers (such as wolverine, lynx, marten, red fox, and wolf). Game birds also provide other ecological services like dispersing seeds and pollinating coniferous and deciduous vegetation.

Distribution and Abundance

Very little region-specific data is available for upland game birds in the Southern Lakes area. They typically require species-specific surveys to determine distribution and abundance. Because surveys have not been done in the region, most existing information is from incidental observations and the knowledge of people who are familiar with the biology and habitat use of these species.

Ruffed Grouse

Ruffed Grouse lives throughout lowland areas in the Southern Lakes. Its preferred habitats include early successional forests, and it also uses deciduous vegetation, particularly trembling aspen and balsam poplar. Ruffed Grouse are most often found in riparian areas but also occur in uplands. Their numbers can be highly variable from year to year, and they are cyclical, similar to the snowshoe hare. In addition to natural predation and harvest by hunters, Ruffed Grouse populations are limited regionally by natural aging and succession of forests.

Roadside drumming surveys in the spring are most successful method for surveying Ruffed Grouse in the Yukon. Surveys should start half an hour before sunrise, and each stop should be surveyed for the number of drumming grouse during a 4-minute period. The number of stops can vary, but the duration of the survey should be less than 3 hours. Stops should be located at least 800 metres apart.

Spruce Grouse

Found in coniferous forests throughout the Southern Lakes, Spruce Grouse is the most common upland game bird species in the region. The species is usually associated with spruce forest in the Yukon, but it may also be found in lodgepole pine and subalpine fir. Kluane area studies revealed that Spruce Grouse populations declined one year before the snowshoe hare decline and were increasing while snowshoe hares remained low in their population cycle.

Spruce Grouse do not display as often during the breeding season so they are more difficult to survey. A notable survey method for this species is encounter (or strip) transects in suitable habitat during the summer breeding season. More recent research used female calls during the breeding season to attract males at sampling plots. This method may be more suitable and cost-effective for surveying Spruce Grouse in accessible parts of the Southern Lakes.

Willow Ptarmigan

The most common ptarmigan in the Southern Lakes, Willow Ptarmigan is found at lower elevations than other ptarmigan species. They live in arctic, sub-arctic and subalpine tundra. Their preferred Yukon summer habitat is willow shrub tundra, and in winter they select riparian willow thickets. This species has been recorded in high elevation areas throughout the Southern Lakes, and it is likely well distributed given the availability of suitable habitat. Population densities are variable between years, and monitoring at Chilkat Pass showed that the population cycle occurs over a period of 8 to 11 years.

Monitoring data for male Willow Ptarmigan is available from annual spring surveys on the Dempster Highway (North Fork Pass) and Chilkat Pass. These surveys include a total ground search (with the aid of a trained dog) for birds in a plot of optimal breeding habitat (Figure 2).

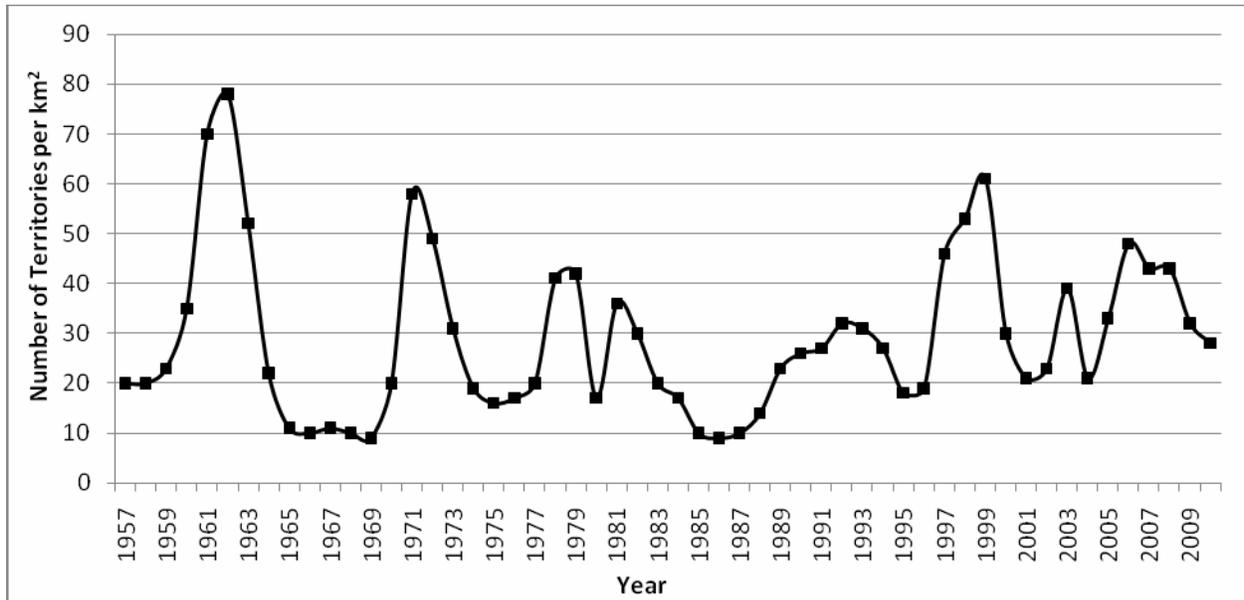


Figure 2. Willow ptarmigan population trend for the Coast Range (Chilkat Pass) from 1957 to 2010 (Mossop unpub. data 2011).

Rock Ptarmigan

Rock Ptarmigan is most often found at higher elevations in its preferred habitat, the transitional zone between shrubby tundra and bare tundra areas. Rock Ptarmigan have been documented in mountainous areas of the Southern Lakes area, but it is much more common in northern Yukon. Highly suitable habitat in the Southern Lakes may be limited so the species is less common than Willow Ptarmigan.

Evidence from other locations (Alaska, Nunavut) suggests that Rock Ptarmigan is cyclical similar to Willow Ptarmigan. As this species is relatively uncommon in the Southern Lakes, species-specific surveys may not be feasible.

White-tailed Ptarmigan

The smallest and least common ptarmigan species is the White-tailed Ptarmigan, found in the Yukon's highest elevation tundra areas. Its breeding habitat includes rocky areas, stunted trees and vegetation adjacent to streams

and snowfields at or above treeline. White-tailed Ptarmigan remains in its high elevation habitat year-round, though some individuals move to lower elevations in winter. This species has been documented in the Southern Lakes area, but little is known about its distribution, abundance, or occurrence in the region. Species-specific surveys would be challenging due to its low numbers.

Dusky (Blue) Grouse

The largest and an uncommon Yukon grouse species, the Dusky Grouse is found in the subalpine across southern Yukon. Blue Grouse was recently split into 2 species: the coastal Sooty Grouse, and the interior Dusky Grouse found in the Yukon. Its preferred habitat is open subalpine fir and sometimes denser subalpine forests in winter. Dusky Grouse has been documented in the Southern Lakes though it is rarely seen in lowland areas. Suitable habitat is available in the region so the species is likely present.

Sharp-tailed Grouse

The Sharp-tailed Grouse has the most restricted range of Yukon upland game birds. They typically select open parkland habitats and may also be found in subalpine areas, open bogs, and burned areas. In the Yukon, this species is usually found in the southwest. Sharp-tailed Grouse are very rarely encountered in the Southern Lakes area, though the most suitable habitat is near the Kusawa Lake Road. Surveys involve counting the number of males displaying at lekking sites (mating areas) during spring breeding.

Species Monitoring

Methods used to survey and monitor other bird species in the Southern Lakes area do not adequately sample upland game birds. Surveys such as the Roadside Breeding Bird Survey, Christmas Bird Count, and Yukon Bird Observatories collect incidental observations of upland game birds, but the sample size is very low. Species-specific surveys are required to obtain trend data which may be analyzed over time.

No systematic monitoring exists in the Southern Lakes area. Since 1957 Willow Ptarmigan surveys have been completed in 4 areas of the Yukon and Northern British Columbia, including the Coast Range monitoring program which contains the largest data set with annual surveys from 1957 to 2010. These surveys involved census plots (average 2 km²) counted during the peak of territorial display in early May, and ground searches by a trained pointing dog.

Monitoring data from the Coast Range shows an 8 to 11 year population cycle in Willow Ptarmigan. The magnitude of the population cycles also appears to be variable. Sharp-tailed Grouse populations within the Alaska Highway

Transportation Corridor in Southwest Yukon have also been studied. Fifteen locations between the Yukon/Alaska border and the Kusawa Lake Road were identified as areas where Sharp-tailed grouse may be found. The Kusawa Lake Road location is the only location in the Southern Lakes area.

Harvest Trends

Before the mid-90s, upland game bird harvesting was an add-on to a voluntary wildlife harvest questionnaire that focused on big game. After 1995, mandatory kill reporting was required for big game. As a result, harvest data continued to be tracked through a voluntary mail out survey that focused on upland game birds only. The survey includes questions about hunting effort, species harvested, and areas hunted.

From 1978 to 1994, the annual harvest of upland game birds was variable with a range of 2,700 to 22,000 birds harvested per year. The data shows that harvest of upland game birds closely follows hunter effort. Because they are relatively easy to harvest, increased hunter effort typically results in more birds being harvested.

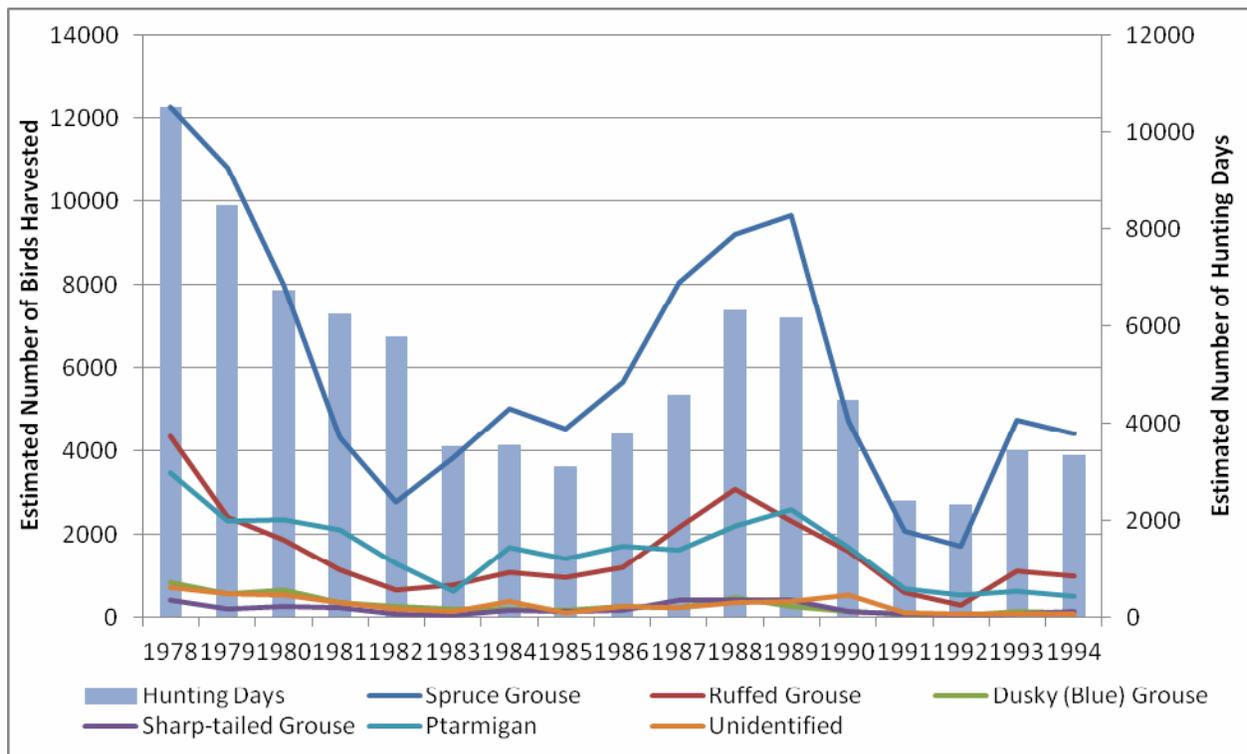


Figure 3. Historical harvest and hunting effort for upland game birds, 1978 to 1994.

Total harvest trends since 1995 are unavailable due to data analysis issues with the voluntary mail out survey. However, relative harvest by species shows that Spruce Grouse is the primary upland game bird harvested in the Southern Lakes.

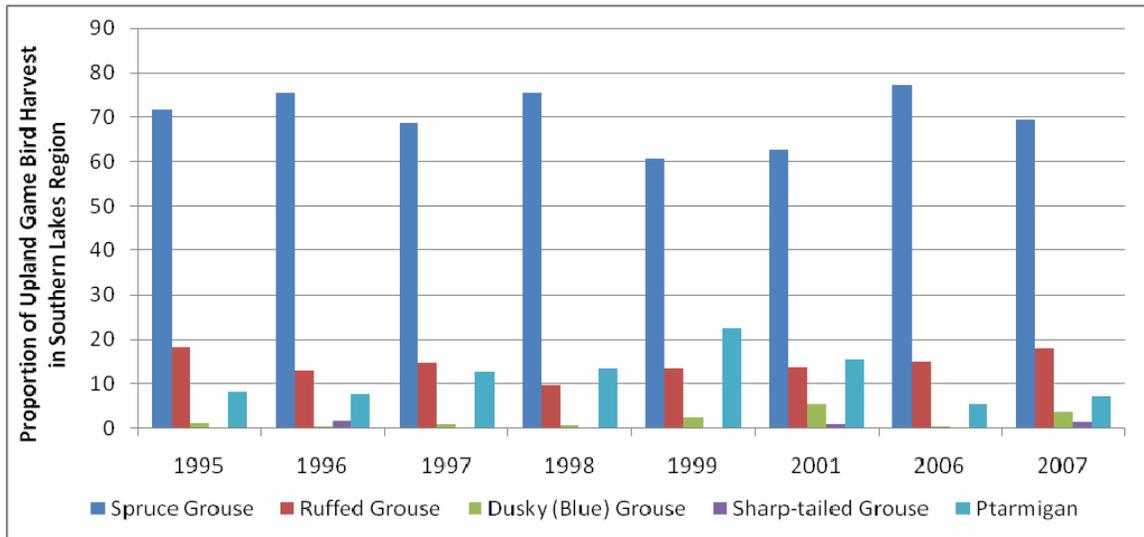


Figure 4. Relative proportion of upland game bird harvest in the Southern Lakes area from 1995 to 2007 (Yukon Environment unpublished data 2011).

