Research on the Yukon North Slope
Funded Through the Inuvialuit Final Agreement (IFA)
1985-2005

Project Name	Start	End	Lead Agency(ies)	Investigator(s)	Goal	Description
Review of migratory bird populations on the Yukon North Slope	1985	1987	Canadian Wildlife Service	Hawkings, J.	To summarize the status of populations of migratory waterbirds on the Yukon North Slope and adjacent Mackenzie Delta.	Existing data about migratory bird populations on the North Slope were examined and synthesized in 1985 and 1986, with the goal of helping establish priorities for further studies. The synthesis was published as a Canadian Wildlife Service technical report in 1987.
Wolf, moose, muskoxen, and grizzly bear observations on the Yukon North Slope	1986	1986	Yukon Government	Hayes, R.; Barichello, N.	To report on the abundance and distribution of wolves, muskoxen, moose, and grizzly bears observed on the Yukon North Slope in late spring.	During June 1986, aerial surveys of wildlife were conducted along major drainages of the Yukon North Slope. The purpose of the surveys was to visit known wolf dens and search for new den sites. During the flights, researchers also recorded moose, muskoxen, and grizzly bear observations. During visits to the wolf dens, two adult wolves were radio-instrumented. A report on results of the research was completed in 1986 and published by Yukon Renewable Resources.
Status and habitat assessment of arctic fox on Yukon North Slope	1986	1990	Yukon Government	Smits, C.; Slough, B.	To gather baseline information for the management of arctic fox from both habitat and population management perspectives	Dens were located by systematic transect census, stratified random block sampling census, and incidental observations during relocation flights or other field activities. Dens were checked to determine their occupancy, and the presence of juveniles. Foxes were ear-tagged to enable identification of harvested foxes and seasonal distribution. A number of reports were produced through Yukon Renewable Resources.

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Status and seasonal distribution of moose in the northern Richardson Mountains	1987	1991	Yukon Government	Smits, C.	To determine the abundance of moose, to delineate seasonal movement patterns and location, timing, and duration of seasonal use of habitat units, and to estimate sustainable harvest levels.	A total of 26 moose were fitted with radio collars in 1987 and 1988. To determine seasonal distribution, 18 aerial searches were made between December 1987 and July 1990. Population size was estimated using aerial surveys during March or April of 1987, 1988, and 1989. Mortality rates were calculated from radio-collared moose. A survey to determine sex and age composition was conducted in November 1988. Home range areas were calculated. Habitat use was recorded for all moose seen. A report was issued through Yukon Renewable Resources in 1991.
North Slope wolf studies	1987	1995	Yukon Government	Hayes, R.; Cooley, D.	To record distribution and abundance of wolves in the northern Yukon. To record information on wolf-killed ungulates and summer food habits. To determine the seasonal movements and general prey relationships of radio-instrumented wolves. To locate denning sites and determine productivity. To determine annual survival rates of pups.	Researchers conducted an aerial census in the spring of 1987. At least two members of each wolf pack were radio-collared and followed to record denning sites, pup survival, and movements. Scat samples were taken to determine food habits. Kill sites were examined to determine species, age class, and sex of prey. Denning sites were mapped and pup survival was recorded. A second aerial survey was conducted in 1993. Satellite collars were put on eight wolves and weekly locations were recorded until April 1994. Pup survival was low and wolf mortality high during the years of the study. The researchers concluded that the wolf population in the Northern Yukon and adjacent Northwest Territories is kept low naturally by seasonal caribou availability, low denning success, normal natural mortality (one wolf in four, per year), and harvest activity by hunters and trappers. Because of their small population, the wolves do not have a strong impact on the Porcupine Caribou.

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Wildlife viewing assessment	1987	1990	Yukon Government	Mossop, D.; Talarico, D.	To determine the potential effects of the industry on the resources of the area, the attractiveness of bird populations and other features of the North Slope to visitors, the potential disruption to the life of the people of the North Slope, and a monitoring program for the non-game wildlife of Herschel Island.	Researchers conducted personal interviews with Aklavik community members and a community workshop provided background information concerning attitudes towards wildlife viewing. A trip was designed to field-test potential impacts and resources of the island. Training sessions for Park employees were held and field transects were developed to monitor avian populations. Reports were produced in 1988 and 1989 covered tourism and birds on Herschel Island, an experimental bird watching enterprise using boat trips from Aklavik to the North Slope and Herschel Island, and techniques for monitoring and managing birds on Herschel Island.
Vegetation mapping on the Yukon North Slope	1987	1990	Canadian Wildlife Service	Hawkings, J.	To produce, from satellite imagery, a detailed vegetation map of the Yukon North Slope to be used in habitat assessment.	Two field seasons were conducted in 1986 and 1989. A paper vegetation map was produced in 1990. However, this covered only the area east of the Firth River and was difficult to interpret. Computerized mapping and map production in 1990-95, funded by the Canadian Wildlife Service, produced a more useful digitized version of the map, covering the Yukon coastal plain between the Firth River and the Yukon/NWT border.
Demographics and breeding biology of Black Brant	1987	1988	Canadian Wildlife Service	Hawkings, J.	To determine the relationships between breeding, migration, and wintering grounds of Canadian stock of Pacific Flyway Brant.	Most of the Canadian stock of Pacific Flyway Brant breed in the Inuvialuit Settlement Region. Brant were banded with coloured, numbered leg bands and radio transmitters on arctic breeding areas in 1987 and 1988. The birds were observed using telescopes and radio receivers at various places during migration and in the winter. Some bands were recovered from hunter-killed birds. Several publications and further research have resulted.
A review of the biology and management of grizzly bears on the Yukon North Slope	1988	1989	Yukon Government Government of the NWT	Nagy, J.	To provide a summary of information to direct management responses and guide further research for grizzly bears on the North Slope	The project involved a literature review of existing information about grizzly bears on the Yukon North Slope. The results were incorporated in a report, along with a number of recommendations for further research and management measures.

