2013 Annual Report of

Wildlife Research In The NWT

Photo: GNWT/A. D'Hont, ENR

Northwest Territories Environment and Natural Resources

Photo: GNWT/J. Adamczewski, ENR

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Arctic Ocean
Beaufort Sea
Prince Patrick Island
McClure Strait
Melville Island
Aulavik
Banks Island
Sachs Harbour
Herschel Island
Tuktoyaktuk
Aklavik
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Fort McPherson
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Great Bear Lake
North Slave
Gamèti
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Whati
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Ndilo
Detah
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Wrigley
Dehcho
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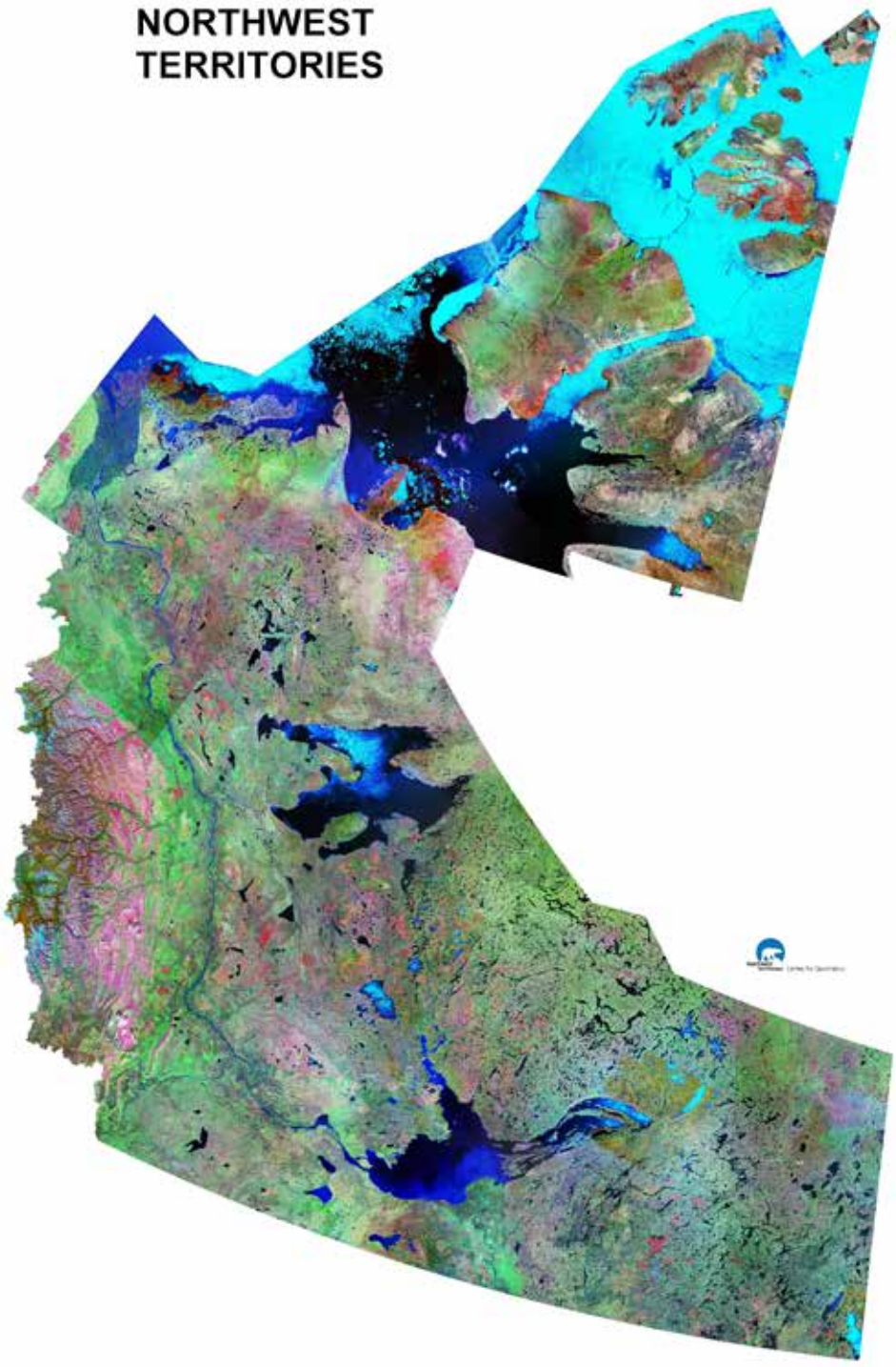
NORTHWEST
TERRITORIES

2013 Annual Report of Wildlife Research in the NWT

INTRODUCTION

Under section 24 of the *Wildlife Act* RSNWT 1988, a valid Wildlife Research Permit is required to study wildlife or wildlife habitat in the Northwest Territories (NWT). It is an offence to conduct a survey or census of wildlife or wildlife behaviour, administer drugs, collect or purchase specimens or carry out any scientific research relating to wildlife without a permit.

The Government of the Northwest Territories (GNWT) Department of Environment and Natural Resources (ENR) is responsible for issuing Wildlife Research Permits. Each year, researchers carry out studies on all types of wildlife and wildlife habitat throughout the NWT. As a requirement of an NWT Wildlife Research Permit, researchers must submit a summary report of their activities and findings to ENR.

Studies receiving funding from the Western NWT Biophysical Study also require a Wildlife Research Permit and report because they relate to wildlife and wildlife habitat research. The Western NWT Biophysical Study was established to help ensure baseline data necessary to assess, mitigate and monitor the environmental impacts of proposed developments in the Western NWT is available to industry, regulators, communities and government. The program focuses on areas within the mandate of the ENR: wildlife, wildlife habitat, forests, and air quality.

The Western NWT Biophysical Study provided $390,000 towards projects in 2013/2014. Partnerships with federal agencies, wildlife management boards, universities, non-government organizations and industry have been developed on a project-by-project basis. Most projects involve multiple partners.

This publication provides summary reports for both wildlife research and biophysical studies carried out during 2013. Contact information for the main investigator leading each project has been included if you wish to obtain more information on a specific project. For more information on wildlife research in the NWT, please go to www.enr.gov.nt.ca or contact your local ENR office.

DISCLAIMER

The contents of each summary are the sole responsibility of the team leads for each project and do not reflect any official policy of ENR or the GNWT.

Bat Monitoring in the Northwest Territories

April 2013 - March 2014

MAIN INVESTIGATOR:

Joanna Wilson, Wildlife Biologist (Species at Risk), Environment and Natural Resources, GNWT

WILDLIFE RESEARCH PERMIT NUMBER:

WL500121

LOCATION:

Bat monitoring took place in the spring, summer and fall at various locations in the South Slave, North Slave, Tłı̨chǫ, Dehcho and Sahtú regions. At least seven, and possibly eight, species of bats are found in the NWT: little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), long-eared myotis (*Myotis evotis*), long-legged myotis (*Myotis volans*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), and likely the eastern red bat (*Lasiurus borealis*).

PARTNERS:

- Environment and Natural Resources
- University of Calgary researchers
- Wildlife Conservation Society of Canada
- Deh Gáh Elementary and Secondary School
- MWH Environmental Consultants and Husky Oil
- Industry, Tourism and Investment (Territorial parks)
- Community residents

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RATIONALE:

Bats are an important component of northern ecosystems but are facing threats including white-nose syndrome, a fungal disease killing millions of hibernating bats in eastern North America. Two NWT species of bats are listed as Endangered in Canada because of this threat. Gathering baseline information on bats has become increasingly important. Basic monitoring is needed to document the presence, abundance, range distributions and population trends of bats in the NWT.

The goal of the project was to establish, and continue, remote monitoring of bat activity at a network of NWT sites and to provide information on bat presence/absence, species diversity and seasonal activity levels. If continued over time and in multiple locations, this monitoring will provide insight into population trends and movement patterns of bats in the NWT.

OBJECTIVES:

- To maintain and review performance of remote 'bat detector' monitoring stations already set up at Yellowknife, a South Slave hibernaculum, the Kakisa campground and near a possible hibernaculum in the Sahtú region; and
- To deploy additional bat detectors opportunistically in locations where further monitoring was suggested.

METHODS:

Bat echolocation detectors were used to monitor bats at various locations throughout the NWT. 'Bat detectors' are specialized devices with ultrasound-sensitive microphones that record the echolocation calls of bats. The monitoring is passive and does not affect the bats. Bat detectors were left in locations where bats may be flying (e.g. along trails or beside ponds) and recorded ultrasound from sunset to sunrise. They were visited occasionally to download data and replace batteries. In

some locations, we tested a setup using a solar panel and cold-resistant 12V battery to power the equipment year-round without having to switch the battery. Bat calls were identified by examining the ultrasound recordings using manual identification and filters. Bat calls were separated into two groups: high frequency (*Myotis* species) and low frequency (big brown bat, silver-haired bat and/or hoary bat). With further analysis of the recordings, some calls may be identifiable to the species level.

RESULTS AND MAIN CONCLUSIONS:

- Recordings from the detectors are being analyzed.
- Highlights of preliminary findings (may change as data are further analyzed):
- A new year-round monitoring station was established at Sambaa Deh Territorial Park. Preliminary results indicate a high level of summer bat activity. All recordings are high frequency (*Myotis* species). Monitoring continues at this site.
- A year-round monitoring station was continued at Grace Lake in Yellowknife. Preliminary results indicate some bat activity in late summer 2012 but none in spring 2013. All recordings are high frequency (*Myotis* species), however, hoary bat calls were recorded here in August 2011. Monitoring continues at this site.
- A year-round monitoring station was continued near the site of a possible hibernaculum in the Sahtú region. Preliminary results indicate no bat activity. However, the detector is not at the exact location of the suspected hibernaculum so the presence of a hibernaculum cannot be ruled out. Monitoring continues at this site.
- Monitoring was done from May - October, 2013 at Cheese Creek near Fort Resolution. Preliminary results indicate a high level of bat activity at this site, mainly high frequency (*Myotis* species) but also some low frequency (big brown bat, silver-haired bat and/or hoary bat).
- Monitoring was attempted at Willow Lake on the Horn Plateau in summer 2013 but the detector did not work.
- Monitoring was attempted on the East Arm of Great Slave Lake. Recordings have not been retrieved yet.
- A manuscript is being written about the South Slave hibernaculum, which will include data from 2011-2013 monitoring there.
- Monitoring was done at the Kakisa campground 2011-2013. Data are being analyzed.
- The 12V battery and solar panel setup, tested during 2013, is able to successfully operate the detectors year-round without the need for changing the battery, despite extreme cold and darkness in mid-winter. The equipment stops working in mid-winter but 'wakes up' again and resumes working in the spring.

LONG-TERM PLANS AND RECOMMENDATIONS:

- Test new protocols for the North American Bat Monitoring Program (acoustic monitoring and colony counts) and contribute data from the NWT to a continental pilot study.
- Complete analysis and reporting on data collected in 2011-2013 from acoustic bat detectors, including identification to species (where possible).
- Maintain remote bat detectors at Yellowknife, South Slave hibernaculum, Kakisa campground and Sambaa Deh Territorial Park. Monitor year-round to improve information on seasonal activity levels.
- Stop operating the detector near the Sahtú potential hibernaculum. Look for opportunities to visit the site and search for the hibernaculum.
- Deploy additional detectors opportunistically

Photo: GNWT/J. Wilson, ENR

Bat detector station.

in locations where further monitoring has been suggested to learn more about species distribution and occurrence (e.g. Norman Wells, Wrigley, Liard Valley, Horn Plateau).

- Investigate species which occur in Fort Resolution area by mist-netting there during the summer.
- Opportunistically investigate reports suggesting possible bat hibernacula and maternity colonies as a step towards identifying sites for long-term population monitoring.
- Develop a management plan for bat hibernation sites.

COMMUNITY INVOLVEMENT:

Updates on bat monitoring activities have been discussed at community meetings and workshops in the South Slave and Dehcho regions and Yellowknife from 2010 to 2013. Public education talks and programs on bats have been delivered in the South Slave region and Yellowknife. Local community members are encouraged to be involved in bat monitoring. Some bat detectors have been deployed with help from local residents, industry and youth. Local knowledge helps to determine where bat detectors should be placed.

Photo: GNWT/J. Wilson, ENR

Little brown myotis.

Inuvik–Tuktoyaktuk Highway Grizzly Bear Denning Survey

March 15, 2013 – May 1, 2013

MAIN INVESTIGATOR:

Erica Bonhomme M.Sc., Senior Consultant,
Stantec Consulting Ltd.

WILDLIFE RESEARCH PERMIT NUMBER:

WL005416

LOCATION:

Inuvik, NWT.

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RATIONALE:

The Department of Transportation (DOT) is planning to conduct a winter 2013 geotechnical investigations program in relation to the Inuvik to Tuktoyaktuk Highway project. In October 2012, Department of Environment and Natural Resources (ENR) biologists conducted an aerial grizzly bear denning survey in the vicinity of the proposed highway so appropriate setback distances (500 m) could be implemented around active dens during winter geotechnical program activities. However, not all areas proposed for geotechnical investigation were surveyed by ENR during the fall aerial surveys. Ground-based techniques using hand-held forward looking infrared technology (FLIR) and trained dogs are proposed for use at three sites to test the effectiveness of this technique in detecting active grizzly bear dens during winter conditions.

OBJECTIVES:

- To test the effectiveness of ground-based grizzly bear denning survey techniques using hand-held FLIR cameras and dogs trained to detect active grizzly bear dens in the Inuvialuit Settlement Region; and
- To determine if any active grizzly bear dens may be present at, or within 500 m of PW6, PW9 and PW12.

METHODS:

Pre-program

Prior to conducting denning surveys at PW6, PW9 and PW12, suitable denning habitat was mapped within each survey area as a means of focusing survey efforts. Habitat suitability was modelled using both slope and aspect determined by aerial imagery and light detection and ranging (LiDAR).

Grizzly bears tend to use denning habitat existing on slopes, which accumulate snow as insulation during

Photo: Kavik-Stantec Inc

High den potential steep slopes at PW9.

winter, with high use of slopes 20-50 percent, and lesser use of slopes 10-20 percent (Nagy et al. 1983). Flat ground and steep slopes are not usually used for denning. Aspect is an important factor in determining the amount of solar warming a den receives. While a den may face in any direction, generally north-facing aspects are not preferred. Data from the NWT suggest the optimal range extends from 120° - 320° (Nagy et al. 1983, McLoughlin et al. 2002).

Prior to field work commencing ENR provided a point location for a potentially active grizzly bear den site close to the town of Inuvik. Actual den activity was not confirmed by ENR.

Photo: Kavik-Stantec Inc

Surveying PW6.

Photo: Kavik-Stantec Inc

Snow at PW6 averaged >150cm.

Program

The ground-based den surveys were conducted March 18-21, 2013. The survey team employed an Inuvialuit guide and wildlife monitor and used snowmobiles to safely and accurately locate each borrow source. Karelian bear dogs are specifically trained to uniquely respond to bears. The FLIR is used to confirm a positive clue from the dog by detecting heat from an active den.

Prior to commencing surveys, the suspected bear den location provided by ENR was surveyed to the extent possible.

RESULTS AND MAIN CONCLUSIONS:

The team was not able to locate an active grizzly bear den at the location ENR indicated may contain an active den. This may be due to inaccurate location (GPS locations taken from helicopter may be as much as 100 m off) or due to absence of a denning bear.

Searches of PW6 and PW9 denning areas found no signs of active dens nor did the trained dogs detect grizzly bear scent. However, as access issues prevented a search from being conducted on PW12, drilling is recommended after April 1 as per DOT requirements to avoid high den potential areas on the steep slopes facing Douglas Creek.

The dogs' ability to detect grizzly bear scent was partially affected by wind direction and speed, which reduced efficiency of the search at PW9 near Noell Lake (water body northwest of PW9). Because of this, the dogs were run on Noell Lake as close to the high potential den area as possible. Two days later, ideal wind conditions allowed a more thorough search of the area. At one point, the dogs exhibited some altered behaviour upon which further trails were opened to the west of where altered behaviour was exhibited to allow for better coverage of the area. No bear den activity was confirmed.

Searches of PW6 had no positive indications from the dogs regarding grizzly bear scent. The area to the north east of the point indicated was investigated after a minor sign from one of the dogs. Expanded search had no follow-up behaviour from the dogs.

Deep snow during the surveys made travel around the areas difficult. Complete coverage at den potential areas in, and around, PW9 and PW6 was achieved and the surveys were deemed to be successful. The deep snow made PW12 inaccessible with the equipment available.

No active grizzly bear dens were identified at, or within, 500 m of PW6 and PW9. It was not possible to determine if there were any active dens at, or within, 500 m of PW12 due to the inability of the survey team to access the site.

LONG-TERM PLANS AND RECOMMENDATIONS:

The use of heated transportation to, and from, the field would increase the dogs' productivity by keeping them warm during the commute and providing shelter in case of inclement weather or an emergency situation. Alternatively, having a base camp in the search area would increase the dogs' productivity survey time.

Investigation of a confirmed active grizzly bear den at the beginning of the survey, or arranging successful "finds" of odoriferous bear parts during the daily surveys, would help to keep the dogs motivated.

Sites difficult to survey, due to terrain and snow conditions (i.e. snow depth), could be surveyed if heated transport were available and additional time was allowed for the survey team to break trails for the dogs to investigate any findings.

A reconnaissance assessment of bear sign or visual denning activity conducted in early spring will confirm any active grizzly bear dens.

Identification of suspected grizzly bear denning habitat within a buffer around the work zone to focus survey efforts was an effective means to cover a large expanse of bear denning habitat quickly and effectively.

Grizzly Bear Denning Survey for the Inuvik – Tuktoyaktuk Highway

October 2013 – December 2013

MAIN INVESTIGATOR:

Marsha Branigan, Manager Wildlife Management, Environment and Natural Resources, GNWT, Inuvik Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500185

LOCATION:

Between Tuktoyaktuk and Inuvik along the highway right-of-way and material sources.

PARTNERS:

- Department of Transportation (DOT)
- Environment and Natural Resources (ENR)
- Inuvik and Tuktoyaktuk Hunters and Trappers Committees (HTCs)

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RATIONALE:

Project will collect data on grizzly bear denning activity in the vicinity of the proposed road. ENR is conducting the survey on behalf of the DOT, which is providing funding for helicopter time. If active dens are found, ENR will work with the HTCs and proponent to prevent disturbance of denning bears due to winter activities that may occur in 2013/2014 or determine alternative actions. These surveys have been conducted in areas with winter work since 2004, based on the recommendation of the Environmental Impact Steering Committee (EISC). If no work happens in the winter 2013/2014, this data will be added to the baseline information on grizzly bear denning in the area of the proposed highway.

OBJECTIVE:

- To determine locations of active dens in fall of 2013 in winter work areas.

METHODS:

DOT provided GPS data for the survey area. Proposed highway work area, access roads, water lakes and gravel sources were flown by a helicopter to look for active bear dens. The timing of the survey is critical. The bears must have dug their dens but the entrance to the den must still be visible. Some snow cover assists in the identification of dens but too much snow means they are no longer visible. Mid- to late October is the best time. Local assistants from both Tuktoyaktuk and Inuvik participated in the survey.

RESULTS AND MAIN CONCLUSIONS:

The survey was conducted in October 2013. A summary of the results were presented to the Inuvik and Tuktoyaktuk HTC. Locations of active dens are confidential until the bears have emerged in the spring. Results will also be presented at the semi-annual Corridor Working Group meetings.

Photo: GNWT/M. Branigan, ENR

Grizzly bear den site.

LONG-TERM PLANS AND RECOMMENDATIONS:

This project is part of the Wildlife Protection Plan (WPP) for the highway and part of the mitigations committed to by the developer, DOT. ENR conducted the survey on behalf of DOT. A spring survey will also be conducted to determine if the dens were active and provide information about how much disturbance denning bears can tolerate.

COMMUNITY INVOLVEMENT:

Members of both HTCs are part of the survey crew. Survey results were discussed with the HTCs and the developer to determine appropriate mitigation and monitoring as per the WPP.

Reducing Human–Bear Conflicts on the Dempster Highway

July 2013 – September 2013

MAIN INVESTIGATOR:

Kristen Callaghan, Wildlife Biologist,
Gwich'in Renewable Resources Board

WILDLIFE RESEARCH PERMIT NUMBER:

WL500179

LOCATION:

Dempster Highway, focused on the NWT-Yukon Territory border between the Arctic Circle and Midway Lake.

PARTNERS:

- Gwich'in Renewable Resources Board (GRRB)
- Environment and Natural Resources (ENR), GNWT
- Aurora Research Institute (ARI)
- Environment Yukon (YE)
- Tetlit Renewable Resources Council (TRRC)
- Gwichya Gwich'in Renewable Resources Council (GRRC)
- Nihtat Renewable Resources Council (NRRC)
- Ehdiitat Renewable Resources Council (ERRC)

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RATIONALE:

GRRC and other community members have reported increased concerns about grizzly bear activity in the study region. Concerns focused on changes in bear behaviour wherein some bears were reported to be increasingly aggressive towards caribou hunters and other highway travelers during the caribou harvesting season. This is an hypothesized response to positive reinforcement of food rewards in proximity to the highway; to highway travelers via gut-piles and other caribou remains left after hunting activities; and, to habituation to human presence on the highway. Results of this project are intended to help wildlife management authorities better understand the issue and plan appropriate actions in response.

OBJECTIVES:

- To educate travellers of the highway with targeted messages in order to help reduce human-grizzly bear conflicts;
- To document bear observations and conflicts; and
- To survey bear distribution and activity relative to the highway and try to reduce bear attractants close to the highway.

METHODS:

This project had multiple components: to create and distribute educational materials to help highway travelers modify their behaviour in reaction to bear activity; to systematically survey the study area to document bear behaviour throughout the study period; map distribution of bears in relation to attractants; provide means for travelers to report their observations in a systematic way through development and distribution of a reporting form; to reduce of bear attractants along the highway by talking directly with harvesters in addition to messages provided in educational materials; and by actively moving bear attractants away from the highway corridor.

RESULTS AND MAIN CONCLUSIONS:

Education materials in the form of two large posters with messages for caribou harvesters and all highway travelers were created and posted in communities and at key locations along the highway corridor from Dawson to Inuvik. A community assistant patrolled the highway when caribou harvesting activities were underway to talk with harvesters and to move bear attractants. Surveys in the study area were undertaken and highway travelers also shared their observations of bears and people. A total of 243 observations of bears were recorded and shared using forms circulated with the education materials. Of these, 90 percent were of grizzly bears, eight percent were of black bears and two percent were not recorded as to species. Some reports were made of negative interactions where some bears approached persons or hunters with caribou. However, most observations were of bears who left the area in response to human presence or who appeared indifferent to human presence. Caribou presence on the highway began sooner than expected and surveys of the highway were not conducted in time for comparison of bear activity before caribou migrated into the region. Analysis of project data is underway and a full report will be completed and shared with the GRRB, GRRCs, ARI, ENR and YE. Feedback from RRCs on this project to date has been positive and interest has been received to see it continue in future.

LONG-TERM PLANS AND RECOMMENDATIONS:

Feedback from RRCs on this project to date has been positive and interest has been received to see it continue in future. Access to bear observation forms by highway travelers should be continued as a simple means for reporting on how bears and people are interacting in the area of concern. Communication materials relating to bear safety and to the role humans play in bear behaviour will be helpful to continue to address community concerns about bears in this region.

Photo: G. Rhonde

Grizzly bears eating caribou remains along the Dempster highway in August 2013.

COMMUNITY INVOLVEMENT:

GRRC raised the concern and advised on project methodology. The GRRC also helped to circulate educational materials, distribute and collect bear observation forms and discuss the project with their community members. Visitor centres in Inuvik, Fort McPherson, Tombstone Territorial Park and Dawson, the Peel River hunter check station, ENR and YE regional offices and staff also assisted by advertising posters and distributing and collecting bear observation forms.

Viscount Melville Sound Polar Bear Subpopulation Survey

April 9, 2013 - May 10, 2013

MAIN INVESTIGATOR:

Jodie Pongracz, Regional Biologist, Environment and Natural Resources, GNWT, Inuvik Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL005418

LOCATION:

Viscount Melville Sound, NWT. This was the second year of a three-year mark-recapture program to estimate the current subpopulation size of the Viscount Melville polar bear subpopulation. Fieldwork this year also involved a pilot hair snag project conducted in conjunction with Olokhatomiut Hunters and Trappers Committee in Ulukhaktok and the Ekaluktutiak Hunters and Trappers Organization in Cambridge Bay.

Two capture field crews worked from three base camps: polar bear cabins located at Wynniatt Bay on Victoria Island, Cape Providence on Melville Island, and near Castel Bay in Aulavik National Park on Banks Island. The crews did not work from base camps at Mould Bay or Nias Point due to weather constraints. However, the larger Viscount Melville polar bear subpopulation region was still surveyed.

Hair snag fieldwork was conducted by workers from Cambridge Bay and Ulukhaktok who travelled to, and worked from, Hadley Bay and Wynniatt Bay respectively.

RATIONALE:

Sustainable management of harvested wildlife is dependent on current information concerning distribution, abundance and demographic parameters of wildlife populations. The most recent subpopulation estimate and demographic data for the Viscount Melville (VM) polar bear subpopulation comes from mark-recapture research conducted from 1989-1992. In recent years the sea ice in the VM region has shifted from a multi-year sea ice to an annual sea ice system, remaining ice free in late summer. Currently, it is not known how the VM polar bear subpopulation is responding to these observed changes in sea ice habitat. It has been suggested a shift from a multi-year sea ice system to an annual sea ice system may benefit polar bears in the short term by increasing the productivity of the sea ice environment. In order to assess whether the current allocated harvest of seven bears a year can be changed, a more detailed understanding of how bears in this subpopulation are responding to changing sea ice conditions is required.

OBJECTIVES:

- To conduct mark-recapture of the VM polar bear subpopulation to estimate the current subpopulation size and demographic parameters;
- To assess the current boundaries of the VM polar bear subpopulation; and
- To assess polar bear habitat use of changing sea ice habitat in the area of VM Sound.

METHODS:

Survival, reproductive rates and the size of the VM polar bear subpopulation will be determined using a three-year traditional mark-recapture (i.e., immobilization and tagging of bears) method. This study will also involve the deployment of 25 satellite radio collars on adult female polar bears from the VM region to examine

Photo: GNWT/J. Pongracz, ENR

Polar bear in sea ice habitat.

polar bear habitat use, distribution and movement rates, and subpopulation delineation. This data will allow researchers to assess whether the existing boundary for the VM polar bear subpopulation is adequate and to the extent to which polar bears use both multi-year and annual sea ice.

A pilot hair snag project will be conducted in Wynniatt Bay and Hadley Bay. Plans are for each crew to set 50-60 sites, leave for seven to ten days, then check, remove hair and re-bait, then check again and take down.

RESULTS AND MAIN CONCLUSIONS:

Weather was exceptionally poor during the 2013 field season. Capture crew 1 experienced an abundance of bad weather days not suitable for flying (did not fly 21 of 34 days in the field due to poor weather). Overcast conditions prevailed and there were many days with strong winds, blowing snow and very poor visibility. Days worked were cut short due to deteriorating weather conditions.

A total of 32 bears were marked in the VM Sound subpopulation area. These bears were sighted in 22

PARTNERS:

- Olokhatomiut Hunters and Trappers Committee in Ulukhaktok
- Ekaluktutiak Hunters and Trappers Organization in Cambridge Bay
- Inuvialuit Game Council
- Aboriginal Affairs and Northern Development Canada (AANDC)
- Environment Canada
- Environment and Natural Resources (ENR)
- Nunavut Wildlife Management Board
- Polar Continental Shelf
- University of Alberta
- Wildlife Management Advisory Committee (NWT)
- World Wildlife Fund

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groups (six family groups, two mated pairs, 14 lone individuals). Four family groups were yearlings, two females were with cubs-of-the-year (COYs). An additional six collars were deployed on adult female polar bears throughout the region.

There were very few observations of seal kills and attempted digs on seal layers. Sea ice was consolidated in the VM Sound. No open water, moving ice or active cracks were observed by either crew. No large pans of multiyear sea ice were observed in VM sound as was the case in spring 2012. A few small floes of multiyear ice were observed near Winter Harbour and the region to the east. No prominent pressure ridges occurred through the larger bays (Liddon Gulf and Wynniatt Bay) as was observed in spring 2012. Overall, tracking conditions were very poor. Crew 2 experienced excellent tracking conditions on a single day and flew approximately 1,000 km, observing an abundance of fox tracks but only three bears.

During the VM survey, one grizzly bear was captured in Liddon Gulf on Melville Island. A second grizzly bear, with similar markings and coloring as one captured last year on the sea ice north of Clumber Point, Victoria Island, was sighted just off Northwest Banks Island.

Capture crew 1 observed two mortality events navigated to by stationary collars. One was a 17-year-old adult female that had two COYs in spring 2012. Her collar went stationary on January 17, 2013. Her heavily scavenged remains (only bones remaining) and half of the collar were found at the site. There was an abundance of wolf scat in the immediate vicinity. The second mortality we discovered was a 30-year-old adult female. Her collar went stationary on January 16, 2013. Her remains were not scavenged but were covered in snow. She appeared emaciated and had bled a considerable amount from the mouth. There was

also a bare patch on the top of her head. Her collar was removed and there did not appear to be any collar wear.

Capture crew 1 observed a few cases of hair loss on the face/behind the ears. Capture crew 2 observed a single case of hair loss on top of a hind foot.

Hair snag fieldworkers from Cambridge Bay were in the field from April 7 through May 17. Thirty-eight stations were set using aged seal with narwhale fat. Eleven stations were hit and 22 samples were collected. Hair snag fieldworkers from Ulukhaktok were in the field April 12 through May 8. Thirteen stations were set using fermented fish as lure. Four stations were hit, two of which were hit twice. A total of 34 samples were collected. DNA results from hair snag work indicate two individuals were identified by hair snag stations in Wynniatt Bay. Both were also captured. Seven individuals were identified by hair snag work in Hadley Bay. Two of these were also captured.

LONG-TERM PLANS AND RECOMMENDATIONS:

Currently planning for the spring 2014 field season.

COMMUNITY INVOLVEMENT:

Prior to the start of research, community consultations were held in both Cambridge Bay and Ulukhaktok. The objective of the meeting was to get direction from the Olokhatomiut Hunters and Trappers Committee (OHTC), the Ekaluktutiak Hunters and Trappers Organization (EHTO) and both communities as to whether the research should occur and what methods should be used. Both communities and respective HTO/HTCs approved the research and gave the ENR direction to proceed with an initial year of traditional mark-recapture methods and to deploy 25 satellite-GPS collars on adult female polar bears.

In August of 2012, the project leaders attended the Inuvialuit-Inuit polar bear management meetings in Tuktoyaktuk, NWT where results of the first field season of the VM polar bear project were presented to the commissioners of the agreement from Ulukhaktok and Cambridge Bay.

Research planning meetings with the OHTC, EHTO and public meetings in both Ulukhaktok and Cambridge Bay were held in January 2013. During these meetings an overview of the 2012 field season was presented, followed by a discussion of methods to be used for future fieldwork. It was determined a traditional mark-recapture program would continue with deployment of 11 collars not deployed in 2012 and a pilot hair snag program would be conducted in 2013.

Joint Regional Grizzly Bear DNA Hair Snagging Program

June 1, 2013 – September 15, 2013

MAIN INVESTIGATOR:

Harry O'Keefe, Environmental Advisor,
Dominion Diamond Ekati Corporation;
David Wells, Superintendent Environment HSE,
Diavik Diamond Mines Inc.

WILDLIFE RESEARCH PERMIT NUMBER:

WL500169

LOCATION:

The study area for this program was centered on the Lac de Gras region of the central barren lands, covering an area of approximately 16,000 km^2.

PARTNERS:

- Diavik Diamond Mine Inc.
- Dominion Diamond Ekati Corporation
- North Slave Métis Alliance
- Yellowknife Dene First Nation
- Kitikmeot Inuit Association
- Łutselk'e Dene First Nation
- Tłı̨chǫ

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(Website) www.diavik.ca

RATIONALE:

While site-specific activities such as waste management, recording of incidental sightings and deterrent efforts will continue at each project location, the objective of the regional program is intended to supersede other regional objectives such as determining zone of influence. The population data collected will be provided to the Government of the Northwest Territories – Department of Environment and Natural Resources (ENR) to assess cumulative impacts and contribute to their grizzly bear management plan.

OBJECTIVES:

- To determine if mine-related activities influence the relative abundance and distribution of grizzly bears over time.

Photo: Dominion Diamond Ekati Corporation

Wolverine on top of a hair snagging station.

Photo: Dominion Diamond Ekati Corporation

Grizzly bear near a hair snagging station.

METHODS:

A grid pattern consisting of 12x12 km cells will be utilized based on an approximation of a two-week home range of female barren ground grizzly bears. The 12x12 km grid consists of 111 cells covering approximately 16,000 km^2. Each cell contains a wooden tripod with a fixed base and legs wrapped in barbed wire to collect grizzly bear hair. The wooden tripod was located using traditional knowledge to identify areas of high quality grizzly bear habitat (e.g. esker, riparian area, upland meadow, wetland meadow) to increase the likelihood of "capturing" a bear. Non-reward lures (e.g. cured cows blood, fish oil, castor oil, commercial bear bait and sweeter scented oils) were used to attract bears to the tripods. The lures are poured on the top of the posts, down the legs and in the center on the ground to encourage a bear to squeeze between the legs. The posts will not be relocated between each sampling period; therefore, a novel scent combination will be used each session to prevent habituation.

Wildlife Genetics International (WGI), Nelson, BC will conduct all DNA extraction and analyses. Included in its services is the development of a database that provides individual identification and a capture history for each individual. The capture history can then be used in the program MARK to estimate population parameters. WGI further compares captured individuals to other existing databases in the Northwest Territories and Nunavut to determine if any overlaps exist. It is anticipated the Pradel model for open populations will be appropriate for this dataset.

RESULTS AND MAIN CONCLUSIONS:

Dominion Diamond Ekati Corporation (DDEC) completed the 2012-13 Grizzly Bear DNA Programs, in partnership with Diavik Diamond Mine Inc. (DDMI), in

Photo: Dominion Diamond Ekati Corporation

Caribou herd walking near a hair snagging station.

August 2013. A total of 1,902 and 4,705 hair samples were collected in 2012 and 2013, respectively, and submitted to WGI for DNA analysis. The DNA analyses of the 2012 samples were received on June 28, 2013.