A number of factors drive the trends in upland game bird harvest, most importantly the abundance of birds on the landscape. When the birds are abundant, harvest rates are correspondingly high. Increased access to the backcountry by off-road vehicles and other forms of transportation means that more areas are open to harvest. Inaccessible areas likely receive a relatively low amount of hunting effort and bird harvest.

Species Assessment

Monitoring data is limited for Yukon upland game birds. With the exception of Willow Ptarmigan, no current data is available to help determine the status of these species in the Southern Lakes region. Ruffed and Spruce grouse are widespread and the availability of suitable habitat suggests they are doing well in the region. Dusky Grouse, Rock Ptarmigan and White-tailed Ptarmigan are restricted to high elevation areas which are remote and may not have the same threats as more accessible locations. Sharp-tailed Grouse are rare in the Southern Lakes area and its status cannot be determined.

The Willow Ptarmigan monitoring data from the Coast Range (Chilkat Pass) provides a good indicator for this population because it is near the

Southern Lakes. The natural cyclic pattern in this population is likely due to a number of factors including food availability and predation. The data suggests that Willow Ptarmigan in the Coast Mountains are doing well, but ongoing monitoring is important for future assessment.

None of the upland game bird species found in the Southern Lakes area have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). General status rankings are available for all species at the territorial and national level. Sharp-tailed Grouse is classified as sensitive which indicates that it may require special attention to prevent them from becoming at risk in the future (Table 14).

Table 14. COSEWIC and General Status rankings for upland game bird species which regularly occur within the Southern Lakes area.

Common Name	Latin Name	COSEWIC	General Status (2010)	
			Yukon	Canada
Ruffed Grouse	<i>Bonasa umbellus</i>		Secure	Secure
Spruce Grouse	<i>Falcipennis canadensis</i>		Secure	Secure
Willow Ptarmigan	<i>Lagopus lagopus</i>		Secure	Secure
Rock Ptarmigan	<i>Lagopus mutus</i>	NOT ASSESSED	Secure	Secure
White-tailed Ptarmigan	<i>Lagopus leucurus</i>		Secure	Secure
Dusky Grouse	<i>Dendragapus obscurus</i>		Secure	Secure
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>		Sensitive	Secure

Stressors and Threats

A number of activities in the Southern Lakes area could cumulatively affect upland game birds. Little information is available on how significant these threats are to these species.

Harvesting

Harvest is the primary human-caused threat. Hunters can quickly reduce the population, particularly when they are at a cyclic low. Most of these species are relatively easy to harvest, so access is a driving factor that influences the harvest rates. Studies on the harvest of Blue (Sooty) Grouse on Vancouver Island have found that the impact of hunting on populations was low in remote areas where access was limited.

Spruce and Ruffed grouse are distributed widely and it is unlikely that current harvest levels pose a threat to these species. When populations are in a cyclic low, overharvesting is a greater risk. Due to Yukon's large land mass,

harvesting can eradicate local populations but likely does not play a role in large scale reductions.

Ptarmigan can be legally harvested during the winter and may be overharvested when birds are concentrated in specific habitat and larger groups. Harvest rates are highest where access is available. The relative ease of access during winter by snowmobile (such as Golden Horn Mountain) has the potential to substantially increase harvest rates in local areas. Overharvest of ptarmigan when populations are at a cyclic low can result in losses that may not recover when the population increases.

Sharp-tailed Grouse are found in small groups, so harvesting of a whole group has the potential to remove this species from a certain area. Removal of these small sub-populations would be very damaging when the population is in a cyclic low.

To mitigate the threat of overharvesting on upland game birds, hunting regulations could be modified to include bag limits (daily and possession), season lengths, and area closures. These measures may be applied to areas with high hunting pressure or areas with critical habits for these species.

Habitat Loss and Alteration

Each upland game bird species is typically found within a specific habitat type. The loss and/or alteration of habitat has the potential to displace birds from suitable habitat.

Ruffed Grouse are adapted to mid-successional forests that are dominated by deciduous vegetation. As a result, disturbance from forest fire or timber harvesting can benefit populations. In eastern North America, Ruffed Grouse have historically been limited by fire control, opposition to clear cut logging, and forestry management for older growth forests.

Spruce Grouse are displaced from their coniferous forest habitats when the forest is cleared for timber harvesting or other industrial activities. Large fires also remove areas of suitable habitat and limit grouse to small forest patches.

The high elevation habitats used by Rock and White-tailed ptarmigan are relatively remote and are unlikely to be threatened by human activity. As Willow Ptarmigan are found at slightly lower elevations and in more accessible areas, they may be more prone to habitat disruption. Industrial developments in important breeding and wintering habitats have the potential to displace birds. This species is vulnerable during winter when birds are concentrated at lower elevations.

Threats to Sharp-tailed Grouse habitat are focused on lekking areas and often involve birds gathering to breed. A study in Southwest Yukon identified raised mounds with a view over the surrounding area as primary lekking

habitat. These areas were often on sand dunes and contained sparse vegetation like balsam poplar and tall shrubs. Due to the complex breeding behaviour of this species, these unique lekking sites are critical to the persistence of this species, particularly when the availability of suitable lekking sites are limited.

To reduce the impacts of habitat loss and alteration on upland game birds, habitat planning must happen before development occurs. This is particularly important for Sharp-tailed Grouse and the three species of ptarmigan which may be more susceptible to habitat loss.

Disturbance by Humans

The three species of ptarmigan are prone to disturbance during winter when large groups of birds gather in the best habitat. Researchers have found that winter flocks include birds that come from far away (23 km), so activities can negatively impact individuals from a substantial distance. Winter disturbance is often caused by recreational sports like downhill skiing, snowboarding, and snowmobiling. These activities can displace ptarmigan from preferred habitats. They also compact the snow cover which prevents the birds from burrowing for insulation from cold temperatures.

Sharp-tailed Grouse are very vulnerable to disturbance during the lekking period from mid-April to early May in the Yukon. Yukon populations have been found to be relatively tolerant of vehicle traffic by lekking very near the Alaska Highway. However, increases in noise such as heavy machinery or low flying aircraft near lekking sites would likely threaten this species. Research in other locations has found that female Sharp-tailed Grouse are more susceptible to disturbance, and disruption at leks and limited reproductive opportunities may result in population declines.

Climate Change

With a changing climate, encroaching trees and shrubs are expected to reduce tundra habitat in arctic and alpine areas. In the Southern Lakes area, researchers expect the treeline will advance upslope. This will reduce the habitat available for ptarmigan, particularly White-tailed and Rock ptarmigan which are found above the shrub transition zone. This will likely influence the distribution and abundance of these species and may lead to increased competition between these species for resources.

Collisions

Although they are non-migratory, upland game birds can collide with stationary and moving objects in their habitat. Birds are killed in collisions with vehicles along transportation corridors and by flying into low power lines.

Key Habitats

The Yukon Key Wildlife Area database only contains areas for Sharp-tailed Grouse, most of which are in Southwest Yukon. One identified area lies on First Nations' Settlement Lands at the western edge of the Southern Lakes area near the junction of the Alaska Highway and Kusawa Lake Road. This key wildlife area is based on a small number of sight records of this species before 1979. The area has no known leks and the presence of the species is unknown. This area should be re-investigated to determine the current status of Sharp-tailed Grouse in this location.

Better surveys are required to identify key wildlife areas for other upland game birds in the Southern Lakes. Creating key wildlife areas for Ruffed and Spruce grouse is not feasible because they are so widespread. If more detailed surveys are completed for the three ptarmigan species and Dusky Grouse, key wildlife areas may be identified for these species.

Species Management

Upland game birds are managed by the Government of Yukon. Currently, management is limited to harvest monitoring through bag and possession limits which are reported through a voluntary mail out survey (Table 15).

Table 15. Harvest season and bag limits for upland game birds in the Yukon.

Species	Harvest Season	Bag Limits	
		Daily	Possession
Spruce Grouse / Ruffed Grouse (aggregate limit)	Sept 1-Nov 30	10	30
Dusky (Blue) Grouse	Sept 1-Nov 30	5	15
Sharp-tailed Grouse	Sept 1-Nov 30	5*	15*
Willow Ptarmigan / Rock Ptarmigan / White-tailed Ptarmigan (aggregate limit)	Sept 1-Mar 30	10	30

* Except Zone 5: Daily = 2, Possession = 6

The hunting regulations (seasons, bag limits) for upland game birds in the Yukon are similar to neighbouring jurisdictions. For example, in northern British Columbia (region 6 and 7), the daily aggregate limit for Ruffed, Spruce and Blue grouse is 10 birds with 30 in possession. In northeast British Columbia, more restrictive bag limits (3 daily, 9 possession) are in place for Sharp-tailed Grouse.

For ptarmigan, the aggregate daily limit in northern British Columbia is also 10 birds per day with 30 in possession. In Alaska, the bag limits are generally more liberal than the Yukon (up to 20 birds per day for ptarmigan or grouse), but the regulations are more complex and variable between regions of the state.

Inventories of upland game birds are limited in the Yukon. From the 1950s to the mid-90s, Environment Yukon conducted annual Willow Ptarmigan surveys in the Coast Range, Ogilvie Mountains, Logan Mountains and the North Slope. These surveys have continued in a decreased capacity. Some Sharp-tailed Grouse inventories were done in the 1980s in the Nisling and Donjek areas. Species-specific inventories for Spruce, Ruffed, and Dusky (Blue) grouse have not yet been completed in the Yukon.

Education and Outreach

The Yukon Bird Club and the Yukon Bird Observatories are involved in outreach and education opportunities for birds in the Southern Lakes. These organizations promote bird conservation by increasing public awareness of Yukon bird species.

Education and outreach are a key part of the Yukon Bird Club's mandate. During the summer, the club hosts birdwatching field trips in the Southern Lakes area. The society also hosts presentations and public talks that promote awareness and conservation of birds in the region. They host an annual Yukon 'Birdathon' in late May to increase awareness and raise funds to promote the conservation of birds in the territory.

The Yukon Bird Observatories is a non-profit society that monitors migrating birds in Southern Yukon. Education is a core part of their operation. Members of the public visit the observatories and receive training on bird identification and other aspects of bird research (mist netting, banding, etc). Over 300 people visit the observatories each year, including many school groups from community schools in the Southern Lakes area.

Birds of Prey

Introduction

Nineteen birds of prey (including 4 falcons, 2 accipiters, 4 buteos, 6 owls, 2 eagles and the Northern Harrier) occur in the Southern Lakes area. Of these, 15 breed in the area (Table 16).

The Snowy Owl may be a migrant although it has not been recorded in the Southern Lakes area. Several other very uncommon birds of prey to the

Yukon potentially occur in the Southern Lakes area including the Long-Eared Owl, Barred Owl and Broad-Winged Hawk.

Species Significance

Yukon First Nations

Birds of prey are highly revered and honoured by First Nations people in Southern Lakes area with owls carrying great spiritual importance. Owls must not be bothered by people because they bring messages of tragedy and death. Some First Nations believe that when people die, owls take their spirit so they are not gone, but are living with the owls.

Table 16. Birds of prey species which regularly occur year-round in the Southern Lakes area.

Common Name	Latin Name	Confirmed Breeding
American Kestrel	<i>Falco sparverius</i>	Yes
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Yes
Boreal Owl	<i>Aegolius funereus</i>	Yes
Golden Eagle	<i>Aquila chrysaetos</i>	Yes
Great Gray Owl	<i>Strix nebulosa</i>	No
Great Horned Owl	<i>Bubo virginianus</i>	Yes
Gyrfalcon	<i>Falco rusticolus</i>	Yes
Merlin	<i>Falco columbarius</i>	Yes
Northern Goshawk	<i>Accipiter gentilis</i>	Yes
Northern Harrier	<i>Circus cyaneus</i>	Yes
Northern Hawk Owl	<i>Surnia ulula</i>	Yes
Northern Saw-Whet Owl	<i>Aegolius acadicus</i>	Yes
Osprey	<i>Pandion haliaetus</i>	Yes
Peregrine Falcon	<i>Falco peregrinus</i>	Yes
Red-Tailed Hawk	<i>Buteo jamaicensis</i>	Yes
Rough-Legged Hawk	<i>Buteo lagopus</i>	No
Sharp-Shinned Hawk	<i>Accipiter striatus</i>	Yes
Short-Eared Owl	<i>Asio flammeus</i>	No
Swainson's Hawk	<i>Buteo swainsoni</i>	No

Eagles are sacred to First Nations people as signified by their representation as clan animals. Eagle feather quills were collected and used in spring traps for gophers. By removing the barbules of the feather, then soaking the rachis, the feather was shaped and fashioned into a snare like trap.

Children were told to listen to the owls, and when they heard them it was time to settle down and go to bed.

Other Significance

Birds of prey are a valued part of the food web. As top predators, they can accumulate and succumb to toxins in the environment, acting as indicators of contaminant levels. Situated at higher levels on the food chain, they are also good indicator species of ecosystem health.