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Competition between muskoxen and caribou on the Yukon North Slope	1989	1989	Yukon Government	Smits, C.	To review studies dealing with competition between caribou and muskoxen, and to draw conclusions regarding the likelihood of competition between muskoxen and caribou of the Porcupine Herd.	The project reviewed existing literature about muskoxen and caribou and concluded the likelihood of competition between muskoxen and Porcupine caribou, for either space or food, is small. Results and conclusions were contained in a report prepared by Yukon Renewable Resources in 1989.
Habitat use and aircraft disturbance studies of Snow Geese	1989	1990	Canadian Wildlife Service	Hawkings, J.; Hughes, N.	To determine habitat use by Snow Geese in the northern Yukon and to summarize it using the North Slope vegetation map, and to assess the impact of aircraft disturbance on the birds.	Hundreds of thousands of Snow Geese that next on Banks Island use the Yukon North Slope to gain fat and condition before migrating south in the fall. Ground observations and aerial surveys were conducted in 1986 with non-IFA funding. In 1989-90, the information was compiled in a report and incorporated into the Geographic Information System associated with the vegetation map of the Yukon North Slope.
Spring use of waterfowl in the western Mackenzie Delta and North Slope	1989	1990	Yukon Government	Mossop, D.	To quantify the value of this resource to the people of the North Slope area.	This was an expansion of a Northwest Territories project already underway in the eastern Delta under the leadership of R. Bromley. The use of waterfowl as a food in the spring was an important unknown in designing management decisions on overall harvest and, in particular, on management of a potential hunt under the Migratory Bird Spring Hunt protocol. The value of the resource was to be quantified and its effect on waterfowl population dynamics determined. Sex, species, and age data were collected from field encounters with hunters. As an additional benefit from the study, body tissue samples were collected for pesticide analysis.

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Wolverine and arctic fox carcass collection study	1989	1990	Yukon Government	Slough, B.	To improve knowledge about the effect of harvest on wolverine and arctic fox populations.	The effect of harvest on both wolverine and arctic fox populations in the northern Yukon was largely unknown, since the pelts go to market through the Northwest Territories, not the Yukon. Studying carcasses provides information about sex and age ratios, which gives an indication of the status of the population. Other information that can be gleaned from carcasses includes pregnancy rates, litter size, stomach contents, genetic identity, and radio-cesium levels. Carcasses were collected from the Inuvialuit Settlement Region in the Yukon for at least one winter and the researcher went to Inuvik to necropsy them. No formal report was prepared; information was incorporated into North Slope management planning.
Grizzly bear habitat classification	1989	1990	Yukon Government		To delineate habitat according to its suitability for grizzly bears.	Habitat association of grizzly bears in the Barn Mountains was analyzed from bear relocation data collected in a previous Canadian Wildlife Service study and from a North Slope vegetation map. The purpose was to delineate habitat according to its suitability for grizzly bears in order to incorporate bear habitat management in the land use planning process.
Continuation of wildlife habitat mapping in the northern Richardson Mountains	1992	1995	Yukon Government	Loewen, V.; Staniforth, J.	To produce a vegetation/landcover map of the Richardson Mountains to be used as a base map for outlining the distribution of important wildlife habitats.	Satellite imagery and digital analysis were used to develop classifications of vegetation communities. The classification was ground-truthed to see what is on the land in the area of study and to determine whether it matched the computer classification. Information on wildlife in the area was gathered and a process to relate wildlife distribution to the landcover classes was developed on a Geographic Information System (GIS). The result is a computerized map of landcover and wildlife habitat in the northern Richardson Mountains.

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Initial populations of breeding migratory birds	1992	1994	Canadian Wildlife Service	Hawkings, J.; Loewen, V.	To establish habitat use by breeding birds on the Yukon North Slope	Using the North Slope vegetation map and ground counts of breeding birds at several locations across the North Slope, the researchers assessed the relationships between birds and their habitat. Field seasons were conducted in 1992 and 1993. Data was analyzed at CWS in Whitehorse and incorporated into a GIS system for interactive use with the vegetation map. A report was also produced.
Range quality and body condition studies of the Porcupine Caribou Herd	1992	1994	Canadian Wildlife Service	Russell, D.	To determine methods to monitor range condition; to see how changes in range quality affect body condition; and to see how body condition affects productivity.	The Porcupine Caribou Herd has been identified as the most important wildlife species by the people of Aklavik. Monitoring and managing threats to the well-being of the herd require good scientific knowledge of the herd, its habitat and the factors that affect its productivity. This part of ongoing studies of the herd focused on the importance of summer range. Females with and without calves were captured, weighed, and assessed for fat in late June and late September. Calf growth was also determined. The results of the two-year study have been reported in a number of papers.
North Slope wolverine study	1993	1994	Yukon Government		To estimate wolverine population size in hunted and unhunted areas of the North Slope and compare population to reported harvest levels.	The researchers' approach was to radio-collar wolverines in the North Richardson Mountains to estimate population size and density, seasonal movements, how many are born and die each year. Thirteen animals were collared in April 1993. The first survey, in 1992-93, could not be completed due to weather conditions, but the collared animals were relocated on an ongoing basis. A planned census in 1994 was cut short by poor weather. However, information retrieved on distribution and home range size provided an indication of density.