The following information was compiled after a preliminary review of the 2012 results:

- Six sessions, 10-15 days between collections;
- 112 individual bears (42 male and 70 female);
- Ten bears recaptured from the pilot study;
- Two bears originally identified at the Izok study area;
- 13 bears originally identified at the Courageous Lake study area;
- Four bears originally identified at the Hackett River study area;
- Extraction rates were lower than those found in similar studies carried out in the above study areas (68% vs. 80%); and
- Detection frequency of 7 bears/1,000 km^2; previous estimates of 3.5 (central barrens) to 7 (Kitikmeot) bears/1,000 km^2

Summary of the 2013 field season:

- Six sessions; 9-13 days between collections;
- 4,705 samples;
- Anticipate higher DNA extraction success due to shorter collection intervals; and
- Results expected in April 2014.

Photo: Dominion Diamond Ekati Corporation

Grizzly bear family group grazing on vegetation.

LONG-TERM PLANS AND RECOMMENDATIONS:

A summary of long-term plans for the project and recommendations generated from project results. Final report expected end of July 2014.

COMMUNITY INVOLVEMENT:

Community elders were directly involved in the field selection of sampling locations for the posts. Elders were also asked to provide a set of guidelines or criteria for locating posts, which can be used in future to provide consistency in sampling. Community members were also hired to participate in the collection of hair samples. First Nations youth were invited to participate in the program for one week shifts.

Black Bear Ecology in the North Slave Region

2012-2013

MAIN INVESTIGATOR:

Dean Cluff, Regional Biologist,
Environment and Natural Resources, GNWT,
North Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500070

LOCATION:

The study area is the North Slave Region (NSR) with focus on black bears along Highway 3. However, bears around Yellowknife and the Ingraham Trail (Highway 4) may also be candidates for collaring and relocation.

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RATIONALE:

No studies of black bears (*Ursus americanus*) in the NSR have been done, therefore very little information is known about these bears in the northernmost part of their range. This dearth of information was a limiting factor in assessing the impact of an outfitter's recent proposal to bait black bears for hunting. Concern was expressed that baits will habituate these bears to people and create conflicts. The NSR has also spent considerable effort in staff and equipment during the last 10-12 years responding to potential conflict situations between people and bears with little information gained. Whether baiting bears creates additional conflict situations with people is unknown. Public opinion favours moving bears rather than killing them, however, this is not always possible. Bears that come in close proximity to people or their dwellings are assessed on a case-by-case basis as to what action to take. A bear can be immobilized and moved if public safety is not at risk. When safety is a concern, the bear is killed.

In 1998, NSR staff began immobilizing black bears in the Yellowknife area and moved some of them elsewhere. Relocated bears were ear-tagged, lip-tattooed and measured prior to their release. These tags allowed unique identification of the bear if the bear was later re-captured or killed. Coloured vinyl streamers were attached to one or both ears (e.g. "ear-flag") via the ear-tag at the time of capture to facilitate individual recognition from a distance after the bear's release.

However, these ear-streamers were temporary and were likely lost within a few weeks to months. A relocated bear marked in this way cannot be regularly tracked except if it returns to the area soon after its relocation. The cryptic and nocturnal behaviour of bears, whether ear-tagged or not, further complicates

repeated monitoring. A more reliable method is needed to track bears once they are relocated to evaluate if this technique of managing human-bear conflict is practical.

The harvest of black bears within the NSR is unknown but is considered low. However, much of the harvest that occurs is facilitated by Highway 3 because of the access it offers to hunters. The highway cuts a major corridor through the Taiga Plains ecozone and also has numerous side access points with open areas. Black bears frequent the highway corridor in spring to feed and its impact on movements of bears is unknown. The highway could also act as a population sink by being a seasonal attractant for bears but also rendering them vulnerable to spring hunting by people.

OBJECTIVES:

- To collect baseline information of black bear ecology, specifically on their movements and behaviour;
- To document the movements and range sizes of black bears in the northern boreal forest;
- To identify den site locations and black bear fidelity to them;
- To document movements and behaviour of black bears around highways and food attractants; and
- To provide management recommendations for relocating bears in the NSR.

METHODS:

Black bears were to be captured in the summer or fall 2012 primarily along Highway 3, but near Yellowknife and Behchokǫ as opportunities permit. Capture would have been done by culvert traps or possibly remote dart injection. Both solitary bears and family groups were targeted. Once chemically immobilized (via Telazol), all bears were to be ear-tagged and lip-tattooed. The ear-punch disk would be used as a biopsy marker. A hair sample (with follicles) would be taken for a genetic identifier. Uniquely marked cubs in family groups would be critical to determining if cubs brought to garbage or bait sites by their mothers become more likely to get into conflict situations later once on their own.

Adult bears captured would be collared with a GPS/Iridium radio collar to allow their movements to be tracked intensively (1 GPS location/30 minutes) for two years (May to October 2012, 2013), given the collar will be silent during winter hibernation. These duty cycles would make possible the mapping of detailed movement paths for monitored bears. Three GPS/Iridium collars would be deployed in fall 2012 with three collars available for deployment in the spring. A programmable collar release mechanism is attached to each collar so no recapture is needed for collar removal. A VHF (Very High Frequency) beacon is included in the collar to facilitate its retrieval after drop-off. One VHF-only collar is also available for deployment. Bears captured and collared would be in response to managing potential conflict situations where bear sightings have occurred. The relocation site is the same for all bears and is accessed near km 154 on Highway 3.

The GPS/Iridium collar would obtain a GPS location every 30 minutes. Location data would be transmitted daily to the Iridium satellite system after every 18 locations and emailed to the Project Leader. Locations would also be stored in the collar's memory. Collars would be programmed to be silent during winter hibernation and turn on again after spring den emergence. Radio tracking each bear once during the fall or winter via the VHF beacon would confirm the bear's denning location. Collars would be programmed to drop off in late October 2013. The late drop-off may identify the den area for the second year to help determine fidelity to denning locations.

Black bear locations would be mapped with ArcGIS. Range use would be estimated with the fixed kernel method and other movement analysis methods. Habitat use would be estimated by resource selection function analysis and spatially explicit techniques. Analysis of movement patterns would include locations of all known bear baiting stations and other attractants. Individual based movement modelling would also be completed.

RESULTS AND MAIN CONCLUSIONS:

Results and main conclusions were not submitted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

Photo: GNWT/S. Yuill, ENR

Distribution and Movements of Beverly and Ahiak Barren-ground Caribou

March 16, 2012 – March 16, 2013

MAIN INVESTIGATOR:

Allicia Kelly, Manager Research and Monitoring,
Environment and Natural Resources, GNWT,
South Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL005771

LOCATION:

The ranges of the Beverly and Ahiak barren-ground caribou herds are among the largest in North America. These caribou range from northern Saskatchewan to the Queen Maud Gulf and Northeast Mainland of Nunavut. Collar deployment occurred across the barren-ground caribou winter range from the east arm of Great Slave Lake, east to approximately the Thelon River. The nearest NWT communities are Łutselk'e, Fort Resolution and Fort Smith.

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RATIONALE:

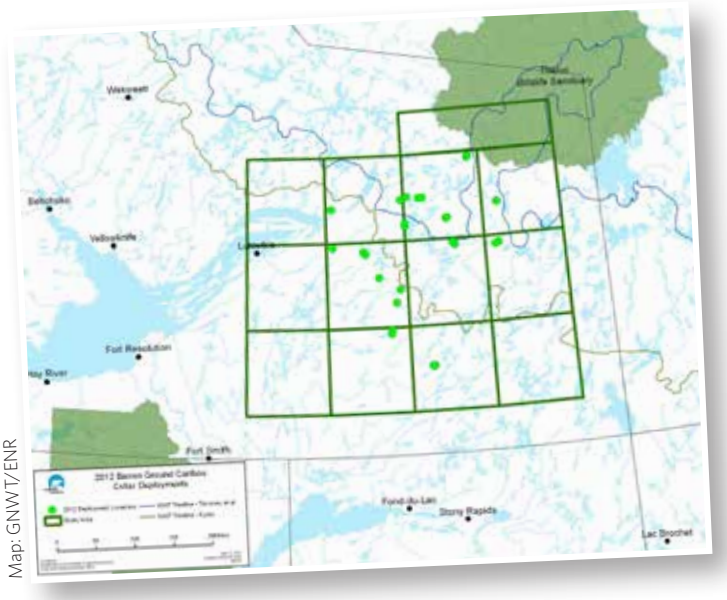
This range is remote and little observational information on these herds' distribution is obtained each year and only where caribou range near communities and accessible harvesting areas. Collar technology is an invaluable tool to collect information on year-round movements and range use patterns and to assess the cumulative impacts of human activity and natural disturbances. Caribou location data is also needed to determine caribou locations for cost-effective survey work and to understand which herd(s) is (are) using seasonally occupied areas in a given year. Monitoring collar locations provides the most cost effective and least intrusive method for obtaining information on caribou movements and distribution.

OBJECTIVES:

- To deploy up to 27 GPS-satellite collars on adult female barren-ground caribou;
- To continue to monitor the distribution and movements of collared cows, to get information on seasonal use patterns, movement rates and migration routes;
- To assess seasonal habitat use; evaluate the movements of cows in relation to human and natural disturbances;
- To examine herd structure and improve the assignment of harvest to adjacent herds; and
- To aid in surveying population parameters.

METHODS:

Existing collared cow locations, knowledge of historical and recent range use and reports from land users were used to help plan the collar deployment. An aerial reconnaissance survey was conducted March 6-14, 2012 to help determine late winter caribou distribution and to ensure capture effort was spread across the caribou distribution.



Map: GNWT/ENR

2012 caribou collar deployments.

Photo: GNWT/A. Kelly, ENR

Collared caribou.

Caribou were live captured by an experienced capture crew, using a net gun fired from a helicopter. Pursuit of individual females is kept short (<1 min of running) and terminated if the target animal shows signs of fatigue. Each animal is examined to assess condition (fat cover over ribs, back and hip bone) and to check for any capture-related injuries. The collar is fastened around the animal's neck. Blood and fecal samples are collected whenever possible to determine pregnancy, exposure to various pathogens, etc. Immobilizing drugs are not used. All collars have a programmable breakaway device that allows the collar drop to the ground at a pre-determined time. These collars are scheduled to release in August 2016.

The GPS-satellite collars (Telonics TGW-4680-2) are programmed to collect three locations per day and the data is retrieved using the ARGOS system daily or every three days depending on time of year. Collar locations are mapped weekly and spatial analyses are on-going.

RESULTS AND MAIN CONCLUSIONS:

The collar deployment went very smoothly with 27 collars safely deployed over two days (March 21-22, 2012). All captured caribou appeared healthy. There were no injuries or mortalities during the capture work. Collars were distributed throughout the range, avoiding the area south of Rennie and Firedrake Lakes where large numbers of Qamanirjuaq caribou wintered this year.

LONG-TERM PLANS AND RECOMMENDATIONS:

Monitoring of barren-ground caribou on this range will continue. The Beverly and Qamanirjuaq Caribou Management Board has recommended a minimum of 40 GPS collars be deployed on the Beverly herd as part of the monitoring plan for this herd. We recommend additional collars be deployed to meet this target.

COMMUNITY INVOLVEMENT:

Joseph Catholique from Łutselk'e was the observer for the March reconnaissance survey.

Bioelectronic Monitoring of Peregrine Falcons along the Mackenzie River, NWT

July 14, 2013 – July 31, 2013

MAIN INVESTIGATOR:

Keith Hodson, Research Biologist

WILDLIFE RESEARCH PERMIT NUMBER:

WL500161

LOCATION:

Mackenzie River – Wrigley to Point Separation, NWT.

PARTNERS:

- NWT Renewable Resource Branch
- Canadian Wildlife Service
- Sahtú Renewable Resources Council
- Gwich'in Renewable Resources Council

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RATIONALE:

The 2013 project was conducted to affix as many passive integrated transponder (PIT) bands as possible on juvenile peregrines so, starting in 2015, a chip monitor can be used as the birds become mature. Factors affecting population numbers including weather, parasites and human disturbance are being noted as assessed.

OBJECTIVES:

- To ascertain all natural parameters of the unique population of peregrine falcons along the Mackenzie River so remedial action can be taken should detrimental factors become critical. Of special concern is oil field development.

METHODS:

Between July 14 and 31, 2013, the Mackenzie River was surveyed for nesting falcons. Occupied sites were climbed into, mostly using repelling gear and ropes. Young were banded with conventional and PIT bands and weights and measurements of the falcons were taken.

RESULTS AND MAIN CONCLUSIONS:

Eighty-five sites were checked and 53 sites were active. Eighteen sites had successfully raised 34 young to bandable age, of which 32 were conventionally banded and 31 PIT banded. Very poor site occupancy and success were noted compared to previous surveys (1995, 2000, 2005 and 2010). Detrimental effects of weather and parasites were noted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans include yearly surveying and banding of peregrine falcon hopefully to 2025. Use of chip monitor, beginning in 2015, to assess entrance of chip-banded birds into the breeding population.

Peregrine falcon observed along the Mackenzie River.

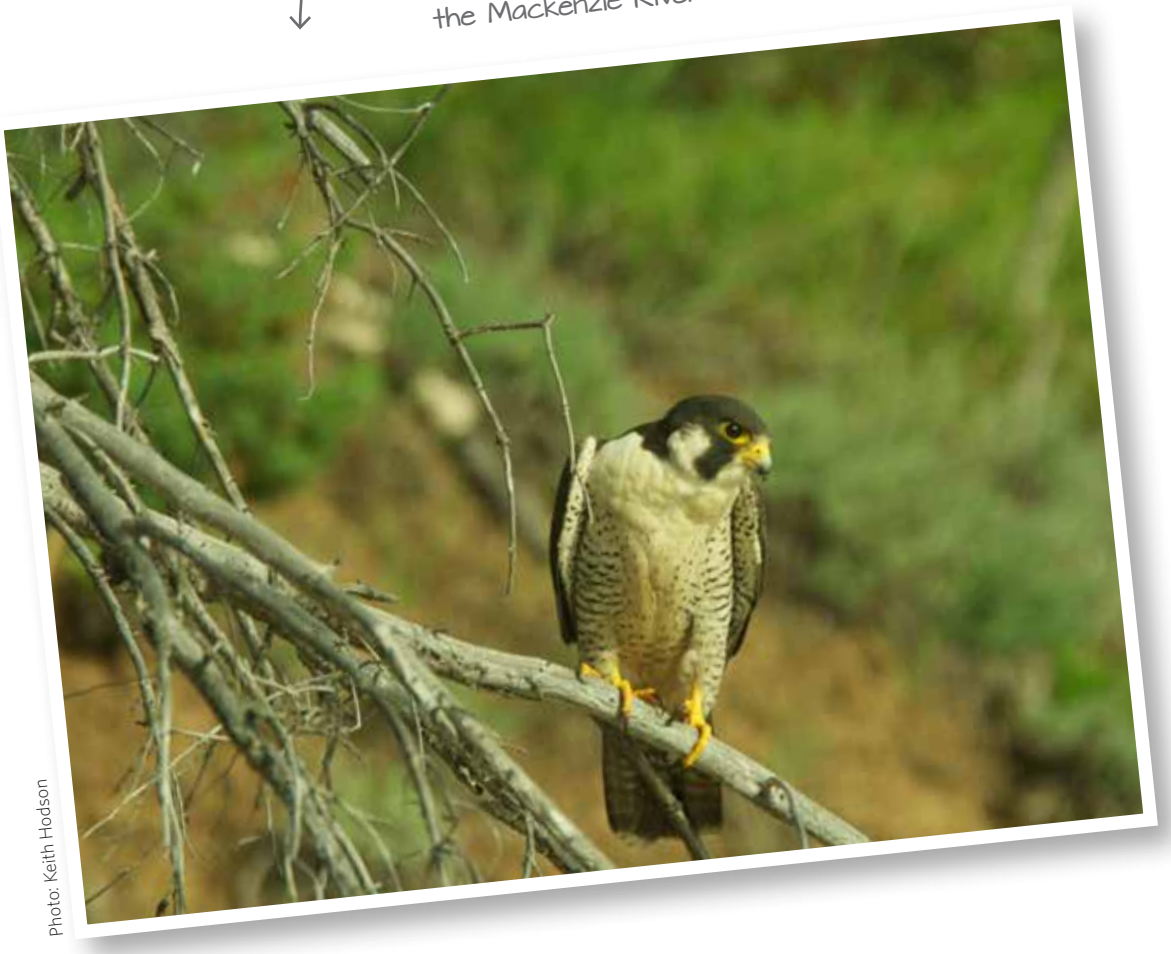

Photo: Keith Hodson

COMMUNITY INVOLVEMENT:

Personal visits were made to the Renewable Resource Council in Norman Wells and a brief presentation was made explaining the project as well as a picture presentation of previous studies. The council was very interested in the study and a good discussion was held.

At the request of David Manecho (Tulít'a), Lyle Etchinelle joined us as a monitor and accompanied us from Bear River to Norman Wells.

Cooperative Waterfowl Population Surveys in the Northwest Territories

May 2013 - June 2013

MAIN INVESTIGATOR:

Jim Wortham, Chief of Waterfowl Population Surveys, United States Fish and Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500129

LOCATION:

The survey covers much of the Mackenzie Valley region from the southern border of the NWT to the Mackenzie Delta Region. The survey in the NWT is part of the waterfowl population survey program. This program conducts annual aerial surveys for waterfowl in many of the important waterfowl breeding areas in North America.

PARTNERS:

- United States Fish and Wildlife Service
- Canadian Wildlife Service

CONTACTS:

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Jim Wortham, Chief of Waterfowl Population Surveys
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RATIONALE:

The NWT is one of the most important breeding and summering areas for ducks, geese and swans in North America. Information on bird numbers, distribution and population trends is needed to determine if current harvest levels are sustainable. This will help ensure waterfowl populations are conserved for the long-term use and appreciation by northern residents and all other people residing within the migratory range of these species.

OBJECTIVES:

- To determine the species and number of ducks and other waterfowl in the Mackenzie River drainage during the breeding season.

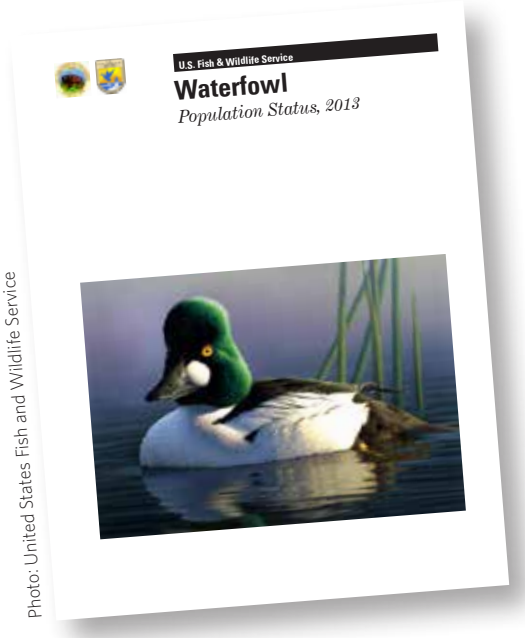
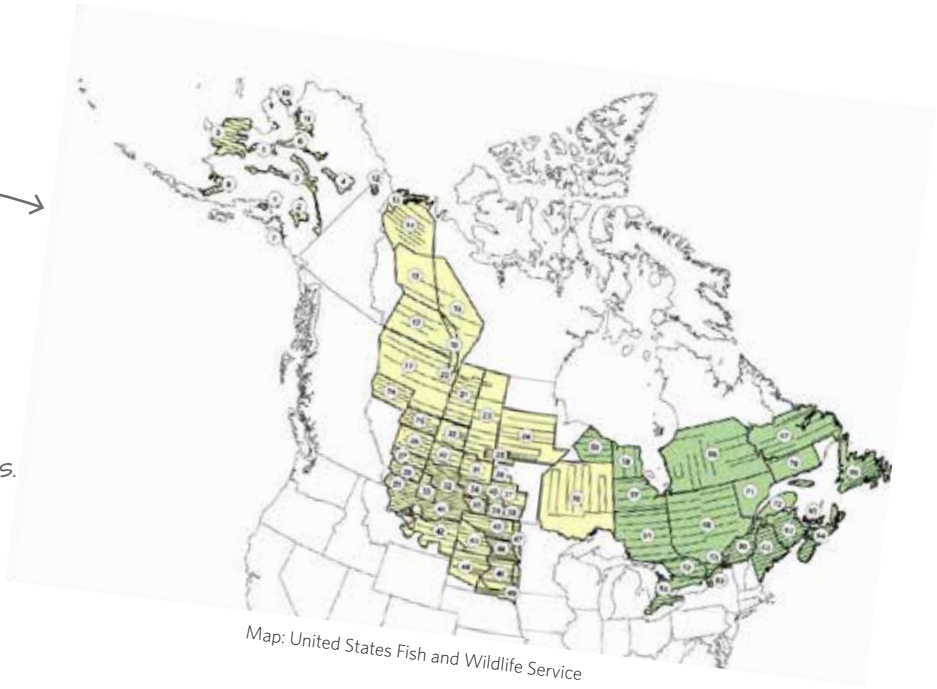


Photo: United States Fish and Wildlife Service

2013 Waterfowl Population Status Report.



Map of waterfowl transects.

Map: United States Fish and Wildlife Service

METHODS:

The survey followed standard operating procedures for aerial waterfowl surveys. A small airplane flew a single pass along straight-line transects at a height of 46 m (150 feet). Two observers recorded the number and species of waterfowl observed within 200 m (660 feet) on each side of the aircraft. The location of all observations was also recorded.

RESULTS AND MAIN CONCLUSIONS:

After a prolonged winter and one of the latest break-ups in recent years, spring returned quickly to the north. Smaller wetlands thawed quickly and waterfowl appeared to occupy these desirable habitats immediately. As usual, larger lakes were slower to thaw, however, birds were also observed in good numbers along open shoreline habitat. Wetland conditions were good throughout the region. In the Mackenzie River Delta, spring flooding may have impacted early nesters.

The 2013 total breeding duck estimate in central and northern Alberta, northeastern British Columbia and the NWT was similar to the 2012 estimate and 16 percent higher than the long-term average (1955-2012). Mallard numbers were 34 percent lower than 2012 and similar to the long-term average. American wigeon numbers were 62 percent higher than the 2012 estimate and similar to the long-term average. Green-winged teal numbers were similar to 2012 and 53 percent above the long-term average. Northern shoveler numbers were similar

to the 2012 estimate and 59 percent above the long-term average. Northern pintails were 199 percent higher than 2012 and 34 percent below the long-term average. Canvasback and scaup numbers were both similar to last year and to the long-term average.

The 2013 waterfowl population status report as well as previous status reports can be accessed online at: www.fws.gov/migratorybirds/NewReportsPublications/PopulationStatus.html.

LONG-TERM PLANS AND RECOMMENDATIONS:

The waterfowl population survey program has evolved into the largest and most reliable wildlife survey effort in the world. For more than 50 years, cooperative waterfowl surveys have been performed by United States Fish and Wildlife Service (USFWS), Canadian Wildlife Service (CWS), state and provincial biologists and non-government partners. Survey results determine the status of North America's waterfowl populations, play an important role in setting annual waterfowl hunting regulations and help guide the decisions of waterfowl mangers throughout North America. The surveys are planned to continue annually.

COMMUNITY INVOLVEMENT:

CWS has reviewed all concerns and comments provided by the communities and have discussed solutions directly with them. The main concerns received by the communities are opportunities for local hiring and potential disturbance to wildlife. The USFWS is unable to hire local help because of liability and legal issues as well as constraints in the United States civil service hiring regulations. It is expected the surveys will have a negligible effect on waterfowl and other wildlife because transects are widely spaced over a vast area and areas are only surveyed once annually.

Photo: GNWT/B. Fournier, ENR

Snow Goose Population Study in the Inuvialuit Settlement Region

June 2013

MAIN INVESTIGATOR:

Brian Lubinski, Regional Wildlife Biologist/Pilot, United States Fish and Wildlife Service;
Myra Robertson, Population Management Biologist (Waterfowl), Canadian Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500157

LOCATION:

Surveys were done at the snow goose colonies near Egg River on Banks Island, Anderson River Delta and Kendall Island, NWT.

PARTNERS:

- United States Fish and Wildlife Service (USFWS)
- Canadian Wildlife Service (CWS)

CONTACT:

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RATIONALE

The western Arctic population of snow goose is well above the spring population objective of 200,000 birds. Photographic surveys of the nesting colonies indicate the number of nesting birds has grown from about 171,000 adults in 1976 to more than double that number in recent years. The population is showing a pattern of rapid growth similar to that which has been observed in other populations of snow geese and Ross's geese.

Serious habitat loss from the destructive foraging activities of snow geese and Ross's geese occurred in parallel with very rapid population growth in the central and eastern Arctic. Some localized habitat damage has already occurred on Banks Island from the foraging activities of western Arctic snow geese. If the western Arctic population continues to increase at the present rate, the negative impacts to habitat and other species are predicted to expand. As such, CWS has been considering ways to increase harvest of the western Arctic population in an effort to stabilize population growth. This includes possibly designating the population as overabundant and allowing non-Aboriginal harvest of snow geese in the spring.

The majority of the western Arctic population of snow geese nests at a colony near Egg River on Banks Island. Small nesting colonies also occur at Anderson River Delta and Kendall Island. Numbers of snow geese at these three colonies are counted periodically (about every five years) through air photo surveys carried out jointly by the USFWS and the CWS. The three colonies were previously surveyed in 2009. Air photo surveys were conducted in June 2013 so current population information would be available for managers to determine whether regulations to increase harvest were still needed.

OBJECTIVES:

- To estimate the population size of snow goose colonies in the western Canadian Arctic.

Photo: Environment Canada

Partenavia aircraft used to take survey photos of snow geese.

METHODS:

All surveys were done using the USFWS airplane (Partenavia P.68 is the aircraft. N701 is the call sign.) equipped with a high resolution camera in the plane. Surveys were conducted at the colonies near Anderson River Delta and Kendall Island on June 19, 2013 and at the colony on Banks Island on June 21, 2013. Surveys were flown at an altitude of 518-762 m (1,700-2,500 feet) with a few areas of the Banks Island colony flown again at 305 m (1,000 feet) for comparison. While flying over each colony, multiple high resolution photographs were taken. Photographs were then analyzed in the lab to determine the number of nesting geese.

RESULTS AND MAIN CONCLUSIONS:

The Banks Island colony had lots of nesting geese in the traditional core colony area near Egg River. Preliminary analysis suggests there were approximately 429,000 nesting snow geese at the colony, which is similar to numbers observed in 2009 and well above the western Arctic population objective of 200,000 snow geese. The extent of the Banks Island colony was slightly smaller than some years suggesting birds were nesting more densely than in previous years. The field crew flew over some parts of southern Banks Island but no new snow goose colonies were observed.

There were very few snow geese nesting at the Anderson River Delta and Kendall Island colonies. In recent years, these colonies typically have had about 2,000 snow geese nesting at each colony. There were approximately 2,000 snow geese in flocks near Kendall Island and approximately 4,000 snow geese in flocks at Anderson River Delta. Ice was still present on many of the lakes near the mainland coast and in Liverpool Bay in late June and a late spring along the coast may resulted in some geese not nesting that year. Additionally, hunters from Inuvik observed geese starting to nest at the Kendall Island colony in late May and then these nests destroyed by flooding about a week later.

LONG-TERM PLANS AND RECOMMENDATIONS:

Monitoring of the western Arctic snow goose population through air photo surveys at the nesting colonies is expected to continue at regular intervals, approximately every three to five years.

COMMUNITY INVOLVEMENT

The Sachs Harbour Hunters and Trappers Committee provided valuable information on environmental conditions and the status of nesting geese at the Banks Island colony in early June 2013. This helped to determine the timing of the Banks Island survey and whether or not it was an appropriate year to conduct the survey. Members of the Inuvik Hunters and Trappers Committee provided important information on nesting geese and flooding at the Kendall Island colony.

Breeding Bird Surveys in the Gwich'in Settlement Area, Routes 1 to 4

June 2013

MAIN INVESTIGATOR:

Wayne Condon, GIS Manager,
Aurora Research Institute

WILDLIFE RESEARCH PERMIT NUMBER:

WL500156

LOCATION:

On June 8, 9, and 12, 2013, Aurora Research Institute (ARI) staff and six local field assistants, conducted three breeding bird survey routes near the communities of Fort McPherson, Inuvik and Tsiigehtchic in the NWT. Route 43-001 was not completed due to rain.

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OBJECTIVES:

- To collect information about species at risk in the Gwich'in Settlement Area and provide the data to the Species at Risk Stewardship Program and the local Renewable Resource Councils;
- To collect information about breeding birds in the region on breeding bird survey (BBS) routes 043-001, 002, 003 and 004 that were vacant (i.e. no surveyors were scheduled to complete the routes in 2013);
- To provide the data collected to the Canadian Wildlife Service for inclusion in the North American-wide breeding bird surveys program to determine long-term population trends; and
- To provide training for local field assistants so they may survey the routes in future years.

METHODS:

A total of 150 individual surveys were completed on three routes along the Dempster Highway. These surveys were part of North American-wide BBS which were started in the 1960s to monitor long-term trends in bird populations. The method employed to conduct the surveys was to record all birds seen and heard within 400 m of individual point count locations during three minute periods along each of the three routes. Survey locations were 800 m apart and the routes were 40 km long allowing for 50 stops per route. The surveys were conducted from 3:30 a.m. to 10:00 a.m. At each stop, the time, temperature, wind, speed and sky conditions were also noted. Route 043-001 was not surveyed due to bad weather (to conduct BBS surveys there must be little wind and only light showers).

RESULTS AND MAIN CONCLUSIONS:

Forty-nine different bird species were observed on all three routes completed in 2013. The most common

Photo: Aurora Research Institute

Osprey nest on the Inuvik route (route 043-004).

Photo: Aurora Research Institute

Inuvik BBS 043-004.

bird species observed on all three routes in 2013 were, in descending order: white-crowned sparrow, yellow warbler, northern waterthrush, Swainson's thrush, Wilson's snipe, common redpole, American robin, yellow-rumped warbler (myrtle), and gray-cheeked thrush. Other birds observed included seven species at risk, all listed as sensitive in the NWT: lesser scaup, white-winged scoter, lesser yellowlegs, short-eared owl, blackpoll warbler, American tree sparrow and rusty blackbird. Sensitive wildlife species are those "that are not at risk of extinction or extirpation but may also require special attention or protection to prevent them from becoming at risk," (ENR 2011). A total of 835 individual birds were observed on all three routes.

A short-eared owl and snowy owl were observed hunting at about the half-way point on route 43-001. An osprey was observed building a nest at stop 42 of route 043-004.

Monitoring bird populations is an important tool to identify where species at risk are located and for assessing the conservation status of common species.

LONG-TERM PLANS AND RECOMMENDATIONS:

Data needs to be collected on an annual basis to enable the long-term assessment of bird population trends over time. It is recommended the surveys be completed on an annual basis. To allow this to happen, trained local surveyors must be available to complete the work. Ideally, surveyors should have knowledge of, and experience, with bird point counts. A program should be implemented to train community members to conduct these surveys. ENR should consider investing funds to ensure on-going surveys.

Survey of Seabird Colony at Cape Parry Migratory Bird Sanctuary

July 2013

MAIN INVESTIGATORS:

Blake Bartzen and Marie Fast, Habitat Biologists, Canadian Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500147

LOCATION:

The survey for thick-billed murres (*Uria lomvia*) and black guillemots (*Cepphus grylle*) was conducted at Cape Parry Migratory Bird Sanctuary (70°12'N, 124°40'W), situated at the northern end of Parry Peninsula, near the community of Paulatuk, NWT. Travel to, and from, the site took place on July 23 and 24, 2013, and the survey took place on July 24.

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RATIONALE:

Cape Parry has the only breeding colony of thick-billed murres in the western Canadian Arctic and is more than 1,300 km from the nearest colonies in Alaska and Nunavut. Cape Parry is also one of two sites in the western Canadian Arctic where black guillemots breed. If industry, boat traffic or other activities in the region were to increase, the colony could be impacted through disturbance, pollution and other habitat degradation. Given the uniqueness of the colony to the region, periodic surveys are warranted to ensure the colony is at a population level that does not warrant further management actions.

OBJECTIVES:

- To assess the population of thick-billed murres and black guillemots, which nest on the cliffs of Cape Parry. Incidental observations of wildlife were also made while travelling between Paulatuk and Cape Parry.

METHODS:

The survey of the colonies was conducted from a boat, using local boat operators from Paulatuk. The survey route followed the shoreline of the cape from East Point past Devon and Police Point in the west. During the survey, we attempted to stay roughly 100 m from the shoreline to increase the likelihood of detecting all birds while minimizing disturbance to the colony.

During the survey, we counted all birds on the water and flying. In addition, we took digital photos of the cliff colonies. Counts of birds captured on the digital photos were conducted using a double blind technique after images were processed to remove duplication. Counts were summed to determine the number of individuals within the Migratory Bird Sanctuary.

Photo: Environment Canada

Cape Perry, NWT.

Photo: Environment Canada

Thick-billed murres and black guillemots on the cliffs at Cape Perry.

RESULTS AND MAIN CONCLUSIONS:

There were 880 thick-billed murres observed at Cape Parry on July 24, 2013. This is considered to be a minimum population estimate due to variation in colony attendance and survey method. Thick-billed murres were observed on the cliffs at Police (West) Point and East Point. None were observed on Devon (Middle) Point. No eggs or chicks were observed during the survey.

Twelve black guillemots were observed during the survey. Black guillemots were observed on the water near Police (West) Point and East Point. None were observed near Devon (Middle) Point.

Other bird species were observed during the survey including common eiders, glaucous gulls, red-throated loons and red-breasted mergansers.

LONG-TERM PLANS AND RECOMMENDATIONS:

The information from this study will be compared to earlier surveys to determine population trends for this site.

This survey is to be repeated roughly every five years.

COMMUNITY INVOLVEMENT

Tony and Ian Green of Paulatuk, through a contract with the Paulatuk Hunters and Trappers Committee (HTC), provided boats and guiding services for the work conducted at Cape Parry Migratory Bird Sanctuary. This project was reviewed and approved by the Paulatuk HTC.