Populations of Bald Eagles, Ospreys, Golden Eagles, and Gyrfalcons are found in the mountains throughout the region. These populations are relatively easily monitored, providing a robust indicator of ecosystem health over time. The Southern Lakes is unique geographically because migrating birds of prey and other birds funnel through the area.

Some birds of prey species are of national and international interest. Gyrfalcons were once sold for falconry and regarded as a source of income for northern residents, though Convention on International Trade in Endangered Species (CITES) has since made this practice illegal. Bald Eagles are highly regarded as symbols of freedom and strength in the United States. Encounters with birds of prey are often memorable and are sought by birdwatchers, naturalists, and photographers.

Distribution and Abundance

In the Southern Lakes area researchers conduct several repeated surveys to detect birds of prey.

Nocturnal Owl Survey

This survey targets owl populations, and aims to track changes in populations at a continental scale. In April researchers visit routes consisting of 10 stops, spaced approximately 1.6 km apart, ideally between one half hour after sunset and midnight when owls are most vocal. At each stop, owl activity is recorded for at least two minutes. Nocturnal Owl Surveys are co-ordinated by Bird Studies Canada, a non-profit organization.

Over the last 12 years, there have been 34 survey routes with 11-14 routes surveyed per year. Species recorded on the surveys are Great Horned Owl, Boreal Owl; occasionally Northern Hawk Owl, Northern Saw-whet Owl.

Breeding Bird Survey (BBS)

These surveys are not specific to birds of prey, and are not necessarily well suited to monitoring their populations. Nevertheless, they provide some information on apparent population trends for some species of birds of prey.

Seven BBS routes are in or adjacent to the Southern Lakes area. Routes consist of 50 stops spaced 800 metres apart where all birds seen or heard are recorded over a three-minute interval. Surveys occur once between 28 May and 7 July. Canadian Wildlife Service coordinates the breeding bird surveys in Canada.

The most commonly recorded birds of prey are the Bald Eagle, Red-tailed Hawk and American Kestrel. Routes that have been surveyed many years tend to have accumulated more birds of prey sightings, such as the Jakes Corner route that has been surveyed for 22 years. Few records exist from Teslin and Johnson Crossing because the route has only been surveyed once.

Christmas Bird Count (CBC)

These surveys are not specific to birds of prey, and are not necessarily well suited to monitoring their populations. Nevertheless, they provide some information on apparent population trends for some species of birds of prey.

Several areas in the Southern Lakes have been surveyed through the Christmas Bird Count since 1973. The survey area is a 24 km diameter circle, and volunteers record all the birds they hear or see during a 24-hour period between 14 December and 5 January. Supplemental data are also collected by recording bird species seen or heard three days before and three days after the count date. Birds Studies Canada coordinates Christmas Bird Counts in Canada.

Northern Goshawk is the most widely detected species during the CBC. Many birds of prey species known to the Southern Lakes have not been recorded during CBC, some of which are migratory and not expected in the Yukon in winter (e.g. Red-tailed Hawk and American Kestrel). It's important to note that search effort varies between areas and years.

Roadside Surveys

These surveys are not specific to birds of prey, and are not necessarily well suited to monitoring their populations. Nevertheless, they provide some information on apparent population trends for some species of birds of prey.

The first roadside survey in the Southern Lakes took place in 1972. Since then surveys have been conducted at 7 accessible wetlands in the area. Fourteen birds of prey species have been seen or heard during the roadside surveys, and only 4 species (3 owls and Gyrfalcon) have not been recorded.

Bald Eagle is the most commonly seen birds of prey species. Other high counts are American Kestrels at Lewes-M'Clintock, Ospreys at the river outflow from Teslin Lake, and Northern Harrier at Lewes-M'Clintock and Tagish Narrows.

Throughout the Yukon, the Canadian Wildlife Service has coordinated data collection of bird counts conducted from roadside vantage points during the spring. During these counts all birds observed may be counted, but the focus is typically on waterfowl, gulls, and shorebirds.

During roadside surveys each wetland was surveyed five times at weekly intervals beginning in early May to cover the range of breeding dates for the various species of waterfowl. Each wetland was counted from one to four vantage points, and the observer detailed the species present.

Teslin Lake Bird Observatory & McIntyre Marsh Bird Banding Demonstration Site

Researchers at the Teslin Lake Bird Observatory have been monitoring the movement of birds through the Teslin area since 2006. They have records of 12 birds of prey species. They mainly use mist nets to capture and band birds, and they also conduct visual migration counts. Because counts focus on migrants, they may not be indicative of the numbers and species of birds of prey breeding within the Southern Lakes.

The McIntyre Marsh Bird Banding Demonstration Site, which also used mist nets, operated in 2009 and 2010. Four Sharp-Shinned Hawks were banded, and operators have observed 46 other individuals, including American Kestrels, Bald Eagles, Northern Harriers, and Red-tailed Hawks. Researchers have not yet prepared a detailed bird monitoring protocol for the McIntyre demonstration site.

Both the Teslin Lake Bird Observatory and the McIntyre Marsh Bird Banding Demonstration Site are organised by Society of Yukon Bird Observatories.

Nest Box Monitoring

The Southern Lakes region is home to 27 species of cavity nesting birds. The Southern Lakes Nest Box Project was initiated in spring 2000 to enhance nesting opportunities for cavity nesters. Monitoring is done mainly by volunteers with the aim of increase public awareness and appreciation for cavity nesters and the role of nest boxes.

In 2000, 95 nest boxes were established in the Southern Lakes area and of these, 41 were used by seven species of birds. In 2011, nest boxes were established to monitor boreal owls in the proposed Kusawa and Agay Mene Territorial Park areas. Dave Mossop has been monitoring nest boxes for many years, with a particular focus on owls and American kestrels. Nest box

monitoring data is entered into a North American database
<http://nestwatch.org/>

Gyr Falcon surveys

Environment Yukon have conducted annual gyrfalcon surveys in the Coast Mountain ecoregion since 1982 in collaboration with Northern Research Institute, Yukon College. The results are used to determine sustainable harvest levels of young birds for falconry, as well as tracking ecosystem health through a key indicator bird species

Peregrine falcon surveys

After the population collapse of peregrine falcons in the 1950s and 1960s as a result of pesticide (DDT) contamination, an international survey of breeding pairs was initiated in 1970. These surveys have been carried out at 5 year intervals, visiting representative samples from all sub-populations of peregrine falcon known in the territory. In the Southern Lakes survey area one pair was observed in 1995 and observed again in 2000. In 2005 two pairs were observed. The 2010 survey conducted between June 28 and July 2 observed three pairs.

Harvest Trends

Under the *Yukon Wildlife Act*, it is illegal to harvest birds of prey in the Yukon.

Species Assessment

The Convention on International Trade in Endangered Species (CITES) lists all Yukon birds of prey in CITES Appendix 2, except for the Gyrfalcon which is listed under Appendix 1 (species most threatened by international trade). CITES prohibits international trade for species under Appendix 1, except in rare cases such as justifiable scientific research. Species listed under Appendix 2 are considered potentially threatened with extinction if trade is not closely controlled.

According to NatureServe, most birds of prey occurring in the Southern Lakes area are considered globally secure (G5), and the IUCN ranks them as least concern. Nationally, most birds of prey assessed by COSEWIC have been designated not at risk, although the short-eared owl and peregrine falcon are listed as Special Concern under the federal *Species at Risk Act*.

In the Yukon, most birds of prey species are considered *secure*, with a few exceptions. At a national level, the American Kestrel is a candidate for COSEWIC assessment due to declining numbers in recent years. The Swainson's Hawk is very uncommon in the Yukon and has not been previously assessed nationally. The Osprey and Snowy Owl are considered sensitive in the

Yukon because they are uncommon in the territory. The Golden Eagle also is sensitive due to its relatively small population size and its sensitivity to nest site disturbance (Table 17).

The numbers of American Kestrels using nest boxes have been declining in recent years.

Stressors and Threats

The Habitat Protection Guidelines for Yukon Birds of prey includes a list of potential stressors and threats to all species of birds of prey in the Yukon.

Loss of habitat is the primary threat to birds of prey in the Southern Lakes area. Loss of habitat can remove nest sites and reduces the quality of roosting, perching and foraging habitats. The territorial nature of birds of prey and the specialized criteria for suitable nesting sites combine to restrict options for nest locations. Changes in forest structure also potentially impacts prey abundance.

Birds of prey populations are sensitive to development-related activities and disturbance. For example, golden eagles are extremely sensitive to disturbance during the breeding season. Adults will often leave the nest when disturbed, allowing for increased opportunities for predation on eggs, drying, cooling or warming of eggs, or missed feedings for the young. Continued disturbance may cause the parents to completely abandon the nest. The relatively high human habitation in the Southern Lakes area may increase disturbance to nesting golden eagles.

There is a link between seasonal and annual changes in birds of prey numbers and the availability of their food supply. Voles, hares and ptarmigan populations are cyclic and in years of cyclic population lows, birds of prey numbers may decrease. In fact, over most of the gyrfalcon's range ptarmigan are the major food resource and it is thought that the cyclic nature of ptarmigan may be a limiting factor in gyrfalcon population size. As well, threats to prey species in the Southern Lakes area may ultimately impact birds of prey populations.

Gyrfalcon populations are vulnerable to over-harvest. The gyrfalcon population in the Yukon/B.C. Coast Mountain Ecoregion has been co-operatively managed between Yukon and B.C. governments since 1986 to allow a sustainable harvest for falconry. Surveys demonstrate that productivity of gyrfalcon populations in this area has been near the lower threshold since 2009 and this is of concern for the long term health of the population.

Table 17. Rankings of birds of prey species found in the Southern Lakes area.

Common Name	General Status Rank 2010	COSEWIC	IUCN	CITES	Nature Serve
American Kestrel	May be at Risk	<i>Not Assessed</i>	Least Concern	Appendix 2	G5
Bald Eagle	Secure	Not at Risk	Least Concern	Appendix 2	G5
Boreal Owl	Secure	Not at Risk	Least Concern	Appendix 2	G5
Golden Eagle	Sensitive	Not at Risk	Least Concern	Appendix 2	G5
Great Gray Owl	Secure	Not at Risk	Least Concern	Appendix 2	G5
Great Horned Owl	Secure	Not at Risk	Least Concern	Appendix 2	G5
Gyr Falcon	Secure	Not at Risk	Least Concern	Appendix 1	G5
Merlin	Secure	Not at Risk	Least Concern	Appendix 2	G5
Northern Goshawk	Secure	Not at Risk	Least Concern	Appendix 2	G5
Northern Harrier	Secure	Not at Risk	Least Concern	Appendix 2	G5
Northern Hawk Owl	Secure	Not at Risk	Least Concern	Appendix 2	G5
Northern Saw-Whet Owl	Secure	Not at Risk	Least Concern	Appendix 2	G5
Osprey	Sensitive	Not at Risk	Least Concern	Appendix 2	G5
Peregrine Falcon	Sensitive	Special Concern	Least Concern	Appendix 2	G4
Red-Tailed Hawk	Secure	Not at Risk	Least Concern	Appendix 2	G5
Rough-Legged Hawk	Secure	Not at Risk	Least Concern	Appendix 2	G5
Sharp-Shinned Hawk	Secure	Not at Risk	Least Concern	Appendix 2	G5
Snowy owl	Sensitive	Not at Risk	Least Concern	Appendix 2	G5
Short-eared owl	Sensitive	Special Concern	Least Concern	Appendix 2	G5
Swainson's Hawk	May be at Risk	<i>Not Assessed</i>	Least Concern	Appendix 2	G5

The use of pesticides in the 1950s and 1960s caused drastic declines in birds of prey populations. As top predators, they accumulated toxins in their system from their prey, which affects their breeding, eggshell formation, and hatching success. Restrictions on the use of pesticides along with nation-wide recovery efforts enabled many populations to recover. The use of pesticides and other toxins is still a threat to birds of prey, particularly in wintering grounds outside of the Yukon.

Other threats to birds of prey that should be carefully managed include road fatalities, incidental catch in traps, electrocution, and the illegal collection of eggs.

Key Habitats

Nesting and foraging needs are key considerations in describing birds of prey habitats (Table 18). Researchers are currently updating forest cover maps for the Southern Lakes area to provide more accurate information about birds of prey forest habitat.

The Yukon Key Wildlife Area database assigns priority to Gyrfalcon, Peregrine Falcon, Golden Eagle, Bald Eagle, Osprey, Merlin, and Rough-Legged Hawk in the Southern Lakes because of their vulnerability to disturbance. Summer birds of prey nesting areas are also mapped. Nest sites are used from March to August, though nesting period depends on the species and nesting latitude. The key areas mapped for alpine and riparian birds of prey include at least a 2-km disturbance-free buffer zone. Birds of prey nest site locations are kept confidential to protect birds from illegal activities.

Most birds of prey migrate south every year, but many Gyrfalcon remain in the Yukon all year, particularly when ptarmigan are abundant.

Species Management

When Canada established the *Migratory Birds Conventions Act* in 1917, birds of prey were seen as pests and did not receive any protection. Birds of prey remain the responsibility of Yukon government, even though many birds of prey species are migratory. The *Yukon Wildlife Act* prohibits the killing or possession of birds of prey, and the collection of eggs and chicks.

No legislation specifically protects birds of prey habitat, and birds of prey are not actively managed in the Southern Lakes. However, forestry operations in southeastern Yukon follow guidelines to retain a 200-metre buffer zone around Northern Goshawk nests.

Birds of prey monitoring is mostly initiated by volunteers, academics, non-profit organizations or the federal government, and activities are often part of programs that monitor federally protected species.

Table 18. Key habitats for basic life requisites of birds of prey species.