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Muskoxen population survey, composition count, and management plan	1993	ongoing	Parks Canada Yukon Government	Raillard, M.; Cooley, D.	To estimate the number of muskoxen and number of calves, in anticipation of establishing a harvest quota for muskoxen.	A population survey and a composition count were conducted in March 1995. The survey found 146 muskoxen from the Yukon/Alaska border to the Blow Rivers. The composition count found 28 yearlings per 100 cows and 79 bulls per 100 cows. The animals were quite dispersed during the flights. A total of 14 groups of muskoxen were found. Some of the groups were further south and higher in elevation than those found in the 1993 survey conducted by Yukon Renewable Resources. Stormy weather during the week before the survey may have forced the animals into the mountains. This became two projects in 1995-96.
Survey of grizzly bear habitat in Ivvavik National Park (key habitats of the Firth River Valley)	1993	1996	Parks Canada	Smith, B.; Sahanatien, V.; MacHutchon, G.	To obtain sufficient information on grizzly bear habitat, seasonal habitat use, and movements to effectively manage human activities in order to minimize impact on bears.	The geographic focus of the research was the Firth River Valley where the majority of visitor activities occur in Ivvavik National Park. Eight grizzly bears were fitted with radio-tracking collars. Throughout June, July, and August of 1993, 1994, and 1995, each bear was relocated periodically. At each location, vegetation plots were completed. During 1994 and 1995, focal observations of 24-hour periods were completed for each bear. During these periods, the bear's behaviour, food selection, and habitat use were recorded for the entire period. Scat and plant collections were completed during both years. During 1993, 24 vegetated habitat units and 5 non-vegetated habitat units were defined and mapped at 1:20,000 within the Firth River Valley. During 1994 and 1995, the habitat units were field-checked and transferred from aerial photographs to digital format. A number of publications resulted from this study, including a final report completed in 1996.
Richardson Mountains grizzly bear reproductive rates	1993	2000	Government of NWT	Nagy, J.; Branigan, M.; Cooley, D.	To monitor assess the reproductive rates and cub survival of grizzlies in the Richardson Mountains.	This six-year study of grizzly bears in the Richardson Mountains was concluded in 2000. Researchers monitored 15 radio-collared adult female grizzly bears over a 6-year period to assess reproductive rates and cub survival. This work was conducted each year in the spring.

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Porcupine Caribou Herd telemetry and composition count	1995	ongoing	Yukon Government	Cooley, D.	To monitor the size and status of the Porcupine Caribou Herd.	This was an early stage in a series of ongoing programs to monitor the status and size of the herd and to learn more about the ecology of the Porcupine Caribou.
Muskox Habitat Report	1995	1996	Yukon Government	Cooley, D.; Dehn, M.	To produce a report on multi-year muskoxen study	A final report on muskox distribution, abundance, and key habitat locations was produced, pulling together information collected through several years of IFA-funded research. The report is on file in the WMAC(NS) office.
Harvest data collection	1995	ongoing	Yukon Government		To monitor the nature and level of harvests by Inuvialuit on the Yukon North Slope.	Harvest data has been collected from communities that use the Yukon North Slope under a number of program names over the years: Inuvialuit Harvest Study, Yukon North Slope Harvest Information and, most recently, Aklavik Harvest Data Collection. Reports on the results are in the WMAC(NS) library.
Porcupine Caribou conventional (radio) collaring	1995	ongoing	Yukon Government	Cooley, D.	To maintain between 80 and 100 conventional radio collars on the herd to assist with the location of the herd during the composition counts and censuses.	The radio-collar program has been going on since 1995. Each year, radio collared caribou die of natural causes. More collars need to be placed on caribou each year in order to maintain the number of collars on the herd. In March 2002, eighteen new collars were put on animals in the herd. In March 2003, 63 radio-collared caribou were located. The herd was spread out from the Hart River to the Bell River. A total of 21 new conventional collars were deployed on ten bulls, two adult cows and nine 9-month-old females. These young females were captured because the program is starting to monitor the survival of young females to see if a reduction in survival may be contributing to the herd decline. Cooperating agencies purchase radio collars and the Yukon Government is responsible for putting them on the caribou.
Aklavik Hunters and Trappers Committee trip to Kaktovik	1996	1996	Aklavik Hunters and Trappers Committee		To allow Aklavik hunters to learn more about how people live with muskoxen and caribou.	Four Aklavik hunters traveled to Kaktovik in March 1996. The Aklavik HTC saw this as an opportunity to learn more about muskoxen and caribou living together, as well as a chance to start a dialogue between the two communities. Meeting minutes are on file.

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Ecosystem database development: bryophyte identification, labeling and cataloguing	1996	1997	Yukon Government	Loewen, V.	To identify, label, and catalogue bryophyte (moss) specimens collected during the field work for the Northern Richardson Mountains vegetation mapping project.	About 1000 specimens of vascular plants, lichens, and mosses (bryophytes) were collected in the Northern Richardson Mountains during 1992 and 1993. Vascular plant and lichen specimens were identified free of charge by the National Museum of Canada. However, the bryophyte taxonomists were laid off in 1993 and now private consultants must be hired to identify specimens. Funds were provided to identify about 150 specimens, and to label and catalogue them. Mosses are an important part of many northern ecosystems, including the North Slope, and the data recorded through this project provide basic knowledge of the area's biological resources.
Ecosystem database development: insects of the Yukon	1996	1997	Biological Survey Foundation	Danks, H.	To contribute to the publication of the book, Insects of the Yukon.	Insects of the Yukon is a comprehensive guide to Yukon insects, including those found on the Yukon North Slope. The book is a significant contribution to the knowledge of ecological systems on the Yukon North Slope.
Ecosystem monitoring: Firth River Water Survey Station equipment purchase	1996	1998	Parks Canada	Sahanatien, V.	To purchase new equipment for the station.	As part of its ecosystem monitoring efforts, Parks Canada expressed an interest in reactivating the water monitoring station on the Firth River, operated by Water Survey of Canada from 1980 to 1995. Aklavik Inuvialuit were interested in monitoring what appeared to be reduced flows in some locations on the North Slope. The Arctic Borderlands Co-op also recognized that maintaining this water station is important for ecosystem monitoring. Therefore, funding was recommended to purchase and install the required equipment. Water Survey assisted with training, maintenance, and data storage and management.