The Wildlife Management Advisory Council (NWT) also reviewed and approved this survey as part of the Canadian Wildlife Service program for 2013. The Inuvialuit Land Administration approved a Land Use Licence (ILA13PN007) for the establishment of a temporary camp associated with this project.

Arctic Shorebird Monitoring Program

June 2013 - July 2013

MAIN INVESTIGATOR:

Jennie Rausch, Shorebird Biologist,
Canadian Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500153

LOCATION:

Mackenzie Delta, Inuvialuit Settlement Region, NWT.

PARTNERS:

- Canadian Wildlife Service
- Program for Regional and International Shorebird Monitoring (PRISM)
- Manomet Centre for Conservation Sciences
- Neotropical Migratory Bird Conservation Act (US Government)
- Center for Conservation Biology
- Polar Continental Shelf Program, Natural Resources Canada

CONTACT:

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RATIONALE:

The Arctic Shorebird Monitoring Program was initiated in response to widespread shorebird population declines noted on migration routes through southern Canada and the United States. In order to identify the causes of this decline, it is critical to study shorebird populations and population dynamics on their breeding grounds, where more accurate population estimates and demographic information can be obtained.

OBJECTIVES:

This project is part of a larger program called the Arctic Program for Regional and International Shorebird Monitoring (Arctic PRISM). The purpose of the program is:

- To generate population estimates for all Arctic breeding shorebirds;
- To produce maps showing shorebird distribution and abundance across the North American Arctic;

Red-necked phalarope.

Photo: Alvan Buckley

Photo: Alvan Buckley

Semipalmated sandpiper.

- To identify highest-quality habitats for each shorebird species;
- To provide shorebird densities and breeding ecology information at each survey site; and
- To assist local managers in meeting their conservation goals.

METHODS:

Three 12 ha plots and five larger (100-220 ha) plots were surveyed for shorebirds and their nests. Nesting and hatching success were monitored at five day intervals. Adult and juvenile shorebirds were banded with a stainless steel band and a combination of colour bands which allow for visual identification of individual birds. When possible, blood, feather and fecal samples were collected from adult birds for additional analysis (genetics, contaminants, isotopes).

Some semipalmated sandpipers were also fitted with a small geolocator (attached to a leg band) and some Hudsonian godwits and whimbrel were fitted with satellite transmitters (backpack mount). These devices can be used to tracks the bird's movements through their annual cycle and help us determine their migration routes and locations of staging and wintering areas.

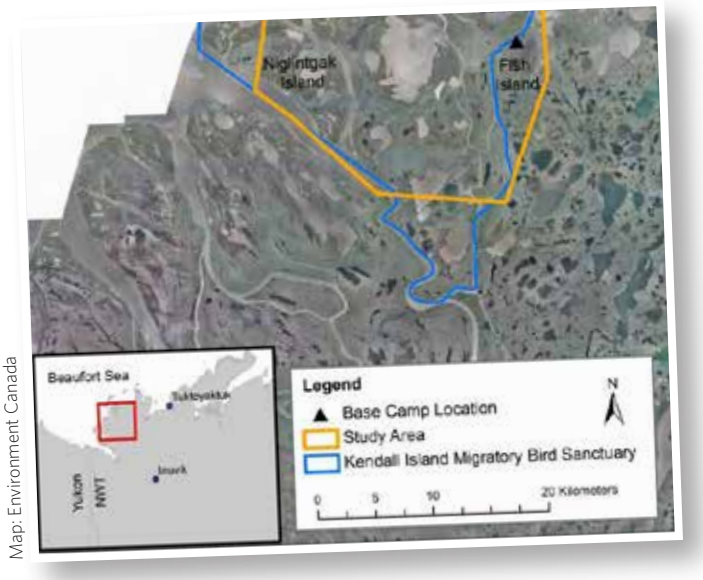
RESULTS AND MAIN CONCLUSIONS:

A total of 118 shorebird nests were observed in our Mackenzie Delta plots this year, within a combined area of 716 ha. The most common nests found belonged to red-necked phalarope (55), semipalmated sandpiper (29) and pectoral sandpiper (10). Of the 118 nests observed, 15 are known to have hatched, 55 are known to have failed, 17 where the fate is unknown and 31 that were still active at the time of our departure. It is possible some of these nests hatched after our departure but their fates remain undetermined.

Eighty-four adult shorebirds and 46 chicks were banded. This year we also re-sighted 16 shorebirds that had been banded in previous years. Of the adult birds we captured, we were able to collect blood samples from 79, feather samples from 84 and fecal samples from 38. Additionally, we deployed 15 geolocators on semipalmated sandpipers and three satellite transmitters each on Hudsonian godwits and whimbrel.

Photo: Gennyne McCune

Semipalmated plover nest.



Map: Environment Canada

Mackenzie Delta site showing study area within the Kendall Island Migratory Bird Sanctuary.

LONG-TERM PLANS AND RECOMMENDATIONS:

The shorebird camp in the Mackenzie Delta is one of two Arctic PRISM Tier 2 (long term) shorebird monitoring sites in Canada. We are planning to conduct surveys at the site again in 2014. Additionally, we are planning to conduct short term surveys on Prince Patrick and Melville Islands (both NWT and Nunavut portions) in 2014.

COMMUNITY INVOLVEMENT:

During the last nine years, the Canadian Wildlife Service (CWS) shorebird program has hired nine students from communities in the NWT to work as part of our field team. This year, as part of CWS's mentoring program in Nunavut (Inuit field research assistant program) Lisa Bachellier from Iqaluit accompany the crew to the Mackenzie Delta field site.

Photo: Environment Canada

Monitoring Oil Sands Contaminants in Migrating Waterfowl

May 1, 2013 – October 31, 2013

MAIN INVESTIGATOR:

Lukas Mundy, Biologist, Environment Canada

WILDLIFE RESEARCH PERMIT NUMBER:

WL500128

LOCATION:

The study was conducted near the community of Fort Resolution, NWT. During the spring of 2013, mallard ducks (*Anas platyrhynchos*) were collected by local hunters from the Deninu K'ue First Nation from sites on the Little Buffalo River, the Slave River and the Slave River Delta.

PARTNERS:

- Deninu K'ue First Nation
- Joint Canada-Alberta Oil Sands Monitoring Program
- Alberta Innovates Technology Futures (AITF)
- Alberta Trapper's Association (ATA)
- All participating hunters

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RATIONALE:

There is great concern about the effects of oil sands-related development and other industrial development and, related to this, the potential release of contaminants on wildlife species in northwestern Canada. However, very little information is available about the possible contamination of waterfowl that migrate through the oil sands region during their spring migration north. Tailings ponds are believed to be the main sites at which contamination of the ducks could occur. Some ducks that land in tailings ponds are often lightly oiled and still able to fly. In such cases, it is believed the exposed ducks would be able to transport chemicals as they migrate north from these toxic water bodies. Ducks that escape tailings ponds might also be shot by hunters, resulting in the possibility that contaminated meat will be consumed.

OBJECTIVES:

- The main objective of this work is to provide information on oil sands-related contaminants, such as polycyclic aromatic hydrocarbons (PAHs), naphthenic acids and heavy metals that waterfowl may be exposed to while migrating through the oil sands region of Alberta. These specific chemicals are being studied because they are found in tailings ponds. The mallards collected near Fort Resolution, NWT make up our most northern collection sites. We want to compare the chemicals found in these birds with those collected at sites to the south to find out whether mallards to the north of the oil sands region have higher contaminant levels in their tissues than those collected south of the oil sands region.

METHODS:

This project relies completely on the participation of local hunters and traditional collectors. In the NWT,

hunters from the Deninu K'ue First Nation were asked to collect 20 adult mallards from their traditional territories near Fort Resolution. Hunters provided location information, bagged the duck carcasses in clean plastic bags and shipped them frozen to the National Wildlife Research Centre (Environment Canada Laboratory) in Ottawa, ON. On arrival, the birds were inspected for external oiling and dissected for toxicological assessment. Mallards were also collected in the province of Alberta at locations south of, and north of, the oil sands region, including the Peace-Athabasca Delta. We are currently analyzing these samples for the presence of oil sands-related contaminants. This will give us some insight into whether migratory mallards are potentially being exposed to oil sands-related contaminants as they fly north in the spring.

RESULTS AND MAIN CONCLUSIONS:

Results to date are preliminary. In spring 2013, with the help of local hunters, we were able to collect a total of approximately 100 mallards from various locations across the province of Alberta and from near Fort Resolution, NWT. These mallard samples have been dissected and the tissues collected (kidneys, liver, gallbladder, breast muscle) are currently in storage in the National Wildlife Specimen Bank at the National Wildlife Research Centre (Ottawa, ON). The analysis for heavy metals (25 metals) and PAHs in liver samples is underway. More time is necessary to properly analyse and evaluate these mallard samples. However, once the analysis is complete, a scientific report will be generated after the participating communities have been briefed and involved.

This waterfowl collection project is also part of a larger wildlife collection project titled "Hunter/Trapper Harvested Wildlife Contaminants and Toxicology" that is being funded through the Joint Canada-Alberta Oil Sands Monitoring Program (JOSM). This larger wildlife collection project is aimed at analyzing fur-bearing mammal carcasses that have been submitted by local hunters and trappers from across the province of Alberta for the presence of oil sands-related contaminants. Additional information about this project and about waterfowl collection locations can be found in the "Wildlife Contaminants" section of the JOSM information website: http://jointoilsandsmonitoring.ca.

LONG-TERM PLANS AND RECOMMENDATIONS:

At this point in time, not enough information is available to discern long-term plans or recommendations from this particular project. From an oil sands perspective, continued future environmental monitoring projects in northern Alberta and the NWT may be warranted given the planned increase in oil sands development over the decades to follow.

COMMUNITY INVOLVEMENT:

We are thankful members of the community of Fort Resolution, NWT were able to help in the collection of waterfowl for this project. At this point in time, we have yet to report back to the community. We will do so when our analysis is complete.

Densities and Population Trends of Tundra Birds at TERS Daring Lake, NWT

June 1, 2013 – September 30, 2013

MAIN INVESTIGATOR:

Joachim Obst

WILDLIFE RESEARCH PERMIT NUMBER:

WL500144

LOCATION:

The Daring Lake Tundra Ecosystem Research Station (TERS), NWT.

PARTNERS:

- The study was sponsored in kind by the Department of Environment and Natural Resources (ENR). The field work was conducted at own time by the primary investigator.

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RATIONALE:

Monitoring the impacts of climate change on vegetation, habitats and breeding birds on the tundra because populations of some bird species increased, some remained stable, others declined or disappeared completely and new species appeared in the TERS study area.

OBJECTIVES:

- To record habitat changes, breeding densities and population trends of tundra birds; and
- To use the data for monitoring the state of the environment and for conservation efforts.

METHODS:

Breeding birds in the TERS study area (2,673 ha) were observed and recorded during surveys on foot. Satellite imagery was used for plotting locations of nest sites, vegetation and habitats. Beached loon feathers and egg shells were collected for contaminants analysis.

Photo: J. Obst

Rough-legged hawk chicks.

Photo: J. Obst

Semipalmated sandpiper at Daring Lake.

RESULTS AND MAIN CONCLUSIONS:

Spring arrival of birds was a week earlier than normal. A total of 1,413 occupied nest sites and habitats of 32 bird species were plotted on vegetation maps. The numbers of songbird breeding pairs on the main study plot (100 ha) were the highest on record with 534 occupied nest sites. The causes for this increase were:

- Increasing growth of tall shrubs provided more habitats for shrub-depending birds such as four species of sparrows and warblers which increased by 31.9 percent within a year;
- Spreading of low shrubs provided more nest-cover and protection for meadow-breeding birds such as larks, longspurs and pipits which increased by 34.4 percent within a year; and,
- The reproductive success of songbirds already was higher than usual in previous years.

Shorebird breeding populations increased slightly. A bad weather period during the nesting period caused nest failures for nearly all raptors. The numbers of three loon species declined from 29 to 22 occupied territories and only two chicks were raised due to nest failures caused by strong winds washing out nests and predation by bald eagles and red foxes. The numbers of staging and nesting ducks were low but stable for eight species. Greater scaup (*Aythya marila*) completely disappeared while counts of black scoters (*Melanitta nigra*) increased.

The main conclusion is that breeding populations of songbirds increased while most other bird populations remained stable except for the vanishing of greater scaup ducks.

LONG-TERM PLANS AND RECOMMENDATIONS:

The results of this study will be published. Recommendation is to continue this study because climate change impacts on wildlife habitats and bird populations are considerable.

COMMUNITY INVOLVEMENT:

Field assistants from communities will be involved if funding becomes available.

Gull Surveys on Frame Lake, Yellowknife

May 2013 - August 2013

MAIN INVESTIGATOR:

Myra Robertson, Population Management Biologist (Waterfowl), Canadian Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500148

LOCATION:

Frame Lake, within the city of Yellowknife, NWT.

PARTNER:

- Canadian Wildlife Service (CWS)

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RATIONALE:

Gulls are present within the city of Yellowknife throughout the summer. In addition to scavenging for food at the nearby dump, they commonly scavenge for garbage and loaf in the downtown area. The City is trying to reduce numbers of gulls at the dump because of concerns with bird-aircraft collisions at the nearby airport.

A gull colony recently has established on two islands on Frame Lake, located in the center of Yellowknife. It is unclear whether the presence of this colony has or will lead to an increase in human-gull interactions. Information on gull use of Frame Lake could help in the development of mitigation measures to reduce gull-human interactions, should such measures be required in the future.

OBJECTIVES:

- To gather a second year of basic information on the species, numbers, and timing of gulls breeding on Frame Lake during 2013;
- To repeat surveys on two islands in the southern part of Frame Lake where gulls had nested in previous years; and
- To expand gull nest searches to cover the rest of the lake.

METHODS:

The two islands in the southern part of Frame Lake were monitored from the shoreline twice per week during the breeding season. A spotting scope and binoculars were used to identify and count birds. Each island was surveyed from multiple view points along the shoreline to ensure maximum coverage. On June 18, the islands were accessed by canoe and a ground survey was done to confirm the locations of nests and count eggs. An additional survey was completed on June 21 to survey the remainder of the lake for additional gull nesting locations.

Photo: Paul Woodard, Environment Canada

Herring gull nest.

RESULTS AND MAIN CONCLUSIONS:

Overall, gull numbers were lower in 2013 than in 2012 but abundance was consistent throughout the summer. The number of gull nests doubled in 2013 due to an increase in nesting ring-billed gulls. Only a single California gull was observed in 2013 compared to five in 2012 but there were a similar number of mew and herring gulls observed in both years.

In 2012, a large number of ring-billed gulls, which were believed to be potential nesters, abandoned Islands 1 and 2. Gull numbers steeply declined after May 30, 2012 and the population never returned to the islands. Their departure was attributed to the presence of a fox on the island in early May, which was able to gain access to the island because of extensive ice cover on the lake. In contrast, the ring-billed gull population was relatively stable throughout May and June of 2013. While only a single ring-billed gull nest was discovered in 2012, 34 nests were found in 2013. There was no evidence of mammalian predators on the island despite similar ice cover in 2013. Moreover, it appears that ring-billed gull nesting in 2013 occurred later, after the ice was gone. Later nesting and the absence of mammalian predators on the islands in early May could explain the steady population numbers observed in 2013. Though nest success was not determined, the presence of many

juvenile gulls at the end of the season suggests that at least some nests were successful.

The islands in Frame Lake also provide habitat for nesting common and Arctic terns as well as ducks, shorebirds, songbirds and loons. A search of the remainder of the lake identified nesting locations for Bonaparte's, herring and mew gulls as well as lesser scaup and mallard.

A more detailed report outlining the results from the 2013 surveys is available from CWS, upon request.

LONG-TERM PLANS AND RECOMMENDATIONS:

Gulls nesting on Frame Lake will be monitored in future years, as opportunity and funding permit.

COMMUNITY INVOLVEMENT:

The CWS in Yellowknife hires local summer students with experience in biology or renewable resources to assist in the field and office. Reid Hildebrandt, a summer student with CWS, collected the data for the gull surveys.

We thank Velma Sterenberg, a local Yellowknife resident, for her continued efforts to inform CWS of interesting bird and other wildlife observations in the Frame Lake area.

Photo: Paul Woodard, Environment Canada

Surveying gull nests on Frame Lake.

Photo: Paul Woodard, Environment Canada

Vocalizations and Other Sounds as Tools to Document Population Structure of the Wilson's Snipe Across its North American Breeding Range

June 2013

MAIN INVESTIGATOR:

Dr. Edward H. Miller, Memorial University,
St. John's NFLD c/o Paul Woodard,
Canadian Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500149

LOCATION:

Area along Highway 3 between the communities of Behchokǫ and Yellowknife, North Slave Region, NWT.

PARTNER:

- Canadian Wildlife Service

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RATIONALE:

Calls and other sounds of Wilson's snipe and related shorebird species are innate and hence are not affected by learning, unlike in songbirds. Shorebird sounds therefore have the potential to provide information about population structure, especially in widely distributed species. The Wilson's snipe was chosen for this study because it is likely to show population structure over its vast North American breeding range (western Alaska south to California and east to Newfoundland and Labrador and the northeastern United States). Sounds from throughout this range have been obtained and analyzed but there are several large areas with no known recordings, including the NWT. It is important to fill this gap to improve geographic coverage and complete the analyses.

Recording equipment set up to obtain sound recordings of male Wilson's snipe.

Photo: Paul Woodard, Environment Canada

OBJECTIVE:

- To obtain sound recordings (calls plus non-vocal tail sounds given in display flights) from breeding male Wilson's snipe from the NWT for inclusion in a continent-wide study.

METHODS:

Sound recordings of different displaying birds were taken during the breeding season using an Earthsong E3AHD bio-acoustic monitoring unit. Birds were located by sound from the highway and observers then hiked in to areas closer to where they were displaying. Recordings were taken from distances great enough so as not to disturb the birds and averaged about ten minutes in length. Sounds samples were saved as digital files in wave format, and analyses will be conducted using Raven Pro 1.5 (Cornell University) and Praat 5.3.45, www.fon.hum.uva.nl/praat/, software.

RESULTS AND MAIN CONCLUSIONS:

Display sounds of seven individual Wilson's snipe were recorded from areas along Highway 3 in June 2013. These sounds have not yet been analyzed at the time of this summary report so detailed results and main conclusions are not currently available.

LONG-TERM PLANS AND RECOMMENDATIONS:

Additional surveys have not been planned for 2014.

COMMUNITY INVOLVEMENT:

The Canadian Wildlife Service (CWS) in Yellowknife hires local summer students with backgrounds in biology or renewable resources to assist in the field and office. Reid Hildebrandt, a summer student with the CWS, assisted with data collection for the study.

Wilson's snipe.

Photo: Gennyne McCune

Western Canada Cooperative Banding Program – Stagg River Station

2013

MAIN INVESTIGATOR:

Jon Klimstra, Wildlife Biologist,
United States Fish and Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500060

LOCATION:

Stagg River Delta, located approximately 13 miles southeast of Behchokǫ, NWT.

PARTNER:

- Canadian Wildlife Service

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RATIONALE:

This station is one of approximately 20 banding stations in western Canada that band pre-season waterfowl in the support of waterfowl management in North America.

OBJECTIVES:

- Pre-season banding of: 2,000 mallards 1,500 northern pintails and 1,000 of all other waterfowl species at each of the approximately 20 banding stations in western Canada. In 2013, the Stagg River station banded 767 ducks including: 289 mallards, 330 American green-winged teal, 20 American wigeon, 1 blue-winged teal, 126 northern pintail and 1 northern shoveler.

METHODS:

Swim-in bait traps will be used. Traps: 8'x8'x4'-1"x 2" mesh welded wire with loafing platforms. Bait: approximately 4,000 lbs. of "cleaned" Canadian barley was used.

RESULTS AND MAIN CONCLUSIONS:

A final report is available upon request.

LONG-TERM PLANS AND RECOMMENDATIONS:

This station will continue to be operated and band pre-season waterfowl.

COMMUNITY INVOLVEMENT:

Since the inception of this station, we have utilized local business for lodging, fuel, groceries and supplies.

Photo: GNWT/S. Yuill, ENR

Whooping Crane Ecology and Rehabilitation

May 1, 2013 - September 1, 2013

MAIN INVESTIGATOR:

Mark Bidwell, Species at Risk Biologist,
Canadian Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500126

LOCATION:

Work is conducted within a 200 km radius of 60°10'N, 113°20'W. The nearest community is Fort Smith, NWT. Most whooping cranes breed within Wood Buffalo National Park (WBNP), however, there are several nests north of the Nyarling River outside the northern park boundary and two nests in Lobstick marsh, which is just east of the Little Buffalo River east of the park boundary.

PARTNERS:

- United States Geological Survey
- United States Fish and Wildlife Service
- Crane Trust
- Platte River Recovery Implementation Program
- Parks Canada
- International Crane Foundation
- Gulf Coast Bird Observatory

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RATIONALE:

The whooping crane recovery strategy aims to protect, restore and manage whooping crane populations to be self-sustaining in the wild and to down list the species' status under the *Species at Risk Act* (SARA) from Endangered to Threatened. A key component of the recovery is to monitor whooping crane breeding grounds in, and around, WBNP. Data are used to identify and update areas designated as critical habitat (CH) under SARA. At present, there are fewer than 300 individuals in the Wood Buffalo-Aransas whooping crane population, the only naturally-occurring population remaining. Due to the small population size, breeding individuals are closely monitored allowing considerable information of the population's demography. This is achieved annually by conducting: (1) aerial surveys of breeding pairs and nests (May) and (2) aerial surveys of fledging success (July/August). In some years, (3) aerial surveys of hatching success (June) are also conducted. Environment Canada has conducted this work in WBNP annually since 1966.

OBJECTIVES:

- To monitor and understand the breeding ecology of whooping cranes in WBNP and the surrounding area for population monitoring. Datasets acquired during monitoring are used to identify and designate areas as CH under SARA and to estimate the relative abundance of breeding pairs annually.

METHODS:

Due to the inaccessibility of the whooping crane nesting area, aerial surveys are necessary to monitor breeding whooping cranes. Surveys of this nature have been conducted on the breeding grounds since 1966. Breeding pair surveys occur between May 1 and 30. During these surveys, observers record GPS coordinates for

Photo: Mark Bidwell, Canadian Wildlife Service

Whooping crane fitted with leg bands and a transmitter.

whooping crane nests (documenting clutch size when possible), non-nesting pairs and lone birds. Fledging surveys occur between July 20 and August 10 and record locations of family groups, pairs and lone birds. During all aerial surveys, any observations of colour leg bands are recorded. Surveys are normally conducted from an altitude of about 300 m AGL, although lower passes may be required to determine colour leg band information.

In 2013, surveys to locate and count whooping crane breeding pairs and nests in, and around, WBNP were conducted by Mark Bidwell (May 22-26) with the assistance of John Conkin (Canadian Wildlife Service (CWS); May 22-26), Sharon Irwin (Parks Canada (PCA); May 22-24, 26) and John McKinnon (PCA; May 25). Surveys were performed over 27 hours using a Eurocopter 120 Colibri helicopter piloted by Mark Rayner of Wood Buffalo Helicopters (Fort McMurray).

Surveys to locate and count fledged whooping cranes were conducted by Mark Bidwell (CWS), John Conkin (CWS) and John McKinnon (PCA), August 1-4. Surveys were conducted over 25.2 hours again using a Eurocopter 120 Colibri helicopter piloted by Mark Rayner of Wood Buffalo Helicopters.

RESULTS AND MAIN CONCLUSIONS:

During breeding pair surveys, 74 nesting pairs of whooping cranes were detected. The number of nests detected in 2013 represents the second highest count on record. In addition to nesting pairs, 21-25 territorial pairs were detected suggesting potential for substantial population expansion in upcoming years. Because cranes may move over the duration of the survey, this range reflects the possible number of unique pairs. Eight nests were found outside of WBNP (this is the highest count ever); two in the Lobstick Creek/Foxholes area; and, six north of the Nyarling River. A single nesting pair was found in a previously undocumented nesting area. This pair was identified through regular review of locations of whooping cranes fitted with satellite transmitters.

During fledging surveys, observers detected 28 fledged young. All family groups had a single offspring. The number of fledged young per nest was 0.38, lower than the 20-year average of 0.48 but within the long term natural range of variation.

LONG-TERM PLANS AND RECOMMENDATIONS:

It is very rare in wildlife ecology to be able to monitor an entire population and track individuals for extended periods of time. Due to the small size of the Wood Buffalo-Aransas whooping crane population, the birds' size and colour and their high degree of territoriality, it has been possible to monitor it with great detail, paying attention to population and individual attributes. This long term data has provided incredible insight to the populations' growth, obstacles and path to recovery.

Despite a healthy average annual growth rate of 4 percent, reaching the recovery goal of 1,000 birds in the wild is many years away. The long-term plans for this project are to continue monitoring breeding effort and chick production. We would like to relate these variables to habitat conditions and quality to better forecast future expansion of the breeding grounds and future impacts such as global warming and changes in water quality and quantity.

COMMUNITY INVOLVEMENT:

Local communities were contacted requesting comment, local knowledge and other feedback regarding this research. The following communities were consulted: Salt River First Nation (SRFN), Fort Smith Métis Council, Smith's Landing First Nation, Hay River Métis Council, Katlodeechee First Nation, West Point First Nation, Fort Resolution Métis Council and Deninu K'ue First Nation. In August, Mark Bidwell met with Chief Frieda Martselos of the SRFN to discuss work conducted by CWS on SRFN lands, including the possibility for future collaboration between CWS and the First Nation. Of particular interest to both parties is the possibility of mitigating the impact on cranes by recreational users of the SRFN reserve in the Foxholes/Lobstick area. CWS and SRFN agreed to remain in contact and, if possible, for CWS to make a presentation to the Band Council on activities related to whooping crane conservation.

In October, Mark Bidwell presented whooping crane scientific research at the third biennial South Slave Regional Wildlife Workshop in Fort Smith, NWT. This workshop was attended by representatives of local First Nations and Métis communities and non-Aboriginal people. We remain open for further consultation with the aforementioned bodies and other interested stakeholders.

Photo: John McKinnon

Western Canada Cooperative Pre-season Waterfowl Banding Program – Mills Lake Station

August 7, 2013 – August 25, 2013

MAIN INVESTIGATOR:

David Fronczak, Wildlife Biologist,
United States Fish and Wildlife Service

WILDLIFE RESEARCH PERMIT NUMBER:

WL500178

LOCATION:

Mills Lake is located 21 miles WNW of Fort Providence, NWT. Banding was conducted within the marsh on the east end of the lake. Operation was conducted between August 7 and 25, 2013.

PARTNERS:

- South Slave Region – GNWT (permits)
- Fort Providence Community (supplies, gas, and logistical assistance)
- United States Geological Survey, Bird Banding Laboratory (bands)

CONTACT:

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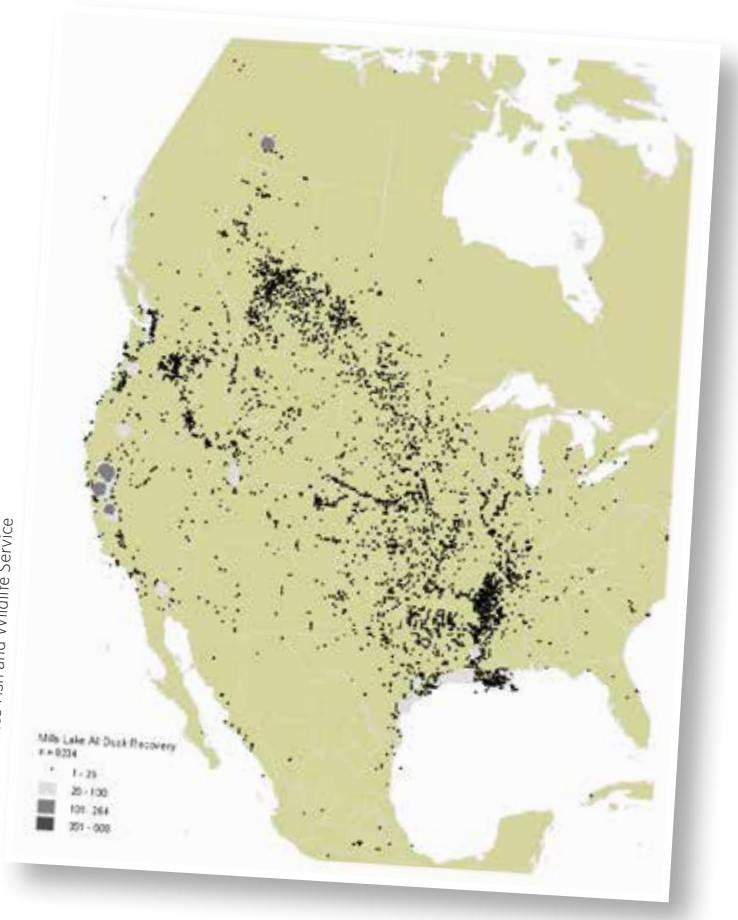
Photo: John McKinnon

Baited wire funnel trap.

RATIONALE:

Pre-season waterfowl banding at Mills Lake, NWT has been an ongoing event since 1964. Within the 40 years of operations, approximately more than 88,000 waterfowl have been banded. Recovery information is used to help determine migration routes, assess harvest pressure, measure vulnerability to harvest pressure, estimate waterfowl production rates and estimate survival rates of a breeding population. Mills Lake has proven to be an important area towards the overall waterfowl population monitoring program by providing a cost effective way to sample a segment of the boreal breeding population.



Map: United States Fish and Wildlife Service

Mills Lake duck band recovery locations.

OBJECTIVE:

- To pre-season band 1,000 mallards (of each cohort) for the combined banding effort at Mills Lake station.

METHODS:

Waterfowl were trapped within baited wire funnel traps. Traps were placed in strategic areas within the marsh and then checked daily after baiting has been initiated. Caught birds are then herded into a catch box for processing. Biological information such as species, age, sex, date and location are then recorded for each bird. A federal aluminum band is placed on the bird's leg and then released. Each band has a unique number which links the collected biological information to that bird. Persons that encounter banded birds are highly encouraged to report the band number back to a wildlife agency, Government of the Northwest Territories or to the Canadian Wildlife Service's Banding Office, 1-800-327-band or at www.reportband.gov.

RESULTS AND MAIN CONCLUSIONS:

A total of 2,427 ducks were banded (667 mallard, 1,706 northern pintail, 34 American green-winged teal, 18 American wigeon, one northern shoveler and one blue-winged teal) over a 12 day period (August 12-24). For mallard and northern pintail, the percentage of young totaled 26 percent, and 21 percent, respectively. Sixty-three previously banded ducks were captured, consisting of 12 mallard and 51 northern pintail. Detailed information can be obtained from the Mills Lake 2013 Preseason Banding Report from the South Slave GNWT office.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans include the continuation of annual preseason banding at Mills Lake. Mills Lake is a unique staging area for waterfowl and logistically feasible for gathering pertinent information on waterfowl for population monitoring/management that pertain specifically to the Mackenzie River's boreal forest region. Recommendation is for regional community and resource management agency continued support for preseason banding within Mills Lake.

Dehcho Boreal Caribou Collar Deployment

April 1, 2012 – March 31, 2013

MAIN INVESTIGATOR:

Nic Larter, Manager Research and Monitoring, Environment and Natural Resources, GNWT, Dehcho Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL005037

LOCATION:

This is an ongoing study, initiated in March 2004, which has increased in size and scope to include the traditional areas of eight Dehcho First Nations and includes the area of the Dehcho region east of the Mackenzie Mountains. The study area is adjacent to the Hay River Lowlands study areas where female boreal caribou have been collared by the South Slave Environment and Natural Resources (ENR) Region as part of another study. The ten collars deployed under this permit were within the study area outlined on the map. All the collars deployed were GPS units with the capability of providing location data for up to five calving periods. One unit is an Iridium-based model we are trying out for the first time; it also provides ambient temperature with each satellite location. All other units are ARGOS based.

PARTNERS:

- Environment Canada provided funding assistance.
- The Cumulative Impacts Monitoring Program provided funding assistance.
- First Nation partners include: Sambaa K'e Dene Band, Liidlii Kue First Nation, Fort Simpson Métis Local, Jean Marie River First Nation, Pehdzeh Ki First Nation, Nahanni Butte Dene Band, Acho Dene Koe Band and Ka'a'gee Tu First Nation.

RATIONALE:

Baseline data on boreal caribou in the Dehcho are lacking. Oil and gas exploration is anticipated to continue and increase in the future, especially with the proposed Mackenzie Gas Pipeline. To ensure informed land use decisions are made in regard to the maintenance of boreal caribou populations in the Dehcho radio collars were deployed on female boreal caribou starting in March 2004.

Since 2004, a combination of satellite, GPS and VHF collars have been deployed on female boreal caribou to document seasonal range use, seasonal movements, detailed daily movements, and fidelity to calving areas of female caribou over multiple years in areas of boreal caribou range which have had limited to moderate fire and seismic disturbances. VHF collars were deployed only once in 2006 and the use of satellite collars has been phased out during the course of the study. GPS units providing three locations per day and with a lifespan of five calving periods are the standard units we are deploying. Collars and the annual spring classification survey provide estimates of calf and adult female survival as well as calf production which provide annual estimates of the rate of population change.

These data will be used to monitor the population and to determine habitat use and habitat requirements, assist in the delineation of secure and critical habitat, assist in the development of range plans, and to assess impacts of potential resource development. More specific details are available in the annual Dehcho Boreal Caribou Progress Report, April 2012 located at www.enr.gov.nt.ca/_live/documents/content/ProgRep7_Dehcho_Boreal_Caribou_Study_March11_v2.1.pdf.

Photo: GNWT/D. Allaire, ENR

Collared borreal caribou in the Dehcho region.

OBJECTIVES:

- To monitor annual calf production, calf survival, and adult survival in order to make annual estimates of λ;
- To ensure that the distribution of collared boreal caribou covers key areas throughout the range of boreal caribou in the Dehcho region;
- To determine the calving period and the degree of fidelity of female caribou to calving areas over multiple years in areas with a range of seismic and fire disturbance history;
- To use location data of female boreal caribou over multiple years overlaid with the current human footprint and wildfires to determine areas of high use and areas of avoidance by female boreal caribou in the landscape, and whether there is a seasonal component;
- To provide empirical data to determine areas of secure boreal caribou habitat, given the current human footprint, and to compare this to the predictions and robustness of the study completed to predict high value boreal caribou habitats in the Dehcho;
- To provide current knowledge of boreal caribou ecology for use with evaluating land use applications made in the Dehcho;
- To provide empirical data for RSF modeling to assist with assessing important habitat types and areas;
- As development occurs, to be able to assess responses of female caribou in relation to their use of space in the landscape;
- To provide empirical data for assisting in the development of range plans;
- To continue to document cause of death of collared animals as the opportunities arise; and
- To continue to document and assess disease and parasites in boreal caribou.