Species	Primary nesting habitat	Primary nest type	Primary foraging habitat
American Kestrel	Tree	Cavity	Open Forest - non forested
Bald Eagle	Tree	Stick	Wetland
Boreal Owl	Forest	Cavity	Forest
Golden Eagle	Cliff	Stick	Tundra
Great Gray Owl	Forest	Stick/witch's broom	Forest
Great Horned Owl	Forest	Stick/witch's broom	Forest - non forested
Gyrfalcon	Cliff	Ledge	Open tundra
Merlin	Tree	Stick/witch's broom	Forest - non forested
Northern Goshawk	Forest	Stick	Forest
Northern Harrier	Ground	Bare ground	Open wetland
Northern Hawk Owl	Forest	Cavity	Open Forest
Northern Saw-Whet Owl	Forest	Cavity	Forest
Osprey	Tree	Stick	Wetland
Red-Tailed Hawk	Tree	Stick	Open Forest - non forested
Rough-Legged Hawk	Cliff	Stick	Tundra
Sharp-Shinned Hawk	Forest	Stick	Forest
Swainson's Hawk	Tree	Stick	Open forest - non forested

Education and Outreach

Researchers sometimes make presentations about birds of prey at events like the Biodiversity Forum and Celebration of Swans. Other examples of outreach include newspaper articles, college lectures and courses, and online media like the bald eagle webcam in Whitehorse. In April 2011, the Celebration of Swans program at Swan Haven at Marsh Lake presented live birds of prey from the American Bald Eagle Foundation.

Future outreach and education programs should focus on promoting viewing opportunities in existing environmental education programs such as

Environment Yukon's Wildlife Viewing Program, and through excursions and demonstrations offered by the Yukon Bird Club, Yukon Bird Observatory, the Yukon Conservation Society, as well as First Nation culture camps.

The Southern Lakes area has excellent opportunities for birds of prey viewing and education, such as the bald eagle nest near the Robert Service campground in Whitehorse, or osprey nests near the Snafu Lake campground in Agay Mene Territorial Park. These sites are ideal locations for interpretation panels about the biology and conservation of birds of prey.

The Yukon Wildlife Preserve can potentially provide excellent educational and viewing opportunities for birds of prey, particularly in relation to their new wildlife rehabilitation centre. It is an ideal location for school groups.

The Yukon Southern Lakes Nest Box Project is useful in engaging volunteer 'citizen scientists' in nest box monitoring.

Migratory Birds

Introduction

Migratory birds are species that occur regularly in the Southern Lakes area and are not resident birds, waterfowl, or raptors. Approximately 100 migratory bird species occur in the Southern Lakes area (see Table 19), though 13 of these species are usually seen in very low numbers.

Many migratory species are limited by habitat in the Southern Lakes area. For example, some of the songbirds, which are fairly broad in their habitat requirements further south in Canada, are limited to the biologically productive lowland riparian forests in the Yukon. In this landscape of generally low biological productivity, riparian areas around wetlands and river valleys are especially important.

Species Significance

Yukon First Nations

Migratory birds are highly respected in traditional culture, and the harvesting of some species such as cranes is forbidden. Traditional law did not allow hunting after February to protected birds that were nesting and breeding. Loons hold great spiritual importance for Yukon's First Nations people and traditional law forbids the harvest of loons. Loons are believed to bring good things to people. If a loon is seen flying high, it means that bad weather is coming.

Other Significance

Migratory birds are important to Southern Lakes ecosystems and provide ecological services such as seed dispersal, insect control, and pollination. Birds and their eggs are food sources for mammals including red squirrel, marten, weasel, fox, coyote, black bear, and grizzly bear. Birds and their eggs also provide food for other bird species such as shrike, hawk, falcon and owl.

Birds that excavate nest cavities in trees provide shelter and nesting sites for small mammals, such as squirrels and bats, and for other bird species known as secondary cavity nesters. Secondary cavity nesters include chickadee, swallow, nuthatch, bluebird, and several species of waterfowl.

Residents and visitors to the Southern Lakes enjoy wildlife viewing activities that focus on migratory birds. Birdwatchers can see and hear many species in all Southern Lakes habitats. Hunting seasons exist for Sandhill Crane and Wilson's Snipe in the Southern Lakes, but few are harvested.

Distribution and Abundance

Some migratory bird monitoring activities are specific to the Southern Lakes area, while others contribute to territorial and continent-wide programs. Long-term bird population data informs decision making and helps identify new conservation issues. Data is used to identify and understand factors affecting bird populations and their habitats, and guide decisions about habitat conservation and mitigating the effects of industrial activities. Monitoring activities may be used to track distribution, relative abundance, migration, and population trends.

However, major knowledge gaps exist for many species, distribution of colony nesters, timing of breeding, migration corridors for landbirds, and incidence of disease.

Birds of the Yukon Database

Researchers have done many bird inventory surveys in the Southern Lakes area over the past several decades. Data from these surveys, as well as bird observations from local and visiting birdwatchers, are compiled in the Birds of the Yukon database, which contains bird records from the 1860s to 1998. This database contains over 160,000 bird records for the territory, a large proportion of which are from the Southern Lakes area. The database provides detailed information on distribution, breeding ecology, habitat, and timing of migration for migratory birds in the area.

North American Breeding Bird Survey

Each June, Breeding Bird Survey (BBS) volunteers count birds, mostly by sound, on roadside routes across North America. The BBS has been active in Yukon since 1972, with consistent coverage beginning in the late 1980s. The survey focuses on songbirds. There are 7 BBS routes in the Southern Lakes area.

Christmas Bird Counts

The Christmas Bird Count is an annual volunteer-based, continent-wide survey of wintering bird populations. Christmas Bird Counts are held each year at Carcross, Whitehorse, and Marsh Lake.

Yukon Roadside Waterfowl Surveys

In cooperation with Environment Yukon and Yukon College, Canadian Wildlife Service (CWS) has done ground-based monitoring of about 140 nesting wetlands in the Southern Lakes area since 1991. The surveys track changes in breeding populations of waterfowl and other wetland birds in the southern Yukon. Researchers measure parameters such as wetland size and distance from the road. Though it was designed for waterfowl, this survey also covers loons, grebes, and gulls.

Since 2004, songbird and shorebird species such as Rusty Blackbird and Lesser Yellowlegs have been included in this waterfowl survey. Monitoring non-waterfowl species at these sites contributes to the continental evaluation of bird population trends. In the case of Rusty Blackbird, the population trend data shows serious decline.

Data and photos from these surveys are maintained within an electronic database located at the CWS Yukon offices. The information is considered reliable and current.

Spring Migration Area Surveys

Since 1986, CWS has done annual ground and aerial surveys of critical migratory bird staging areas during spring in the Southern Lakes. Researchers count birds at important spring migration areas near McClintock Bay, Tagish River, Shallow Bay, Swan Lake, Yukon River between Whitehorse and Lake Laberge, and Johnson's Crossing). These counts are obtained from the ground or by aerial survey during April and May. Coverage varies with the location. Supported by CWS and the Yukon, this survey has been conducted every year since 1986, with some coverage during 1978-1985.

The data tracks the timing of migration of waterbirds through the Whitehorse area. Although this survey was designed for waterfowl, it includes other waterbirds and shorebirds.

Data and photos from these annual surveys are maintained within an electronic database located at the CWS Yukon offices. The information is considered reliable and current.

Yukon Bird Observatories

The Society of Yukon Bird Observatories operates a spring bird-banding demonstration site at McIntyre Marsh in Whitehorse. Data from this site contributes to our understanding of species diversity and distribution.

There are many data gaps for migratory birds in the Southern Lakes Region. Some examples are: information on the use of islands (colony nesters and other species), timing of breeding, migration corridors for landbirds, incidence of disease.

Harvest Trends

Sandhill Cranes and Wilson's Snipe are harvested under the federal Migratory Birds Regulations. It is believed that the annual harvest of these species is minimal.

Species Assessment

As of October 2010, 3 species of migratory and resident birds occurring in Yukon are listed on Schedule 1 of the federal *Species at Risk Act* (SARA): Olive-sided Flycatcher and Common Nighthawk are threatened, and Rusty Blackbird is listed as special concern. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) also recommended that Horned Grebe be listed as special concern, but this species is not yet included in Schedule 1.

Currently no species of migratory birds occurring in Yukon are listed on SARA Schedules 2, or 3.

Table 19. General Status rankings for migratory bird species found in the Southern Lakes area.

Species	Latin Name	Bird Group	Mandated Govt.	Canada general status 2010	Yukon general status 2010	Occurrence	Distribution
Red-throated Loon	<i>Gavia stellata</i>	Waterbird	Canada	secure	secure	rare	localized
Pacific Loon	<i>Gavia pacifica</i>	Waterbird	Canada	secure	secure	common	widespread
Common Loon	<i>Gavia immer</i>	Waterbird	Canada	secure	secure	common	widespread
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Waterbird	Canada	secure	sensitive	rare	localized
Horned Grebe	<i>Podiceps auritus</i>	Waterbird	Canada	secure	sensitive	common	widespread
Red-necked Grebe	<i>Podiceps grisegena</i>	Waterbird	Canada	secure	secure	common	widespread
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	Waterbird	Yukon	secure	may be at risk	rare	localized
Sora	<i>Porzana carolina</i>	Waterbird	Canada	secure	secure	uncommon	localized
American Coot	<i>Fulica americana</i>	Waterbird	Canada	secure	secure	uncommon	localized
Sandhill Crane	<i>Grus canadensis</i>	Waterbird	Canada	secure	sensitive	rare	localized
Black-bellied Plover	<i>Grus grus</i>	Shorebird	Canada	sensitive	secure	casual	localized
American Golden-Plover	<i>Pluvialis dominica</i>	Shorebird	Canada	sensitive	sensitive	rare	localized
Semipalmated Plover	<i>Charadrius semipalmatus</i>	Shorebird	Canada	secure	secure	common	widespread
Killdeer	<i>Charadrius vociferus</i>	Shorebird	Canada	secure	secure	uncommon	localized

Table 19. Continued.

Species	Latin Name	Bird Group	Mandated Govt.	Canada general status 2010	Yukon general status 2010	Occurrence	Distribution
Greater Yellowlegs	<i>Tringa melanoleuca</i>	Shorebird	Canada	secure	sensitive	uncommon	localized
Lesser Yellowlegs	<i>Tringa flavipes</i>	Shorebird	Canada	secure	sensitive	common	widespread
Solitary Sandpiper	<i>Tringa solitaria</i>	Shorebird	Canada	secure	secure	common	widespread
Wandering Tattler	<i>Heteroscelus incanus</i>	Shorebird	Canada	sensitive	sensitive	uncommon	localized
Spotted Sandpiper	<i>Actitis macularia</i>	Shorebird	Canada	secure	secure	common	widespread
Upland Sandpiper	<i>Bartramia longicauda</i>	Shorebird	Canada	secure	secure	uncommon	localized
Whimbrel	<i>Numenius phaeopus</i>	Shorebird	Canada	sensitive	sensitive	rare	localized
Semipalmated Sandpiper	<i>Calidris pusilla</i>	Shorebird	Canada	sensitive	sensitive	uncommon	localized
Least Sandpiper	<i>Calidris minutilla</i>	Shorebird	Canada	secure	secure	uncommon	localized
Baird's Sandpiper	<i>Calidris bairdii</i>	Shorebird	Canada	secure	secure	casual	localized
Pectoral Sandpiper	<i>Calidris melanotos</i>	Shorebird	Canada	secure	secure	casual	localized
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Shorebird	Canada	secure	may be at risk	uncommon	localized

Table 19. Continued.

Species	Latin Name	Bird Group	Mandated Govt.	Canada general status 2010	Yukon general status 2010	Occurrence	Distribution
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	Shorebird	Canada	sensitive	sensitive	rare	localized
Wilson's Snipe	<i>Gallinago delicata</i>	Shorebird	Canada	secure	secure	common	widespread
Wilson's Phalarope	<i>Phalaropus tricolor</i>	Shorebird	Canada	secure	may be at risk	rare	localized
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Shorebird	Canada	secure	sensitive	uncommon	localized
Bonaparte's Gull	<i>Larus philadelphia</i>	Waterbird	Canada	secure	secure	common	widespread
Mew Gull	<i>Larus canus</i>	Waterbird	Canada	secure	secure	common	widespread
Ring-billed Gull	<i>Larus delawarensis</i>	Waterbird	Canada	secure	accidental	casual	localized
Herring Gull	<i>Larus argentatus</i>	Waterbird	Canada	secure	secure	common	widespread
Thayer's Gull	<i>Larus thayeri</i>	Waterbird	Canada	Sensitive	accidental	casual	localized
Glaucous-winged Gull	<i>Larus glaucescens</i>	Waterbird	Canada	secure	accidental	casual	localized
Glaucous Gull	<i>Larus hyperboreus</i>	Waterbird	Canada	secure	sensitive	casual	localized
Arctic Tern	<i>Sterna paradisaea</i>	Waterbird	Canada	secure	secure	common	widespread

Table 19. Continued.

Species	Latin Name	Bird Group	Mandated Govt.	Canada general status 2010	Yukon general status 2010	Occurrence	Distribution
Common Nighthawk	<i>Chordeiles minor</i>	Landbird	Canada	at risk	at risk	common	widespread
Rufous Hummingbird	<i>Selasphorus rufus</i>	Landbird	Canada	secure	undetermined	casual	localized
Belted Kingfisher	<i>Ceryle alcyon</i>	Landbird	Yukon	secure	secure	common	widespread
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Landbird	Canada	secure	secure	uncommon	localized
Northern Flicker	<i>Colaptes auratus</i>	Landbird	Canada	secure	secure	common	widespread
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Landbird	Canada	at risk	at risk	common	widespread
Western Wood-Pewee	<i>Contopus sordidulus</i>	Landbird	Canada	secure	secure	common	widespread
Alder Flycatcher	<i>Empidonax alnorum</i>	Landbird	Canada	secure	secure	common	widespread
Least Flycatcher	<i>Empidonax minimus</i>	Landbird	Canada	secure	secure	uncommon	localized
Hammond's Flycatcher	<i>Empidonax hammondii</i>	Landbird	Canada	secure	secure	common	localized
Dusky Flycatcher	<i>Empidonax oberholseri</i>	Landbird	Canada	secure	secure	uncommon	localized
Say's Phoebe	<i>Sayornis saya</i>	Landbird	Canada	secure	secure	uncommon	widespread

Table 19. Continued.