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Ecosystem monitoring: GOES transmitter for remote weather station	1996	1997	Parks Canada	Sahanatien, V.	To purchase new equipment for the station.	In 1995, Parks Canada installed two remote weather stations in Ivvavik National Park for monitoring climate conditions. The stations were located at Sheep Creek and Lloyd Creek. Sheep Creek was equipped with a GOES transmitter that transmits the weather information in real time each hour to the Arctic Weather Centre in Edmonton. This project installed a similar transmitter at the Lloyd Creek station. The weather stations are critical to the long-term ecological monitoring work of Parks Canada and to the public safety program for Ivvavik National Park. Data from these two stations complements that collected along the Beaufort coast at Komakuk, Herschel, and Shingle Point.
North Slope wolf video	1996	1997	Yukon Government		To enable information about the North Slope wolf study to be distributed to a wider audience in the communities.	This video summarizes results of the North Slope wolf studies conducted from 1987 to 1995. It was aimed at a general audience, for use in the communities associated with the Yukon North Slope.
Finalization of land cover classes for use with Wildlife Key Habitats in the northern Richardson Mountains	1996	1997	Yukon Government	Loewen, V.; Staniforth, J.	To use satellite imagery, digital, and statistical analysis to produce a final landcover map of the Richardson Mountains.	The landcover map of the Richardson Mountains was an integral part of a broader effort to complete a digital landcover map of the ISR, providing baseline data for wildlife management. This project is the final stage in work that started in 1992 and 1993 with intensive studies of vegetation, soil, and site data. Digital analysis of remotely sensed data along with statistical analysis of vegetation communities were used to produce a supervised landcover map. Truthing of this map for accuracy of cover classes occurred in 1994. Further digital analysis work occurred in 1995 to improve the landcover classification.
GIS database	1996	1997	Yukon Government	Loewen, V.	To improve the North Yukon Wildlife and Habitat GIS Database.	The project included new software, new design, and training sessions for users and administrators - all with the purpose of making the databases more powerful and useful.

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Muskox fact-finding trip to Paulatuk	1996	1996	Yukon GovernmentWMAC(NS)	Cooley, D.	To train Aklavik hunters in techniques for hunting muskoxen.	This training project was part of a broader muskox management plan developed for the emerging muskoxen population on the Yukon North Slope. The plan includes a hunting quota for Aklavik Inuvialuit. Paulatuk has a history of hunting muskoxen, so a number of Aklavik hunters traveled to the community to learn muskox hunting techniques.
Yukon North Slope Long-term Research Planning	1997	1999	WMAC(NS)		To develop a long-term research plan for the Yukon North Slope.	The need to develop a long-term research plan was identified in the Yukon North Slope Wildlife Conservation and Management Plan and is considered an important tool for directing future studies in the region. Plan development began in 1997 and was completed in 1999. The process of development included two workshops that brought together interested parties to discuss and identify future research priorities and initiatives for the region. The updated plan is available online at www.taiga.net/wmac/researchplan.
Wolf head submissions and sample analyses	1997	1998	Yukon Government	Cooley, D.	To establish the relationships between North Slope wolves through DNA sampling.	Previous studies of Yukon North Slope wolves indicate that wolves north of treeline are migratory and follow the caribou. These large movements and dispersals are important to wolf ecology and genetics. Wolf heads were purchased from trappers in Aklavik. These submissions furnished samples for DNA sequencing to provide insight into how wolves are related to each other. The heads were also sampled for trichinosis and rabies.
Muskox school unit	1997	1998	Yukon Government	Cooley, D.	Part of the Yukon North Slope Muskox Management Plan.	The then-draft Yukon North Slope Muskox Management Plan called for a school unit to be developed so that students could learn more about muskoxen. The school unit was developed for all grades by Sandra Elanik, a teacher in the Aklavik school. The school unit provides information on muskox biology, habitat, history, distribution, and behaviour.

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Porcupine Caribou "Adopt-a-Collar" program	1997	2001	Yukon Government	Cooley, D.	To contribute support to an ongoing Yukon Government project to replace collars and retrieve data.	The Porcupine Caribou Herd's total home range covers great distances across Alaska, Yukon, and the Northwest Territories. Documenting seasonal range use and migration patterns of the herd using conventional radio telemetry is expensive. The Yukon Government proposed the purchase of 10 satellite collars as a more convenient and practical means of tracking the movements of the herd on an ongoing basis. Five agencies and co-management bodies, including WMAC(NS), contributed to this program.
Northern Richardson Mountains Dall's sheep census	1997	1997	Government of NWT	Nagy, J.	To determine the distribution of rams during the time when non-subsistence hunting may eventually occur, in order to determine the allowable number and distribution of permits.	The survey took place in August 1997. The previous survey was done in 1991; the interval is supposed to be 5 years, but the 1996 attempt failed due to weather. Sheep were counted and classified by sex and age class as follows: nursery sheep (ewes, yearlings, 2-year-old rams), lambs, and rams (half, three-quarter, full curl). A total of 1303 sheep were counted and classified in 9 of the 12 survey blocks. In 1991, 1008 sheep were counted in the same area. If the unsurveyed blocks remained constant, and allowing for a 10% error, the 1997 population was approximately 1730 sheep. The observed overall productivity of 31 lambs/100 nursery sheep indicates a stable to increasing population. The sex ratio of 35 rams/100 nursery sheep is typical of a population where there is heavy trophy hunting. Full curl rams make up 9.7% of the population but 45.8% of the 3+ year-old-rams. This is consistent with previous results.