CONTACT:

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METHODS:

Adult female caribou were live captured by a professional net-gunning team using techniques approved by the ENR Wildlife Care Committee and used in previous collar deployments. The net is fired by a gunner in the helicopter and captures the caribou.

Blood, hair and fecal samples, a neck girth measurement and photos of the teeth were collected from each female caribou as long as the opportunity was provided.

A more detailed methodology and description of the collars and their duty cycles can be found in the Dehcho Boreal Caribou Progress Report, April 2009.

RESULTS AND MAIN CONCLUSIONS:

GPS collars were deployed successfully on ten female boreal caribou throughout the Dehcho Region, five on females north of the Mackenzie River and five on females south of the Mackenzie River. Nine were Telonics Gen IV GPS ARGOS collars and one was a Vectronic GPS-Plus 2 Iridium collar. All collars are equipped with release mechanisms. The Telonics collars are programmed to release in June 2017 and the Vectronic in January 2018.

LONG-TERM PLANS AND RECOMMENDATIONS:

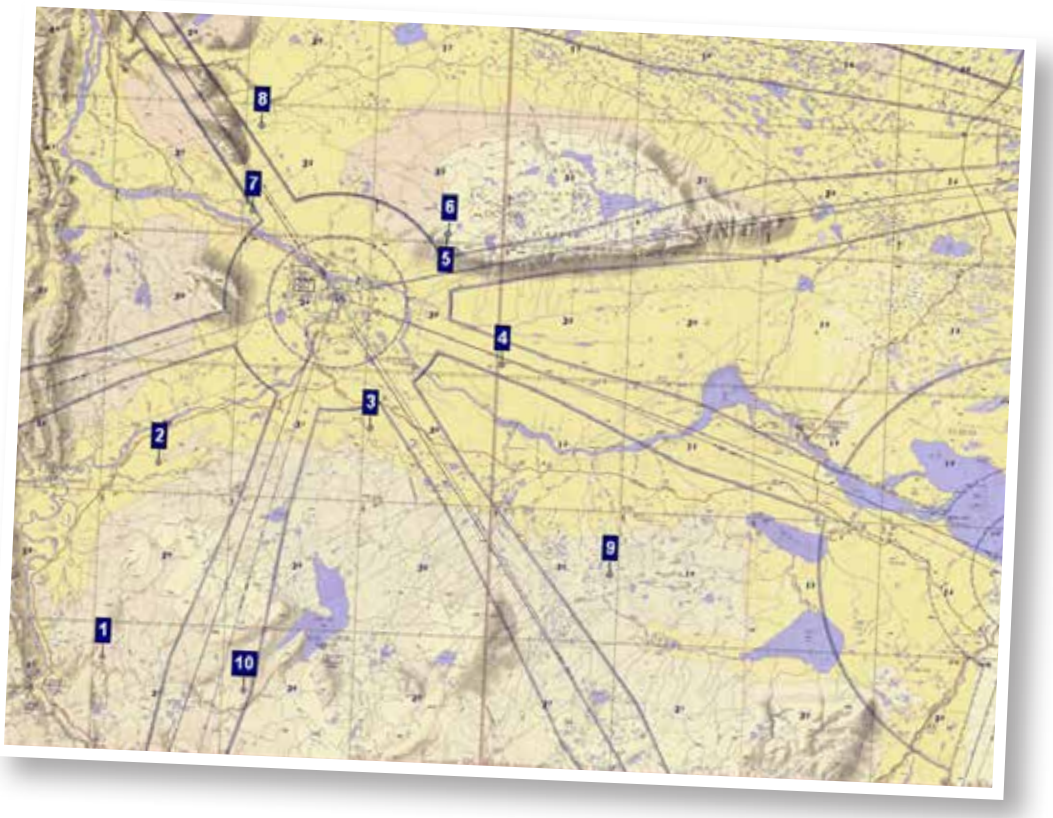
Monitoring of collared caribou will continue through the life of the collars currently deployed to better refine local and landscape seasonal patterns of use over extended periods of time. Detailed analyses are currently being conducted with results to be used for environmental assessments of land use activities and the development of range plans among other things. An annual report of the program is being prepared. Additional collars are to be deployed in February 2014 to ensure there are at least 30 functioning collars on female boreal caribou annually.

COMMUNITY INVOLVEMENT:

The eight local First Nation partners provided information on where they would like caribou collared and indicated animals currently collared be used for locating other caribou to capture for collar deployment.

The program was reviewed and critiqued by First Nations delegates at the 6th biennial Dehcho Regional Wildlife Workshop in October 2012. There was consensus that ten collars be deployed on female caribou in February 2013 with a minimum of one in each First Nation partner's traditional area as requested.

Boreal caribou collar deployment sites.



Map: GNWT/ENR

Boreal Caribou Monitoring – Hay River Lowlands (Ka'a'gee Tu Candidate Protected Area) and Cameron Hills

May 2012 – March 2013

MAIN INVESTIGATOR:

Allicia Kelly, Manager Research and Monitoring, Environment and Natural Resources, GNWT, South Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500045 (May –December 2012)

LOCATION:

The combined study area (Hay River Lowlands and Cameron Hills) is bounded by Hay River to the east, the Mackenzie River and Great Slave Lake to the north, the Redknife and Kakisa Rivers to the west and the Hay River to the south.

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RATIONALE:

Boreal caribou monitoring is required to determine if these ranges are providing sustainable habitat for boreal caribou, to understand how boreal caribou respond to development, climate change and other pressures, and to make effective management decisions that will conserve boreal caribou for future generations. This study has been ongoing since 2003 and has provided valuable information on boreal caribou population demographics, condition and habitat selection in South Slave region. Monitoring was limited in 2012 due to very few collared cows in this area and postponed funding. Twenty-five collars were deployed in February 2013, which is covered under wildlife research permit WL500106.

OBJECTIVES:

- To monitor population demographics: adult female survival, calf production, ten-month calf recruitment, and finite rate of population increase (the relative change in size of population from one year to the next);
- To document seasonal range use, annual home ranges and fidelity to calving areas (whether cows use the same area to calve year after year); and
- To examine boreal caribou habitat use and selection in relation to natural and human caused disturbance (e.g. wildfire, development) and landscape features (e.g. forest type).

METHODS:

Monitoring was limited during this period due to very few collared cows in this area and postponed funding. GPS collars are programmed to collect three locations per day, 365 days/year.

A recruitment survey was not conducted in March 2012 because there were too few collars to assist with locating

Photo: GNWT/A. Kelly, ENR

Boreal caribou.

groups of caribou to classify and to calculate cow survival (needed to calculate lambda and population trend).

RESULTS AND MAIN CONCLUSIONS:

As of April 1, 2011, in the Hay River Lowlands study area, there were two active GPS collars and six active VHF collars. The two GPS collars released in July 2011 and were retrieved in August 2011.

As of February 2011, four of the six VHF collared caribou were still alive. Three of the remaining VHF collars were scheduled to drop in June 2012 and one is scheduled to drop in April 2013.

As of April 1, 2011, in the Cameron Hills area, there were two active GPS collars managed by NWT. Both collars released in July 2011 and were retrieved in August 2011.

LONG-TERM PLANS AND RECOMMENDATIONS:

Future monitoring will focus on boreal caribou habitat north of the Cameron Hills. We recommend that monitoring of boreal caribou continue with a minimum of 25 collared cows in the study area. Caribou movement and location data also provides valuable data on how caribou use the habitat available to them. Meetings will be held with partners to discuss additional program priorities and share information.

COMMUNITY INVOLVEMENT:

Local observers are used when possible for surveys. Results are shared and discussed at community based meetings including the biennial regional wildlife workshops.

Collaring and Photo Survey of Tuktoyaktuk Peninsula, Cape Bathurst, and Bluenose-West Barren-ground Caribou

March 2012 – March 2013

MAIN INVESTIGATOR:

Tracy Davison, Regional Biologist,
Environment and Natural Resources, GNWT,
Inuvik Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL005407

LOCATION:

Range of the Tuktoyaktuk Peninsula, Cape Bathurst and Bluenose-West barren-ground caribou herds.

PARTNERS:

- Environment and Natural Resources
- Gwich'in Renewable Resource Board
- Parks Canada, western Arctic field unit
- Inuvialuit wildlife studies funds

CONTACT:

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RATIONALE:

Collars were deployed and used for the post-caving photo survey in July 2012. Periodic surveys of barren-ground caribou herds are required to monitor population trend and ensure the harvest is sustainable. Population estimates obtained for the Cape Bathurst and Bluenose-West suggest these herds declined between 2000 and 2006 but appear to have stabilized between 2006 and 2009.

OBJECTIVES:

- To collar caribou in each herd;
- To conduct photo survey to obtain population estimate for each herd; and
- To monitor caribou movement and range use by GPS collar.

METHODS:

A fix-wing aircraft is used to fly a reconnaissance before collaring to ensure collars are deployed throughout the distribution of caribou. Caribou are captured with a net gun from a helicopter using standard protocols to minimize impact of this activity. The collars are used to monitor the caribou and for the post-calving photographic population survey. These surveys are conducted during early to mid-July when the caribou form large aggregations for insect relief. The groups are located by tracking radio collared caribou, which are then photographed. Caribou are counted on the photographs and herd size is estimated.

RESULTS AND MAIN CONCLUSIONS:

Between March 3 and 28, a total of 105 collars were deployed on adult caribou in the Tuktoyaktuk Peninsula (TP), Cape Bathurst (CB) and Bluenose-West (BW) barren-ground caribou herds. Collars were deployed in the known winter ranges of the herds with 46 collars (37 cows, 9 bulls) deployed on TP and CB animals and 59 collars (42 cows, 17 bulls) deployed on BW animals.

Bull caribou on the Tuktoyaktuk Peninsula.

Photo: GNWT/J. Pongracz, ENR

Post-calving photo survey was conducted in July. Results estimate the Tuktoyaktuk peninsula herd to be 2,192±178 (95% CI) animals, slightly lower than 2009 results. The Cape Bathurst herds was estimated at 2,427 (no CI available), a slight increase from 2009. The Bluenose-West herd was estimated to be 20,465±3,489 (95% CI), which is not significantly different than the 2009 estimate.

LONG-TERM PLANS AND RECOMMENDATIONS:

These barren-ground caribou herds will continue to be monitored with the next population estimate scheduled for 2015.

Monitoring of the Bathurst and Bluenose–East Caribou

2012-2013

MAIN INVESTIGATOR:

Bruno Croft, Manager Research and Monitoring,
Environment and Natural Resources, GNWT,
North Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500015

LOCATION:

Survey area is expected to extend from Déline, south of Great Bear Lake, Keller Lake and Grandin Lake, and all areas between the communities of Behchokǫ, Whatì, Gaméti, Wekweeti, Dettah and Łutselk'e.

CONTACT:

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Environment and Natural Resources
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RATIONALE:

In order to ensure barren-ground caribou herds remain healthy, a number of monitoring actions must be undertaken on an annual basis to provide decision makers with relevant information to address management objectives. The following monitoring actions are considered part of the core monitoring program at all-time regardless of the status of the herd.

The use of satellite collared caribou facilitates the monitoring of movement and distribution of migrating caribou on a weekly basis. For this purpose, community leaders, elders and the Department of Environment and Natural Resources have mutually agreed to deploy, maintain and manage up to 20 collars on Bathurst caribou cows annually.

In years when a calving ground photographic survey (Bathurst herd) and a post-calving photographic survey (Bluenose-East herd) are scheduled, a full complement of satellite collars must be deployed on caribou prior to these events. First, an intensive systematic reconnaissance survey must be conducted in March to determine main aggregation of wintering caribou in order to adequately allocate collar deployment efforts. A minimum of five days of flying transect surveys will take place between March 7-12, 2012 for that purpose.

Following the results of this survey, and depending on the number of existing Bathurst collars still operational in early April, it is expected that between 13 and 20 collars will be deployed to bring the total of active collars back up to 20 for the herd.

In the case of the Bluenose-East caribou herd, because of the technical and scientific requirements of the post-calving photographic survey, it is expected up to 60 collars will be deployed.

Photo: GNWT/B. Tracz ENR

Caribou calf.

Satellite collars also used for quantifying cow mortality, planning and in the design of various caribou surveys including the calving ground photographic survey.

The location of satellite collared caribou is also used for planning community hunts as requested by Aboriginal leaders.

The spring and fall composition surveys are also two important indicators of caribou herd health.

The late winter calf survival survey (spring survey) provides a measure of calf survival as they reach nine months of age and an index of recruitment for the herd. Normally, this survey is conducted late March or early April every year to provide a long term trend assessment of productivity regardless of the status of the herds.

The fall survey is conducted during the rut (mid-October) and is designed to assess the ration of bulls to

Photo: GNWT/B. Tracz, ENR

Caribou on the summer range.

cows in the herd. Usually a herd in decline and/or at low numbers will have a low sex ratio.

The sex ratio is one of the parameters needed to generate the total population estimate using the calving ground photographic census method. Usually, it is recommended to undertake a fall composition survey in the year prior to the next calving ground survey. In the case of the Bathurst herd, the calving ground work required for the next population estimate is planned for June 2012.

A fall survey was conducted in the fall of 2011 but due to bad weather resulting in questionable results, another survey is proposed and scheduled for October of 2012.

OBJECTIVES:

- To continue to acquire location data from satellite collars currently deployed on up to 20 cows on the Bathurst caribou herd;
- To measure annual calf survival in March-April 2012 and compare herd trends;
- To measure fall sex ratio in October 2012; and
- To deploy between 13 and 20 collars (20 if all existing collars fail before March) on Bathurst caribou females as per methods described below in late March 2012.

METHODS:

Satellite collars are programmed to transmit locations throughout the year. These locations are acquired from Service Argo and mapped weekly using ArcView GIS software and distributed to user groups by fax and email.

A systematic reconnaissance survey will be conducted to determine spatial distribution of wintering barren-ground caribou in the North Slave Region as well as pattern of density. A Turbo Beaver aircraft using wheels/skis will be used for this work. Transect lines will be spaced 20 km apart. A minimum of five days of flying transect surveys will take place between March 7-12, 2012 covering the area between Artillery Lake to the east to around Déline to the west.

Results of the systematic reconnaissance survey will indicate where collaring efforts need to be allocated for both the Bluenose-East and Bathurst herds.

A professional capture crew with an experienced helicopter pilot will be employed to conduct this operation. Only female caribou will be captured. There will be no pursuit of bull caribou. Handling of most caribou will last ten minutes or less (condition assessment, satellite collar fastened around animal's neck and photos taken of the head with collar number displayed and incisor tooth wear).

Results of the systematic reconnaissance survey, local information and the satellite collared caribou cow locations will determine the areas to be sampled during the March-April 2012 calf survival survey. A helicopter will be used to place the field crew near large groups of caribou. Caribou will be classified from the ground as calves, cows and bulls using a spotting scope.

Further aerial surveys (helicopter or fixed wing flown no lower than 300 m AGL) will only be conducted if unexpected events make it necessary to investigate caribou distribution over the Bathurst and Bluenose-East caribou range.

RESULTS AND MAIN CONCLUSIONS:

Results and main conclusions were not submitted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

Bathurst and Bluenose-East Caribou Health, Condition and Contaminants Monitoring

2012-2013

MAIN INVESTIGATOR:

Bruno Croft, Manager Research and Monitoring, Environment and Natural Resources, GNWT, North Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500016

LOCATION:

Bathurst and Bluenose-East caribou late winter and fall range (exact location to be determined based on current caribou locations).

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RATIONALE:

Health, body condition, disease and parasites of barren-ground caribou provide important information on the status of the herds and on the potential for population growth. Basic samples taken from animals harvested permit current levels of environmental contaminants to be determined and trends over time evaluated.

OBJECTIVES:

- To collect basic information on the health, diseases and parasites of Bathurst and Bluenose-East caribou to assess current status and monitor trends over time;
- To collect information on body condition of caribou on the Bathurst and Bluenose-East range during the fall and winter, which can be used to assess nutritional status and predict pregnancy rates;
- To collect information on the presence of environmental contaminants in caribou, to assess current exposure and trends over time; and

Caribou lymph node.

Photo: GNWT/J. Adamczewski, ENR

- To compare this information to previous information from the Bathurst caribou herd and other caribou herds across the north using a standardized protocol developed by the Circum Arctic Rangifer Monitoring and Assessment Network (CARMA) and previous collected by the Department of Environment and Natural Resources (ENR).

METHODS:

Health, condition and contaminant monitoring will be done on caribou harvested by community hunters in the North Slave caribou range in late winter and in the fall of 2012. Sample kits will be distributed to community caribou monitors who will supervise collection of samples at the community level with the assistance of ENR staff.

Field sampling and laboratory testing will be done using a standardized protocol developed by CARMA and from knowledge acquired from previous samples collected by ENR. Samples will be collected in the field and stored in a manner consistent with future testing needs. The level of information collected will be consistent with the less detailed Level I of the CAMRA sampling protocol.

Samples and information recorded will include: sex and age of animals harvested, location, back fat measurement, kidney (left) with fat, if females are pregnant or not in the winter, collection of the lower jaw with incisor teeth for aging, and, hunter score of their overall body condition assessment in the field.

Diseases and Parasites

No specific collection of parasites is included as part of this CARMA Level I protocol but hunters and community monitors are encouraged to report and/or collect samples if major diseases or parasites are present on animals harvested.

RESULTS AND MAIN CONCLUSIONS:

Results and main conclusions were not submitted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

Warble fly larvae on a caribou hide.

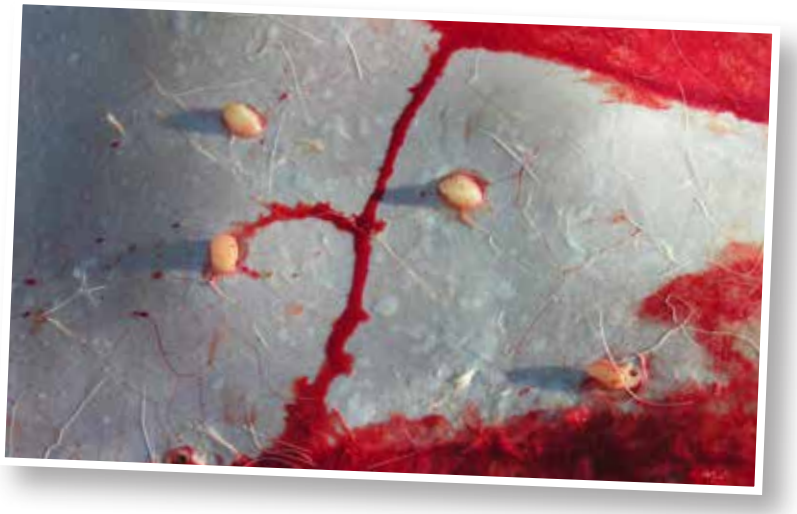

Photo: GNWT/J. Adamczewski, ENR

Small Mammal and Hare Surveys

June 2013 - September 2013

MAIN INVESTIGATOR:

Suzanne Carrière, Wildlife Biologist (Biodiversity), Environment and Natural Resources, GNWT

WILDLIFE RESEARCH PERMIT NUMBER:

WL500152

LOCATIONS:

Sahtu

Norman Wells:	65° 18'N; 127° 20'W
Tulita:	64° 54'N; 125° 34'W*
Carcajou Lake:	64° 39'N 127° 52'W *Special Project*

North Slave

Yellowknife:	62° 24'N; 114° 26'W
Tibbitt Lake:	62° 34'N; 113° 20'W *Hare only*
Daring Lake:	65° 00'N; 111° 30'W *Arctic Hare Special*

Dehcho

Fort Liard:	60° 39'N; 117° 29'W*
Fort Simpson:	62° 00'N; 122° 00'W
Trout Lake:	60° 26'N; 121° 15'W*

South Slave

Fort Smith:	60° 01'N; 111° 54'W
Fort Resolution:	61° 10'N; 113° 40'W
Fort Providence:	61° 20'N; 117° 40'W *Hare only*
Kakisa:	61° 00'N; 117° 20'W*
Tsu Lake:	60° 35'N; 111° 53'W
WBNP (AB):	59° 57'N 111° 40'W

Inuvialuit-Gwich'in

Inuvik:	68° 18'N; 133° 29'W

* Survey not performed in 2013 due to personnel unavailability. All surveys were done between June 1 and August 31, 2013.

OBJECTIVES:

The small mammal survey monitors changes in density of voles, mice, lemmings and shrews across five ecozones in the NWT. The hare transect survey monitors snowshoe hare density across all forested ecozones and an abundance index for Arctic hare at the tundra site.

METHODS:

Small mammal data is collected using snap-traps or live traps and reported as the number of trapped specimens per 100 trap-nights (capture index). Monitoring is done on standardized permanent trap lines. Usually 100 traps are out for five nights. Trap lines are checked at least each morning before 10:00 a.m. The trapping is planned for August each year but at some sites the survey is performed in June, July or September if other activities require a change in timing.

Hare data is collected on four transects at each site. Each transect consists of 20 permanent quadrats measuring 5.1 cm x 305.0 cm oriented along transect and evenly spaced 15-30 m apart. Hare fecal pellets deposited within each quadrat are then counted and cleared from the quadrat. The number of pellets per quadrat is then correlated to an estimate of hare density (number of hare per hectares) at each site.

RESULTS AND MAIN CONCLUSIONS:

In summer 2013, small mammal numbers were medium or low across the NWT.

Peaks in hare numbers have occurred in the NWT every 10 years or so, in 1962, 1971, 1980, 1990, and 1999-2000. Hare populations across the NWT remained low between 2002 and 2006 but increased rapidly in 2009 and may have peaked in 2010. This latest peak in numbers is not as high as in previous decades. Lower peaks are also observed in the Yukon. The hare numbers were low in

2011-2012 but both survey results and reports from NWT residents indicate they are increasing again.

Kurt Galbreath used some of the survey's specimens for his project "Biogeography and Coevolution of North American Mammals and Parasites" WRP500174.

Small mammal survey was performed at Carcajou Lake in August 2013 as part of a larger project on biodiversity (plants, moss and lichen) in the unglaciated part of the Mackenzie Mountains.

Small mammal specimens were sent to Museum of Southwestern Biology Division of Mammals, University of New Mexico (Jonathan Dunnum and Joseph Cook). Specimens were prepared for shipping in ENR regional lab by Kurt Galbreath (Northern Michigan University) and shipping permits were prepared by Sasha Ross (ENR).

Published in 2013:

Krebs, CJ., Kielland, K. Bryant, J. O'Donoghue, M. Doyle, F. McIntyre, C. DiFolco, D. N. Berg, S. Carrière, R. Boonstra, S. Boutin, A.J. Kenney, D.G. Reid, K. Bodony, J. Putera, H.K. Timm and T.Burke. 2013. *Synchrony in the Snowshoe Hare Cycle in northwestern North America*, 1970-2012. Canadian Journal of Zoology 91(8): 562-572.

Survey data were shared for:

A paper titled "What Factors Determine Cyclic Amplitude in the Snowshoe Hare Cycle? submitted to Journal of Wildlife Management December 2013. Data shared with Charles Krebs, UBC.

Ecozone evidence for key findings and for technical reports underpinning the summary report "Canadian Biodiversity: Ecosystem Status and Trends 2010". These are available at www.biodvcanada.ca.

Photo: GNWT/D. Allaire, ENR

Hare found in the Dehcho region.

PARTNERS:

- Environment and Natural Resources (ENR)
- Ka'a'gee Tu First Nation
- Sahtú Renewable Resources Board
- Gwich'in Renewable Resources Board
- Aurora College in Fort Smith

CONTACT:

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Small Mammal conditions in the website: www.arcticbirds.net, coordinated by Mikhail Soloviev, Department of Vertebrate Zoology, Lomonosov Moscow State University, Moscow, Russia.

LONG-TERM PLANS AND RECOMMENDATIONS:

This survey is part of long-term efforts to monitor the natural fluctuations in both forested and tundra ecosystems in the NWT. Plans are to continue the survey and expand the number of sites with community advice. The survey will be expanded to include communities which request it.

The information from both hare and small mammal surveys are used in many other projects, e.g. to predict furbearer abundance in the NWT. Other agencies or organizations also rely on results from the SMS and hare surveys to complement their studies.

CONTACTS AND PARTICIPANTS:

- **Carcajou Lake:** Richard Popko (ENR, Sahtú)
- **Daring Lake:** Steve Matthews (coordinator for ENR) and Daring Lake Tundra Science Camp
- **Fort Providence:** Sasha Ross and Kendra McGreish (ENR, Wildlife Division)
- **Fort Resolution:** Karl Cox and Kyle Beck (ENR, South Slave)
- **Fort Simpson:** Danny Allaire and Nic Larter (ENR, Dehcho)
- **Fort Smith:** Karl Cox and Heather Beck (ENR, South Slave)
- **Inuvik:** Kristen Callaghan, Alicia McRae and Ryan Brooks (Gwich'in Renewable Resources Board)
- **Kakisa:** not surveyed (Ka'a'gee Tu First Nation)
- **Tibbitt Lake:** Sasha Ross (ENR, Wildlife Division)
- **Tsu Lake:** (Aurora College) Linh Nguyen (coordinator), Catherine Graydon, Danny

MacDonald, Shannon Cazon, Debbie Simpson, Lee Mandeville, Ambe Chenemu, Kyle Nault, Michael Krutko, Tyanna Sienwand, Jessica Chenkie, Jaenette Lochart and Evelyn Biih Nebe

- **Norman Wells:** Stephanie Behrens and Kayla Chinna (ENR, Sahtú Region)
- **Yellowknife:** Suzanne Carrière, Sasha Ross, Bonnie Fournier, Kendra McGreish (ENR, Wildlife Division), Katarina Carthew (ENR, Water Resources), Patricia Flemming (volunteer), field class from Ontario Universities (Professor, Jennifer Baltzer)
- **Wood Buffalo National Park (on Alberta side):** Parks Canada staff.

COMMUNITY INVOLVEMENT:

Over the years, biologists from government, co-management board and non-profit organizations, Renewable Resources Officers, academic researchers, schools and colleges, academia and environmental consultants have all participated in data collection for both projects. At some sites, students assisted in data collection within research camps or school field courses. The success of the NWT small mammal survey and hare survey is possible because of the combined efforts of all project participants.

Photo: GNWT/N. Larter, ENR

Hare in its summer coat.

Unglaciated Sahtú Survey

August 9, 2013 – August 14, 2013

MAIN INVESTIGATORS:

Suzanne Carrière (Wildlife Biologist, Biodiversity, Environment and Natural Resources, GNWT), Richard Popko (Manager Research and Monitoring, Environment and Natural Resources, GNWT), Bruce Bennett ((Beringia fauna and flora specialist) Wildlife Biologist, Environment Yukon), René Belland (Bryophyte specialist, Devonian Botanic Garden, University of Alberta), Jane Lancaster (Rare plant consultant, Kestrel Research Inc.), and Janet Marsh (Lichenology consultant, JMarsh Environmental)

WILDLIFE RESEARCH PERMIT NUMBER:

WL500238

LOCATION:

The survey was conducted in the Mackenzie Mountains in and near areas not glaciated in the last Glacial Age: near Carcajou Lake (camp site), Plains of Abraham, Lymnaea Springs, and Caribou Flats and near the Stelfox Mountains.

PARTNERS:

- Environment and Natural Resources
- Devonian Botanic Garden
- University of Alberta
- JM March Environmental
- Kestrel Research Inc.

CONTACT:

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RATIONALE:

The survey results in lists of rare vascular plants, mosses and lichens and in lists of incidental observation of arthropods and small mammals for the extreme eastern edge of Beringia in the Mackenzie Mountains, Sahtú Region, NWT. This area has the highest probability of finding rare species in the NWT. The data will be used to update the general status ranks for rare species in the NWT and to refine lists of priority species sent to the Species at Risk Committee (NWT) and the Committee on the Endangered Wildlife in Canada (COSEWIC) for detailed biological status assessments.

OBJECTIVES:

- To inventory rare biodiversity in or near an area of the Mackenzie Mountains that was not glaciated during the last Ice Age.

Photo: GNWT/S. Carrière, ENR

Sik sik, Arctic ground squirrel.

Photo: GNWT/S. Carrière, ENR

Collared pika.

Photo: GNWT/S. Carrière, ENR

Surveying for plants, mosses, and lichens.

METHODS:

At Carcajou Lake, mice, voles and lemmings were captured using snap-traps and pitfall traps. Insects and spiders were captured using malaise traps, pitfalls and nectar traps (simple yellow paper plates with sugared water). All other sites were accessed by helicopter. At each site insects were collected using butterfly nets and one-hour walking and collecting surveys for vascular plants, mosses and lichens were conducted.

RESULTS AND MAIN CONCLUSIONS:

Two new locations of bushy-tailed wood rat (*Neotoma cinerea*) and five new locations of collared pika (*Ochotona collaris*) were found. Results from the small mammal survey are included in the small mammal survey. Approximately 160 species of vascular plants, 150 species of mosses and 125 species of lichens were observed. These represent 13 percent of all vascular plants known to be in the NWT, 30 percent of mosses and 38 percent of lichens. Each collection is being further studied to confirm species and sub-species and to identify rare taxa. It is expected some species observed will be new to the NWT.

LONG-TERM PLANS AND RECOMMENDATIONS:

Each specimen will be deposited in a reputed herbarium, including the Canadian Museum of Nature, University of Alberta Herbarium and the University of Calgary Herbarium. Locations of observed mammals and birds were included in the wildlife management information system (WMIS). The species list will be used in the NWT General Status Ranking Program and shared with NatureServe Canada.

Biogeography and Coevolution of North American Mammals and Their Parasites

July 25, 2013 – August 10, 2013

MAIN INVESTIGATOR:

Kurt Galbreath, Assistant Professor Biology Department, Northern Michigan University

WILDLIFE RESEARCH PERMIT NUMBER:

WL500174

LOCATION:

We sampled five localities distributed along the Liard and Mackenzie Highways between Fort Liard, Fort Simpson and Wrigley as well as one additional locality along the Mackenzie Highway.

In addition, we acquired and processed frozen mammal specimens from various Department of Environment and Natural Resources' (ENR) small mammal surveys representing several additional localities.

PARTNERS:

- Northern Michigan University – Kurt Galbreath (project lead for NWT transect)
- Unites States National Parasite Collection – Eric Hoberg (Co-Principal Investigator accompanying field crew)

RATIONALE:

High-latitude environments are experiencing profound climate change, with consequences for ecological community dynamics and parasite/pathogen transmission and emergence (CAFF 2013). However, the ability to detect and monitor these effects is hindered by a lack of data regarding current species distributions and host-parasite associations. We have worked over the past decade in Alaska and Siberia to establish such baselines for mammal/parasite communities and the current project in the NWT expands that work into northern Canada. Our emphasis on parasites in addition to mammals complements ongoing small mammal surveys by ENR, which our project supplements and does not replace.

OBJECTIVES:

- To survey and document small mammal and parasite diversity for a range of habitat types and localities distributed across the NWT.
- Each mammal specimen collected was processed so as to preserve a maximum amount of data possible, including locality data, standard measurements, reproductive information, ectoparasite and endoparasite specimens, tissues for genetic analyses and voucher specimens (skins, skulls, or skeletons) for archiving in appropriate museum collections. These data contribute to a growing museum archive of specimens that serves as the foundation for investigations on the history and diversity of North American animal communities and the environmental processes that shape these communities in the past, present, and future.

METHODS:

We collected small mammals using standard methods (e.g. snap, pit, and Sherman traps) approved by the American Society of Mammalogists (Sikes et al. 2011) to survey diversity from as many different habitat types

as we could identify at each trapping locality. At each locality, lines of 50-100 traps were set, with each trap station five to ten meters apart. Individual trap lines were run for two to four nights and all traps and flagging were removed before leaving the field.

In addition to these new collections, we coordinated with ENR biologists in Fort Simpson (Nic Larter) and Yellowknife (Suzanne Carrière) and their colleagues to gain access to mammal specimens collected previously as part of routine small mammal surveys of various localities throughout NWT. This permitted us to expand our sampling while simultaneously providing an important service to the ENR by collecting, archiving and making accessible data for each of these specimens.

We recorded standard measurements and reproductive data and preserved ectoparasites (e.g. fleas, ticks), tissues (e.g. heart, liver) and endoparasites (e.g. intestinal worms) from all mammal specimens. Museum specimens of all mammals (mostly full skeletons, but also some skins) and parasites (whole preserved specimens held in 70 percent ethanol) were prepared for archiving in appropriate natural history museums (e.g. Northern Michigan University's Museum of Zoology or the University of New Mexico's Museum of Southwestern Biology).

RESULTS AND MAIN CONCLUSIONS:

We trapped 179 small mammal specimens representing 12 species of mice, voles, lemmings, squirrels, chipmunks, shrews and weasels from the six collecting localities we sampled. As anticipated based on previous collections in the North, red-backed voles, meadow voles and deer mice represented the most abundant species in our sample. We acquired 158 additional frozen mammal specimens from ENR biologists representing eight localities, six of which were not represented in our own trapping efforts.

Positive identification of all parasite species requires further investigation by colleagues who are experts in the relevant taxonomic groups, but some preliminary results can be reported. Ectoparasite abundance and diversity appeared to be consistent with previous field collections at northern localities (e.g. in Alaska where we have worked extensively). We collected ectoparasites (primarily fleas, mites, and lice) from approximately half (N=162) of the total mammal specimens that we processed. Endoparasites were somewhat less abundant in our collections than we have observed elsewhere, but we collected representatives of several tapeworm (e.g. *Arostrilepis, Paranoplocephala*, and *Catenotaenia* in voles), nematode (e.g. *Syphacia* and unidentified heligmosomes) and fluke (*Quinquiserialis* and *Alaria*) genera from 121 animals. Most endoparasites were associated with voles and shrews. Mice and squirrels were largely free of endoparasites, which is typical of northern mammal/parasite communities based on our prior experience.