Species	Latin Name	Bird Group	Mandated Govt.	Canada general status 2010	Yukon general status 2010	Occurrence	Distribution
Northern Shrike	<i>Lanius excubitor</i>	Landbird	Canada	secure	sensitive	rare	localized
Warbling Vireo	<i>Vireo gilvus</i>	Landbird	Canada	secure	secure	common	localized
Horned Lark	<i>Eremophila alpestris</i>	Landbird	Canada	secure	secure	uncommon	localized
Tree Swallow	<i>Tachycineta bicolor</i>	Landbird	Canada	secure	secure	common	widespread
Violet-green Swallow	<i>Tachycineta thalassina</i>	Landbird	Canada	secure	secure	common	widespread
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Landbird	Canada	secure	sensitive	rare	localized
Bank Swallow	<i>Riparia riparia</i>	Landbird	Canada	secure	secure	common	widespread
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Landbird	Canada	secure	secure	common	widespread
Barn Swallow	<i>Hirundo rustica</i>	Landbird	Canada	secure	sensitive	uncommon	localized
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Landbird	Canada	secure	sensitive	uncommon	localized
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Landbird	Canada	secure	secure	common	widespread
Mountain Bluebird	<i>Sialia currucoides</i>	Landbird	Canada	secure	sensitive	uncommon	widespread

Table 19. Continued.

Species	Latin Name	Bird Group	Mandated Govt.	Canada general status 2010	Yukon general status 2010	Occurrence	Distribution
Townsend's Solitaire	<i>Myadestes townsendi</i>	Landbird	Canada	secure	secure	uncommon	widespread
Gray-cheeked Thrush	<i>Catharus minimus</i>	Landbird	Canada	secure	secure	uncommon	localized
Swainson's Thrush	<i>Catharus ustulatus</i>	Landbird	Canada	secure	secure	common	widespread
Hermit Thrush	<i>Catharus guttatus</i>	Landbird	Canada	secure	secure	common	widespread
American Robin	<i>Turdus migratorius</i>	Landbird	Canada	secure	secure	common	widespread
Varied Thrush	<i>Ixoreus naevius</i>	Landbird	Canada	secure	secure	uncommon	widespread
American Pipit	<i>Anthus rubescens</i>	Landbird	Canada	secure	secure	common	widespread
Bohemian Waxwing	<i>Bombycilla garrulus</i>	Landbird	Canada	secure	secure	uncommon	widespread
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Landbird	Canada	secure	secure	rare	localized
Tennessee Warbler	<i>Vermivora peregrina</i>	Landbird	Canada	secure	secure	uncommon	localized
Orange-crowned Warbler	<i>Vermivora celata</i>	Landbird	Canada	secure	secure	common	widespread

Table 19. Continued.

Species	Latin Name	Bird Group	Mandated Govt.	Canada general status 2010	Yukon general status 2010	Occurrence	Distribution
Yellow Warbler	<i>Dendroica petechia</i>	Landbird	Canada	secure	secure	common	widespread
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Landbird	Canada	secure	secure	common	widespread
Townsend's Warbler	<i>Dendroica townsendi</i>	Landbird	Canada	secure	sensitive	rare	localized
Blackpoll Warbler	<i>Dendroica striata</i>	Landbird	Canada	secure	secure	common	widespread
American Redstart	<i>Setophaga ruticilla</i>	Landbird	Canada	secure	sensitive	uncommon	localized
Northern Waterthrush	<i>Seiurus noveboracensis</i>	Landbird	Canada	secure	secure	common	localized
Common Yellowthroat	<i>Geothlypis trichas</i>	Landbird	Canada	secure	secure	common	widespread
Wilson's Warbler	<i>Wilsonia pusilla</i>	Landbird	Canada	secure	secure	common	widespread
American Tree Sparrow	<i>Spizella arborea</i>	Landbird	Canada	secure	secure	common	widespread
Chipping Sparrow	<i>Spizella passerina</i>	Landbird	Canada	secure	secure	common	widespread
Brewer's Sparrow	<i>Spizella breweri</i>	Landbird	Canada	secure	sensitive	rare	localized

Table 19. Continued.

Species	Latin Name	Bird Group	Mandated Govt.	Canada general status 2010	Yukon general status 2010	Occurrence	Distribution
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Landbird	Canada	secure	secure	common	widespread
Fox Sparrow	<i>Passerella iliaca</i>	Landbird	Canada	secure	secure	common	widespread
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	Landbird	Canada	secure	secure	uncommon	widespread
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Landbird	Canada	secure	sensitive	casual	localized
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	Landbird	Canada	secure	secure	common	widespread
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	Landbird	Canada	secure	secure	uncommon	localized
Dark-eyed Junco	<i>Junco hyemalis</i>	Landbird	Canada	secure	secure	common	widespread
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Landbird	Yukon	secure	secure	common	widespread
Rusty Blackbird	<i>Euphagus carolinus</i>	Landbird	Yukon	sensitive	sensitive	common	widespread
Brown-headed Cowbird	<i>Molothrus ater</i>	Landbird	Yukon	secure	secure	uncommon	localized
Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>	Landbird	Canada	secure	secure	rare	localized
Purple Finch	<i>Carpodacus purpureus</i>	Landbird	Canada	secure	secure	uncommon	localized
Pine Siskin	<i>Carduelis pinus</i>	Landbird	Canada	secure	secure	common	widespread

Several species are declining within the broader Northwestern Interior Forest Bird Conservation Region, which encompasses the Southern Lakes area. Results from the BBS show regional population declines for 2 species listed under SARA (Olive-sided Flycatcher and Rusty Blackbird) and 3 other species (Lesser Yellowlegs, Blackpoll Warbler, and White-crowned Sparrow).

Stressors and Threats

Human activities and development create many stressors and threats to migratory birds in the Southern Lakes area. These include habitat loss and fragmentation, nest disturbance and destruction, water level changes, collisions with buildings and vehicles, predation by domestic animals, and loss of nest cavity trees from wood harvesting and land development. Little is known about how or to what extent a population is affected by these and other stressors.

Land use plans that incorporate the habitat needs of migratory birds would be a useful tool for reducing the impact of stressors and threats to birds in the Southern Lakes area. Riparian buffers around wetlands, wetland complexes, lakes, and streams can help mitigate and manage impacts to migratory birds.

Of 97 bird species listed in Table 18 are priority species for regional stewardship in the draft Northwestern Interior Forest - Bird Conservation Region Plan. For many of these priority species, a large proportion of their continental and/or world population occurs in the Northwestern Interior Forest - Bird Conservation Region, so if these species are not given attention here, no other region can compensate. Some of the priority species also have specific habitat needs, such as shoreline areas or riparian habitat for nesting.

Key Habitats

Migratory birds use the full range of habitats in the Southern Lakes area, from generalist species that can use disturbed sites to habitat specialist species that need old spruce forests in riparian areas. Examples of key sites include trees with nesting cavities, rocky islands for colonial nesters and human structures for barn swallows. Spring and fall staging areas are also important to migratory waterbird and shorebird species.

Key habitats for landbird species tend to be widely distributed and hard to mark on a map. However some habitats, such as riparian areas, and certain habitat features, such as large standing dead trees, are critical for many species. In some cases, large connected habitats such as mature and old-growth White Spruce forests are important. Even burned forests are important habitat for some species of woodpecker. Identifying and mapping key habitat for priority species would inform land use planning in the Southern Lakes area.

Species Management

Environment Canada's (EC) Canadian Wildlife Service (CWS) has prime responsibility for the conservation and protection of migratory birds and their nests. The *Migratory Birds Convention Act* prohibits deposit of harmful substances in waters or areas frequented by bird species listed under the act. Under the *Migratory Birds Regulations*, disturbance or destruction of migratory bird nests and/or eggs is prohibited.

Species not managed by the federal government are the responsibility of Government of Yukon under the *Yukon Wildlife Act*. Some species listed under this act do not migrate, and some species that migrate are not listed under the act.

Migratory birds and other bird species are the focus of a continental effort to create Bird Conservation Region (BCR) plans. The Southern Lakes area falls within Bird Conservation Region (BCR) 4: Northwestern Interior Forest area.

Education and Outreach

The Yukon Bird Club offers annual bird identification workshops and coordinates field trips focused on birds and their behaviour and habitats. Yukon College offers a college and university level ornithology course at the Whitehorse campus. The Society of Yukon Bird Observatories encourages the public to visit the demonstration banding site at McIntyre Marsh.

The second Saturday of May is International Migratory Bird Day. Each year has a different education theme such as Birds of the Boreal and Birds and Climate Change. Bird Studies Canada coordinates other public participation programs including Project NestWatch and Project FeederWatch. CWS provides information about birds at the annual Environment Fair.

Resident Birds

Introduction

Resident birds are species that regularly occur year-round in the Southern Lakes area that are not waterfowl, raptors, or upland game birds. Resident birds are generally non-migratory and include woodpeckers, corvids, chickadees, nuthatches, American Dipper, and finches. Many of the 18 resident species are irruptive migrants, meaning they often produce a sudden, dramatic increase in population. Rock Pigeon and House Sparrow are exotic

species with established populations in Whitehorse and are not typically encountered outside the downtown area (Table 20).

Table 20. Resident bird species which regularly occur year-round in the Southern Lakes area.

Common Name	Latin Name	Occurrence	Distribution
Rock Pigeon	<i>Columba livia</i>	Rare	Localized
Downy Woodpecker	<i>Picoides pubescens</i>	Uncommon	Widespread
Hairy Woodpecker	<i>Picoides villosus</i>	Uncommon	Widespread
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	Common	Widespread
Black-backed Woodpecker	<i>Picoides arcticus</i>	Rare	Widespread
Gray Jay	<i>Perisoreus canadensis</i>	Common	Widespread
Black-billed Magpie	<i>Pica hudsonia</i>	Common	Widespread
Common Raven	<i>Corvus corax</i>	Common	Widespread
Black-capped Chickadee	<i>Poecile atricapilla</i>	Common	Widespread
Mountain Chickadee	<i>Poecile gambeli</i>	Rare	Localized
Boreal Chickadee	<i>Poecile hudsonica</i>	Common	Widespread
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Uncommon	Widespread
American Dipper	<i>Cinclus mexicanus</i>	Uncommon	Widespread
Pine Grosbeak	<i>Pinicola enucleator</i>	Common	Widespread
Red Crossbill	<i>Loxia curvirostra</i>	Uncommon	Widespread
White-winged Crossbill	<i>Loxia leucoptera</i>	Common	Widespread
Common Redpoll	<i>Acanthis flammea</i>	Common	Widespread
House Sparrow	<i>Passer domesticus</i>	Rare	Localized

Species Significance

Yukon First Nations

Some resident birds have strong cultural value to First Nations people in the Southern Lakes area. As the symbol of one of two local clans, the crow (Common Raven) is important to Yukon First Nations social organizational structure. First Nations involve the crow in ceremonial dances and depict crows in their traditional regalia. The crow also plays a pivotal role in many

First Nation legends. The crow is a messenger and when crows are playing in the wind it means that bad things will come.

Black-capped Chickadee and Gray Jay are also included in First Nation legends. The chickadee's presence is thought to be a sign that someone is coming to visit, and its mournful sound in summer is believed to represent an upcoming death. First Nations hunters recognized the Gray Jay's ability to find food year-round and would ask the bird for good hunting luck. Legends also suggest that Gray Jay was like a person and he taught others how to cache food for times when food was scarce. First Nation people would feed the Gray Jay to give thanks.

Other Significance

People value resident birds primarily for their wildlife viewing and cultural values. Birdwatching is increasing in popularity for residents and visitors in the Southern Lakes region. Many resident bird species are attracted to bird feeders in the area, especially Boreal Chickadee, Black-capped Chickadee, Pine Grosbeak, and Common Redpoll. Bird feeding often leads to an increased interest in birdwatching and, consequently, appreciation of local wildlife.

Many resident birds species perform ecological services including pollination and seed dispersal and may also assist in natural insect control. Woodpeckers, chickadees, and nuthatches excavate holes in trees and snags for nest and roost sites. These nest sites in turn provide shelter for small mammals and other bird species. Resident birds (and their eggs) are a food source for furbearers and other birds (raptors).

Distribution and Abundance

Few surveys have specifically assessed distribution and abundance of resident birds in the Southern Lakes area. Information from sightings, nest records, and survey data shows that these birds are found in areas where suitable habitats exist.

Some species are irruptive, in response to seed crops or insect outbreaks. Highly irruptive species such as the finches (grosbeaks, crossbills, redpolls) can be present in large numbers and are often highly variable between years.

Species Monitoring

No surveys focus on resident birds in the Southern Lakes area, though they are incidentally surveyed in combination with migratory birds.

Roadside Breeding Bird Surveys

The North American Breeding Bird Survey is an annual continent-wide survey of birds conducted along a predetermined route at the peak of breeding season. Over 4,000 Breeding Bird Survey routes are monitored annually in Canada and the USA. Six active routes lie within or adjacent to the Southern Lakes area: Mt. McIntyre, Jakes Corner, Cowley, Lake Laberge, Champagne, and Teslin Lake routes (USGS 2010). The first Yukon BBS routes were surveyed during the early 1970s with more consistent coverage beginning in the late 1980s in the Southern Lakes area (Table 21).