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Porcupine Caribou satellite collaring program	1997	ongoing	Yukon Government	Cooley, D.	To use satellite radio-collars on Porcupine Caribou to document the seasonal range use and migration patterns of the herd.	This is a cooperative project between a number of wildlife agencies and Boards. The herd's total home range is approximately 260,000 km2, between Kaktovik (Alaska), Aklavik (NWT), and Dawson City (Yukon). Most of this very large area is used quite often by the herd; however, use of specific areas (other than during calving) is not always predictable. At the start of this project, 10 cow caribou were captured in October and November of 1997. Over time, researchers have tried to maintain a minimum of 7 satellite collared cow caribou, adding and replacing collars as caribou died, or collars went off the air. Information and results are available online at www.taiga.net/satellite.
Status of traditional knowledge on the Yukon North Slope (database)	1998	1998	WMAC(NS)	Walker, V.	To compile a database of existing sources of traditional knowledge about wildlife and the environment on the Yukon North Slope.	The 91-entry database was completed in the spring of 1998 and installed on the WMAC(NS) website at http://yukon.taiga.net/northslope. A print report is also on file at the WMAC(NS) office.
Herschel Island vegetation mapping	1998	ongoing	Yukon Government		To identify what type of terrain different animals use at different times of the year.	In the summer of 1998, Yukon Government biologists went to Herschel Island Territorial Park and trained Park Rangers to use soil and vegetation maps. By using these techniques, vegetation types can be matched up with animal locations to show which type of habitat and terrain animals, such as muskox, prefer at different seasons of the year. Twenty-four wildlife observations were recorded over the summer. The next step was to develop a database of observations to be kept and updated in the Park’s office.

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Herschel Island vegetation studies	1998	ongoing	Yukon Government		To gain a better understanding of habitat use and ecology, and to obtain information on the use of habitat types by the animals on the island.	In 1998, researchers involved in vegetation mapping noticed that the vegetation had changed since initial terrain mapping 12 years earlier. Then, much of the island had been covered by low-growing tussock vegetation, willow, dryas, lichens and vetches. In 1998 researchers found much more grassy vegetation. Other changes, including high water levels and early-flowering plants, appeared point to global warming effects. As a consequence of these observations, long-term monitoring of several biophysical components of the Herschel Island ecosystem was initiated. Ongoing studies include the re-surveying of vegetation species and soil activities that have shown dramatic change over the past years. Permanent vegetation plots, measured every five years, will show any change in the types of plants growing. Annual growth monitoring shows how different years and weather affect plant growth. Park Rangers are recording vegetation and terrain changes in their usual wildlife observations.
Ground-based count of muskox and moose	1998	1998	WMAC(NS)	Gordon, D. C.	To learn more about muskox population and behaviour, and about ground-based monitoring.	This project was conducted through a 12-day snowmobile trip across the Yukon North Slope, in March 1998, led by Danny C. Gordon, a resident of Aklavik. The primary focus was to learn more about the muskox population and behaviour, as well as to assess the accuracy and usefulness of the method as a tool for wildlife monitoring. Other species sighted were also recorded and snow sampling was conducted at designated sites. The trip provided a number of insights into environmental conditions on the North Slope in late winter and was a considered an important contribution to the involvement of the community in ecological monitoring. The Council also provided funding to the Inuvialuit Communications Society to videotape the trip. A report prepared by Danny C. Gordon is online at www.taiga.net/wmac/survey98.

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Muskox population survey and composition count	1998	1999	Yukon Government		To address Aklavik HTC's priority for more research on muskoxen.	The first formal count of muskoxen on the Yukon North Slope was done in 1993, when a 157 animals were reported. In 1995, 146 muskoxen were counted. An incomplete count of 121 animals was recorded in 1996. In April 1998, the survey counted 94 muskoxen. Information was also obtained on the age and sex of the animals counted in each survey. The fluctuating numbers might reflect migration by the animals back and forth across the Alaskan border or the difficulty of finding and counting brown animals against a brown background. Plans were made to monitor muskoxen numbers over the ensuing three years in association with muskox exology studies.
Yukon North Slope satellite images and poster production	1998	2000	WMAC(NS)		To provide an educational and research tool illustrating the regional, national and international significance of the Yukon North Slope.	WMAC(NS) purchased two Landsat images of the Yukon North Slope. The images can be used as reference material by managers, researchers, and educators for any purpose that requires an aerial view of the region. The images can also be used for mapping purposes, including landcover mapping, and can be integrated with other digital geographic data in a geographic information system. The satellite imagery was used as a central feature in a poster of the Yukon North Slope. The poster is a combination map and source of general information about the landscape and wildlife of the area.
Yukon North Slope land use and wildlife atlas	1998	2000	WMAC(NS)		To provide resource management agencies, co-management and environmental assessment bodies, and Inuvialuit organizations with a decision-support tool, as well as to provide a general reference	This atlas is a compilation of all available mapped information about the Yukon North Slope, including GIS and resource maps, satellite images, wildlife habitat and distribution maps, and topographical maps of the Yukon North Slope and surrounding regions of the ISR.