We documented an interesting biogeographic pattern among endoparasites in the form of an apparent transition in diversity that fell between Fort Liard and Fort Simpson. The more southerly distributed parasite assemblage, which we sampled in the Fort Liard vicinity, was characterized by the tapeworm *Catenotaenia*, a genus generally associated with temperate latitudes in North America. Conversely, the tapeworm genus *Arostrilepis* was more common in mammal populations at and to the north of Fort Simpson. *Arostrilepis* spp. are common and widespread across northern Eurasia and Alaska, with a few low-latitude species patchily distributed across temperate North America. Most of the *Arostrilepis* specimens we collected are tentatively identified as *A. macrocirrosa*, which has a high-latitude distribution, but identifications must be confirmed using either morphological or genetic methods. This apparent

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transition in parasite diversity may reflect the respective geographic distributions of northern and southern red-backed voles (*Myodes rutilus* and *M. gapperi*, respectively), which serve as primary hosts for these tapeworms.

The major short-term product of this work is the museum specimens and associated data that were collected. All specimen data will be archived digitally and available globally online via the Arctos database (http://arctos.database.museum/SpecimenSearch.cfm), which will be updated as new information (e.g. expert identifications of parasites) becomes available. This database and the specimens we collected provide a rich source of information for biologists to use in investigations of northern diversity. Further, these records are based on physical specimens of mammals and parasites, which themselves provide the basis for further data collection. We are currently using molecular tools to investigate the species histories of northern mammals and their parasites. The specimens we collected in the current project will be integrated with established genetic datasets representing other localities across the Holarctic. Thus, these data are contributing to investigations on patterns and processes of population structure and diversification across the North, which will ultimately be published in the peer-reviewed literature.

LONG-TERM PLANS AND RECOMMENDATIONS:

This effort to document the mammal/parasite assemblages of the NWT represents a step toward establishing a baseline against which to evaluate the consequences of ongoing climate change for these communities. However, vast areas of the North remain unsurveyed for biotic diversity. Without better resolution of the distribution of diversity across the landscape, future environmentally driven changes in

faunal assemblages will be impossible to document. We recommend a continued effort to investigate the mammal/parasite communities at poorly studied sites across the NWT to provide a point of reference for understanding future impacts of pervasive environmental change.

Further, the putative transition zone we identified in the parasite communities of small mammals provides a potential opportunity to study the dynamics of host-parasite assemblages as they come into contact following prolonged separation. The geographic distribution of our current sampling, however, is too coarse to pinpoint the location of a putative contact zone or the distribution of parasite diversity across it. Future efforts should focus on establishing better resolution of these patterns, which would allow us to address questions regarding interactions between host species (e.g. Is hybridization occurring?), between hosts and parasites (e.g. Do parasites move freely into new hosts upon secondary contact?) and between parasite species (e.g. Does competitive exclusion influence the distribution of parasite species?). This will require fine-scale sampling of mammal and parasite populations along the Liard Highway between Fort Liard and Fort Simpson. Future sampling efforts should also focus on additional transects at similar latitudes, such as along the Mackenzie Highway between the NWT/Alberta border and Fort Providence. Such efforts will support the aforementioned goal of establishing a comprehensive database of current patterns of mammal/parasite diversity while addressing fundamental questions regarding the factors that shape mammal/parasite communities.

COMMUNITY INVOLVEMENT:

We worked directly out of Fort Liard and Fort Simpson during our field work and in both communities we contacted the local leadership to inform them of our arrival and offered to meet with community members to discuss our research. In Fort Liard, we were invited to attend a community meeting and gave a brief presentation on the project to approximately one dozen people. We appreciated the many thoughtful questions, comments and suggestions we received from these community members, which gave us a better understanding of the local landscape and environmental changes that have been observed in recent years. Unfortunately, restrictions on our field schedule prevented us from visiting all of the communities that expressed an interest in our research. Our hope is that we will be able to return in future seasons to expand our work to the areas we were unable to visit on this trip and to arrange more meetings with additional communities. We will send a copy of this project report to all communities who responded to our initial request.

Surveying for small mammals.

Photo: Kurt Galbreath

Semi-aquatic Furbearers: Contaminants, Population, Harvest (Historical and Current) and the Effect of River Level Fluctuations to Beaver and Muskrat (South Slave Region)

2012-2013

MAIN INVESTIGATORS:

Stefan Goodman, Watershed Science Consultant, Environment and Natural Resources, GNWT;
Ryan Gregory, Watershed Programs and Partnerships Technical Support, Environment and Natural Resources, GNWT

WILDLIFE RESEARCH PERMIT NUMBER:

WL500101

LOCATION:

The Slave River and Delta near the communities of Fort Smith and Fort Resolution, NWT.

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RATIONALE:

The vulnerability assessment and prioritization exercise with the Slave River and Delta Partnership (SRDP) identified main community concerns as: contaminants in fish and wildlife, effects of altered water flow on muskrat and beaver populations, and differences in harvesting over time.

Mink (*Mustela vison*) have been previously utilized as a means to measure contaminant load in the environment and as an indicator of ecosystem health. They are top trophic level carnivores that consume aquatic and terrestrial based prey and are commonly harvested by local people in the Slave River and Delta regions. They bioaccumulate persistent chemicals and are considered among the most sensitive mammals to the effects of polychlorinated biphenyl (PCBs), polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzodioxins (PCDDs).

Sampling a mink carcass for contaminants.

Photo: GNWT/R. Gregory, ENR

Photo: GNWT/R. Gregory, ENR

Surveying muskrat pushups.

OBJECTIVES:

- To determine contaminant levels in mink, muskrats, beavers and snowshoe hares;
- To determine beaver and muskrat population density by examining houses and push-ups; and
- To compare results to historical data.

METHODS:

Mink, muskrat and hare contaminant analyses

Thirty-one mink, 30 muskrats, 21 snowshoe hares and three adult beavers (with seven fetuses) were collected by local trappers. Trappers were compensated for completed data kits.

Sex, maturity level, morphometrics, body condition and full body weight and weight of various organs were recorded.

Liver, kidney, skeletal muscle and fat (inguinal pad) samples were collected. Liver and skeletal muscle samples were scanned for 34 heavy metals. Ten samples from each species were analyzed for persistent organic pollutants. Muscle samples are undergoing stable isotope analysis ($\delta^{13}C$ and $\delta^{15}N$) to characterize trophic relationships in the food web. Contaminant analysis is being conducted by the Canada Centre for Inland Waters (CCIW) in Burlington, Ontario.

Stomach content analysis will be conducted to determine prey species consumed. Age will be determined from tooth cementum of a lower canine at Matson's Laboratory in Milltown, Montana.

Beaver and muskrat house observations in the Slave River and Delta

A ground survey using snowmobiles was conducted by the Department of Environment and Natural Resources and community members in February and March. The house location, type, number and activity level were recorded and photos were taken. Due to snow conditions, not all areas could be safely accessed. The location of the houses acted as baseline for the follow-up aerial survey.

Aerial muskrat and beaver survey of the Slave River and Slave River Delta

Aerial surveys conducted in May followed Parks Canada protocols to count muskrat and beaver houses, and push-ups.

Historical harvest analysis

Historical harvest information will be analyzed and compared to data collected in this study.

RESULTS AND MAIN CONCLUSIONS:

Mink, muskrat and hare contaminant analyses

Samples have been submitted and results are pending.

Beaver and muskrat house observations and aerial survey

Due to unsafe weather conditions, the ground survey could not be appropriately completed. A boat survey was to be conducted in the fall to complement the ground surveys, however, it did not occur due to unsafe weather conditions and poor accessibility to desired locations.

Due to logistics, the aerial survey was conducted during ice break-up. This made it difficult to accurately identify push-ups.

Data is being analyzed and results are pending. Due to unanticipated issues with these surveys, the validity of results is being investigated.

Historical harvest analysis

Results are pending.

LONG-TERM PLANS AND RECOMMENDATIONS:

Plans and recommendations will largely depend on the nature of the results. Hopefully, they can provide insight into the health status of furbearers and the overall ecosystem in the Slave River and Delta and may assist local and transboundary management decisions.

Recommendation to develop a long-term furbearer monitoring program.

Photo: GNWT/R. Gregory, ENR

North Slave and South Slave Mollusc Survey

September 6, 2013 – September 30, 2013

MAIN INVESTIGATORS:

Dwayne Lepitzki and members of the Molluscs Species Specialist Subcommittee of COSEWIC

WILDLIFE RESEARCH PERMIT NUMBER:

WL500184

LOCATION:

Ponds, streams, rivers, forests, lakeshores, and other mollusc habitats in and around Hay River and Yellowknife, NWT.

PARTNERS:

- Environment and Natural Resources
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC)

CONTACTS:

Dr. Dwayne Lepitzki, Co-chair of Molluscs Species Specialist Subcommittee (SSC) of COSEWIC; Member of COSEWIC
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RATIONALE:

Little is known about mollusc biodiversity and distribution in the NWT. This study provided the opportunity to collect and identify aquatic and terrestrial molluscs in and near Great Slave Lake. Information will be forwarded to the GNWT for use in the General Status Ranking report, the NWT Species Infobase and the Wildlife Management Information System (WMIS). Valuable data on mollusc biodiversity in the NWT will be gathered and will serve as a baseline for future monitoring of NWT molluscs. Data will be used by the Molluscs SSC of COSEWIC for its candidate species list.

OBJECTIVES:

- To sample and identify molluscs in and around Yellowknife and Hay River; and
- To provide baseline data of biodiversity of molluscs in the NWT.

A western glass-snail (*Vitrina pellucida*), Hay River, September 2013.

Photo: R. Forsyth

Photo: D. Lepitzki

Live fatmuckets (*Lampsilis siliquoidea*) found in the Hay River, 9 September 2013.

METHODS:

Most of the members of the Molluscs SSC of COSEWIC participated. Initially only one site was searched in Yellowknife and three sites were examined in the town of Hay River before the group searched at five stops (multiple sites per stop) on September 9. Five more stops were examined the next day along with a total of three more sites in Yellowknife.

Visual searches and looking under objects (e.g. rocks, woody debris) were used to locate terrestrial snails and slugs. Five leaf litter samples also were collected. Aquatic snails, clams, and mussels were searched for by feel and visually in the water and in drift along the water line and by dip nets. GPS locations and digital photographs were taken. Specimens, both live and empty shells, were collected. Some tissue from mussels was collected for DNA analysis and the mussels were checked for parasitic infections. Specimens will eventually be deposited into museums.

Photo: D. Lepitzki

Gerry Mackie (left) and Daelyn Woolnough (right) comparing mussel shells from the Hay River, 9 September 2013.

Photo: R. Forsyth

A colony of multirib Vallonia (*Vallonia gracilicosta*), Hay River, September 2013.

RESULTS AND MAIN CONCLUSIONS:

Not all mollusc collections have been sorted and species identified. So far 20 species of terrestrial molluscs have been identified. Several of these species have been collected previously in NWT but the records do not appear in the scientific literature. We found three species not previously collected from NWT: *Cochlicopa lubrica* (glossy pillar), *Vertigo elatior* (tapered vertigo), and the non-native, introduced *Deroceras reticulatum* (grey field slug).

So far, one new species of freshwater snail for the NWT, a limpet probably creeping ancylid (*Ferrissia rivularis*), has been discovered. Another freshwater snail, rams-horn valvata (*Valvata mergella*), may be a new species for the NWT although other collected valve snails resemble mossy valvata (*Valvata sincera*), a previously reported species. Some of the collected physid snails were sent for DNA barcoding to confirm identification. While the majority of the freshwater snail and fingernail clam collections still require identification, four fingernail clams (*Musculium securis, Sphaerium striatinum, Pisidium compressum, Pisidium casertnaum*), and six snails not already mentioned above (*Planorbella trivolvis, Gyraulus parvus, Amnicola limosus, Helisoma anceps, Physella gyrina,* and *Lymnaea stagnalis*) have been identified. The NWT is not included in the distribution for *Planorbella trivolvis* or *A. limosus* in older maps (Clarke 1981) or in the recent compilation of the conservation status of United States and Canadian freshwater snails (Johnson et al. 2013).

The two mussels expected near Hay River were found. Tissue samples from 20 fatmuckets (*Lampsilis siliquoidea*) and two giant floaters (*Pyganodon grandis*) were collected and sent to a Ph.D. student who is working to elucidate species' relationships. Ten fatmuckets and two giant floaters were necropsied. None were infected with common parasites.

Photo: R. Forsyth

The exotic grey field slug (*Derocera reticulatum*) found near Hay River.

LONG-TERM PLANS AND RECOMMENDATIONS:

The newly recorded molluscs for NWT have been or will be included in the 2015 Wild Species of Canada report. Although disappointing, the finding of the exotic grey field slug, was not unexpected. The good news is it was only found at three sites near the town of Hay River. Its distribution and potential impacts on native flora and fauna need further investigation. Publications on the various species' range extensions are expected. Results of the muscle tissue sampling will add to the current lack of knowledge on the relationships between northern and other North American populations. Our collections are the farthest north included in the Ph.D. study. Members of the Molluscs SSC would love to be involved in further research on the marvelous molluscs of the north. But even with the extremely limited time available, we did add to the list of freshwater and terrestrial molluscs known to inhabit the NWT.

COMMUNITY INVOLVMENT:

Public presentations organized and arranged by Ecology North were given in both Yellowknife (September 7) and Hay River (September 10) to familiarize residents with molluscs in the NWT and the process COSEWIC uses to assess the status of species. The opportunity for ride-alongs during the field work did not result in any takers.

Northern Richardson Mountain Moose Survey, 2013

March 10, 2013 – May 1, 2013

MAIN INVESTIGATOR:

Mike Suitor, Regional Biologist,
Environment Yukon

WILDLIFE RESEARCH PERMIT NUMBER:

WL005417

LOCATION:

Northern Richardson Mountains, NWT and Yukon.

PARTNERS:

- Gwich'in Renewable Resources Board
- Wildlife Management Advisory Council North Slope
- Government of the Northwest Territories

CONTACT:

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RATIONALE:

Earlier work on moose in this study area identified it as one that could be easily overharvested and highly susceptible to impacts from development.

OBJECTIVES:

- The primary objective of the survey was to update the minimum number of moose in the population, map late winter densities and to identify population trend.

METHODS:

The survey was conducted with an A-Star B2 helicopter based out of Aklavik with a pilot navigator in front and two observers in the back. We searched most valleys and basins containing shrub or forest in the previously defined study area. Once an animal or group of animals were observed, we attempted to obtain an accurate count first and if feasible, sexed individuals by reducing elevation as needed to either identify pedestal scars on bulls or vulva patches on females. Each unique group of animals received an independent GPS location.

GPS recording moose on a survey in the Northern Richardson Mountains.

Photo: Martin Kienzler

Photo: Martin Kienzler

Moose surveyed in the Northern Richardson Mountains.

RESULTS AND MAIN CONCLUSIONS:

We counted a total of 678 moose in the North Richardson Mountains survey area, which is an increase of 52 percent over the number of moose counted in the same area in March 2000. The number of moose observed in 2013 represents an overall density of about 72 moose/1,000 km^2 for the entire study area. If we consider only habitable moose range in the survey area (approximately 610 km^2 based on 1989 values), the density is much higher at about 1,111 moose/1,000 km^2. Of the total moose observed and sexed in the area in 2013, 272 were mature cows, 199 were mature bulls (73 for every 100 mature cows) and 102 were calves (37/100 mature cows). A little over seven percent of cows with calves had twins, which is approximately 38 percent and 46 percent of the twinning percentage noted in 2000 and 1989 respectively. Unfortunately 89 moose were counted but were not aged or sexed. Most of these occurred where moose densities and cover from tall thick spruce and willow were high. It is highly likely most of these animals were adults. However, as we were unable to approach too close to these animals without compromising the quality of our count data, we cannot be certain of age and sex structure of them. Given the large number of animals unclassified, many of our ratio data become less reliable, in particular data which represents the proportion of cohorts in the population. To provide for an assessment of a worst case scenario of population metrics, we considered all unidentified animals to be mature cows which would result in cow to calf ratios of 10:100 and bull to cow ratios of 50:100. Based on these findings and projected changes to shrub communities in sub-Arctic and Arctic communities, we anticipate this population will continue to increase in coming years.

LONG-TERM PLANS AND RECOMMENDATIONS:

Future work should continue to monitor as population growth potential appears to remain high. Additional work may include as feasible: remapping available habitat to assess the rate of shrub encroachment since it was first mapped in 1989; and further delineation of movement corridors and migratory ecology. A reassessment of ecosystems dynamics, similar to what took place in the late 1980s and early 1990s, may prove valuable in furthering our understanding of this ecosystem in the context of potential increases in shrub encroachment and subsequent changes in prey biomass.

COMMUNITY INVOLVEMENT:

With the partners identified above and in cooperation with Aklavik Hunters and Trappers Committee and Ehdiitat Renewable Resource Council, we worked together to initiate a ground based survey for moose in the survey area. These two bodies also recommended observers for the aerial moose survey, which provided significant contributions.

Moose Population Survey – Kakisa/Tathlina Lakes Area

November/December 2012

MAIN INVESTIGATOR:

Allicia Kelly, Manager Research and Monitoring, Environment and Natural Resources, GNWT, South Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500091

LOCATION:

The survey covered the Hay River Lowlands between the Mackenzie River and the Cameron Hills (Kakisa Lake/Tathlina Lake area).

PARTNERS:

- Ka'a'gee Tu First Nation
- Katlodeechee First Nation
- Hay River Métis Council

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RATIONALE:

In the past, the Department of Environment and Natural Resources has conducted systematic moose population surveys in the South Slave Region in areas that reflect important moose harvesting areas. This information needs to be updated. This survey will build on moose surveys conducted in surrounding areas in the past.

OBJECTIVES:

- To determine moose population abundance and composition in the Kakisa/Tathlina Lakes areas; and
- To compare results to moose population surveys in nearby areas.

METHODS:

We used a geospatial survey method. This type of survey is used across the NWT and Alaska for moose surveys. The survey area was divided into ~4 km x 4 km cells and one fixed wing aircraft (Found Bush Hawk) was used to

Local observers during survey for moose.

Photo: GNWT/K. Cox, ENR

intensively survey 80 of these cells distributed across the entire survey area (or 8.1% of the study area).

RESULTS AND MAIN CONCLUSIONS:

The moose population survey was conducted from November 28 - December 8, with habitat assessment flights from November 13-16. We flew a total of 51.7 hours on survey (plus 15.8 hours for stratification flights to assess habitat quality for moose). In total, 102 moose were observed: 27 bulls, 48 cows, five unspecified and 20 calves (including two sets of twins). This includes moose inside and outside of survey blocks and on ferry flights. We also saw one wolf, one red fox, and 24 boreal caribou.

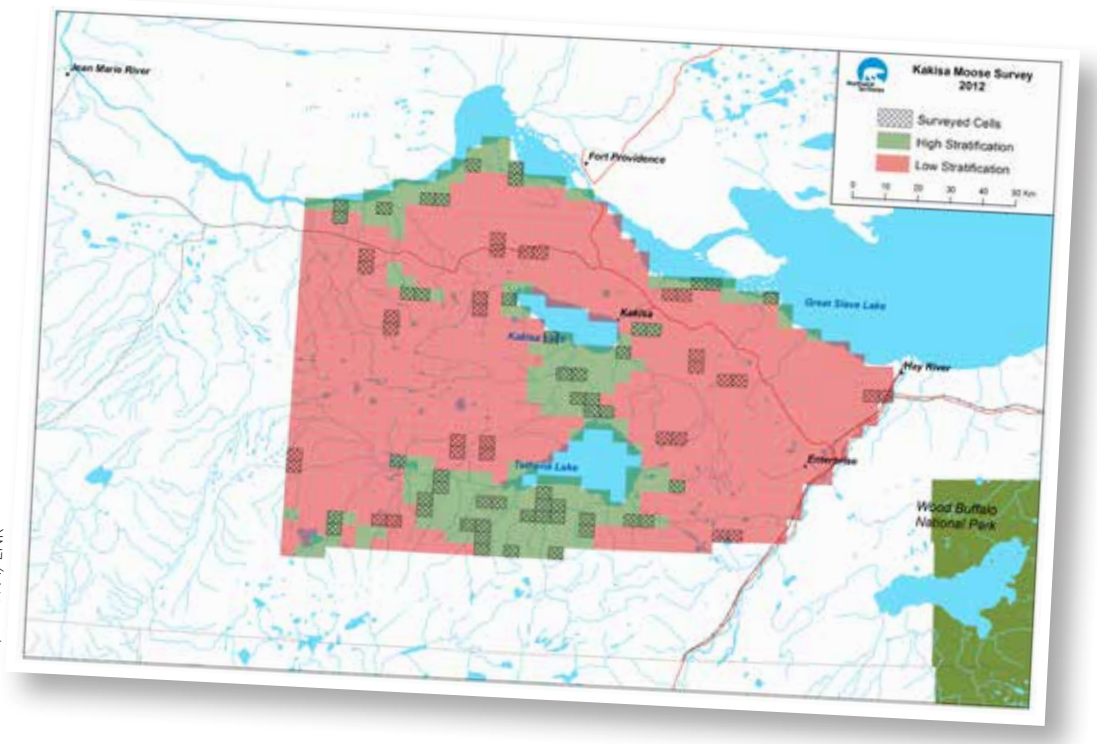
LONG-TERM PLANS AND RECOMMENDATIONS:

A summary report with a population estimate and any recommendations is currently being developed.

COMMUNITY INVOLVEMENT:

Local organizations were consulted when establishing the study area boundaries. Local observers were used both in the stratification flights and in the survey itself.

Kakisa moose survey area.



Map: GNWT/ENR

Wolf Abundance and Predation on the Bathurst Caribou Range

March 2012 – March 2013

MAIN INVESTIGATOR:

Dean Cluff, Regional Biologist,
Environment and Natural Resources, GNWT,
North Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500018

LOCATION:

The Bathurst caribou winter range within the North Slave Region including the communities within the North Slave Region (Wekweeti, Gaméti, Behchokǫ̀, Dettah/N'Dilo, Łutselk'e, and Yellowknife).

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RATIONALE:

Wolves are the main predator of barren-ground caribou but their effect on caribou herd status is poorly understood. This is an issue because of the resultant uncertainty on how wolves should be managed, especially when caribou numbers are low. Although caribou and wolves have persisted for thousands of years, in addition to subsistence hunting by people, recent ecosystem changes and cumulative effects could increase the impact wolves may have on caribou now. Wolves on the tundra are migratory given that they follow migratory caribou herds. This complicates the system despite it being largely a one predator: one prey system. Consequently, the benefit of applying results and conclusions from wolf studies elsewhere can be problematic.

To aid the recovery of the Bathurst caribou herd, increased wolf harvests have been recommended in the joint management proposal (WRRB 2010). Consequently, increased wolf monitoring is needed for such an adaptive management plan for caribou recovery because knowledge of the causal linkages between caribou herd size and wolf abundance and predation is lacking. Managers need to know if attempts to reduce wolves though increased harvest incentives are working.

Deploying collars on wolves now assists in determining factors that affect sightability of wolves during abundance surveys so these can be applied on future surveys when wolves are not collared. Collars on wolves are also necessary to locate their kill sites to investigate predation patterns.

OBJECTIVES:

- To estimate the number of wolves associated with caribou on the winter range;
- To quantify predation rate on caribou by wolves in winter; and

- To evaluate den monitoring and pup surveys currently conducted by ENR as long term monitoring tools for wolves.

METHODS:

Winter abundance of wolves

Aerial surveys will be conducted with a Bush Hawk or Husky aircraft. Wolf collaring would commence in late March or early April. Reconnaissance surveys for wolves on the caribou range will be conducted two to three days prior to capture to locate candidate wolf packs. Twenty GPS collars would be deployed. GPS collars are programmed to obtain eight GPS/Argos collar locations per day and 18 GPS/Iridium locations collar per day.

Predation on caribou in winter

Movement patterns of GPS collared wolves will be analyzed to identify and locate kill sites in winter. Several GPS locations per collared wolf per day should identify potential kill sites by the pack by clustering of locations in space and time (Webb et al. 2008). Each week, clusters will be identified graphically (mapping) and analytically by a rule based algorithm (Knofpp et al. 2009) or other scan statistics (e.g. SaTScan, Kuldorff et al. 2005). Visit to GPS location cluster sites (i.e. ground-truthing) is needed to distinguish between kill and non-kill sites (Ruth et al. 2010)

Site investigations

Accumulated GPS locations of collared wolves will be received via e-mail every seven days (Mondays). Therefore, a collection of suspected sites over the previous week can be determined that day and these sites investigated with a helicopter thereafter to assess if a kill occurred. Three to four days of site visits by helicopter are expected per week given that up to 20 wolf packs may be monitored over a large area. A second helicopter and crew might be needed to complete the site investigations more quickly.

For each site visit, if a kill was made, samples can be taken and depending on the time since death and extent of scavenging, species, sex and age class as well as the nutritional status of the killed prey could be determined. Relative vulnerability of caribou age and sex-classes could be coarsely estimated if enough kill sites can be identified and prey assessed. Community observers can participate and help interpret potential kill sites.

Modeling predation rate

Site investigations during late fall and late winter monitoring periods will allow constraining of maximum values in the space-time clustering routine. These results will inform analytical determination of kill sites during the other months of winter when site visits cannot be made. Parameters for movement patterns from consecutive locations will be developed to model kill site occurrence. This combination of confirming kill sites during intensive monitoring periods and modeling of movement patterns derived from several precise locations per day will allow an estimation of the number of kills made by that pack.

Evaluate summer wolf den monitoring as an indicator of population trend

An index of abundance for tundra wolves has been developed based on occupancy (presence-absence) estimation of wolves at dens. Trends in wolf numbers are then monitored by tracking changes in wolf den site usage (occupancy).

About 100 known wolf den sites from previous surveys are revisited each year in late May or early June for activity. Late May or early June is an optimum time for the survey because wolves rest at the den site during the day and are easily visible. The survey route also optimizes flying over eskers and esker-like habitat between revisited den sites as a way to look for new den sites (Mackenzie et al. 2006).

Trend in wolf numbers based on wolf den occupancy can be tested against trend obtained from the winter abundance surveys if winter range overlap of Bathurst and Bluenose-East caribou herds is minimal. Counts of pups at dens in later summer can also be better evaluated because without collared wolves, counts of pups are based on revisits to the den site. If there are no pups observed at the site, or nearby, three scenarios are possible: 1) all the pups have died and the site abandoned, 2) the den site has since been moved, or 3) the pups have been moved from the den site to a rendezvous site (Joslin 1967) where the adults routinely leave the pups when the adults travel to hunt. Collared wolves will be tracked so any new home sites can be found.

RESULTS AND MAIN CONCLUSIONS:

Results and main conclusions were not submitted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

Photo: GNWT/D. Dewar, ENR

Index of Abundance for Tundra-denning Wolves

May 2012 – May 2013

MAIN INVESTIGATOR:

Dean Cluff, Regional Biologist,
Environment and Natural Resources, GNWT,
North Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500066

LOCATION:

The study will focus on the central tundra region of the NWT and includes Aylmer and Clinton-Colden Lakes to the east, Pellatt Lake to the north, Point Lake, Greenstockings Lake and Jolly Lake to the west and Mackay and Walmsley Lakes to the south. Dettah/N'Dilo, Łutselk'e and Wekweeti are the nearest communities outside of Yellowknife.

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RATIONALE:

Management plans prepared for barren-ground caribou herds recommend monitoring for trends in predator abundance. Population sizes of wolves are notoriously difficult to estimate because wolves range over vast areas, exist at relatively low densities, have secretive behaviour and limit their activity during daylight hours. Wolves that follow migratory barren-ground caribou add to the difficulty by having increased annual home range sizes. Consequently, counting wolves can be a complex and costly effort easily susceptible to biases and errors. Standardized, accurate and cost-effective methods of assessing wolf distribution and abundance are lacking and need to be identified and implemented.

Previous studies with radio collared wolves on the tundra have shown that mated pairs usually return to the same site each year. Determining den site occupancy annually over a large set of known wolf dens offers a way to monitor the population status of wolves in the Bathurst caribou herd range. A positive linear relationship is assumed such that more wolves on the landscape would result in more active den sites. Because wolf population size likely tracks caribou population size (but with a possible lag effect), trends in annual wolf numbers can also help understand changes in caribou numbers especially when caribou abundance surveys are limited to three to six-year intervals.

Monitoring litter size of wolves estimates annual recruitment and can indicate responses of wolves to changing pretty densities. Aerial surveys are useful to count pups over a wide geographical area, a necessary effort when habitat type vary and litter size fluctuates locally. Follow-up surveys are required to assess confidence in counts. Recruitment is best estimated in late summer or early fall once pups begin travelling with

adults. However, finding enough wolf packs to count pups at that time is not practical. Therefore, unless many denning wolves are radio collared, pups counts must be done by the end of August.

Counts of pups prior to late August are helpful to track pup mortality over the summer and confirm the subsequent recruitment estimate. Wolf pups are not normally observed during the early June aerial surveys for den occupancy because pups are small (two to three weeks old) and remain inside the den. In March 2012, 24 wolves were collared in the North Slave Region. It will be useful to track their location during the August pup count to resolve whether many pups die by that time or the wolves simply move elsewhere.

Necropsies of female wolves harvested in late winter offers an assessment of pregnancy and *in utero* litter size. Identifying sources of pup mortality, such as disease or starvation, plays an important role in wolf population dynamics and implications for management. Necropsies of both male and female wolves offer an assessment of nutritional condition which influences reproduction.

OBJECTIVES:

- To establish an annual relative abundance index for tundra wolves;
- To investigate wolf population response to changing caribou abundance; and
- To quantify frequency of den site usage.

METHODS:

Establish an annual relative abundance index for tundra wolves

Trends in wolf numbers can be monitored by tracking changes in wolf den site usage. About 100 wolf den sites known from previous surveys are monitored each year in early to mid-June for activity. Late May or early June is an optimum time for this survey because wolves rest at the den site during the day and are easily visible. Lake ice can also support aircraft for landings and accessing fuel caches. Each den site will be assessed if active from the air with a small fixed-wing airplane (i.e. Aviat Husky). The survey area was expanded in June 2006 to cover a wider geographic area and this area is now flown each year. The survey route also optimizes flying over eskers and esker-like habitat between known den sites as a way to look for new den sites. Active den sites and survey routes are mapped to a 10 km x 10 km grid established for the NWT for spatial analysis for wildlife management surveys. Eskers and esker-like habitat identified for each grid cell in the survey area serves as high quality habitat stratification for flying grid cells as entire grid cells (100 km^2 each) cannot be completely surveyed.

The spring survey flight allows for documenting natal or whelping den sites of wolves. A den site is considered active if wolves are observed there. If active, the number of individuals observed at each site will be noted. If only signs, such as tracks or fresh digging, are observed, then we return at another time (e.g. next day) to determine if the site is active. Revisits to sites are also necessary to quantify detection probabilities of wolves at dens.

Investigate wolf population response to changing caribou abundance

Recruitment of pups into the population is a significant factor in wolf population dynamics, which in turn is thought to reflect changes in caribou abundance. Consequently, to count pups an aerial survey of currently active wolf den sites is typically flown in mid- to late August with a small fixed-wing airplane. Ground observations of active den sites may be done in late summer where logistics permit to assess the accuracy of aerial counts. Ground counts can be facilitated

by collaboration with other wildlife monitoring programs such as those conducted by industry. The most reliable number of wolf pups observed at each site in late summer or early fall will estimate recruitment.

Carcasses of harvested wolves will be collected in late summer, fall, and winter from participating hunters. Necropsies of these carcasses, both male and female wolves, offer an assessment of nutritional condition by measuring fatness. Reproductive tracts of breeding females will be examined for *in utero* pup counts to estimate potential average litter size. Litter sizes and body condition will be compared with previous years, especially from necropsy results from a decade ago when caribou numbers were higher.

Quantifying frequency of den site usage

The survey route has included den sites of unmarked and radio collared wolves in the past. Monitoring radio collared wolves has the advantage of greater certainty in finding re-located den sites and thereby a better understanding of den site fidelity. Wolves were collared in the North Slave Region in March 2012 and these wolves will be monitored for their den use and radio tracked to assist in the pup count survey.

RESULTS AND MAIN CONCLUSIONS:

Results and main conclusions were not submitted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

Photo: GNWT/D.Cluff, ENR

Wolverine DNA Sampling on the Central Barrens

April 1, 2013 – April 28, 2013

MAIN INVESTIGATOR:

Robert Mulders, Wildlife Biologist
(Carnivore and Furbearers),
Environment and Natural Resources, GNWT

WILDLIFE RESEARCH PERMIT NUMBER:

WL500125

LOCATION:

Daring Lake, NWT.

PARTNERS:

- Dominion Diamonds Ltd., Ekati
- Diavik Diamond Mines International
- De Beers Canada - Gahcho Kué
- De Beers Canada - Snap Lake
- John Boulanger, Integrated Ecological Research
- David Paetkau, Wildlife Genetics International

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RATIONALE:

On the central barrens, human activities relating to mineral exploration, mining and interest in expanding hunting opportunities have been increasing over the past 15 years. Communities, governments and wildlife monitoring agencies have expressed concerns over the potential adverse cumulative effects on wolverine populations, in terms of habitat loss, disturbance and increasing mortality. This concern is further highlighted as the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has assessed wolverine as a species of special concern. The NWT Species at Risk Committee will be assessing wolverine in 2015.

OBJECTIVES:

- To obtain wolverine abundance and density estimates; and
- To obtain demographic data on longer-term changes in the wolverine population.

METHODS:

A standardized sampling design has been developed in collaboration with John Boulanger (Integrated Ecological Research) to ensure research methodologies and regional monitoring efforts are technically sound (Mulders et al. 2007). This survey is carried out by snowmobile in April. Spruce posts (4"x4"x5' in length) were set up within the study area in a systematic grid with a spacing of 3 km. Each post is wrapped in double stranded barbed wire, intended to snag single or small clumps of hair. Posts are baited with a small portion of meat deemed unfit for human consumption (bison, moose or caribou) as well as commercially prepared lures. Each post was checked every ten days over a 20-day period, providing two separate snagging sessions. Collected hair was kept dry and sent to a genetics lab for DNA extraction and analysis to identify individuals.

The Department of Environment and Natural Resources (ENR) and the mining industry are continuing to use a standard regional sampling protocol to index wolverine abundance for long-term monitoring.

RESULTS AND MAIN CONCLUSIONS:

Soft snow and rough field conditions in early April posed some challenges for travel and post set-up at Daring Lake. However, by late April both hair snagging sessions were successfully completed. (In addition to the Daring Lake effort, De Beers carried out concurrent wolverine DNA surveys in their regional study areas at Snap Lake and at Gahcho Kué). Although genetic analysis of the April field work was completed in December 2013, a multi-year analysis of the 2013 and pending April 2014 surveys is scheduled to be done in late 2014.