Table 21. Summary of Roadside BBS survey effort in the Southern Lakes area.

Route Name	Current Status	Route Started	Total Years Surveyed	Years Surveyed
Mt. McIntyre	Active	1998	13	1998-2011
Jakes Corner	Active	1987	21	1987-88, 1990-96, 1998-2002, 2004-10
Cowley	Active	1988	10	1988 – 1995, 1999, 2007
Lake Laberge	Active	1986	17	1986-97, 2005-07, 2009-11
Champagne	Active	1974	13	1974, 1976, 1989, 1991-98, 2004-05
Teslin Lake	Active	2010	1	2010-2011
Wigan	Inactive	1974	24	1974-76, 1986-2006

One disadvantage of the BBS survey is that it focuses on common species, so many resident birds in the Southern Lakes area are not likely to be well monitored. Though the Roadside Breeding Bird Survey collects valuable monitoring data, it relies on the availability of reliable volunteers.

Birds of the Yukon Database

The Birds of the Yukon Database maintained by the Canadian Wildlife Service contains a list of occurrences for all bird species in the Southern Lakes area. The database contains records from a variety of surveys and incidental sightings by local and visiting bird watchers. However, the database has not been updated since the late 1990s and also relies on voluntary submission of observations.

Christmas Bird Counts

The Christmas Bird Count is a continent-wide survey to collect monitoring data on overwintering birds. Birds are surveyed within a 24 km diameter “count circle” on a single day in December or early January. All birds within the circle cannot be counted; however, this survey provides an indication of the number of birds and which species are overwintering within the region.

During 2010, 1,300 counts were done in North America, including 5 in the Southern Lakes area: Whitehorse, Marsh Lake/Yukon River, Carcross, Tagish and Teslin.

Most resident bird species are surveyed, but some species like Mountain Chickadee, American Dipper, and woodpeckers are seen irregularly. Like the Breeding Bird Surveys, the Christmas Bird Counts are conducted by volunteers.

Yukon Bird Observatories

The Yukon Bird Observatories is a non-profit society that operates three bird migration monitoring stations in Yukon. The bird observatories conduct standardized mist netting and banding and collect bird observations. They operate during the spring and fall migration with the goal of conducting population trend analyses to determine if migratory and resident bird species are increasing or declining.

Yukon Bird Observatory field stations located in or adjacent to the Southern Lakes area include McIntyre Marsh near Whitehorse (since 2009, spring season) and Teslin Lake (since 2005, fall season).

The primary limitation of the bird observatories is that they focus on migratory birds. The birds counted at the observatory are a combination of individuals from the Southern Lakes and from areas further north and west of the region.

Harvest Trends

The *Yukon Wildlife Act* protects all resident birds from harvest. Woodpeckers, chickadees, nuthatches, finches, and dippers are also protected from harvest under the federal *Migratory Birds Convention Act*.

Species Assessment

The Breeding Bird Survey provides the most useful information because data are compiled and statistically analyzed territorially and nationally. However, BBS data are limited to only a few routes in the Southern Lakes area. Though Yukon population trends are available for many resident bird species, the sample size is insufficient to provide confidence in these trends. As a result,

Canada-wide BBS trends are used to provide information on resident birds in the Southern Lakes (Table 22). Given the relatively intact habitats within the Southern Lakes area, resident bird species in the region are likely doing well compared to national population trends.

None of the resident bird species found in the Southern Lakes area have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). General status rankings are available for all species at the territorial and national level (Table 23). Mountain Chickadee is classified as *Sensitive* which indicates that it may require special attention to prevent it from becoming at risk in the future.

Table 22. Canada-wide Breeding Bird Survey trends (1966-2007) for resident bird species which regularly occur year-round in the Southern Lakes area (USGS 2010).

Common Name	Latin Name	Canada Wide Breeding Bird Survey Trend (1966-2007)
Downy Woodpecker	<i>Picoides pubescens</i>	Increasing
Hairy Woodpecker	<i>Picoides villosus</i>	Increasing
Common Raven	<i>Corvus corax</i>	Increasing
Black-capped Chickadee	<i>Poecile atricapilla</i>	Increasing
Boreal Chickadee	<i>Poecile hudsonica</i>	Decreasing
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Increasing

Canada-wide survey trends show that some species of resident birds are increasing; this may be because these species can adapt to habitats altered by humans. The Canada-wide decreasing trend in Boreal Chickadee requires confirmation in the Yukon. Though most species appear to be stable, it is unclear how wide-ranging threats such as climate change may influence resident bird species in the future. Based on the available species trend information, it is not currently possible to determine the status of these populations in the Southern Lakes area.

Stressors and Threats

A number of activities in the Southern Lakes area could cumulatively affect resident birds. Little information is available on how significant these threats are to these species.

Table 23. COSEWIC and General Status rankings for resident bird species which regularly occur year-round in the Southern Lakes area (COSEWIC 2010, CESSC 2010).

Common Name	Latin Name	COSEWIC	General Status (2005)	
			Yukon	Canada
Rock Pigeon	<i>Columba livia</i>		Exotic	Exotic
Downy Woodpecker	<i>Picoides pubescens</i>		Secure	Secure
Hairy Woodpecker	<i>Picoides villosus</i>		Secure	Secure
American Three-toed Woodpecker	<i>Picoides dorsalis</i>		Secure	Secure
Black-backed Woodpecker	<i>Picoides arcticus</i>		Secure	Secure
Gray Jay	<i>Perisoreus canadensis</i>		Secure	Secure
Black-billed Magpie	<i>Pica hudsonia</i>		Secure	Secure
Common Raven	<i>Corvus corax</i>		Secure	Secure
Black-capped Chickadee	<i>Poecile atricapilla</i>	NOT ASSESSED	Secure	Secure
Mountain Chickadee	<i>Poecile gambeli</i>		Sensitive	Secure
Boreal Chickadee	<i>Poecile hudsonica</i>		Secure	Secure
Red-breasted Nuthatch	<i>Sitta canadensis</i>		Secure	Secure
American Dipper	<i>Cinclus mexicanus</i>		Secure	Secure
Pine Grosbeak	<i>Pinicola enucleator</i>		Secure	Secure
Red Crossbill	<i>Loxia curvirostra</i>		Secure	Secure
White-winged Crossbill	<i>Loxia leucoptera</i>		Secure	Secure
Common Redpoll	<i>Acanthis flammea</i>		Secure	Secure
House Sparrow	<i>Passer domesticus</i>		Exotic	Exotic

Habitat Loss and Alteration

Habitat loss and fragmentation can displace resident birds from their habitat. Most bird species have specific habitat requirements, particularly during the breeding season. Southern Lakes habitats are lost or modified for a variety of reasons including residential and commercial developments, road access, agricultural development, and timber harvesting.

The threat of habitat loss and fragmentation is most pronounced in areas with higher bird diversity. In the Southern Lakes area, the highest bird diversity is typically found in riparian corridors along lakes, rivers, streams,

and wetlands. Mitigation can be both simple and disturbance-specific or more involved including landscape-level planning.

Collisions

Collisions account for the death of hundreds of millions of birds in North America each year. A large proportion is likely migratory birds colliding with a wide range of objects including buildings, urban lights, vehicles, power lines, communication towers, and wind turbines.

All types of birds are susceptible to collisions; however, studies show that smaller species (such as songbirds) are more frequently killed as a result of collisions compared to larger birds such as raptors.

Although the Southern Lakes area is not densely populated and there are few high buildings or communications towers, collisions still pose a threat to resident birds. Solutions include incorporating bird-friendly architecture into new buildings and using window decals or planting vegetation in front of glass.

Wind turbines can cause a high number of bird collisions if they are placed in areas frequented by high numbers of birds. Currently, there are two wind turbines in the Southern Lakes area. Careful planning can ensure future turbines are not placed in areas frequented by high numbers of birds.

Predation by Domestic and Feral Cats

Domestic and feral cats kill millions of birds each year in North America. In the Southern Lakes area, this threat is localized near settlements; however, it does pose a problem for both migratory and resident birds. The key to reducing this threat is educating cat owners about the ecological problems associated with allowing domestic cats to roam free.

Destruction of Nests during Breeding

Clearing vegetation for residential and industrial developments and along roadways poses a threat to resident birds because it destroys bird nests and eggs. Bird breeding typically occurs in May, June, and July, so clearing vegetation during the non-breeding season (September to December) can reduce this threat. Alternatively, bird surveys can identify nests and buffers can be established.

Invasive Species

Invasive species pose a threat to resident birds by increasing competition for breeding areas and resources and through increased predation. In the Southern Lakes area, invasive species are relatively uncommon and likely do

not pose a significant threat to resident birds. However, invasive birds including House Sparrow and European Starling are becoming more common in the region and may pose a more substantial threat to resident bird species in the future.

Climate Change

Though the effects of climate change are largely unknown, a changing climate will likely affect many bird species. Egg laying may shift earlier due to warmer spring temperatures. Timing of migrations and seasonal activities like moulting may also shift. Species distributions may change, and ecological communities may be disrupted by new parasites, disease, competitors, and predators.

Key Habitats

No key habitats have been identified for resident birds in the Southern Lakes area. Areas used for breeding could be key habitats for resident birds. For many resident bird species, large standing-dead trees are important breeding habitat as they provide nesting and feeding areas (Table 24).

Species Management

All resident bird species are managed by Environment Canada/Canadian Wildlife Service with the exception of the following which are under the authority of Yukon Environment: Rock Pigeon, Gray Jay, Black-billed Magpie, and Common Raven.

Resident birds are not actively managed in Yukon. However, the federal *Migratory Birds Convention Act (MBCA)* and associated *Migratory Birds Regulations (MBR)* prohibit the harming of species classed as ‘migratory’ under the Act. This includes all of the resident species listed in Table 18 (woodpeckers, chickadees, nuthatches, finches and dippers), except pigeons, jays, magpies, and ravens.

Education and Outreach

The Yukon Bird Club and the Yukon Bird Observatories are involved in outreach and education opportunities for birds in the Southern Lakes. These organizations promote bird conservation by increasing public awareness of Yukon bird species.

Table 24. General habitat associations for resident bird species in the Southern Lakes area.

Common Name	Latin Name	Habitat	
		Primary	Secondary
Rock Pigeon	<i>Columba livia</i>	Urban	
Downy Woodpecker	<i>Picoides pubescens</i>	Mixed	Deciduous
Hairy Woodpecker	<i>Picoides villosus</i>	Mixed	Deciduous
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	Coniferous	
Black-backed Woodpecker	<i>Picoides arcticus</i>	Coniferous	
Gray Jay	<i>Perisoreus canadensis</i>	Coniferous	Mixed
Black-billed Magpie	<i>Pica hudsonia</i>	Shrub	Deciduous
Common Raven	<i>Corvus corax</i>	Ubiquitous; found in all habitats	
Black-capped Chickadee	<i>Poecile atricapilla</i>	Deciduous	Mixed
Mountain Chickadee	<i>Poecile gambeli</i>	Coniferous	
Boreal Chickadee	<i>Poecile hudsonica</i>	Coniferous	Mixed
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Coniferous	Mixed
American Dipper	<i>Cinclus mexicanus</i>	Wetlands; flowing streams	
Pine Grosbeak	<i>Pinicola enucleator</i>	Coniferous	Mixed
Red Crossbill	<i>Loxia curvirostra</i>	Coniferous	
White-winged Crossbill	<i>Loxia leucoptera</i>	Coniferous	
Common Redpoll	<i>Acanthis flammea</i>	Shrub	Deciduous
House Sparrow	<i>Passer domesticus</i>	Urban	

Education and outreach are a key part of the Yukon Bird Club's mandate. During the summer, the club hosts birdwatching field trips in the Southern Lakes area. The society also hosts presentations and public talks that promote awareness and conservation of birds in the region. They host an annual Yukon Birdathon in late May to increase awareness and raise funds to promote the conservation of birds in the territory.

The Yukon Bird Observatories is a non-profit society that monitors migrating birds in Southern Yukon. Education is a core part of their operation. Members of the public visit the observatories and receive training on bird identification and other aspects of bird research (mist netting, banding, etc). Over 300 people visit the observatories each year, including many school groups from community schools in the Southern Lakes area.

Waterfowl

Introduction

Waterfowl includes ducks, geese, and swans, but does include other waterbirds such as loons and grebes. There are 32 species of waterfowl regularly observed in the Southern Lakes area (Table 25).

Species Significance

Yukon First Nations

In the past, waterfowl and other birds and eggs were an important part of the First Nations subsistence diet in the Southern Lakes region. Eggs were used in trade and barter. Skins of waterfowl were used to make garments for babies. Some species, such as swans and some diving ducks, are highly respected in the traditional culture and are not harvested. Traditional laws around hunting waterfowl were always respected. There was no hunting allowed after February and only migrating waterbirds could be hunted to protect the others which were busy making babies.

Over the past 5 years members of Carcross/Tagish First Nation have seen an increase in waterfowl in both spring and fall in the Carcross area at Nares Lake and Six-mile River (Tagish Narrows). They have observed more swans, especially in fall.

Other Significance

Waterfowl and other bird species are an essential part of the Southern Lakes ecosystem. Birds provide important ecological services, and birds and eggs are food sources for many other species of wildlife.

Residents and visitors to the Southern Lakes enjoy wildlife viewing activities that focus on waterfowl, particularly during spring migration in April, May, and June. The annual Celebration of Swans organized by Environment Yukon highlights the value and popularity of non-consumptive use of waterfowl in the Southern Lakes area.

Waterfowl hunting is an important annual activity in the Southern Lakes. In 2009 approximately 189 migratory bird hunting licenses were sold in Yukon.

Table 25. Species of waterfowl regularly observed in the Southern Lakes area.