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Muskox meeting, Anchorage	1999	2000	Yukon Government Parks Canada		To develop co-ordinated management planning for muskoxen on the North Slope.	Meetings were held in Anchorage in December 1999 and 2000 to discuss the management of muskoxen on the North Slope. The meetings were important steps in co-ordinating efforts around North Slope muskox management, such as sharing harvest information, integrating survey methodology, and working together on co-management plans that would be useful for both jurisdictions.
Community-based monitoring program	1999	ongoing	Arctic Borderlands Ecological Knowledge Co-operativeCanadian Wildlife Service	Eamer, J.	To record, annually, local community experts' observations of ecological conditions on the Yukon North Slope.	Community researchers in Aklavik, Fort McPherson, and Old Crow are contracted to conduct interviews with local experts and record their observations on ecological conditions over the preceding year. This includes observations about caribou movements and condition, fish, berries, weather, and general observations about changes in the health of the environment. The community researchers used a standardized questionnaire. Training and development sessions are held to refine the questionnaire and develop good interview and reporting techniques. Community experts who are interviewed receive an honorarium. Results from the community-based monitoring program are available from Arctic Borderlands Co-op. Some results are compiled and available on the Co-op's website at www.taiga.net/coop.

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Muskox ecology studies	1999	2005	Yukon Government Parks Canada	Cooley, D.	To increase knowledge of North Slope muskox populations and behaviour.	Yukon muskox were studied and monitored through aerial surveys, composition counts, satellite tracking, samples from captured muskox and community observations. The satellite tracking program was begun in 1999 in order to learn more about where the muskox live at different times of the year and how much they move around. The satellite collars are also used to help locate groups of muskox for population counts. For several years biologists completed aerial surveys of the muskox in the spring and summer to collect information on the size of the muskox population, the numbers of males and females, how many calves are born each year and how many live to be a year old. All of the information from this study helps biologists make decisions about managing the muskox and assists in determining a sustainable harvest quota.
Analysis of change in North Slope wetlands	2000	2000	Canadian Wildlife Service	Hawkings, J.	To determine if the extent of water cover in the North Slope wetlands has changed over the past decade, and establish a baseline for future monitoring.	The Yukon North Slope coastal wetlands provide important wildlife habitat. The wetlands are sensitive to changes in temperature, precipitation, and permafrost, and are expected to change with changing climate conditions. Analysis of satellite imagery was used to measure changes in the extent of water cover in wetland areas of the coastal plain. The amount of land that has dried up, the amount flooded, and the net change was calculated for grid sections and for the entire study area. This methodology was developed and used for an analysis of changes in water cover in the Old Crow Flats.

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Porcupine Caribou body condition monitoring	2000	2001	Yukon Government	Cooley, D.	To monitor the general health of Porcupine Caribou, using hunter-submitted samples.	Hunters from participating communities (Aklavik, Old Crow, Fort McPherson and Dawson) are asked to take measurements of any cow that they harvest in the fall. Hunters record the date and location where they got the caribou, whether or not the cow was producing milk, whether or not the cow had a calf at heel, weight of the front shoulder to estimate the total body weight, and depth of back fat. Hunters are requested to submit three samples - a tooth (to determine the caribou's age), the lower back legbone (to measure the fat content of the marrow), and the left kidney (to compare the kidney fat weight to the kidney and for contaminant analysis). For their time and effort, hunters are paid for each caribou sampled.
North Richardson Mountains moose survey	2000	2000	Yukon Government	Ward, R.	To assess moose population numbers on the Yukon North Slope.	Because the moose in the northern Yukon were last surveyed in 1989, there was an interest among biologists and hunters in reassessing the population. The survey was flown in March 2000 in the northern Richardson Mountains and adjacent Yukon coastal plain. A biologist from the Yukon Government was accompanied by an observer from Aklavik and a Parks Canada representative from Inuvik. The moose population in the survey area was found to have increased by 67 percent over 1989. Results of the survey are on file in the WMAC(NS) office.
Herschel Island - Qikiqtaruk permafrost monitoring (climate change impact monitoring)	2000	ongoing	Carleton University	Burn, C. R.	To establish a site for monitoring near-surface ground temperatures and to examine the ground ice in various terrain types on the island.	This research was initiated in 2000 with installation of a thermistor cable to measure ground temperatures to depths of 15 m, and collection of various samples of ground ice to investigate the geochemistry of near-surface sediments. Results of this work found that the effect of early-Holocene (8,000 yrs BP) warming on active-layer development was less at Herschel than in the Mackenzie delta area.

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Grizzly bear research and monitoring workshop, Inuvik	2000	2000	Government of NWT		To discuss research and monitoring of grizzly bears in the ISR.	WMAC(NS) participated in a Grizzly Bear Research and Management Workshop held in Inuvik in March 2000. The objectives of the workshop included reviewing the status of grizzly bear population information and discussing and evaluating methods of estimating populations.
Experimental infections of Dall's sheep with muskox lungworm	2001	2003	University of Saskatchewan		To determine if the parasitic muskox lungworm (Umingmakstrongylus pallikuukensis) can infect thin horn sheep (Dall's and Stone's subspecies) and, if so, what its effects are.	This University of Saskatchewan project was initiated because biologists had concerns about the possibility of this parasite, found in muskox populations east of the Mackenzie River, infecting Dall's sheep. It is important to have this information as the muskox are expanding their range and could come in contact with the sheep in the Richardson Mountains. The experiment determined that the parasite is not able to infect the sheep.
Breeding bird distribution and habitat association on the Yukon North Slope	2001	2003	Canadian Wildlife Service		To convert Yukon North Slope breeding bird data into a spatially accurate database and GIS files.	Understanding breeding birds' distribution and habitat preferences is important in conservation management. In 1992 and 1993 the Canadian Wildlife Service, Yukon Government, and WMAC(NS) undertook an extensive field survey of breeding birds at four locations: Running River, Babbage River, Firth River, and Clarence Lagoon. The result of this work was a large database (10,000+ records) of bird observations, with each observation referenced using GPS coordinates. Data analysis proceeded to an advanced stage during 1993/94, but funding ran out before it was complete. Little work has been done on this data since. The resurgence of hydrocarbon industry interest in the Beaufort Sea and Mackenzie Delta has led to a lot of inquiries about this data and there is a need to complete and update the information in order to make it available to all interested parties, including industry consultants.