The April 2013 survey identified 24 individual wolverines (14 male, 10 female), 12 of which were recaptures from earlier Daring Lake, Diavik and Ekati surveys. One of the females was initially detected in 2003 and during each survey since (spanning an 11-year period). Another female has been consistently detected since 2004. Two males detected at Daring Lake were previously detected in 2012 within the Izok Lake study area (100 km to the NW of Daring Lake).

Since 2004, the Daring Lake survey data has identified a pronounced decline in the number and density of resident wolverines. This observed decline of over 60 percent may be linked to the corresponding significant decline in Bathurst caribou, an important food item for wolverines. Two technical reports were released in early 2014:

- Boulanger and Mulders (2013a) summarizes 2005 - 2011 Daring, Diavik and Ekati data; and
- Boulanger and Mulders (2013b) is a comprehensive review of 2004-2011 Daring Lake data.

LONG-TERM PLANS AND RECOMMENDATIONS:

In November 2013, ENR hosted a Slave Geological Province (SGP) Regional Wildlife Monitoring Workshop, which included a review of wolverine monitoring efforts. Discussions included: how to address whether mine-related activities influence the relative abundance and distribution over time, approaches to addressing cumulative impacts, development of a wolverine management plan, and improving our understanding of wildlife ecosystems within the SGP. There was agreement that in April 2014 regional wolverine DNA surveys would be carried out at Daring Lake, Ekati, Diavik, Snap Lake and Gahcho Kué. Pending analysis and review of the 2013 and 2014 data and overall program objectives, the various partners might again participate in regional surveys in 2016.

COMMUNITY INVOLVEMENT:

Since 2003, many local community members have participated in the wolverine project at Daring Lake. In April 2013, field assistants included James Sangris, Colin Fraser, Patrick Colin, Ron Allen, Tyler Kydd and Mark Wasiuta.

Monitoring of the Nahanni Wood Bison Population

April 1, 2012 – March 31, 2013

MAIN INVESTIGATOR:

Nic Larter, Manager Research and Monitoring, Environment and Natural Resources, GNWT, Dehcho Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL005038

LOCATION:

This is an ongoing study monitoring baseline population demography and disease presence of the Nahanni wood bison population. The study was initiated in 2002. The population ranges over NE British Columbia (BC), SE Yukon Territory and the SW NWT with the majority of the range in SW NWT along and adjacent to the Liard and lower reaches of the South Nahanni and Kotaneelee River Valleys.

PARTNERS:

- Environment and Natural Resources (ENR)
- British Columbia Provincial Government

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RATIONALE:

The Nahanni wood bison population was initially established with a transplant of bison to the area in June of 1980. Additional transplants in March 1989 and March 1998 augmented the population. Wood bison were documented dispersing south into BC soon after their release. An aerial population survey in March 2004 estimated 400 bison. A survey in March 2011 estimated 413 bison indicating limited population growth. Future population surveys will be required preferably at ≤5 year frequency.

The Nahanni population is currently afforded a measure of protection against infection with *Brucella abortus* (causes brucellosis) and *Mycobacterium bovis* (causes tuberculosis) by maintaining a bison free zone to prevent contact with infected bison from Wood Buffalo National Park. Monitoring for these diseases through blood sample collections provide a measure of the effectiveness of the bison control program in addition to the assessment of disease status of the Nahanni bison population. Male only hunting of wood bison was initiated in 1998. Currently a quota of seven tags annually is in place. No more than three tags have been used in a year.

Annual composition surveys provide data on calf production, juvenile overwinter survival and the ratio of breeding age males to females. These data are useful for evaluating the impact of selective hunting, herd productivity, causes of death, predation on calves and population survey estimates.

During 2007-2011, GPS and satellite collars were deployed on male and female bison to better identify animal movements, the frequency of river crossings, population range, seasonal range, animals frequenting communities and to assess animal sightability in relation to aerial surveys. The presence of bison within

Photo: GNWT/N. Larter, ENR

Scanning the shoreline for wood bison.

communities remains a highly charged issue. We continue to assess different measures to mitigate bison presence and any perceived threats to human safety.

OBJECTIVES:

- To measure calf, yearling, and bull:cow ratios during the post-calving period;
- To monitor annual calf production and estimate overwinter survival of calf bison;
- To collect biological samples as and when available from harvested animals or those involved in motor vehicle collisions;
- To document seasonal movement patterns and range use of male and female bison throughout the range;
- To delineate the area used by the population and document animal movement into new areas of range;
- To document the frequency of river crossings by collared animals;
- To identify and monitor the presence, movements, and behaviour of bison in communities;
- To provide empirical data for the community bison working groups and for use in drafting a management plan for the Nahanni wood bison population;
- To document the year round diet of Nahanni wood bison; and
- To monitor the Nahanni wood bison population for the presence of brucellosis, tuberculosis and Johne's disease.

METHODS:

- In mid-July, we conduct a boat-based survey of bison along the Liard and South Nahanni Rivers from the BC border to Blackstone. Bison were classified as calves, yearlings, cows, juvenile bulls, sub adult bulls and mature bulls. Fresh fecal

Photo: GNWT/N. Larter, ENR

Collared wood bison.

samples were collected during the survey. ENR and biologists from Government of BC participated in the survey.

- Location data from collared animals are processed and received daily. Data are entered into a database and used for GIS analyses.
- We are currently working with a graduate student on GIS analyses and RSF modelling of the location data.
- Location data are mapped on a biweekly basis.
- With the change in regulations for hunter-killed bison (community quota), any biological samples are provided voluntarily. Any biological samples received are processed accordingly.
- Any available biological samples will be collected from dead or euthanized animals resulting from collisions with motor vehicles or other accidents.

RESULTS AND MAIN CONCLUSIONS:

- One hundred and thirty-one bison were classified in July 2012, below the average of 151 classified annually from 2002-12.
- The number of calves and yearlings/100 females and overwinter survival estimates were calculated.
- The number of yearlings/100 females and overwinter survival were both lower than in most previous years but the 64.7 calves/100 females was the highest recorded of any survey.
- Maps of the survey results were circulated to local First Nations.
- Bison certainly use linear features on the landscape to facilitate movement throughout their range.
- Three bison were harvested under quota and some biological samples were received from these animals.

LONG-TERM PLANS AND RECOMMENDATIONS:

Annual monitoring of population demography needs to be continued through the next population survey. Because all of the collars deployed during 2007-2011 have completed their lifespan, there will need to be collars deployed prior to the next population survey in order to establish an appropriate survey area and sightability correction factor. Another aerial survey to estimate the population should be scheduled by March 2016. There should be continued collaboration with Yukon Government and BC Government on population monitoring and annual sex/age classification surveys for this population. There should be interjurisdictional participation and collaboration in similar surveys of the two northeastern BC populations. Location data will be used to assess seasonal range use and assist in delineating areas of high use in the range. Location data has been be used to update the distribution of animals in the Nahanni wood bison population and document movement patterns in relation to linear corridors. Additional collars should be deployed in future to continue monitoring range use of the population. To continue to monitor animals frequenting communities, work with communities to mitigate bison presence and to develop the NWT Wood Bison Management Strategy. Continued monitoring for disease and the collection of biological samples from hunter-killed, darted or deceased animals should be done as the opportunities arise.

COMMUNITY INVOLVEMENT:

The project was initiated based upon community requests. Local residents have participated as river guides for surveys and as observers in all population surveys. Local residents are hired to assist with the collection of biological samples and distribution of meat from animals euthanized in, or near, communities.

At annual community meetings and biennial regional wildlife workshops, the program is evaluated and critiqued by local First Nations and program comments are discussed and addressed. As part of the NWT Wood Bison Management Strategy, bison working groups have been established in Nahanni Butte and Fort Liard. We continue to have community meetings with these groups twice a year.

Photo: GNWT/N. Larter, ENR

Wood bison group walking along the shore.

Slave River Lowlands Bison Population Studies

March 3, 2012 – March 31, 2013

MAIN INVESTIGATOR:

Allicia Kelly, Manager Research and Monitoring, Environment and Natural Resources, GNWT, South Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500043 (2012 field work)

LOCATION:

The area of study is the known bison range in the Slave River Lowlands (SRL) between Fort Smith and Fort Resolution. The area includes both east and west sides of the Slave River but excludes the area of Wood Buffalo National Park.

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RATIONALE:

Composition surveys

Composition surveys are conducted as one component of monitoring the SRL bison. Combined with other population information such as distribution, abundance and health and condition, these data are used to make inferences on population dynamics, and base recommendations and decisions on wildlife management issues. In addition to providing data on herd composition, particularly calf/cow ratio at the end of the calving period (i.e. an estimate of productivity), annual composition data provide a method to monitor population abundance during the intervening years between population surveys. Changes in calf/cow or yearling/cow ratios, particularly low values, may be indicators that managers need to examine populations more closely to assess population changes and their causes. Correlating increases in herd size with calf/cow ratios assumes that the rate of death of cows is low compared to calves, among others. These assumptions may be true most of the time and may only deviate under abnormal conditions (i.e. high harvest of cows during the year).

Anthrax surveillance

Anthrax is a naturally occurring infectious disease caused by the bacterium *Bacillus anthracis*. Once introduced into an area, anthrax can be maintained in the environment by extremely resistant spores that may remain dormant in the soil for many years. Certain environmental and climatic conditions can facilitate an outbreak of anthrax. The exact nature of these predisposing conditions is not completely understood but a very wet spring followed by a dry, hot summer appears to be one combination that promotes outbreaks. Anthrax outbreaks in northern Canada have implications for bison management, ongoing recovery

efforts for the threatened wood bison and may pose a health risk to humans and other wildlife. Federal and territorial agencies have historically initiated control measures aimed at breaking the cycle of infection. These measures include large-scale carcass detection and disposal operations to minimize scavenging and release of anthrax spores into the environment. Disposal is more effective when carcasses are detected early.

OBJECTIVES:

- To measure calf, yearling, and bull to cow ratios during the post-calving period for bison in the SRL; and
- To monitor the SRL herd for the occurrence of anthrax related mortalities. If any suspected anthrax mortalities are detected, the Anthrax Emergency Response Plan (AERP) is activated and carcasses are dealt with according to this plan. An increase in aerial surveillance also occurs if anthrax is suspected.

METHODS:

Composition survey

Composition surveys are conducted in early to mid-July to collect sex and age data from a representative portion of each population. Observers, usually a spotter and a data recorder, are positioned on the ground near groups of bison by helicopter. The recorder directs the pilot to position the helicopter so the bison move past the observers' position at a suitable distance at a walk or trot. Bison are classified as calves, yearlings, adult females (≥2years old) and three classes of males (B1 are immature males aged two to three years, B2 are young males four to five years of age, and B3 are mature males ≥5 years).

Anthrax surveillance

In coordination with the composition survey, a biweekly fixed-wing flight is conducted over the core range (i.e. Stan's, Hook Lake, Tower and North Prairies, Grande Detour and Little Buffalo) to determine if there are any fresh bison carcasses during the summer anthrax season. If any suspected anthrax mortalities are detected, the AERP is activated and carcasses are dealt with according to this plan. An increase in aerial surveillance also occurs if anthrax is suspected.

RESULTS AND MAIN CONCLUSIONS:

Composition survey

2012 - A composition survey was not conducted in the SRL in 2012, as staff resources were required to respond to the 2012 anthrax outbreak in the Mackenzie Bison Herd range.

Anthrax surveillance

2012 - There were a total of five fixed wing flights between June 18, 2012 and August 14, 2012. No bison carcasses were found in the SRL.

LONG-TERM PLANS AND RECOMMENDATIONS:

This program is ongoing and will continue in the future. Composition surveys are conducted annually as part of overall population monitoring. The SRL bison population was last estimated in 2009 (total population size: 1790±323). It is recommended the bison population size and distribution be estimated every four years.

Anthrax surveillance is an ongoing project. Long-term plans include the completion and documentation of anthrax surveillance flights in the SRL biweekly from June to August each year.

COMMUNITY INVOLVEMENT:

Results are shared and discussed at community-based meetings including biennial regional wildlife workshops. Local observers are used when possible for surveys.

Photo: GNWT/D. Allaire, ENR

Bison Control Area Program – 2012–2013

December 2012 – April 2013

MAIN INVESTIGATOR:

Karl Cox, Wildlife Technician,
Environment and Natural Resources, GNWT,
South Slave Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL004825 (January 1, 2012 – December 31, 2012);
WL500102 (January 31, 2013 – January 31, 2014)

LOCATION:

The Bison Control Area (BCA) is located between the NWT/Alberta border and the Mackenzie River and Great Slave Lake. It is bounded on the east by the Buffalo River and Wood Buffalo National Park (WBNP) and on the west by the Trout River and 121°W.

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RATIONALE:

Bison in WBNP and the Slave River Lowlands are infected with bovine tuberculosis and brucellosis while both the Nahanni and Mackenzie bison populations are free of these livestock diseases. To help protect the disease-free status of these two populations, the Government of the Northwest Territories implemented the BCA program in 1987. The objective of this program is to reduce probability of disease transmission between herds by preventing bison from moving through or establishing herds within the area south of the Mackenzie River between the Trout and Buffalo Rivers. The program is cost-shared with WBNP.

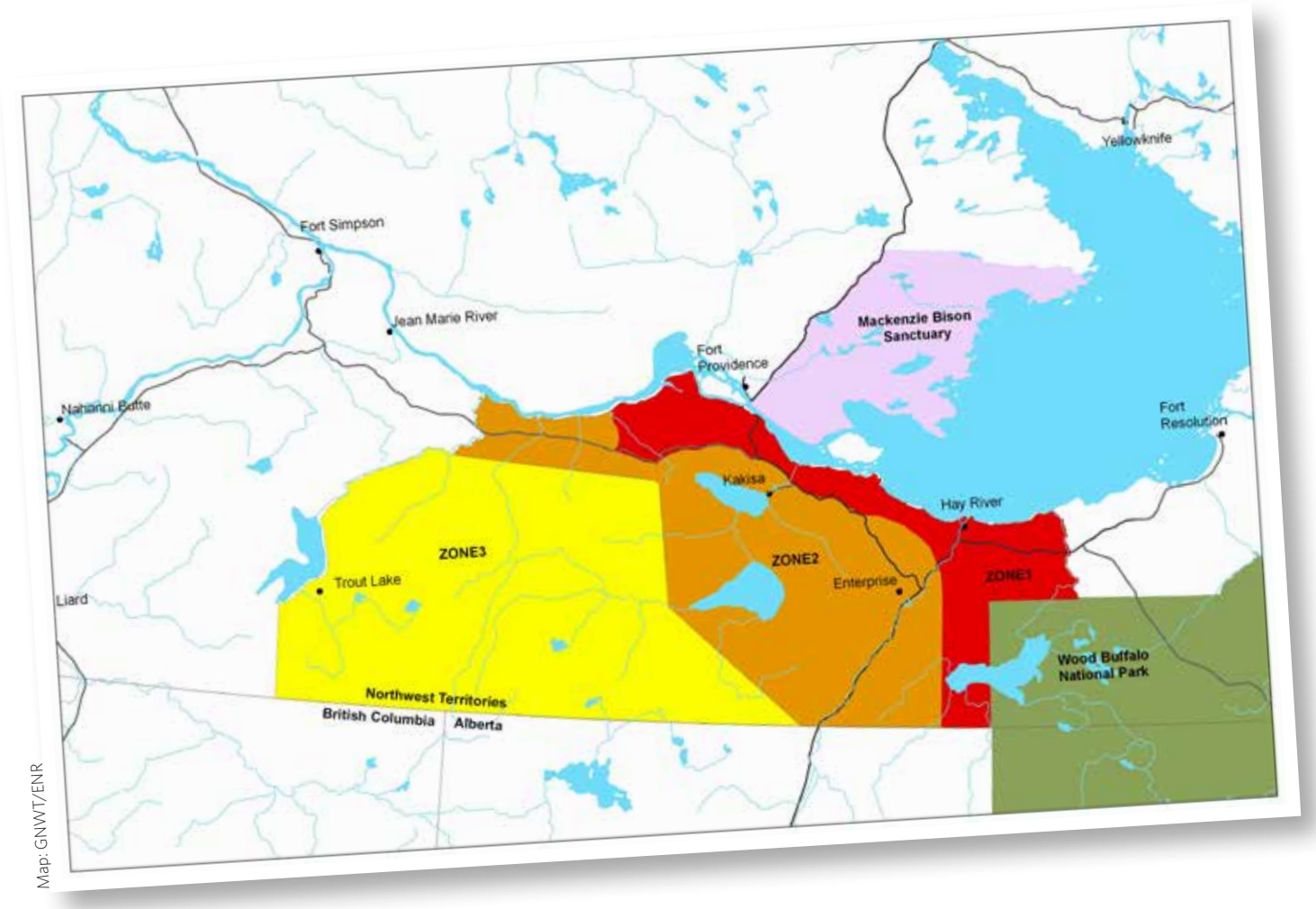
OBJECTIVES

The goal of the bison control program in the NWT is to reduce the risk of infection of the Mackenzie and Nahanni-Liard herds with tuberculosis and brucellosis. Objectives of the program are:

- To continue surveillance of the BCA;
- To maintain the BCA free of bison and prevent the establishment of any herds within its boundaries; and
- To increase public awareness of the bison control program.

METHODS:

The BCA is stratified into three zones. Zone I is the area in which bison are most likely to be seen, since it is the section nearest to both the Mackenzie Bison Sanctuary and WBNP. Therefore, the program focuses on this particular zone with frequent aerial surveillance in the form of weekly shoreline patrols. Zone II is a larger zone and is surveyed twice a year during semi-comprehensive and comprehensive aerial surveys. Personnel include a pilot and one observer for shoreline patrols and a pilot, navigator and two observers for the semi-comprehensive



Bison Control Area, Zone 1, 2 and 3.

and comprehensive surveys. Surveillance of Zone III relies on reports from people living, and travelling, in the area instead of aerial surveys.

Aerial surveillance is conducted during the winter months when bison and signs of their presence (feeding craters and tracks) are most visible. Also, the probability of bison moving through the BCA is the greatest in the winter because we assume bison are more likely to walk across the frozen Mackenzie River than swim across it in the summer.

Public awareness of the BCA is promoted with the use of newspaper and radio advertisements in areas affected by the BCA. There are also signs placed where the highways cross the BCA boundaries.

RESULTS AND MAIN CONCLUSIONS:

During the 2012/2013 season, there were three reports of bison either entering or approaching the BCA. All three reports involved bison leaving the north side of the Mackenzie River. Each report was investigated and no action was required. Twelve shoreline patrols, a semi-comprehensive (February) and comprehensive (March) surveys were flown from January to April, 2013. The aerial surveys were completed in 92.7 hours over 22 days.

LONG-TERM PLANS AND RECOMMENDATIONS:

This program is ongoing. It is recommended the BCA program continue until such time as the risk of disease transmission no longer exists or a better method of reducing that risk is discovered.

COMMUNITY INVOLVEMENT:

Local observers participate in aerial surveys. Throughout the history of the BCA, community members have proven to be extremely valuable as the majority of occurrences of bison in the BCA have been reported by community members.

Photo: GNWT/K.Cox, ENR

Health of Amphibian Populations as Indicators of Ecosystem Health

June 28, 2012 – June 27, 2013

MAIN INVESTIGATOR:

Danna Schock, Keyano College

WILDLIFE RESEARCH PERMIT NUMBER:

WL500071

LOCATION:

Areas accessible by road and short hikes near Fort Smith, Hay River, Fort Resolution and Wood Buffalo National Park, NWT.

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RATIONALE:

This project addresses important knowledge gaps about the possible effects of industrial activity in the North on wildlife populations. My collaborators and I are specifically examining the possible effects of oil sands mining and upgrading activities on amphibian health. Direct and indirect effects of oil sands operations on amphibians are not well understood, with most knowledge on the matter focused on reclamation of tailings ponds. To the best of our knowledge, there is no other study that is addressing the possibly widespread effects of this industry on amphibians. Our project examines several aspects of wildlife health, which in turn affect population stability and persistence. Although our focal species is the wood frog, a species which is not currently thought to be declining, our study is applicable other amphibians in the South Slave region (Canadian toads, boreal chorus frogs and northern leopard frogs).

Amphibian populations are important in boreal ecosystems, linking terrestrial and aquatic food webs by virtue of their lifecycles, and may also serve as valuable indicators of ecosystem health in general. Amphibians may be especially vulnerable to organics and heavy metals from mining processes because their breeding ponds are primarily filled by snowmelt in the spring. Previous studies have shown snowmelt contains particularly high levels of toxic organic compounds such as polycyclic aromatic hydrocarbons (PAH). Thus, amphibians in the boreal forest may be receiving high doses of oil sands related substances when their breeding ponds fill in the spring.

This project will generate knowledge on the potential impacts of industrial development on biodiversity in northern Alberta and the NWT and provide the basis for a potential monitoring tool for on-going oil sands

Photo: M. Stacey, ENR

Taking a measurement.

environmental monitoring. Data collected in the South Slave region will be combined with data collected in the Fort McMurray and Fort Chipewyan areas.

Our project will also increase public knowledge about amphibians, their ecology and how they may be impacted by industrial development in northeastern Alberta through public and scientific presentations, publications and involvement with wildlife management initiatives.

Other information this study might provide include information about the northern leopard frog, which is listed under the federal *Species at Risk Act* (SARA) as Special Concern. There is also potential to gather information on the Canadian toad and red-sided garter snake, which are ranked as species that May be at Risk under the NWT General Status Ranking Program. These amphibians and reptile species often share habitat with wood frogs so it is quite likely that we will be able to collect serendipitous information on these species as well.

OBJECTIVES:

We are using wood frog populations in Alberta and the NWT to test for correlations between proximity to oil sands operations and:

- Amphibian population sizes and demographics;
- Prevalence of two infectious pathogens (ranavirus and chytrid fungus);
- Rates and kinds of physical abnormalties;
- Residues of organics and heavy metals in the tissues of amphibians;
- Residues of organics and heavy metals in water samples from breeding ponds; and
- Biomarkers of chronic stress in the tissues of wild amphibians (metabolomics assays).

METHODS:

A maximum of 15 sites in the NWT will be surveyed (roughly five sites each in the Fort Smith, Hay River and Fort Resolution areas).

Photo: M. Stacey, ENR

Wood frog

No habitat destruction or alteration of any sort is expected.

Amphibian surveys will involve listening and looking for amphibians while walking through suitable places (wetlands and meadows) and dip-netting along the side of breeding sites (ponds and marshes). Amphibians will be captured by hand or dip-net. Access to sites will be accomplished by driving on established gravel roads and by walking.

The vast majority of amphibians captured during this study will be weighed, measured, examined for malformations or signs of illness (lethargy, lesions), non-lethally sampled to screen for pathogens (toe clip – frog stage; tail clip – tadpole stage) and then released at the point of capture within two hours. Up to 30 individuals of each life stage of each species encountered at each site will be non-lethally sampled with tail and toe clips.

This study will also require the capture and euthanasia of a subset of the amphibians encountered. This is for three reasons:

1) Any malformed amphibians, or amphibians with lesions or other signs of illness, will be euthanized and brought back to the lab for detailed examination.
2) Screening wood frog tissues for possible deleterious contaminant levels, and for testing for levels of metabolites indicative of chronic stress. Wood frogs are the focal species for this aspect of the research because they are widespread, abundant, and heavily reliant on ephemeral and semi-ephemeral water bodies for breeding.

   Up to eight frog-stage and 15 tad-poles from each pond will be lethally sampled for this purpose. Therefore, a total maximum of 120 frogs (eight frogs x 15 ponds) and 225 tadpoles (15 tadpoles x 15 ponds) will be

lethally sampled to allow for testing amphibian tissues for substances of concern. More individual tadpoles are required for the assays than the frogs because of their smaller size and the need to have at least 7 g of tissue to screen for all of the substances of interest.

All of the wood frogs lethally sampled will also be tail/toe clipped before processing for ecotox and metabolic assays.

Water samples will be collected at the same time, and from the same ponds, as the wood frogs are lethally collected. Water samples will be screened for heavy metals, NA and PAII's to allow for comparisons between levels of substances in tissue and water. Four litres of water will be collected from each site where water sampling occurs.

3) Properly interpreting rates and types of malformed amphibians encountered in northern Alberta and the NWT. During previous work in the Fort Smith area (2009 and 2010), we detected amphibians with abnormalities not consistent with depredation attempts. For example, frogs were encountered with missing eyes, curved spines and malformed limbs. In order to describe the variability of apparently "normal" frogs, we will collect up to five apparently normal frogs from each breeding site where we detect abnormal frogs in 2012. Amphibians collected for morphological comparisons must be carefully preserved in formalin and are therefore not useable for any of the tissue assays.

   Moribund or malformed individuals, those which appear in any sort of immediate distress (e.g. severe wounds), and all wood frogs collected for contaminant screening will be humanely euthanized with an overdose of buffered MS222 administered by water bath (tadpoles: cone = 4-5 g/L of water) or intracoelomic injection (frog stage: 200 mg/kg).

Several precautions will be taken to prevent accidental transfer of infectious agents among sites, and among animals within sites. First, the bags used to hold animals until processing will be used only once and the animals will be held individually throughout the process. Second, a new pair of latex gloves will be used to process each animal. Third, new blades/ new swabs will be used for each animal. Fourth, rulers/calipers, etc. will be disinfected with viricidal/ bacterial swabs between animals. Finally, boots, nets, coolers and any other large equipment that come into physical contact with the animals will be disinfected with a 10 percent bleach solution and then be allowed to dry before it is used again at another site. (Bleach is transported in a powdered form that minimizes bulk and weight.) Whenever possible, this will take place where the field crew (lead by Schock) will be lodging as the process is greatly facilitated by hot running water. In cases where equipment will be disinfected in the field, the bleach solution will be prepared using water collected in a five gallon bucket from a nearby water body (e.g. pond, ditch) and the equipment allowed to dry as much as possible. The equipment will then be rinsed with pond water at the next site so any animals contacted will only be exposed to water from their own site. When finished with the bleach solution, it will be poured onto the road or a rocky surface where the bleach will rapidly evaporate and break down in the sunlight.

RESULTS AND MAIN CONCLUSIONS:

Results and main conclusions were not submitted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

Wildlife Health, Condition and Genetic Monitoring

January 1, 2013 – December 31, 2013

MAIN INVESTIGATOR:

Brett Elkin, Disease/Contaminant Specialist,
Environment and Natural Resources, GNWT

WILDLIFE RESEARCH PERMIT NUMBER:

WL500098

LOCATION:

NWT-wide.

PARTNERS:

- Local hunters and trappers
- Members of the general public
- Environment and Natural Resources (ENR) biologists and Renewable Resource Officers
- Canadian Cooperative Wildlife Health Centre
- Canadian Food Inspection Agency
- Centre for Coastal Health
- University of Saskatchewan Western College of Veterinary Medicine
- University of Calgary Faculty of Veterinary Medicine
- Wildlife co-management partners

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RATIONALE:

Although most wild animals are healthy, diseases and parasites do occur in any wildlife population. Some diseases and parasites are naturally occurring and appear to cause little problem in their host, while others have the potential to impact wildlife at both the individual animal and population level. Some of these diseases and parasites can also affect people and domestic animals.

Samples from animals harvested by hunters and trappers, found sick or dead, or handled during wildlife research or management activities by ENR staff, other wildlife agencies or university researchers can provide valuable health, condition, stress and genetic information on wildlife populations. These samples provide an opportunity to monitor diseases and contaminants of particular importance to wildlife and human health and to identify new and emerging diseases. Taking advantage of samples from these existing activities provides additional valuable information for making wildlife management decisions and providing public information.

OBJECTIVES:

- To determine the cause of sick or dead wildlife found, harvested or handled by hunters, trappers, biologists, wildlife researchers, Renewable Resource Officers or the general public;
- To assist hunters and trappers by testing samples from harvested wildlife to determine what diseases or parasites are present, and the implications for their use or consumption;
- To work co-operatively with hunters, trappers, Renewable Resource Officers, biologists, researchers, wildlife managers and members of the general public to monitor the health and condition of wildlife on an ongoing basis;

Winter ticks found on a moose.

Photo: J. Polfus

- To identify the types, relative levels and geographical distribution of diseases, parasites and contaminants found in wildlife across the NWT;
- To increase community awareness of diseases and parasites; and
- To collect genetic information that will contribute to the understanding and management of wildlife populations.

METHODS:

- Samples are collected in several different ways.
- Local hunters, trappers and Renewable Resource Officers frequently submit samples from harvested wildlife. They generally provide detailed information on the animal, and the particular case, and often provide additional information on the occurrence and patterns of similar cases within their harvest areas.
- Members of the general public, wildlife biologists or Renewable Resource Officers may also submit samples from wildlife that are sick or found dead.
- Samples from animals handled during wildlife research or management activities may be submitted by biologists, technicians, other wildlife researchers or Renewable Resource Officers. Whole animals or samples of the affected tissues or body parts are collected as well as other samples necessary to determine health status, body condition and age.

Photo: GNWT/ENR

Thread lungworms.

- Samples are analysed for diseases, parasites, contaminants, condition and/or genetics. In many cases, this requires the shipment of samples to specialised laboratories to determine the cause of the abnormality. Results of the testing are provided to the individual(s) who submitted the sample and recorded in an NWT disease database to monitor disease trends across the NWT and over time.

RESULTS AND MAIN CONCLUSIONS:

Hunter submitted samples in 2013 (field and lab tested).

Samples Submitted for Disease Surveillance:

- Anthrax surveillance in Mackenzie Bison Sanctuary and Slave River Lowlands June through August
- Testing suspect anthrax cases (3; all negative)
- Barren-ground caribou health and condition surveillance: Bathurst, Beverly and Ahiak, and Bluenose-East (155 tested)

- Brucellosis and tuberculosis surveillance in wood bison
- CWD surveillance: white-tailed deer and caribou
- Echinococcus surveillance: multiple species
- Erysipelas monitoring in Banks Island muskox
- National Avian Influenza surveillance: birds (not detected)
- National West Nile Virus: birds and mosquitoes (not detected)
- Rabies surveillance (18 submissions, 12 positive)
- Trichinella surveillance: multiple species
- Contaminant testing in caribou, Dall's sheep, mountain goat and moose

Products Produced:

- Results reported to individual hunters and trappers.
- NWT wildlife disease surveillance and database.
- NWT rabies surveillance and database.
- Participation in national wildlife disease, Avian Influenza, West Nile Virus and CWD surveillance efforts.

LONG-TERM PLANS AND RECOMMENDATIONS:

Wildlife disease surveillance is ongoing every year.

Long-term testing will continue on any hunter submitted samples, animals found dead and the investigation of disease cases or outbreaks. Results of this testing will be used to provide information and recommendations to individual harvesters, the public wildlife management agencies and wildlife co-management boards.

COMMUNITY INVOLVEMENT:

Hunters and trappers frequently bring in samples or provide reports of diseases, parasites or abnormalities in harvested wildlife. Identification of the diseases or parasites involved in these cases can be important to make decisions on consumption of meat from the affected animal. Sick or dead animals are also found periodically in the wild, and testing is required to determine the cause of death and potential significance for other wildlife and people. Information provided by hunters and trappers on the occurrence of diseases and parasites can be used to identify areas requiring further monitoring or testing.

Local hunters, trappers and members of the general public are encouraged to submit samples of any abnormalities they find in the wildlife they harvest. Results of testing are provided back to the individuals submitting the samples following diagnostic testing.

Caribou and Moose Genetic Study in the Sahtú Region

Winter 2013

MAIN INVESTIGATOR:
Jean Polfus, Ph.D. Candidate,
University of Manitoba

WILDLIFE RESEARCH PERMIT NUMBER:
WL500104

LOCATION:
Sahtú region, NWT.

PARTNERS:
- ʔehdzo Got'ı̨nę Gots'ę́ Nákedı (Sahtú Renewable Resource Board)
- ʔehdzo Got'ı̨nę (Renewable Resource Councils - RRCs) in Norman Wells, Fort Good Hope, Tulít'a, and Déli̧ne
- Environment and Natural Resources (ENR)
- University of Manitoba
- Trent University
- University of Calgary

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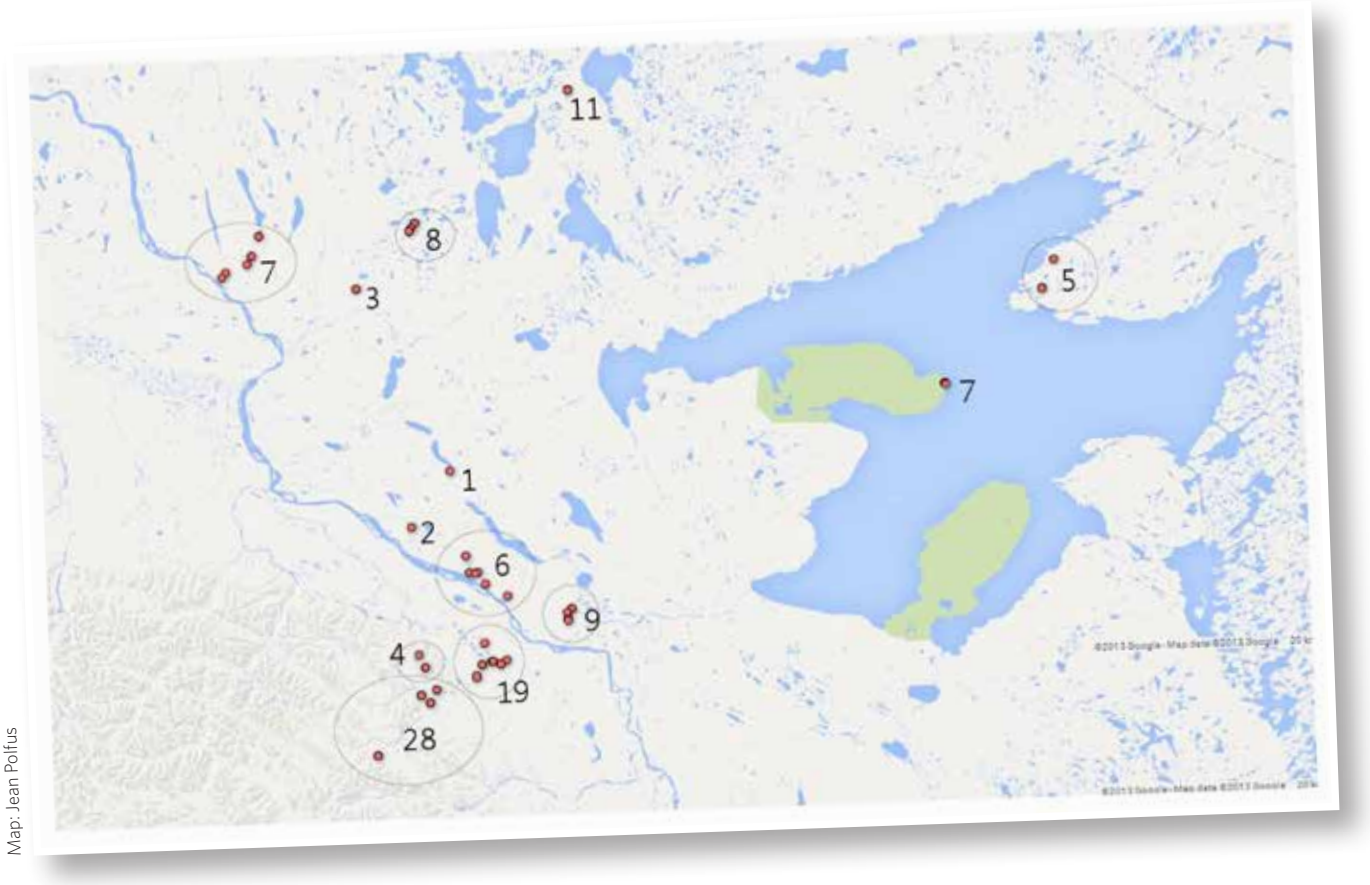
RATIONALE:
The main goal of this research project is to develop a comprehensive understanding of the identities and relationships among caribou populations and Dene people in the Sahtú region of the NWT in order to inform and prioritize management efforts. The project will bring together traditional knowledge (TK) and non-invasive population genetics to organize and understand the biological diversity of caribou. The research includes collecting caribou fecal pellet (scat) samples. The genetic analysis of the mucosal layer covering fecal pellets will help define spatial genetic patterns and help characterize the boundaries of different groups of caribou in the Sahtú.