Common Name	Latin Name	Occurrence	Distribution
Greater White-fronted Goose	<i>Anser albifrons</i>	Casual	Localized
Snow Goose	<i>Chen caerulescens</i>	Casual	Localized
Brant	<i>Branta bernicla</i>	Casual	Localized
Cackling Goose	<i>Branta hutchinsii</i>	Accidental	Unknown
Canada Goose	<i>Branta canadensis</i>	Common	Widespread
Trumpeter Swan	<i>Cygnus buccinator</i>	Uncommon	Localized
Tundra Swan	<i>Cygnus columbianus</i>	Casual	Localized
Gadwall	<i>Anas strepera</i>	Rare	Localized
Eurasian Wigeon	<i>Anas penelope</i>	Casual	Localized
American Wigeon	<i>Anas americana</i>	Common	Widespread
Mallard	<i>Anas platyrhynchos</i>	Common	Widespread
Blue-winged Teal	<i>Anas discors</i>	Uncommon	Widespread
Northern Shoveler	<i>Anas clypeata</i>	Common	Widespread
Northern Pintail	<i>Anas acuta</i>	Common	Widespread
Green-winged Teal	<i>Anas crecca</i>	Common	Widespread
Cinnamon Teal	<i>Anas cyanoptera</i>	Casual	Localized
Canvasback	<i>Aythya valisineria</i>	Common	Widespread
Redhead	<i>Aythya americana</i>	Rare	Localized
Ring-necked Duck	<i>Aythya collaris</i>	Common	Widespread
Greater Scaup	<i>Aythya marila</i>	Common	Widespread
Lesser Scaup	<i>Aythya affinis</i>	Common	Widespread
Harlequin Duck	<i>Histrionicus histrionicus</i>	Uncommon	Localized
Surf Scoter	<i>Melanitta perspicillata</i>	Uncommon	Widespread
White-winged Scoter	<i>Melanitta fusca</i>	Uncommon	Widespread
Long-tailed Duck	<i>Clangula hyemalis</i>	Rare	Localized
Bufflehead	<i>Bucephala albeola</i>	Common	Widespread
Common Goldeneye	<i>Bucephala clangula</i>	Uncommon	Widespread
Barrow's Goldeneye	<i>Bucephala islandica</i>	Common	Widespread
Hooded Merganser	<i>Lophodytes cucullatus</i>	Casual	Localized
Common Merganser	<i>Mergus merganser</i>	Common	Widespread
Red-breasted Merganser	<i>Mergus serrator</i>	Common	Widespread
Ruddy Duck	<i>Oxyura jamaicensis</i>	Uncommon	Localized

Distribution and Abundance

A range of information sources provide a relatively complete picture of waterfowl populations and habitat in the Southern Lakes, especially in accessible wetlands. Long-term bird population data informs decision making and helps identify new conservation issues.

However, major knowledge gaps still exist. For example, at what distance from wetlands do cavity-nesting waterfowl (goldeneye, bufflehead, merganser) use cavity trees? How are high-elevation wetlands used for breeding? How do waterfowl use agricultural lands near Shallow Bay?

Spring Migration Area Surveys

Since 1986, Canadian Wildlife Service (CWS) has done annual ground and aerial surveys of critical waterfowl staging areas during spring migration in the Southern Lakes. Researchers count and estimate the number of waterfowl and document habitat conditions. This program monitors how waterfowl populations use these areas, tracks habitat impacts caused by changing water levels and climate, and supports these sites as protected areas.

Lewes Marsh and M'Clintock Bay, Tagish Narrows, Teslin Lake Outlet, Shallow Bay, and Nares Lake are the best-monitored sites. The most detailed information is collected at M'Clintock Bay (Swan Haven) through Environment Yukon's Wildlife Viewing program. The database also contains historical (pre-1986) survey data. In 2009 Ducks Unlimited led more widespread aerial survey program.

Yukon Roadside Waterfowl Surveys

In cooperation with Environment Yukon and Yukon College, CWS has conducted ground-based monitoring of about 140 nesting wetlands in the Southern Lakes area each year since 1991.

Starting in early May and continuing for five weeks, researchers do weekly road-based surveys of wetlands. They use this information to monitor Yukon waterfowl population trends and include it in national waterfowl trend reports. During the surveys researchers document the numbers of waterfowl and breeding pairs and collect photos of habitat conditions.

Two decades of data show that Southern Lakes waterfowl populations fluctuate but are stable over the long-term. A few species are increasing, and one, Lesser Scaup, is experiencing a long-term decline.

Southern Lakes Waterfowl Inventory

From 2000 to 2002, Ducks Unlimited Canada counted waterfowl by helicopter and fixed-wing aircraft in 325 wetlands scattered across the Southern Lakes.

Yukon Trumpeter Swan Survey

Every 5 years since 1985, researchers do Trumpeter Swan surveys over much of southern Yukon. Since 1995 surveys have been done on individual 1:50,000 maps. This survey shows that Trumpeter Swans have been moving into the Southern Lakes area over the past 30 years from established populations to the south and west.

Harvest Trends

Waterfowl hunting in Canada and the United States has declined significantly since the 1980s. The estimated number of ducks shot and retrieved by permit holders in Canada fell from 2.50 million in 1985 to 1.54 million in 1998. According to the CWS National Harvest Survey, hunting permit sales peaked in Yukon in 1978 at 638 permits and continue to decline (189 permits in 2009). Between 2000 and 2009, permits issued in Yukon represented about 0.1% of all permits issued in Canada.

CWS's annual National Harvest Survey is the joint name for two surveys—the Harvest Questionnaire Survey (HQS) and the Species Composition Survey (SCS)—sent to a sample of licensed waterfowl hunters across Canada. Data from these and other surveys help assess the status of migratory game bird populations including productivity, survival rates, and sustainable harvest.

Based on the National Harvest Survey, permitted Yukon hunters most commonly hunt the following duck species:

- Mallard
- American Wigeon
- Northern Pintail
- Bufflehead
- Green-winged Teal
- Scaup (greater and lesser)
- Common Goldeneye
- Northern Shoveler

Species Assessment

The Continental Bird Conservation Region plans assess species based on population size, breeding and non-breeding distribution, population trend, breeding and non-breeding threats, and regional density and abundance. Using these criteria, there are 13 species of waterfowl known to nest in the Southern Lakes Area that are ranked as priority. Two of these species (Lesser Scaup and American Wigeon) are priority due to regional/continental concern (continental population decline) and regional stewardship concern. The population objective is to increase the populations through conservation measures. Seven species

(Trumpeter Swan, Canada Goose, Mallard, Blue-winged Teal, Northern Pintail, Canvasback and Common Goldeneye) are of continental concern, and the population objective is to maintain the populations through conservation measures. Of these seven species, five (Trumpeter Swan, Canada Goose, Mallard, Northern Pintail and Canvasback) are also high priority due to regional stewardship concern. Four species (Northern Shoveler, Harlequin Duck, Bufflehead and Barrow's Goldeneye) are of regional stewardship concern and the population objective is to maintain the populations through conservation measures.

Currently no species of waterfowl occurring in Yukon are listed on Schedules 1, 2, or 3 of the Canadian *Species at Risk Act* (Table 26).

Stressors and Threats

Stressors and threats to waterfowl in the Southern Lakes area include loss of nest cavity trees, hunting, habitat loss, and disturbance at staging areas caused by recreation and residential development. Hydro-electric development has altered the water regime in the Yukon River and adjoining wetlands above Whitehorse, including Marsh, Tagish, and Bennett lakes. Loss of riparian vegetation due to agricultural and urban development is a significant threat. Riparian buffers around lakes, streams, and wetlands can mitigate and manage impacts to waterfowl.

Little is known about how predation and disturbance affect waterfowl in the Southern Lakes area. Loss of cavity trees due to forest harvesting may be high around easily accessible wetlands near residential areas, but the impact on waterfowl populations is not well documented.

Hunting pressure is not a significant risk to waterfowl populations in the Southern Lakes. Disease and parasites do not pose a significant risk to long term population stability. Occasional disease outbreaks such as botulism may have short-term effects on some populations.

Key Habitats

Waterfowl use wetlands, lakes, and rivers in the Southern Lakes area for migration, nesting, rearing young, and moulting. Spring migration areas at the outlets of large lakes are particularly important in the Southern Lakes. Cavities in trees within the riparian zone of wetlands, lakes, and rivers are critical for nesting Bufflehead, Common Goldeneye, Barrow's Goldeneye, and Common Merganser.

Table 26. General Status rankings for waterfowl species found in the Southern Lakes area.

Species	Canada General Status 2010	Yukon General Status 2010
Greater White-fronted Goose	Secure	Secure
Snow Goose	Secure	Sensitive
Brant	Secure	May be at risk
Cackling Goose	Secure	Sensitive
Canada Goose	Secure	Secure
Trumpeter Swan	Secure	Sensitive
Tundra Swan	Secure	Sensitive
Gadwall	Secure	Secure
Eurasian Wigeon	Secure	Accidental
American Wigeon	Secure	Sensitive
Mallard	Secure	Secure
Blue-winged Teal	Secure	Secure
Northern Shoveler	Secure	Secure
Northern Pintail	Secure	Sensitive
Green-winged Teal	Secure	Secure
Cinnamon Teal	Secure	Accidental
Canvasback	Secure	Secure
Redhead	Secure	Sensitive
Ring-necked Duck	Secure	Secure
Greater Scaup	Secure	Secure
Lesser Scaup	Secure	Sensitive
Harlequin Duck	Sensitive	Sensitive
Surf Scoter	Secure	Sensitive
White-winged Scoter	Secure	Sensitive
Long-tailed Duck	Secure	Sensitive
Bufflehead	Secure	Sensitive
Common Goldeneye	Secure	Secure
Barrow's Goldeneye	Secure	Secure
Hooded Merganser	Secure	Sensitive
Common Merganser	Secure	Secure
Red-breasted Merganser	Secure	Secure
Ruddy Duck	Secure	Secure

Critical spring migration sites in the Southern Lakes area are characterized by early season open water and shallow water depths. These sites include Tagish Narrows, M'Clintock Bay, Teslin Lake outlet, Shallow Bay at the southwest end of Lake Laberge, upper Lake Laberge, and Nares River at Carcross. Most of these areas are in the Wildlife Key Area database. Four of the most important areas are also recognized nationally as Important Bird Areas (IBAs) under a global initiative spearheaded in Canada by Bird Studies Canada and Nature Canada.

The Lewes Marsh/M'Clintock Bay critical spring waterfowl migration area will become a Habitat Protection Area (HPA) under the Kwanlin Dun First Nation Final Agreement. The Tagish Narrows critical spring waterfowl migration area is included in the Tagish River HPA identified under the Carcross/Tagish First Nation Final Agreement. Shallow Bay, Tagish Narrows, Lewes Marsh/M'Clintock Bay, and Nares River are also designated as globally significant IBAs, though designation does not include any protection.

Species Management

Environment Canada's (EC) Canadian Wildlife Service (CWS) has prime responsibility for the conservation and protection of migratory birds and their nests. Migratory bird hunting is managed by CWS under Article II of the Canada/US Migratory Birds Convention (1994).

In Yukon, CWS manages waterfowl by setting annual harvest limits and other regulations related to waterfowl hunting. Habitat conservation is the focus of CWS's waterfowl management activities as well as working with regulatory agencies, environmental assessment bodies, resource management and land use planning processes, and other partners.

Waterfowl and other bird species are the focus of a continental effort to create Bird Conservation Region (BCR) plans. The Southern Lakes area falls within Bird Conservation Region (BCR) 4: Northwestern Interior Forest area.

Education and Outreach

The annual Celebration of Swans coordinated by Environment Yukon in April is the most prominent education and outreach activity concerning waterfowl in the Southern Lakes area. The Yukon Bird Club conducts an annual waterfowl identification workshop and coordinates field trips focused on observing waterfowl, their behaviour, and habitats. Ducks Unlimited Yukon offered a waterfowl hunting workshop in Whitehorse in May, 2010.

Amphibians

Introduction

Two amphibian species are found in the Southern Lakes area: the wood frog *Lithobates sylvaticus* [*Rana sylvatica*] and the Columbia spotted frog *Rana luteiventris*.

A third species, the western toad *Anaxyrus* [Bufo] *boreas*, has been found within 10 km of the Southern Lakes area on Tagish Lake, and on Tutshi and Bennett lakes in British Columbia. Western toads may yet be found in the Southern Lakes region as more areas are surveyed.

Species Significance

Yukon First Nations

Frogs are crest emblems for the inland Tlingit First Nations of Teslin and Carcross. In some Yukon native traditions, frogs are animal shamans, capable of healing when their 'hands' are placed on the ailing part of the body. Frogs can also be guardian spirits, like the frog helper that appeared to Skookum Jim after he returned a stranded frog to a pond. Jim dreamed that the frog's eyes glittered like gold nuggets, and soon after, he discovered gold in the Klondike. Frogs are respected by Yukon First Nations and children are told to never bother frogs. Tlingit, Southern Tutchone, and Tagish people traditionally feared frogs, believing they bring bad luck and must not be hunted.

Other Significance

Naturalists and outdoor enthusiasts appreciate amphibians for their wildlife viewing value, and they bring joy and a sense of discovery to children. Scientific researchers and natural historians are interested in the unique characteristics of amphibians. Yukoners regularly show concern and interest about the health of local amphibian populations. Amphibians are not harvested in the Yukon so they have little direct economic value.

Amphibians play important ecological roles in wetlands and forests. Frog and toad tadpoles eat plants and microorganisms scraped from aquatic plants. Invertebrates, adult frogs, fish, birds, and carnivorous mammals prey on eggs and tadpoles. Adult amphibians eat invertebrates such as insects, slugs, snails, and earthworms, while fish, birds, and mammals eat adult frogs and toads.