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Porcupine Caribou Herd calving surveys	2001	2001	Alaska Department of Fish and Game Yukon Government	Cooley, D.	To get more information about the size of the Porcupine caribou herd, the number of calves that were born and where they were being born.	The calving surveys were conducted in the summer of 2001. Fieldwork was conducted out of Kaktovik, Alaska. Researchers began by locating the radio-collared cows to find out if they already had a calf. If they were pregnant, they were relocated until they gave birth, and then again 1 or 2 days after the calf was born. Half or more of the calf deaths occur in the first 2 days, so it is important to see how many survive this time period. At the end of June, all radio-collared cows were again located to record how many calves survived.
Porcupine Caribou Herd photocensus	2001	2001	Alaska Department of Fish and Game U.S. Fish and Wildlife Service Yukon Government		To estimate the total number of animals in the Porcupine Caribou Herd.	This work was done early in the summer of 2001. When the insects come out in early July, caribou form very large groups, sometimes of many thousands of animals. This makes them easier to count. Using radio collars, a fixed wing aircraft flying very high locates the large groups of caribou. One of the planes flies over the group, taking photographs at regular intervals. Smaller groups are either counted or photographed from the other search planes. The census photos were taken July 3, 2001. The caribou were not grouped up as tightly as usual, so there was a need for more photos to be taken. A total of 414 photos were taken. The results of the studies showed that the herd size was approximately 123,000. This number included over 18,000 calves. A photocensus on the herd is scheduled every 2 to 3 years.

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Firth River water flow monitoring	2001	ongoing	Parks Canada		To determine current water cycles and to identify long-term changes to these cycles.	Changes in the amount of water flowing in Arctic rivers, and the timing of peak and low water levels, may be affected by climate change. Local observations from Aklavik hunters repeatedly note the historic decline in water flows and water quantity on the Yukon North Slope. A station to measure water flow is located on the Firth River and is maintained annually by a Water Survey Canada technician. Information about water flow is valuable for understanding how Arctic ecosystems function. River flow information is also useful to people who are planning to canoe, raft, kayak or cross the Firth River. Data is available on water flow on the Firth River from 1972 to 1994 and since 1997.
Firth River water quality monitoring	2001	ongoing	Parks Canada		To determine current water quality conditions in the Firth River in Ivvavik National Park and to monitor changes over time.	Contaminants from sources in the south have been found in arctic ecosystems. These contaminants travel through the atmosphere and are deposited in the arctic where cold temperatures keep them from traveling any further. The presence of contaminants such as persistent organic pollutants (POPs), heavy metals and radionuclide are a concern because they can have a negative effect on the arctic ecosystems and human health. Three sets of water samples are taken from the Firth River over the summer. Water temperature, conductivity and pH are also measured. Water quality samples are analyzed for physical components, nutrients, major cations, trace metals and organics. Data is available for Ivvavik since 2000. Analysis of the data so far shows that the water quality in the Firth River is excellent.

Project Name	Start	End	Lead Agency(ies)	Investigator(s)	Goal	Description
Ivvavik National Park vegetation and terrain survey	2001	2001	Parks Canada Yukon Government	McDonald, I.; Kennedy, C.; Smith, S.	To collect data on vegetation and terrain, and to look for significant changes over time.	This project had two objectives. The first was to collect data on vegetation and terrain attributes throughout the coastal plain of Ivvavik National Park, to compare with data collected in 1988 and 1989. The second was to analyze the data collected to see if there were significant changes in vegetation and terrain on the coastal plain over the intervening 12- to 13-year period. Global warming has been changing the environment, and scientists conducting environmental monitoring on Herschel Island had found a profound change in the vegetation cover and permafrost activity on the island over a 15-year period. This project attempted to determine if the changes in vegetation and terrain occurring on Herschel Island were also occurring on the coastal plain of Ivvavik National Park. In the summer of 2001, data was collected on vegetation and terrain throughout the coastal plain of Ivvavik National Park. Analysis showed that changes in the abundance and diversity of particular vegetation communities.
Ivvavik National Park weather and permafrost monitoring	2001	ongoing	Parks Canada		To track changes in climate and to understand how these changes will affect the environment of the Western Arctic.	In the past 100 years the average temperature of the earth has increased. However, the amount of increase has varied in different parts of the world. The Western Arctic is one of the most strongly affected regions, with the highest degree of warming showing in winter temperatures. Most projections of future temperature change show this pattern continuing and accelerating in the next few decades. The temperature increase is likely caused by human activities, especially the burning of fossil fuels and deforestation. A weather station has been established in Ivvavik National Park to record precipitation, wind speed and direction, air temperature, incoming short wave radiation, relative humidity, dew point, snowfall and snow depth as well as barometric and vapour pressure. Permafrost probes measure soil temperature at various depths. Measurements are recorded on data loggers and are transmitted by satellite.

Project Name	Start	End	Lead Agency(ies)	Investigator(s)	Goal	Description
Ivvavik National Park sheep surveys	2001	2002	Parks Canada Yukon Government	McDonald, I; Carey, J.	To determine the size, distribution, critical habitat and population structure of Dall's sheep in Ivvavik National Park.	The project involved two aerial surveys. The study area included the western portion of the British Mountains in Ivvavik National Park, between the Malcolm and Firth rivers, and the east side of the Firth River valley. A helicopter was used to search all potential sheep habitat within the study area. Animals sighted were counted, identified by age and sex, and their location mapped using GPS. The survey in the summer of 2001 located 85 sheep and identified lambing cliffs. The second survey was completed in March 2002 to determine winter ranges. A resident of Aklavik accompanied biologists on both surveys. This study will also help to identify the research that may need to be done in future years and develop a long-term monitoring strategy.
Muskox management workshop in Aklavik	2001	2001	WMAC(NS)		To contribute to development of a muskox management plan for the Yukon North Slope.	WMAC(NS) hosted a workshop for three days in Aklavik in October 2001. The workshop brought together community, co-management board and government representatives to exchange scientific and traditional knowledge about muskox behaviour, biology, distribution and population size.