OBJECTIVES:
- The project will bring together multiple approaches to describe and understand the biological diversity of caribou. The research objective is to create an assemblage of knowledge by exploring Aboriginal and western science descriptions of species variation, population structure and spatial dynamics.
- Caribou diversity: within the study region caribou belong to three different designatable units: barren-ground, boreal, and mountain;
- Spatial organization of caribou: phylogenetic and population genetic analyses will help delineate and characterize the main population units; and
- TK: This study will shed light on how people identify different groups and types of caribou.

METHODS:
This project uses an interdisciplinary socio-ecological approach that will allow for the development of questions and concepts based on the goals, values and priorities of communities.



Map: Jean Polfus

Locations of 110 unique individual caribou that were identified from samples collected during the winter of 2013. The numbers on the map indicate how many individual caribou were identified in each group (circle).

TK: TK will be shared during informal trips on the land, expert workshops and focus group meetings. The focus groups will help to build a comprehensive understanding of the origin, dynamic interactions and spatial structure of caribou.

Population genetics: caribou pellets will be collected non-invasively by community members, researchers from other projects and industry monitors. We will use multiple markers (microsatellites, mtDNA) and multiple analytical approaches to help characterize population structure.

RESULTS AND MAIN CONCLUSIONS:

Caribou fecal pellets were collected in collaboration with local community members during the winters of 2013 and 2014. Collection will continue in the winters of 2015 and 2016 to continue to monitor the populations. Preliminary results suggest landscape features may play a role in the genetic structure of boreal caribou in the Sahtú and shed light on some of the complex evolutionary histories of caribou in the region: http://nricaribou.cc.umanitoba.ca/sahturesearch.

LONG-TERM PLANS AND RECOMMENDATIONS:

The importance of population designations and classification systems to conservation biology cannot be overstated. If management boundaries do not reflect the true spatial distribution of caribou, recovery strategies will be ineffective. We hope to produce important contributions to the understanding of caribou genetic biodiversity and also publish on collaborative and cross-cultural research methodologies and intersections between harvester knowledge and genetic results through the final PhD dissertation. Community meetings to present and interpret results (winter 2015) as well as large regional workshops in collaboration with other projects (winter 2016) will provide an avenue for exchange of ideas and promote knowledge generation.

COMMUNITY INVOLVEMENT:

In December 2012, the SRRB (Deborah Simmons and Jean Polfus) met with the RRCs in Norman Wells (December 1), Fort Good Hope (December 5-6), Tulít'a (December 10-13) and Déline (December 16-17) to discuss the project and plan for the pilot season of winter field work. These discussions facilitated the development of research priorities, research questions and appropriate methods for the current and future monitoring. In January 2013, a series of RRC and public meetings were held to set up a solid plan for winter sampling, build awareness for the program and train community members in sampling techniques. Public meetings were held in Fort Good Hope (January 25), Norman Wells (January 26), Tulít'a (January 28) and Déline (January 29). Full day RRC meetings were held in Fort Good Hope, Tulít'a and Déline. The RRCs are fully involved in the project and oversee sample collection, data entry and supervise gift card distribution. Community members receive a gift card for gas in thanks for their participation when they submit samples.

During the winter of 2013 Jean Polfus traveled within the communities in the Sahtú and provided support for the RRCs, collected samples, participated in harvesting activities, met with students at local schools and Aurora College and coordinated the sampling efforts so the sample collection best represented the entire Sahtú study area. A successful meeting with community members from Colville Lake, held in collaboration with ENR (Richard Popko) in March, found strong interest in community participation. In April 2013, we held follow-up meeting with the RRCs in each community to discuss

how the project could be improved in subsequent years and work with harvesters to understand the current state of caribou populations in the region in focus group meetings (Tulít'a: April 4-5; Déline: April 24-25; Norman Wells: April 26; Fort Good Hope: April 29-30; and Colville Lake: May 2).

An important priority of this project is to ensure information relating to the research is easily accessible to all interested parties. A communication plan was developed with the RRCs in December of 2012 to ensure the appropriate community leaders and the public are made aware of the research being conducted. This communication plan includes a memorandum of understanding between the SRRB and the RRCs which, as of February 2013, has been signed by the RRCs in Fort Good Hope, Tulít'a and Déline. The communication plan requires letters be sent to community leadership organizations (First Nations, Land Corporations, Métis Land Corporations, hamlets, ENR, schools and Parks Canada) prior to all public meetings. There is also a strong emphasis on communication through public meetings, with students at the schools and Aurora College, radio announcements, website notifications, community posters, a fall hunt photo book and communication on the SRRB Facebook page and all community Facebook pages. Students are invited to attend all RRC planning meetings, whenever possible.

Wildlife Monitoring along the Enbridge Right-of-Way

Permit Period:
November 11, 2012 – March 31, 2013;
Activity Period:
November 3, 2012 – January 28, 2013

MAIN INVESTIGATOR:

Ann Marie Tout, Manager,
Enbridge Pipelines (NW) Inc.

WILDLIFE RESEARCH PERMIT NUMBER:

WL500089

LOCATION:

Enbridge Right-of-Way, Kp 78 – Kp 160.

PARTNER:

- Tulít'a Renewable Resources Council

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RATIONALE:

The wildlife monitoring program is an annual program done at the request of the community.

OBJECTIVES:

- To support and encourage community-based programs to document wildlife sightings and wildlife tracks along the Enbridge Right-of-Way.

METHODS:

Monitors traveled the Right-of-Way by snowmobile and documented their observations of wildlife tracks.

RESULTS AND MAIN CONCLUSIONS:

Wildlife sighting reports are available from participants.

LONG-TERM PLANS AND RECOMMENDATIONS:

Pending permitting approvals, this program will continue on an annual basis.

COMMUNITY INVOLVEMENT:

The value of the 2012/2013 program was increased based on feedback from the participants.

Photo: GNWT/J. Adamczewski, ENR

Wildlife Monitoring – Enbridge Right-of-Way

Permit Period:
November 30, 2012 – March 31, 2013;
Activity Period:
December 8, 2012 – April 6, 2013

MAIN INVESTIGATOR:

Ann Marie Tout, Manager,
Enbridge Pipelines (NW) Inc.

WILDLIFE RESEARCH PERMIT NUMBER:

WL500097

LOCATION

Enbridge Right-of-Way, Kp 444-510 and Kp 541-585.

PARTNERS:

- Liidlii Kue First Nation
- Fort Simpson Métis Nation Local #52

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RATIONALE

The wildlife monitoring program is an annual program done at the request of the communities.

OBJECTIVES

- To support and encourage community-based programs to document wildlife sightings and wildlife tracks along the Enbridge Right-of-Way.

METHODS

Monitors traveled the Right-of-Way by snowmobile and documented their observations of wildlife tracks.

RESULTS AND MAIN CONCLUSIONS

Wildlife sighting reports are available from participants.

LONG-TERM PLANS AND RECOMMENDATIONS

Pending permitting approvals, this program will continue on an annual basis.

COMMUNITY INVOLVEMENT

The value of the 2012/2013 program was increased based on feedback from the participants.

Photo: Gordon Court

Baseline Wildlife and Habitat Assessment for Husky Oil Operations Limited – EL462 and EL463

July 17, 2012 - April 30, 2013

MAIN INVESTIGATOR:

Darren Heck, Environmental Project Manager,
Northern EnviroSearch (Tulít'a) Ltd.

WILDLIFE RESEARCH PERMIT NUMBER:

WL500077

LOCATION:

Southeast of Norman Wells and southwest of Tulít'a in Husky leases EL462 and EL463.

PARTNERS:

- Northern EnviroSearch (Tulít'a) Ltd.
- Norman Wells Renewable Resources Council
- Tulít'a Renewable Resources Council

CONTACTS:

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RATIONALE:

The wildlife study and habitat assessment was conducted to collect baseline data on wildlife and wildlife habitat prior to further development in EL462 and EL463. This data will allow for the assessment of project effects on wildlife, the development of mitigations to reduce the effects and the monitoring of effects as development proceeds.

OBJECTIVES:

- To collect baseline data on wildlife;
- To identify the diversity of wildlife habitat types (vegetation communities);
- To map the habitat types and assess their suitability for species at risk and culturally and economically important species;
- To assess the distribution and relative abundance of wildlife species at risk and culturally and economically important species; and
- To use the field data to assess, monitor and mitigate potential project effects on wildlife.

METHODS:

Winter Wildlife Tracking Survey

A wildlife tracking survey was conducted in February 2013 to collect information on the relative abundance, distribution and habitat use of terrestrial mammals. Wildlife tracks were recorded along (40) 1,000 m transects in representative habitat types throughout the study area. These surveys focused on caribou, moose, marten, wolverine, lynx and snowshoe hare.

Camera Survey

Forty trail cameras were placed along man-made and naturally-occurring linear corridors to understand if there are differences in habitat use between habitats disturbed by development and natural control areas. The cameras will be in place year-round. Eight cameras were placed

at each linear feature type, including 2D seismic lines, 3D seismic lines, winter access roads, all-season access roads and natural corridors. Cameras were placed in early March 2013. Data will be collected in June 2013.

Denning Survey

A denning survey was conducted in October 2012 along the proposed all-season road to search for bear dens and identify potential denning habitat for other wildlife species of concern (e.g. marten, wolverine, and lynx). When landforms and vegetation types that afforded potential denning habitat were observed, close aerial inspection was conducted and, if required, the area was inspected on the ground.

Land Classification and Habitat Suitability Survey

Habitat types (vegetation communities) were classified using satellite imagery prior to conducting field work. Vegetation communities were characterized from field data collected in 20 m x 20 m plots. Vegetation data was used with the tracking survey results to assess the suitability of each habitat type for species at risk and culturally and economically important species.

Bat Station Assistance

Husky provided assistance to the Department of Environment and Natural Resources (ENR) to place an AnaBat recorder near the Slater River. The goal of the survey is to confirm the presence of bats and to identify the species. The station will be collected and analyzed in spring 2013 by ENR staff.

RESULTS AND MAIN CONCLUSIONS:

A baseline report, including habitat suitability modelling results, is being produced based on 2012 habitat assessments, winter track survey data collected in winter 2012/2013 and pellet group surveys proposed for June 2013. A summary of these results are provided below.

Winter Snow Track Surveys

Snowshoe hare was the most commonly encountered species in the winter track survey. Hare tracks were recorded in every habitat type. The highest snowshoe hare track density was observed in deciduous forest at 56.73 tracks/km/day while the average hare track density across all habitats was 10.32 tracks/km/day.

Caribou tracks were recorded three times during the winter track survey, twice in black spruce-tamarack and once in mixed wood forest habitat types respectively. Caribou track density across the local study area (LSA) was 0.04 tracks/km/day.

Photo: Husky Energy

Trail camera capturing image of a lynx.

Moose tracks were recorded in seven of the nine habitat types surveyed. Moose track density was 0.23 tracks/km/day within the LSA, with the highest recorded density (1.53 tracks/km/day) was in riparian shrub habitat.

Wolverine tracks were recorded at a track density across all habitat types of 0.02 tracks/km/day.

American marten tracks were recorded at 0.52 tracks/km/day across all habitat types. Highest track densities were recorded in white spruce forest at 2.03 tracks/km/day.

Canada lynx were observed in six of the nine terrestrial habitat types surveyed with the highest track density in deciduous forest at 3.53 tracks/km/day. The track density for lynx across the LSA was 0.32 tracks/km/day.

Black bear sow and cubs.

Photo: Husky Energy

Camera Survey
Cameras will be checked, and data cards and batteries replaced in June 2013.

Denning Survey
No dens of black bears, grizzly bears or wolves were observed during surveys of the local study area.

Land Classification and Habitat Suitability Survey
An ecological land classification report was completed, describing the habitat types (vegetation communities) within the local study area.

Bat Station Assistance
Husky will assist ENR in collecting the AnaBat recorder in June 2013.

LONG-TERM PLANS AND RECOMMENDATIONS:

Plans are to increase the size of the local study area within EL462 and EL463 as development plans unfold. Baseline wildlife surveys as described above will continue as part of annual monitoring. In addition,

Moose cow and calf.

Photo: Husky Energy

Photo: Husky Energy

Caribou foraging during winter months.

permits to conduct breeding bird, waterfowl, pellet group, fish and additional bear denning surveys have been applied for. Recommendations include the use of standard survey protocols across all land parcels in the region to facilitate the comparison and, if necessary, combining of research results from the various parcels.

COMMUNITY INVOLVEMENT:

Community involvement included providing food, accommodation, transportation and logistical support to Northern EnviroSearch (Tulít'a) Ltd. staff and assisting field crews in the collection of data. A local community member assisted each crew during each of the surveys including winter track, camera, denning, vegetation and bat station placement.

Photo: Husky Energy

Corridor camera set up.

Environmental Monitoring Activities for Explor's Tulít'a Seismic Program (LUP S11B–004)

February 2013 – April 2013

MAIN INVESTIGATOR:

Jesse Tigner, Ecologist, Explor

WILDLIFE RESEARCH PERMIT NUMBER:

WL500107

LOCATION:

The study occurred in the Tulít'a District of the Sahtú Settlement Area, west of the Mackenzie River spanning approximately from Norman Wells to Tulít'a. Data were collected during seismic survey operations over the exploration leases in the central Mackenzie Valley (CMV).

PARTNERS:

- Explor
- Sahtú Land and Water Board
- Tulít'a Renewable Resources Council (TRRC)
- Norman Wells Renewable Resources Council (NWRRC)

CONTACT:

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RATIONALE:

Increased energy sector exploration in the CMV has spurred economic opportunities and concerns over impacts to wildlife and traditional land uses. Numerous stakeholder groups are interested in achieving balanced land uses in the area to maximize the opportunities while minimizing undesired impacts. Unfortunately, few data exist for the region with which to understand the cause and effect relationships between energy exploration and wildlife response. As a result, informed decision making is stymied and management decisions must be based on "best guesses". Because environmental monitoring is a requirement of industrial development in the NWT, increased exploration activity in the Sahtú presents an opportunity to integrate environmental data collection with operations so as to better inform land use decision-making.

OBJECTIVES:

- To integrate environmental data collection into seismic survey operations to obtain regional baseline information on species' occurrence and habitat use within the CMV; and
- To conduct track counts for marten, wolverine, lynx, fox, wolf, moose and caribou.

METHODS:

Track Counts

We used seismic lines as transects to conduct track counts. Lines were travelled by snowmobile and encountered tracks were recorded to species and marked with a GPS waypoint.

Marten Snow Tracking

Marten tracks were followed through the bush. Trails were recorded as routes in a GPS and marten behaviours (use of subnivean, foraging, investigation, etc.) were recorded and marked with a GPS waypoint.

Photo: Jesse Tigner, Explor

Environmental monitor conducting track counts.

RESULTS AND MAIN CONCLUSIONS:

Track Counts

Marten: marten occurred throughout the region at a high density. Use is highest in closed conifer stands, followed by open conifer stands, followed by burns. Marten seldom use deciduous stands.

Wolverine: wolverine occurred throughout the region. Few wolverine tracks were encountered and use appeared random relative to habitat types.

Lynx: lynx occurred throughout the region, but use was mainly restricted to deciduous stands and burns or in open conifer forests in close proximity to deciduous stands and burns.

Wolves: wolf tracks were not frequently observed. Wolves did use seismic lines in the study area, but use was generally confined to the Carcajou and Little Bear River Valleys.

Photo: Jesse Tigner, Explor

Wolf tracks on snow.

Marten Snow Tracking

Marten appeared to cluster foraging bouts between directed (i.e. straighter lines) travel.

Marten used open habitats with little or no overhead cover, but travel was more directed in those habitats.

Marten travelled along edges between habitat stands more than expected and travel along edges was more circuitous than expected.

These data will be used to improve operations in the future and to understand long term responses of wildlife to exploration activities in the CMV.

LONG-TERM PLANS AND RECOMMENDATIONS:

We recommend better integration of environmental data collection with ongoing operations in the CMV to leverage exploration to collect important data. Further, we recommend future data collection efforts are tailored to fill knowledge gaps important make informed management decisions at local and Territorial levels.

COMMUNITY INVOLVEMENT:

Prior to obtaining the wildlife research permit, the NWRRC and the TRRC were consulted on monitoring activities, goals and planned outcomes. Consultations with the NWRRC and TRRC, as well as the communities of Norman Wells and Tulít'a, were ongoing throughout data collection as a part of LUP S11B-004. During all consultations, environmental data were shared and discussed.

Photo: Jesse Tigner, Explor

Wildlife and Habitat Assessment for ConocoPhillips EL470

July 4, 2012 – April 30, 2013

MAIN INVESTIGATOR:

Sandra Marken, Environmental Coordinator, ConocoPhillips Canada

WILDLIFE RESEARCH PERMIT NUMBER:

WL500075

LOCATION:

The project area is within the boundaries of EL470; 216,000 acres in the Central Mackenzie Valley, NWT; located approximately within 64°45' - 65°15'N and 126°40' - 127°10'W. The nearest community is Norman Wells, NWT.

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RATIONALE:

To support elements of ConocoPhillips' land use permit and water licence applications and to establish a baseline in advance of potential future activity within EL470, ConocoPhillips is proposing to collect baseline wildlife and habitat assessment data. The baseline data will be used to inform project planning and project design, including mitigation measures.

OBJECTIVES:

- To collect baseline species diversity and abundance data on breeding birds;
- To collect baseline species diversity and abundance data on mammals, primarily caribou, moose, grizzly bears and wolves;
- To collect baseline species diversity and abundance data on fish species;
- To map habitat types and based on the aforementioned data to assign species diversity and potential habitat utilization across the EL470 lease to better determine the potential impacts of future projects on these species; and
- To identify and select appropriate impact mitigation options.

METHODS:

All observations and transects described will be geo-referenced using GPS and, where possible, photographed.

Helicopter transects: observations will include species, number of individuals sighted, behaviour/habitat use and habitat type in which they're found.

Ground-based transects (approximately 30 transects, 50 m): record all wildlife observations, wildlife signs (dens, wildlife, trees, cavity nests, nests, etc.) and pellet counts, within selected habitat types (based on map of vegetation communities/habitat types).

Electro-fishing and gill netting: to determine abundance, density, and species composition of fish in rivers/ streams and lakes within EL470.

Winter wildlife and track/pellet count surveys, 2013: conduct wildlife transects and record wildlife observations, track counts (by species) and pellet counts, by species. Indicate habitat type at location of observations.

Surveys will focus on significant species, including species at risk and species of important traditional land use.

RESULTS AND MAIN CONCLUSIONS:

Results and main conclusions were not submitted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

View of the mountain range.

Photo: GNWT/J. Adamczewski, ENR

Grizzly Bear and Wolverine DNA Monitoring Program Inuvik to Tuktoyaktuk Highway

July 2013 – October 2013

MAIN INVESTIGATOR:

Marsha Branigan, Manager Research and Monitoring, Environment and Natural Resources, GNWT, Inuvik Region

WILDLIFE RESEARCH PERMIT NUMBER:

WL500163

LOCATION:

Between Tuktoyaktuk and Inuvik, along the highway right-of-way and adjacent areas.

PARTNERS:

- Department of Transportation (DOT)
- Environment and Natural Resources (ENR)
- Inuvik and Tuktoyaktuk Hunters and Trappers Committees

CONTACT:

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RATIONALE:

This project is part of the wildlife effects monitoring program (WEMP) for the Inuvik-Tuktoyaktuk highway.

OBJECTIVES:

To use grizzly bear and wolverine DNA data collected and mortality from harvest and other factors to determine the following:

- If there is an area of reduced use near the highway during and after construction, and if so, what the size of this area is (i.e. the zone of influence);
- If there is a change in bear denning frequency within, or near, the road corridor during and after construction when the road is in use;
- What the overall impact of the highway is on direct mortality within the regional study area;
- If mitigations and management actions meant to limit impacts on bears and wolverine are effective;
- If bears and wolverine are less likely to cross the highway (may require collars); and

Photo: GNWT/M. Branigan, ENR

Survey crew checking sampling stations for hair.

- If bears and wolverine cross the highway at a higher rate of travel than they would cross over undisturbed areas.

METHODS:

Monitoring stations consisting of a tripod of wooden posts covered in barbed wire and supplied with a scented lure will be placed within each of the grid cells. The survey grid will consist of (93) 10x10 km cells.

Hair samples were collected over four sessions spaced approximately 14 days apart starting in mid-June 2013 and running until mid-August. Two field crews were used to set up the stations including one fieldworker from Tuktoyaktuk and one from Inuvik. Checking the stations for hair and tear down was conducted by one crew of three people.

RESULTS AND MAIN CONCLUSIONS:

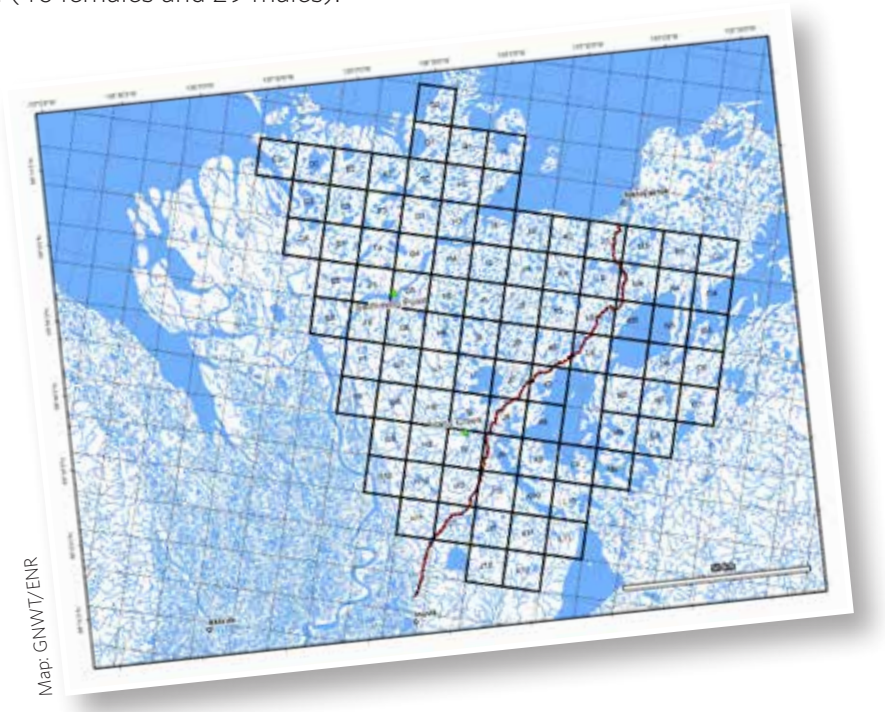
Year one of the study identified 75 individual bears in the study area (46 females and 29 males).

LONG-TERM PLANS AND RECOMMENDATIONS:

This project is part of WEMP for the highway and part of the commitments made by the developer, DOT. ENR conducts the survey on behalf of DOT. The study will be repeated in 2014 and again after construction is complete.

COMMUNITY INVOLVEMENT:

Members of both Hunters and Trappers Committees (HTCs) are part of the survey crew. Survey results were discussed with the HTCs and the developer to determine appropriate mitigation and monitoring as per the wildlife research permit.



Map: GNWT/ENR

Hair sampling station survey grids.

Courageous Lake Project: Wildlife Baseline Program

August 2013 to present

MAIN INVESTIGATOR:

Dr. Gregory Sharam, Lead, Terrestrial Services

WILDLIFE RESEARCH PERMIT NUMBER:

WL500134

LOCATION:

The Courageous Lake project (Project) is owned by Seabridge Gold Incorporated and is located south of Courageous Lake at 64°05´N and 111°15´W, about 240 km northeast of Yellowknife, NWT.

Wildlife baseline studies were conducted in early August, 2013, within the general area of the Project, specifically within the Felsic Ash Tuff (FAT) deposit.

PARTNERS:

- Environmental Resources Management (ERM) Rescan has involved members of the Yellowknives Dene First Nation in the collection of wildlife data in 2011 and 2012. As little field work was conducted for the Project in 2013, there were no partners for this work.

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RATIONALE:

Baseline studies were conducted to provide a reference point for future monitoring studies and allow the evaluation of potential effects of the Project.

OBJECTIVES:

- To collect baseline data on wildlife populations in the area, including numbers, distribution, and behaviour; and
- To examine the distribution and abundance of caribou in areas within the FAT deposit with the use of remote cameras.

METHODS:

Baseline studies for caribou in 2013 included the deployment of Reconyx PC800 Professional digital cameras to monitor caribou numbers and movement in the southern FAT deposit.

RESULTS AND MAIN CONCLUSIONS:

Eight remote cameras were installed on August 11 and 12, 2013. These cameras will continuously monitor the area in the southern FAT deposit for caribou and other wildlife passing through the general area of the Project.

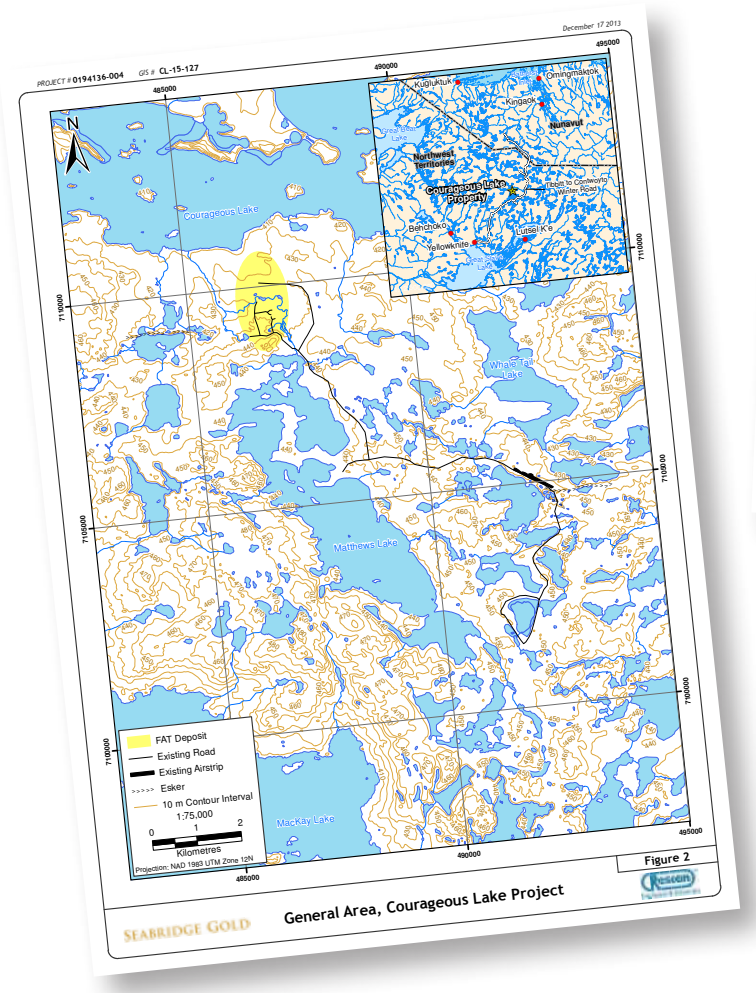
Observation data (in the form of images recorded on camera memory cards) will be downloaded in 2014 when the Project exploration camp reopens.

LONG-TERM PLANS AND RECOMMENDATIONS:

Remote cameras will continue to be used to non-invasively monitor the presence and seasonal patterns in caribou numbers at the Project.

COMMUNITY INVOLVEMENT:

Data from the remote cameras installed in 2013 will become available for analysis in 2014. Results from these remote cameras will be incorporated into the annual wildlife baseline report produced for the Project in 2014, which will be distributed to communities as requested.



Wildlife Effects Monitoring Program – DDEC

July 15, 2012 – July 15, 2013

MAIN INVESTIGATOR:

Harry O'Keefe, Environmental Advisor,
Dominion Diamond Ekati Corporation

WILDLIFE RESEARCH PERMIT NUMBER:

WL500090

LOCATION:

The Ekati Diamond Mine, owned and operated by Dominion Diamond Ekati Corporation (DDEC), is located in the Slave Geological Province of the NWT, approximately 150 km north of the treeline between Yamba Lake and Lac De Gras. The predominant vegetation type in the region is heath tundra with several large eskers in the study area providing travel routes for caribou and denning habitat for wolves and grizzly bears.

PARTNERS:

- Yellowknife Dene First Nation
- Łutselk'e Dene First Nation
- Tłı̨chǫ
- Kitikmeot Inuit Association
- North Slave Métis Alliance

CONTACT:

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RATIONALE:

The wildlife effects monitoring program (WEMP) is a requirement of DDEC's Environmental Agreement (Articles V and VII). WEMP is based on environmental impact statements and predictions that led to a series of monitoring objectives and subsequent studies which, with community input, were designed to determine whether mine activities have effects on wildlife and/or wildlife habitat. WEMP also includes monitoring programs that can be used to measure the effectiveness of mitigation measures.

OBJECTIVES:

In order to monitor the environmental impact predictions and potential effects on valued ecosystem components (VEC) species, and to address key residual environmental risks to wildlife as identified in the environmental impacts review process, there are eight main objectives for the WEMP:

- To monitor caribou;
- To monitor carnivores, including grizzly bears, wolves, wolverine and foxes;
- To monitor upland breeding birds and raptors;
- To monitor interactions between wildlife and traffic, and assess success of mitigation efforts;
- To monitor wildlife mortalities and incidents and assess the effectiveness of mitigation efforts;
- To monitor potential wildlife attractants and assess the effectiveness of waste management efforts;
- To inspect buildings (i.e. accommodation skirting) and fencing structures at the Ekati Diamond Mine and Misery camps for evidence of interaction with or disturbance by wildlife; and
- To monitor wildlife interactions with the Long Lake Containment Facility.

METHODS:

WEMP uses scientific methodology and traditional knowledge to design monitoring programs and as a source of information regarding wildlife and local ecology. The Ekati Diamond Mine employs four Wildlife Technicians, a consultant Wildlife Biologist and an Environmental Advisor dedicated to the wildlife program. The WEMP focuses on wildlife species and habitats identified during the environmental assessment review process (EARP) as being of social or economic importance or of particular ecological or conservation concern. Wildlife effects are defined as changes to a VEC due to human activities (BHP Billiton 2003). A wildlife effect is not necessarily a negative impact. An effect may also be neutral or positive.

RESULTS AND MAIN CONCLUSIONS:

Habitat Alteration and Loss

From January 1 to December 31, 2013, 21.63 ha of additional surface area of habitat were disturbed at the Ekati Diamond Mine due to mine development and operations.

Wildlife-vehicle Encounters

From January 1 to December 31, 2013, a total of 26 vehicle-related animal mortalities were reported. None of the vehicle-related mortalities were caribou or other VEC species. However, there was one incident of vehicle-related mortality for a species at risk (short-eared owl). Other mortalities reported included 11 Arctic hares, five ptarmigan, four Arctic ground squirrel, three greater white-fronted geese, one fox and one common raven.

Non-vehicle Wildlife Incidents and Mortalities

From January 1 to December 31, 2013, ten non-vehicle related wildlife mortalities occurred or were observed around the Ekati Diamond Mine, including one caribou, one fox and eight birds. The caribou mortality was in the vicinity of Grizzly Road and appeared to be caused by wolves.

Caribou

Numbers of caribou in the Ekati Diamond Mine Study Area: In 2013, observers estimated 2,653 caribou within the Ekati Diamond Mine study area. Overall, caribou abundance and timing of migrations through the Ekati Diamond Mine study area have been relatively consistent over the previous 16 years. Approximately two thirds of these animals were observed during the northern and southern migration periods.

Caribou behaviour: Activity budgets and response to stressors: During 2013, the behaviours of 25 individual caribou were observed near the Ekati Diamond Mine. Caribou spent the majority of their time (74% females; 83% males) either feeding, bedded or standing. Results are consistent with those observed in 2011 and 2012, which suggests some level of tolerance for areas in proximity to the mine.

Grizzly Bears

From January 1 to December 31, 2013, there were 52 incidental observations totaling 59 grizzly bears near the Ekati Diamond Mine. The first spring sighting was on May 18, 2013 and the last grizzly bear sighting prior to winter was recorded on November 7, 2013.

Wolves

Between January 1 and December 31, 2013, there were 55 incidental observations of 71 wolves near the Ekati Diamond Mine. Overall, wolf presence within the Ekati Diamond Mine area has been relatively consistent over the last 12 years, with a mean pup production of 5 pups/year and 2 pups/den.