Amphibians are very important indicators of environmental health. Because they have both aquatic and terrestrial life stages they can provide early warnings to changes in both types of environments. Breathing through their skin makes them susceptible to pollution. Their eggs are permeable to

water and are exposed to light, making them vulnerable to pollution, diseases, and ultraviolet radiation. Amphibians depend on the weather, especially precipitation and temperature, making them indicators of global climate change.

Distribution and Abundance

No regular long-term surveys of wood frog or Columbia spotted frog populations have been done in the Southern Lakes, or anywhere in the Yukon. Most amphibian observations recorded before 1993 were collected by biologists who were surveying for other wildlife species and by wilderness travellers. A few wood frog specimens from the Southern Lakes are in museums around North America (Table 27). Recent amphibian surveys and observations have profoundly increased our knowledge of wood frog ranges and occurrences. The Columbia spotted frog was first recorded in the Southern Lakes area in 1993 (Table 27).

Repeat sightings at some sites suggest that populations are stable within the normal range of population fluctuations. Amphibian populations are unstable under natural conditions due to the species' sensitivity to environmental fluctuations and to mass extinction events.

Wood Frog

Wood frogs are widespread and abundant in suitable wetlands below treeline, and they can be found above treeline in riparian areas with shrubby vegetation. Many thousands of wood frogs may breed in countless wetlands in the Southern Lakes area.

Parks Canada started a wood frog monitoring program in Kluane National Park in 2008. This is the only ongoing amphibian monitoring in the Yukon. Attempts to start a FrogWatch amphibian calling survey have been unsuccessful. Challenges include limited road access to breeding habitats and a small number of volunteer 'citizen scientists'. A trial FrogWatch survey was done in May 2001, 2003 and 2006 in the Wolf Creek area of Whitehorse. Researchers visited 10 wood frog breeding ponds, but the survey route was too hard to access for annual monitoring by volunteers.

Columbia Spotted Frog

The 2 Columbia spotted frog breeding sites found near Bennett Lake in 1993 were revisited in 2002. Both sites were occupied, and researchers found a 3rd site. They visited the 3 sites again in 2004; 2 of the 3 were occupied and they found a 4th site. In 2010 they surveyed 3 occupied sites in 2010, including the unoccupied site in 2004. The breeding site that was unoccupied for at least one

year is on a beaver pond, and the frogs were absent while the dam was breached. Fewer than 1,000 spotted frogs live in the Southern Lakes area.

Western Toad

Several amphibian surveys in northwestern British Columbia have found western toads. Breeding sites include locations near the Yukon border in the Chilkoot Trail National Historic Site as far north as Bennett (on Bennett Lake), Tutshi Lake, and Tagish Lake within 10 km of the border. Searches for western toads in Southwest Yukon have been unsuccessful. A museum specimen reportedly collected at Whitehorse in 1948 is believed to be either a stray or a labelling error.

Amphibian Surveys

Amphibian surveys in the Southern Lakes have been limited. The survey methods used are adequate for the species in the area.

Much of the area has not been surveyed for amphibians, especially areas beyond major road, river, and lake access corridors. Currently there are no coordinated monitoring programs for amphibians. A population, habitat, and disease monitoring program is needed to identify populations and habitats in unsurveyed areas and to detect population changes, habitat changes, and disease potential.

Survey Methods

Amphibian surveys use visual techniques while searching and dipnetting terrestrial, semi-terrestrial (wetland), and aquatic habitats. Experienced observers can identify the various life stages including egg masses, tadpoles, juveniles, and adults. In the Southern Lakes area researchers usually do surveys in breeding season (late-April to early-June) and in the warm summer months (June to August) when amphibians are active. They observe tadpoles throughout the summer, with metamorphs appearing on land in late July and August. More intensive surveys use aquatic funnel traps, terrestrial pitfall traps, or artificial cover boards.

Acoustic surveys are also made at wetlands during the spring breeding season. Observers can identify the calls of male wood frogs and Columbia spotted frogs to species. They rank calling intensity for a rough index of abundance which can be compared between years. Visual encounter surveys, combined with audible call identification, have been used exclusively in the Southern Lakes area. Both wood frogs and Columbia spotted frogs are associated with wetland habitats and are readily found if present. The western toad is more difficult to find and surveys take more effort.

Table 27. Summary of Amphibian Surveys in the Southern Lakes area.

Date	Reference	Agencies	Survey Objectives	Key Results
1933 to present	Slough and Mennell 2006; B. Slough unpublished data	Various North American museums and government agencies	Observations and specimens collected during biological surveys or research trips	Observations or specimens of wood frogs from about 30 Southern Lakes sites; A western toad specimen from Whitehorse is suspect.
1993	Mennell 1997	Northern Research Institute, Yukon College	Survey amphibian species and distribution in YT and northern BC	8 wood frog occurrences; 2 Columbia spotted frog occurrences on Bennett Lake
2000	Lee-Yaw et al. 2007	Redpath Museum, McGill University	Collect wood frog DNA for genetic studies	4 wood frog occurrences
2002	B. Slough; published by Funk et al. 2008	NRI, Yukon College; Redpath Museum, McGill University	Collect Columbia spotted frog DNA in YT and BC for genetic studies	1 new Columbia spotted frog (Bennett Lake); resurvey 2 sites
2004	Slough 2005a	Environment Yukon	Survey for western toads in YT and BC	No toads observed; 1 new Columbia spotted frog (Bennett Lake); resurvey 3 previous sites
2001, 2003, 2006	B. Slough; unpublished data	Volunteer	FrogWatch wood frog calling survey in Whitehorse area	Abundance codes of calling frogs recorded for several wetlands, but technique not practical
2007	B. Slough and L. Mennell; unpublished data	Volunteer	Determine amphibian species on Teslin Lake	No toads observed, but wood frogs observed
2009	B. Slough	Yukon Parks, Environment Yukon	Determine amphibian species in Kusawa Park	None observed
2010	B. Slough	Volunteer	Resurvey Columbia spotted frog ponds on Bennett Lake	3 surveyed, all occupied

Species Assessment

In 2000 the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed the Columbia spotted frog as not at risk. COSEWIC has not assessed the wood frog. In 2002 COSEWIC designated the western toad as a species of special concern. The species was designated because it is relatively intolerant of urban expansion, conversion of habitat for agricultural use, non-native predators and competitors, and disease. It is listed on Schedule 1 of the federal *Species at Risk Act* (SARA). A Yukon management plan for amphibians is in development and a national management plan is being prepared by the Canadian Wildlife Service, Environment Canada.

Environment Yukon uses standard general status rankings to highlight species that need a more detailed (i.e. COSEWIC) assessment. The general status rankings are based on the best available information and include expert opinion and existing data. It is recognized that there may be knowledge gaps in this information. NatureServe ranks all species globally (G), based on the status of the species in its entire range, and territorially (S, or sub-nationally) based on its regional status. General status rankings are based on NatureServe ranking factors (Table 28).

Table 28. COSEWIC, General Status, NatureServe global and territorial, and IUCN rankings for amphibians that regularly occur in the Southern Lakes area (COSEWIC 2010, NatureServe 2010, T. Jung, pers. comm. 2011, IUCN 2009).

Common Name	COSEWIC	General Status (2010) Yukon	NatureServe	IUCN
Wood frog	Not assessed	Secure	G5S5 (<i>Secure</i>)	Least Concern
Columbia spotted frog	Not at Risk	May be at Risk	G4 (Apparently Secure) S2S3 (Imperilled-Vulnerable)	Least Concern
Western toad	Special Concern	Sensitive	G4 (Apparently Secure) S3 (Vulnerable)	Near Threatened

The wood frog is widespread and stable in the Yukon. Columbia spotted frog occupies a very small geographic range in two widely separated areas, Bennett Lake in the west and Hyland River in the east. Western toad is thinly distributed in the southern Liard Basin. Disease (chytridiomycosis, caused by the amphibian chytrid fungus) may be a local threat. The Convention on

International Trade in Endangered Species of Wild Flora and Fauna does not list any Yukon amphibian species.

Stressors and Threats

Amphibians face many global threats and are declining more rapidly than birds or mammals. They are more vulnerable because they rely on both aquatic and terrestrial environments and have permeable skin and eggs. Global threats include habitat loss, habitat fragmentation, traffic mortality, collecting for food, bait, medicine and education, acid rain, chemical contaminants and pesticides, introduction of exotic species, diseases from non-native fish, emerging diseases, ultraviolet radiation which may reduce hatching success, global climate change which affects water levels and temperature and results in extreme weather events, or combinations of these.

Climate change and emerging diseases pose the greatest threats to Yukon amphibians. Introduced predators, such as game fish and their diseases, may also pose a threat. Chytridiomycosis has been documented in wood frogs and western toads in northern British Columbia and the Yukon. Western toads are the most vulnerable to the disease. The chytrid fungus may have contributed to undetected western toad declines in the Yukon where populations have not been monitored.

Natural disturbances like wildfires and annual water level fluctuations do not seriously harm amphibian populations. Human-caused disturbances such as agriculture, forestry, mining, oil and gas exploration, and developments may have local impacts. Land use compatibility is optimal if breeding areas are avoided, wetlands are not drained or filled, sediments and contaminants are not discharged, and riparian soils and vegetation are not disturbed.

ATV and snowmobile use in wetlands and riparian areas can lead to soil erosion, sedimentation, and damage to vegetation. Snowmobiles compact the snow, reducing its insulation value which leads to thicker ice and delayed melting. This could affect amphibian breeding success and harm hibernating Columbia spotted frogs. Hydrocarbon pollutants trapped in the snow are released during snowmelt, posing a threat to aquatic organisms.

Many local amphibian populations breed and forage on beaver ponds on dammed streams, including Columbia spotted frogs on the West Arm of Bennett Lake and western toads in Southeast Yukon. Maintaining healthy beaver populations will benefit amphibians.

Key Habitats

The most important amphibian habitats are wetland breeding areas in the shallows of ponds, lakes, river backwaters and streams. They also need land

habitats to migrate, disperse, forage, and hibernate. The long-term stability of regional amphibian populations depends on connected breeding habitats.

Wood frogs breed in small ponds, the shallow margins of lakes, and in stream backwaters and beaver ponds. Wood frogs may use traditional communal breeding sites but are often solitary breeders. They are vulnerable to predation by fish. Summer foraging can occur far from breeding, but the habitat must be moist. Wood frogs hibernate on land under leaf litter, often in the meadows surrounding their breeding ponds.

Numerous wood frog breeding sites are known, but they are not included in Environment Yukon's Wildlife Key Areas database. The Yukon Conservation Data Centre also doesn't track wood frogs. Protected areas in the Southern Lakes are believed to contain some wood frog breeding ponds, though none were found in a 2009 survey in Kusawa Territorial Park. Wood frogs likely occur in Agay Mene Territorial Park, but the area has not been surveyed.

Columbia spotted frogs breed in small fishless ponds and beaver ponds on streams on the West Arm of Bennett Lake. They are the most aquatic Yukon amphibian, often perched at the water's edge. Adults can forage for invertebrates underwater. Their breeding and foraging ponds usually have steep banks and relatively deep water that provides escape cover. They use traditional shallow, flooded basins around pond margins for communal breeding. Columbia spotted frogs hibernate underwater, so they require deep water that doesn't freeze to the bottom, and early, deep snow that prevents ice formation and permits safe hibernation. Tadpoles and hibernating frogs are vulnerable to predation by fish. The lack of deep snow is believed to limit Columbia spotted frog distribution in the north, explaining why it enters the Yukon only in the Liard Basin and Coast Mountains.

The Columbia spotted frog breeding sites near Bennett Lake are not in Environment Yukon's Wildlife Key Areas database, but they are tracked by the Yukon Conservation Data Centre, as are western toads. None of the breeding sites are protected. Data from the Yukon Conservation Data Centre can be used to help evaluate land use development proposals, under the *Yukon Environmental and Socio-Economic Assessment Act* (YESSA), for potential impacts on tracked species and their habitats.

Species Management

Amphibians are classified as wildlife under the *Yukon Wildlife Act*, so the Government of Yukon has the authority to manage amphibians in the Southern Lakes area. A license or permit is required to harvest or study Yukon amphibians. Environment Yukon provides support for status ranking, status reporting, database management, and management planning, but the populations or diseases are not actively monitored.

Currently Yukon is developing an amphibian management plan. Federal and provincial/territorial management plans for the western toad are legally required under the federal *Species at Risk Act*, where it is listed as a species of *Special Concern*. Early on, Environment Yukon decided to develop a management plan that addresses the needs of all four Yukon amphibians. This approach is more comprehensive and takes full advantage of technical experts who are involved in the planning process. It is expected this plan will be completed in 2012.

Education and Outreach

In response to public interest in amphibians, Environment Yukon published the *Yukon Amphibians* brochure. Originally published in 1999 and updated in 2005, the brochure is being revised again. It shares information about local amphibian biology, distribution, and conservation concerns. The brochure also invites new amphibian observations from the public.

Local non-government biologists and naturalists frequently provide media interviews, print information, talks, and natural history interpretive walks for groups such as the Yukon Conservation Society, the Yukon Bird Club, and school classes. The Wood Street School showed some interest in experiential learning tied to Columbia spotted frog monitoring near Log Cabin, British Columbia. With more support from government agencies, this type of collaboration could be developed.

Amphibian viewing, either guided or unguided, has not been capitalized on in the Yukon. Youngsters and biologists often know local wood frog breeding ponds, such as Paddy's Pond and Pelly Pond in Whitehorse, and these sites are excellent for field education. Numerous breeding ponds are found in the Southern Lakes area.

Many jurisdictions use volunteer breeding frog surveys like FrogWatch. There may be opportunities to bring FrogWatch to schools in the Southern Lakes area to educate students on frog biology and to raise awareness about conservation issues.

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