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Reproductive ecology of Tundra Swans in the Mackenzie Delta region	2001	2003	University of Northern British Columbia	Swystun, H.	To monitor environmental change and effects of development in the Mackenzie Delta, using tundra swans as an indicator species for other birds and waterfowl.	The study, conducted by a graduate student of the University of Northern British Columbia, examined tundra swan nesting biology and how they use their habitat. Nesting sites were monitored over three years to see how they were affected by environmental change and development in the Mackenzie Delta. Forty-six plots were established where swans, swan nests, and young productivity were counted each year so that changes could be tracked. Plots were located where development is proposed and where development will likely not occur. Also 31 interviews were completed with local elders and hunters from Inuvik, Tuktoyaktuk, Aklavik, Tsiigehtchic, and Fort McPherson to learn about tundra swan biology through local people. Aerial surveys were conducted in the summers of 2001 and 2002. The project also provided a summary of six years of population estimates for tundra swans before any major impacts of development occurred, as well as descriptions of other species found in the study area.
Herschel Island - Qikiqtaruk Territorial Park raptor and fox survey	2003	2003	Yukon Government		To document the abundance and distribution of raptors and foxes on Herschel Island – Qikiqtaruk.	A previous aerial survey of the island, in July 1999, identified 5 peregrine falcons (1 nest), 39 rough-legged hawks (15 nests), and 101 snowy owls (3 nests). The density of snowy owls is among the highest densities of owls recorded. This survey, conducted in July 2003, counted more birds than in 1999, except for snowy owls. Biologists were particularly interested in learning more about rough-legged hawks and peregrine falcons, as well as arctic and red foxes. The results of the survey will be used to set up an ongoing ground-based monitoring project. Every year, as part of an ongoing program, Park Rangers will visit the sites within walking distance of Pauline Cove to monitor nests and dens. They will record information such as the number of eggs and chicks at each nest site, and the number of dens occupied by the foxes.

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Yukon North Slope grizzly bear research project	2004	ongoing	Yukon Government		To learn more about the grizzly bear population of the Yukon North Slope.	In May 2004, the Yukon Government, in partnership with Parks Canada and the Aklavik Hunters and Trappers Committee, began a six-year grizzly bear research project on the Yukon North Slope. The focus of the project is on grizzly bears between the Firth and the Blow rivers. The research is designed to learn about grizzly bear population size, birth rate, death rate, where bears can be found at different times of the year, and how much they move around. It will also include a review of hunter harvest activity. It is important for wildlife managers, boards, and community organizations to have this information when they are reviewing the conservation requirements of this population and harvest quotas.
Yukon North Slope vegetation change measurements	2005	2005	Yukon Government Parks Canada	Kennedy, C.	To assess changes in vegetation on the coastal plain of Ivvavik National Park.	In 2005, 16 sites in Ivvavik National Park that were sampled in 1988, 1989, and 2001 were re-visited. Site descriptions included depth to permafrost, elevation, aspect, slope, percent of bare soil, site position and soil moisture. Plant species composition and species percent cover were recorded at each site, and specimens of plants were collected for identification when required. Data was to be analyzed and compared to data collected in previous years.
2005 Yukon North Slope raptor survey	2005	2005	Parks Canada Yukon Government		To monitor the status of peregrine falcon populations in North America.	Parks Canada and the Yukon Government surveyed the Yukon North Slope in mid-July to document the number of peregrine falcons and other species of raptors breeding in the region. This survey formed part of the Canadian Peregrine Falcon Survey, conducted every 5 years. Breeding pairs of peregrines with chicks were found in about half of the known nesting areas in Ivvavik National Park. Golden eagle, gyrfalcon, and rough-legged hawks were also observed. The information for Ivvavik is combined with similar information collected in other parts of the Yukon North Slope to give an overall count for the area.

Project Name	Start	End	Lead Agency(ies)	Investigator(s)	Goal	Description
Rare plants and animals along the Beaufort Sea Coast	2005	2005	Yukon Government Parks Canada		To gather some baseline inventory information that is important for monitoring environmental change in the area.	For 3 weeks in late July and early August, the Yukon Government and Parks Canada traveled along the Yukon coast by boat to look for and collect rare plants, butterflies, birds, snails, and small mammals. Aklavik resident Danny C. Gordon provided local expertise. Although previously known from other areas of the Yukon, 25 species were recorded on the Yukon coast for the first time, including mosses, lichens, and aquatic plants. Arctic pennycress, a globally rare plant, was found at a few locations. Some plants reported in the past have disappeared from Kay Point, Nunaluk Spit, and Clarence Lagoon. Researchers found arctic marsh sedge, previously known from the Dempster Highway, and large areas of polar grass.
Breeding shorebird survey	2005	2005	Canadian Wildlife Service		To document the number and location of nests, and to estimate overall numbers of shorebirds and other tundra birds.	The survey was conducted in June, when birds are laying eggs and doing courtship flights. The area was divided into study plots. Nine shorebird species were counted nesting in these plots. Thirty-two other kinds of birds were counted. Researchers were impressed with the high diversity of birds. The survey was part of an Arctic-wide monitoring program, with surveys conducted every 10 years.