Foxes

From January 1 to December 31, 2013, there were 189 incidental observations of 209 foxes recorded on 114 separate days near the Ekati Diamond Mine. It is important to note this does not indicate that 209 individual foxes were observed as several of these observations could have been the same individual foxes recorded on multiple occasions.

LONG-TERM PLANS AND RECOMMENDATIONS:

WEMP is an annual report and will continue to be reviewed and produced through consultation with First Nations and regulators.

COMMUNITY INVOLVEMENT:

WEMP was developed and will continue to be adapted through extensive consultation with stakeholders including regulators, scientists and Aboriginal people.

Photo: Leslie Bol, Rescan

Wildlife Monitoring Program – Diavik

June 25, 2012 – June 25, 2013

MAIN INVESTIGATOR:

Kristin Moore, Supervisor Environment,
Diavik Diamond Mines Inc.

WILDLIFE RESEARCH PERMIT NUMBER:

WL500072

LOCATION:

The wildlife monitoring program will be conducted in the Diavik wildlife study area, centered around Lac de Gras, NWT.

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OBJECTIVES:

- To verify the accuracy of the predicted effects determined in the Environmental Effects Report (Wildlife 1998) and the Comprehensive Study Report (June 1998); and
- To ensure that management and mitigation measures for wildlife and wildlife habitat are effective in preventing significant adverse impacts to wildlife.

METHODS:

The objective is collect appropriate information that will assist Diavik in verifying predicted effects and to determine the effectiveness of mitigation measures.

RESULTS AND MAIN CONCLUSIONS:

Barren-ground Caribou

There was increase in mine footprint in 2012; therefore, the total number of habitat units (HU's) lost has increased in 2.61 HU's, which is less than what was predicted during the environmental assessment.

One natural caribou mortality was reported in 2012, likely a grizzly bear predation. No caribou injuries were reported.

During 2012, the caribou traffic advisory remained at "No Concern" for 365 days, as caribou numbers on East Island did not exceed 100 at any given time.

There were no actions taken to herd caribou in 2012.

DDMI and Ekati jointly completed weekly aerial surveys from July 8 until October 13, 2012.

A total of 86 ground-based caribou behavioral observations were completed in 2012. Ekati did not complete any behaviour scans; therefore could not be pooled. Distances of observation ranged from <2 km to >30 km from mine infrastructure.

Caribou collar data from the Government of the Northwest Territories showed caribou moved west of Diavik during the northern migration and travelled limited movement south during the southern migration.

No caribou were observed during the processed kimberlite containment (PKC) area and rock pile surveys or during the road surveys in 2012.

Grizzly Bear

To date, the total direct grizzly bear habitat loss is 7.5 km^2, which is below the amount predicted during the environmental assessment.

A total of 97 incidental sightings were recorded at the mine site during 2012 from April 27 – October 3, 2012.

No grizzly bear injuries or mortalities occurred during 2012. However, a sow and two cubs were relocated away from East Island.

Grizzly bear hair snagging studies were undertaken jointly by DDMI and Ekati in 2012.

Wolverine

Wolverines were present on East Island in 2012.

Two deceased wolverines were found inside the burnable bin at West Island.

The wolverine hair snagging program was not completed in 2012 and is scheduled to resume in the late winter of 2014.

The snow track survey was conducted in 2012 and one community assistant participated in the monitoring program.

Waste Management

Regular inspections were conducted at the waste transfer area (WTA) and inert landfill in 2012.

At the WTA, food and food packaging were found during two percent and five percent of all inspections in 2012.

At the inert landfill, food was found during three percent of all inspections and food packaging was found during 21 percent of all inspections in 2012.

Falcons

Pit wall/mine infrastructure surveys were conducted May 15, 2012 – September 30, 2012. One peregrine falcon nest was observed by the process plant. Two to three fledglings were observed.

One falcon mortality occurred at the Diavik Mine site in 2012. On August 26, 2012, peregrine falcon wing remains were found on the A418 dyke.

Waterfowl

There was no direct habitat loss in 2012 for shallow or deep water habitats. The total area of water habitat loss to date in 2.5 km^2. This value is below the predicted value set from baseline.

Waterfowl were present at East Island Shallow Bays.

Waterfowl are utilizing mine-altered wetlands, particularly the North Inlet.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

Minerals and Metals Group MMG Izok Corridor Project

March 6, 2013 – December 31, 2013

MAIN INVESTIGATORS:

Kim Poole, Aurora Wildlife Research;
Mike Setterington, Environmental Dynamics Inc.

WILDLIFE RESEARCH PERMIT NUMBER:

WL500117

LOCATION:

Izok Corridor Project is located in the Kitikmeot region of western Nunavut and the North Slave Region of the NWT. The proposed project includes the development of base metal mines at High Lake and Izok, an all-weather road from Izok to Grays Bay and a shipping port at Grays Bay on the Coronation Gulf. During construction, the project will also include winter roads between Izok and Contwoyto Lake and between High Lake and Grays Bay. Aerial ungulate surveys conducted from February to September.

PARTNERS:

- MMG Resources Inc.
- Aurora Wildlife Research
- Environmental Dynamics Inc.

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RATIONALE:

All field programs to date have been designed to collect information on wildlife species in the area in preparation for developing the environmental impact statement (EIS). The 2013 field program was reduced in nature due to further feasibility studies for the project and focused only on aerial ungulate surveys.

OBJECTIVES:

- To document the seasonal distribution of caribou;
- To estimate the abundance and composition of caribou; and
- To document the distribution and abundance of muskoxen and moose.

METHODS:

Six aerial surveys were conducted within the Izok Corridor Regional Study Area (RSA). The aerial ungulate surveys involved flying in a fixed-wing aircraft (Found Bush Hawk) at approximately 125-150 m above ground level and approximately 140-160 kph over the study area on pre-determined systematic transects (1 km wide transects [500 m each side of the aircraft] spaced 8 km apart) and documenting the occurrence of ungulates and any other large mammals. Locations of observations along transects were marked using a GPS. Three observers were used for most surveys. Where possible, caribou observations were classified as cows, calves and bulls, based on body size and the presence and appearance of antlers at various times of the year. Muskoxen were classified simply as adults and calves and moose were also classified to bulls, cows or calves where possible. Other species observed were noted and locations recorded.

RESULTS AND MAIN CONCLUSIONS:

A total of 2,684 caribou were observed, 1,940 of which were on transect. Caribou observations during 2013

were consistent with the general pattern of known caribou movements within the RSA. Dolphin and Union caribou were observed within the High Lake area during mid-winter to spring/pre-calving (February to May) before crossing the Coronation Gulf to Victoria Island for calving and summer range. Caribou numbers were highest in the High Lake area in April and dropped off by May. Bathurst caribou were most often present within the Izok and central road regions during the pre-calving and post-calving to early fall periods, corresponding with movements northwards to the calving grounds and then southwards and more dispersed during post-calving migration and summer and fall seasons. The calving area remains just east of the RSA, around the Hood River. Densities in the Izok area were highest in September as the Bathurst herd migrated south towards their wintering grounds. However, some Bluenose-East caribou were also moving through the area. Muskoxen were observed throughout the entire RSA, while moose were primarily observed within 65 km of the coast.

LONG-TERM PLANS AND RECOMMENDATIONS:

MMG is currently evaluating alternative engineering potions and conducting further exploration.

COMMUNITY INVOVLEMENT:

Community members from the Kitikmeot and the Government of Nunavut Department of Environment regional biologist assisted with surveys. Standard wildlife survey methods were conducted and disturbance to wildlife was minimized.

Map: Environmental Dynamics Inc.

Izok corridor terrestrial study area.

2013 Baseline Wildlife Studies – Fortune Minerals NICO Project (Lou Lake)

January 1, 2013 – December 31, 2013

MAIN INVESTIGATOR:

Golder Associates Ltd., Yellowknife, NWT

WILDLIFE RESEARCH PERMIT NUMBER:

WL500114

LOCATION:

The regional study area (RSA) for wildlife studies is defined by a radius of 15 km from the NICO project camp (Project) on Lou Lake, NWT (63°33'N, 116°47'W) and a 5 km buffer on either side of the proposed NICO project access road (NPAR). The Project is approximately 50 km northeast of Whatì and 22 km west of the Snare Hydo Plant.

PARTNERS:

- Golder Associates Ltd.
- Fortune Minerals Limited

CONTACTS:

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RATIONALE:

Baseline studies were completed to augment existing information on wildlife species and habitat surrounding the Project and the all-weather access road. Data obtained will be used to predict and mitigate effects to wildlife from Project development, provide predevelopment information in support of a future environmental effects monitoring program and contribute to regional studies for assessing and managing potential cumulative effects.

OBJECTIVES:

- To further describe the occurrence, relative abundance, distribution and habitat use of wildlife in the study area;
- To predict effects to the environment and wildlife from Project development;
- To provide baseline data for testing environmental effects predictions and the effectiveness of mitigation; and
- To guide further mitigation and adaptive management for reducing unexpected effects.

RESULTS AND MAIN CONCLUSIONS:

Wildlife studies were not completed in 2013. Aerial surveys for caribou were not triggered by the approach or presence of satellite collared Bathurst caribou in or near the RSA. Wildlife studies have been completed at the Project since 2003. The remaining studies were considered as part of an on-going wildlife monitoring but not required as the Project processed through the Environmental Impact Review process.

LONG-TERM PLANS AND RECOMMENDATIONS:

Wildlife baseline studies and reporting will continue as the permitting process for the Project proceeds.

COMMUNITY INVOLVEMENT:

Fortune Minerals has an ongoing community consultation program for the Project and will continue this dialog as the Project progresses. Consultation started in January 1996 prior to the issuance of Fortune Minerals first land use permit and continues to date. Consultation has included regular community visits and written correspondence to keep communities informed of the company's progress and providing communities with copies of correspondence between Fortune Minerals and government departments. A detailed timeline and description of all consultations are available on request. Consultation efforts were also detailed in the recent mine water licence and land use permit applications. Fortune Minerals is also in the process of developing an engagement plan that will outline the process for community consultation moving into construction and operations.

Fortune Minerals will continue to keep all local communities and any other interested parties apprised of the latest developments regarding the Project. Results of the baseline field studies will be communicated through reports and community presentations.

Fortune Minerals will continue to consult local communities regarding activities at the Project. Communities will have opportunity to provide input into the wildlife study plans. Local knowledge collected from community assistants will be recorded.

Participants from local communities will be asked to assist with the wildlife surveys. Fortune Minerals will continue to consult local communities regarding activities at the Project.

Baseline Wildlife Studies for the De Beers Gahcho Kué Project

January 1, 2013 – December 31, 2013

MAIN INVESTIGATOR:

Golder Associates Ltd.,
Yellowknife, NWT

WILDLIFE RESEARCH PERMIT NUMBER:

WL500113

LOCATION:

The regional study area (RSA) for wildlife studies is defined by a 70 km x 80 km rectangle centered on Kennady Lake, NWT (63°26'N, 109°12'W). The Gahcho Kué project (Project) is approximately 280 km NE of Yellowknife and 140 km NE of Łutselk'e.

PARTNER:

- De Beers Canada Inc.

CONTACTS:

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RATIONALE:

Wildlife studies were completed to augment existing information on wildlife species and habitat surrounding the Project. Data obtained will be used to predict and mitigate effects to wildlife from Project development, provide information in support of an environmental effects monitoring program and contribute to regional studies for assessing and managing potential cumulative effects.

OBJECTIVES:

- To further describe the occurrence, relative abundance, distribution, and habitat use of wildlife in the study area;
- To predict effects to the environment and wildlife from Project development;
- To provide data for testing environmental effects predictions and the effectiveness of mitigation; and
- To guide further mitigation and adaptive management for reducing unexpected effects.

RESULTS AND MAIN CONCLUSIONS:

Given that current low population size of the Bathurst herd and that aerial surveys are unlikely to provide sufficient data for detecting future changes in distribution, aerial surveys were not undertaken in 2013. Instead De Beers contributed to the GNWT monitoring programs supporting the Barren-ground Caribou Management Strategy.

A total of 232 wolverine hair snagging posts were distributed by one biologist and one community assistant in a 3,000 km^2 area surrounding the Snap Lake Mine and the Gahcho Kué Project in 2013. Posts were spaced approximately 5 km apart. Posts were surveyed for hair twice, approximately 10 days apart, April 17 – May 7, 2013. A total of 169 hair samples were collected at both study areas.

A total of 105 grizzly bear hair snagging stations were distributed by one biologist and one community assistant in a 14,500 km^2 area surround the Snap Lake Mine and the Gahcho Kué Project. In 2013, each station was surveyed six times, every 10-14 days, June 25 – September 17, 2013 by helicopter flying approximately 45 m AGL and 60 km/h. Water birds observed include yellow-billed loon, common merganser, black scoter and lesser scaup.

Upland breeding birds were surveyed June 17-19, 2013. Two biologists and one community assistant spaced approximately 10-25 m apart surveyed the shoreline of D2, D3 and E1 lakes. A total of 143 breeding territories (13 species) were observed during the upland breeding bird survey.

Detailed methods and results will be available in 2013 Wildlife Supplemental Baseline Studies Summary Report for the Gahcho Kué Project.

LONG-TERM PLANS AND RECOMMENDATIONS:

Wildlife studies and reporting will continue as the permitting process for the Project proceeds.

COMMUNITY INVOLVEMENT:

De Beers has been involved in community engagement activities for the Project for many years. This is an on-going process. Updates on wildlife studies will be provided to the surrounding communities and will be maintained as the Project moves forward. Any questions can be forwarded to Sarah McLean, De Beers Canada Inc. (867) 766-7300.

Each wildlife study in 2013 included assistants from North Slave communities. Local assistants were selected based on their knowledge of the study area, ability to work as a field technician and/or interest in learning to carry out wildlife surveys. Local assistants included Brenda Michel, Pete Enzoe and Dillon Enzoe of Łutselk'e and Joel Dragon-Smith of Yellowknife, NWT.

De Beers Snap Lake Mine: Wildlife Effects Monitoring Program

January 2013 – December 2013

MAIN INVESTIGATOR:

Alex Hood, Environmental Superintendent,
De Beers Canada

WILDLIFE RESEARCH PERMIT NUMBER:

WL500116

LOCATION:

All wildlife studies took place within a study area of 31 km radius around the Snap Lake Mine, a total area of 3,019 km^2. These studies occurred at various times from January 1, 2011 to December 31, 2013.

PARTNERS:

- De Beers Canada Inc.
- Golder Associates Ltd.
- Snap Lake Environmental Monitoring Agency

CONTACTS:

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RATIONALE:

The wildlife effects monitoring program (WEMP) is a requirement of the Project's environmental agreement (Article VII, 7.2c) and land use permit (condition 36).

The annual Snap Lake WEMP was designed to detect, measure and manage mine-related impacts to wildlife habitat, wildlife presence, behaviour, distribution and wildlife injuries and mortalities. WEMP is intended to provide information for the Mine's environmental management system (EMS) to adaptively manage the Mine to protect wildlife and wildlife habitat and to contribute to regional monitoring information that may then be used to assess cumulative effects of mining on wildlife.

OBJECTIVES:

- To determine if the mine influences:
  - Density, distribution, group composition and behaviour of caribou;
  - Relative activity (presence) and distribution of grizzly and black bears; and
  - Relative activity (presence) and distribution of wolverines.
- Though not part of WEMP, wolf den activity was monitored to provide regional information to the Department of Environment and Natural Resources (ENR).

METHODS:

- Further details on methods can be found in the annual WEMP reports, the Snap Lake Wildlife Monitoring Plan and the Snap Lake Wildlife Management Plan.
- The new study design based on hair snagging stations for bears was continued in 2013 on a regional basis.
- Wolverine hair snagging posts were deployed on a regional basis.

- Funding was provided to GNWT for developing the caribou range plan in lieu of physical work.
- No raptor survey was conducted in 2013.

RESULTS AND MAIN CONCLUSIONS:

Results of 2013 wildlife programs will be presented in the Snap Lake WEMP and Wildlife Habitat Protection Plan reports. There continue to be interactions with wildlife on site.

LONG-TERM PLANS AND RECOMMENDATIONS:

Wildlife monitoring will continue during the entire operational period of the Snap Lake Mine, as per the Snap Lake Mine WEMP.

COMMUNITY INVOLVEMENT:

Community feedback on the WEMP has been provided through the Snap Lake Environmental Monitoring Agency. Various community members from North Slave Métis Alliance, Yellowknife Dene First Nation and Łutselk'e Dene First Nation participated in various aspects of the project including bait processing and monitoring by snowmobile.

Giant Mine Roaster Complex Deconstruction Wildlife and Bird Surveys

May 8, 2013 - November 30, 2013

MAIN INVESTIGATOR:

Public Works and Government Services Canada (PWGSC) on behalf of Aboriginal Affairs and Northern Development Canada (AANDC)

WILDLIFE RESEARCH PERMIT NUMBER:

WL500138

LOCATION:

The Giant Mine site is located on Great Slave Lake's Back Bay along what is now the historic Ingraham Trail (Highway 4), approximately 5 km north of the city of Yellowknife. The roaster complex, consisting of a number of buildings and structures including the AC roaster building, the calcine plant, the dorrco roaster, the cottrell building, the baghouse building, the stack fan building and silo, the roaster stack and all associated flues, is located within the secure area of the site east of Ingraham Trail and constitutes the spatial extent of this work.

PARTNERS:

- Aboriginal Affairs and Northern Development Canada (AANDC)
- Environment Canada, Canadian Wildlife Services (CWS)
- Environment and Natural Resources
- Public Works and Government Services Canada (PWGSC)

CONTACT:

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RATIONALE:

As part of stabilizing Giant Mine in preparation for reclamation of the site, the preparation and initial stages of the roaster complex deconstruction project took place in 2013. The roaster complex required a survey to document presence/absence of birds, bird nests and/or signs of bird use prior to initiation of demolition, as per a request from the CWS on December 20, 2011.

OBJECTIVES:

- To support environmental compliance and due diligence specific to the Federal *Migratory Bird Convention Act* (MBCA) and the *Species at Risk Act* (SARA), the NWT *Wildlife Act* and *Species at Risk (NWT) Act* that regulate disturbance to birds, bird nests and bird habitat.
- Birds observed nesting on buildings at Giant Mine in the past include barn swallow (*Hirundo rustica*), cliff swallow (*Petrochelidon pyrrhonota*), American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), northern flicker (*Colaptes auratus*), eastern phoebe (*Sayornis phoebe*) and common raven (*Corvus corax*) (Cygnus Environmental 2005). This list is based on incidental observations and is not inclusive. The barn swallow was assessed as a Threatened species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in May, 2011 and is eligible for addition to Schedule 1 of the SARA, decision pending. Within the NWT, the barn swallow is considered Sensitive under the NWT General Status Rank and has no status under the NWT list of species at risk (ENR 2013).

METHODS:

The exterior of the roaster complex was surveyed for birds, nests and signs of bird use with binoculars from vantage points spaced around the perimeter of the complex. The interior of the roaster complex could

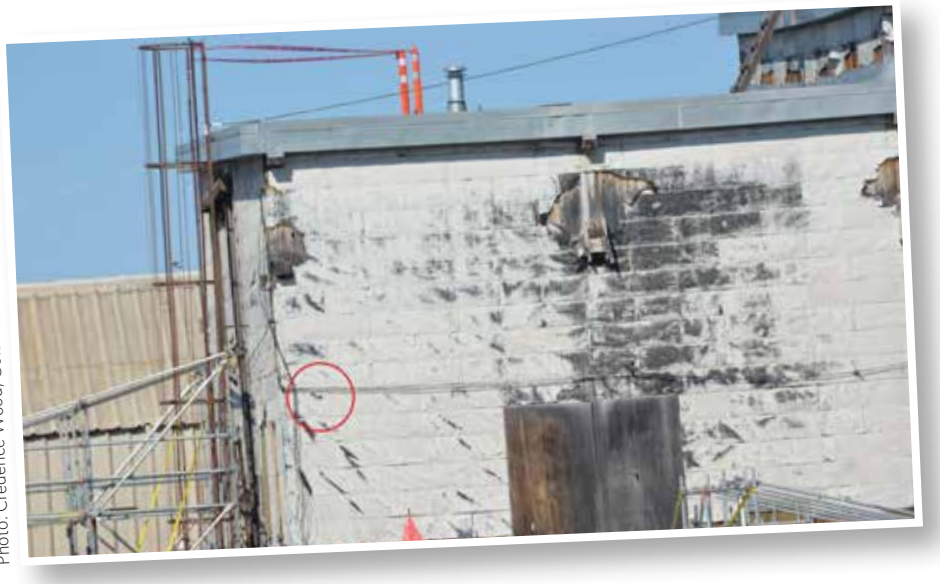

Photo: Credence Wood, Golder Associates Ltd

Potential tree swallow nest site.

not be surveyed because it was unsafe and lighting conditions were poor. Observations were recorded on paper and with a digital camera.

RESULTS AND MAIN CONCLUSIONS:

A survey of the roaster complex was completed on May 31, 2013, from 9:30 a.m. to 12:30 p.m. Weather conditions were 13°C and clear with light wind. Noise making deterrents were present and active prior to and during the survey.

Barn swallows and tree swallows were observed flying around and perching on the roaster complex during the entire survey. Tree swallows were repeatedly observed perching at and entering a hole in the side of a building within the roaster complex. Nesting material (i.e. grass) was observed being deposited in the hole. As tree swallows are cavity nesting birds and nests are often made exclusively of grass, it is probable a nest was present. No barn swallow nests were observed on the exterior of the complex, however, many access points to the interior of the buildings were observed (i.e. holes, broken windows). No barn swallows were observed entering any of the buildings during the survey. Barn swallows were observed copulating at the roaster complex. Barn and tree swallows were observed foraging for insects over a small pond just to the east of the complex.

A male American kestrel was observed perching on the white tank at the north end of the complex. A female kestrel was not observed. However, a stick nest was observed on a platform below the kestrel's perch. It could not be determined if a female kestrel or eggs were present at the nest.

A pair of American kestrels was observed displaying mating behaviours around the roaster complex and the adjacent mill complex on May 9, 2013 and a potential nest site was identified at the mill complex. No kestrels were observed around the potential nest site. The area appears to have been taken over by swallows.

A technical memorandum describing the contents of this document was prepared by Golder Associates and submitted to AANDC/PWGSC on May 31, 2013.

LONG-TERM PLANS AND RECOMMENDATIONS:

To support environmental compliance and due diligence expectations specific to the Federal *MBCA* and the SARA and the NWT *Wildlife Act* and *Species at Risk (NWT) Act*, it is recommended that:

- Existing nests without eggs or young be blocked or removed from the demolition site;
- Bird deterrent devices continue to be used at the demolition site throughout the nest initiation period (through to July 8); and
- A permit under the territorial *Wildlife Act* be acquired from the territorial Department of Environment and Natural Resources, North Slave Office, to mitigate against the possibility of disturbing kestrels and kestrel nest located adjacent to demolition activities or destroying a kestrel nests in the Roaster.

If a nest with eggs or young of a bird species covered under the MBCA are discovered at the roaster complex during demolition activities, any work in the area should be delayed until nesting is complete (i.e. the young have left the nest). Swallows are covered under the MBCA, while kestrels are covered under the territorial *Wildlife Act*.

The barn swallow was assessed as a Threatened species in May, 2011 and is eligible for addition to Schedule 1 of SARA, decision pending. Though the barn swallow is not currently listed under the SARA, Environment Canada suggests, as a matter of best practice, species under consideration for listing on SARA be considered a species at risk.

As decommissioning activities continue at Giant Mine, it is also recommended the use of artificial nesting structures for bird species known to nest on buildings within Giant Mine be investigated.

American kestrel observed on a ladder with a nest located below.

Photo: Credence Wood, Golder Associates Ltd

Pine Point Project: Wildlife Baseline Program

May 2012 - May 2013

MAIN INVESTIGATOR:

Dr. Gregory Sharam, Partner, Wildlife Department Manager, Rescan Environmental Services Ltd.

WILDLIFE RESEARCH PERMIT NUMBER:

WL500057

LOCATION:

The proposed Pine Point Project (Project) is owned by Tamerlane Ventures Incorporated and is located in the South Slave Region east of Hay River about 190 km south of Yellowknife, NWT. Wildlife baseline studies were conducted by Rescan in May and June within the Project Local Study Area (LSA) and Regional Study Area (RSA) for the O-556, P-499, X-25, Z-155, and G-03 Deposits and LSA for the N-204 Deposit.

PARTNERS:

- Rescan conducted environmental baseline studies on behalf of Tamerlane Ventures Inc. to assess the potential effects of the proposed Project in support of a Developer's Assessment Report (DAR).

CONTACT:

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Rescan Environmental Services Ltd. (now ERM-Rescan)
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Vancouver, BC V6E 2J3
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(E-mail) greg.sharam@erm.com

RATIONALE:

Baseline studies were conducted to provide a reference point for potential future monitoring studies and allow the evaluation of potential effects of the Project. However, not all planned studies were conducted as Project progression was halted.

OBJECTIVE:

- To collect baseline data on wildlife populations in the area including numbers, distribution and behavior, and assess the habitat quality for wildlife within the Five Deposits LSA and RSA and N-204 LSA.

METHODS:

Baseline studies focused on amphibian and avian communities and involved ground surveys. Surveys were conducted to 1) characterize the amphibian community and collect baseline information on focal species' presence, distribution and breeding habitat quality and/or use, 2) identify the location and distribution of breeding territories of owls and 3) identify water bird species and record distribution and habitat use during the spring staging period.

In addition, 16 remote digital cameras were installed within the Five Deposits and N-204 areas to passively track wildlife presence.

RESULTS AND MAIN CONCLUSIONS:

Two amphibian species, wood frog and boreal chorus frog, were observed during nocturnal call surveys at wetlands in mid-May within both the Five Deposits and N-204 areas. The two other target species, northern leopard frog and Canadian toad, were not observed. These two species are of conservation concern in the NWT and federally. Wood frog egg masses were also detected in the Five Deposits area.

Photo: A. Mitchell, Rescan

Northern pintail nest.

Photo: A. Mitchell, Rescan

Wood frog egg mass.

Nocturnal call-playback surveys were conducted for owls, including boreal owl, long-eared owl, great horned owl and great grey owl. Three owl species, boreal owl, long-eared owl and great horned owl, were detected during call playbacks. All three of these species were recorded within the Five Deposits area. Boreal owl and great horned owl were recorded at N-204 area. The vast majority of detections were of a single owl. Only one pair (long-eared owl) was recorded on a call playback within the Five Deposits area.

Water bird surveys were conducted during spring staging period. A total of 31 water bird species were recorded during surveys and incidentally during travel between survey sites. A northern pintail nest was observed in the N-204 area containing nine eggs. Five species observed are of conservation concern: American bittern, least sandpiper, lesser scaup, lesser yellowlegs and northern pintail are listed as Sensitive in the NWT.

Sixteen remote digital cameras were installed in early June, 2012, in the Five Deposits and N-204 areas. These cameras were placed within areas anticipated to receive use by large mammals (e.g. moose, caribou, deer and bear), such as travel corridors or foraging areas. Cameras were active throughout the remainder of the year. However, data has not been collected from the cameras since deployment due to a change in Project development.

LONG-TERM PLANS AND RECOMMENDATIONS:

Wildlife baseline studies for the Project have concluded due to a change in Project development.

COMMUNITY INVOLVEMENT:

Representatives of the Hay River Métis, the K'átł'odeeche First Nation, and the Deninu K'ue First Nation participated in the collection of wildlife data during the spring of 2012 in the role of Environmental Field Assistants.

Fort Resolution Waste Management Site Wildlife/Bird Study

October 1, 2012 – September 30, 2013

MAIN INVESTIGATOR:

Eddy McKay, Project Manager,
Hamlet of Fort Resolution

WILDLIFE RESEARCH PERMIT NUMBER:

WL500086

LOCATION:

Proximately of waste management site and airport.

CONTACT:

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RATIONALE:

The current waste management site was built in 1979. The service life of the current sewage lagoon system is near the end of its useful life and needs upgrades or a new system. In order to complete the necessary work for the upgrades or new sewage system, the Department of Transportation requires a wildlife/bird study because of the close proximity to the airport of the proposed project. The study will be the basis of the Department of Transportation's decision to support or oppose the proposed waste management site upgrade project.

OBJECTIVES:

- Potential impact of new facultative infiltration lagoon has on airport operations;
- Details on the quantities of aircraft movement at the airport, quantities of wildlife and bird that can be expected and traffic patterns; and,
- Recommend operational mitigating measures to ensure safe operation of the airport.

METHODS:

Consultant will perform four season specific site surveys.

RESULTS AND MAIN CONCLUSIONS:

Results and main conclusions were not submitted.

LONG-TERM PLANS AND RECOMMENDATIONS:

Long-term plans and recommendations were not submitted.

Photo:GNWT/B. Tracz, ENR

Seismic Regeneration with Respect to Ecology, Disturbance Factors and Time

August 15, 2013 – August 30, 2013

MAIN INVESTIGATOR:

Lisa Smith, Inventory and Planning Forester, Environment and Natural Resources, GNWT, Forest Management

WILDLIFE RESEARCH PERMIT NUMBER:

WL500175

LOCATION:

Field data was collected in two locations between August 15-30, 2013. One area was around the Arrowhead River, east of Nahanni Butte. The other area was west of Norman Wells and Tulít'a, on the west side of the Mackenzie River.

PARTNERS:

- This project was funded by the Department of Environment and Natural Resources (ENR), the Cumulative Impact Monitoring Program (Aboriginal Affairs and Northern Development Canada) and the Environmental Studies Research Fund (Natural Resources Canada). Partner agency is the Sahtú Renewable Resources Board and the Dehcho Boreal Caribou Working Group is also supporting the project.

CONTACT:

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RATIONALE:

The study will provide information on successional response on seismic lines. The impact of seismic lines on boreal caribou habitat has been identified as a priority research gap by ENR. The research will improve understanding of the regeneration response of seismic lines and may provide information to improve understanding of caribou response to linear disturbances over time. In addition, information derived from this study may be used to improve best management practices for oil and gas exploration. Permafrost depth will be measured on and off the seismic line, providing data on the impacts of linear disturbance to permafrost. The study will build early stand succession relationships related to the ecology and the nature of the disturbance.

OBJECTIVES:

- To measure regeneration on seismic lines of various ages, ecological types and levels of disturbance;
- To categorize succession based on a series of indexes reflecting recovery and floristic similarity of vegetation, stand structure, browse availability and ability to travel the corridor;
- To measure impact of seismic lines on permafrost degradation;

Photo: GNWT/L. Smith, ENR

- To provide information that may be used to enhance best management practices for oil and gas exploration; and
- To provide information that may be used to differentiate how the state of regeneration on seismic lines influences caribou, moose and predator movements.

METHODS:

Field work consists of a series of paired plots (on the seismic line and in the adjacent forest) to collect information on all species growing on the site. Information will be collected on the forest canopy, including height, tree age and stand structure. Understory vegetation will be identified and a complete species list compiled for each site.

The field data will be compiled to develop species associations and indexes of recovery. The intent is to develop relationships that can be applied to areas where field data was not collected.

Photo: GNWT/L. Smith, ENR

Understory vegetation.

RESULTS AND MAIN CONCLUSIONS:

Field data collection provided 45 plots in the Dehcho and 100 plots in the Sahtú for analysis. Data is currently being analyzed and final results will be detailed in a report that attempts to classify recovery on seismic lines and link recovery to the ecology and age of the seismic line as well as the nature of the disturbance.

LONG-TERM PLANS AND RECOMMENDATIONS:

This is the first year of field data collection to examine regeneration on seismic lines. Results from this year will help to determine appropriate directions for future data collection. It is anticipated more field data will be required to make successional relationships more robust.

COMMUNITY INVOVLEMENT:

No concerns were received. In both the Sahtú and Dehcho communities where this project has been presented, there has been a lot of support and interest in the project. Environmental monitors from Norman Wells and Fort Simpson participated in the field work.

Photo: GNWT/L. Smith, ENR

Seismic line forest regeneration.

CLS America Data Acquisition (Bluenose–East Caribou)

April 2013 - March 2014

MAIN INVESTIGATOR:

Richard Popko, Manager Research and Monitoring, Environment and Natural Resources, Sahtú Region

LOCATION:

Bluenose-East Herd barren-ground caribou range NWT/Nunavut.

FUNDING:

- Environment and Natural Resources (ENR)

PARTNERS:

- CLS America
- ENR

CONTACT:

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RATIONALE:

Geo-referenced data on satellite collared barren-ground caribou of the Bluenose-East herd is used to delineate the area to be photographed for a population estimate. CLS America provides the data acquisition for a fee.

OBJECTIVES:

- Funding was used to pay the invoice for downloading the satellite information from collars on barren-ground caribou Bluenose-East herd.

METHODS AND INFORMATION COLLECTED:

Geo-referenced data on satellite collared barren-ground caribou Bluenose-East herd is used to determine the calving ground area to be photographed for a population estimate.

RESULTS AND DELIVERABLES:

Geo-reference location data for satellite collared caribou.

LONG-TERM PLANS AND RECOMMENDATIONS:

A minimum number of collars will be maintained on the herd in order to monitor their movements. CLS America will continue to charge for the data acquisition.

Photo: GNWT/A. Gunn, ENR

CLS America Data Acquisition (Caribou)

April 2013 - March 2014

MAIN INVESTIGATOR:

Marsha Branigan, Manager Wildlife Management, Environment and Natural Resources, GNWT, Inuvik Region

LOCATION:

Gwich'in Settlement Area and Inuvialuit Settlement Region.

FUNDING:

- Environment and Natural Resources (ENR)

PARTNERS:

- ENR
- Gwich'in Renewable Resource Board (GRRB)
- Inuvialuit Game Council
- Wildlife Management Advisory Council (NWT)

CONTACT:

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Environment and Natural Resources
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RATIONALE:

This study was established to help ensure that baseline data necessary to assess, mitigate and monitor the environmental impacts of proposed developments in the western NWT is available to industry, regulators, communities and government.

OBJECTIVE:

- To collect baseline data for boreal woodland caribou, barren-ground caribou and grizzly bear movements in the development area.

METHODS AND INFORMATION COLLECTED:

Collars were deployed on the species as set by the ENR Wildlife Care Committee applications. GPS collars were used.

RESULTS AND DELIVERABLES:

Movements were monitored and archived in the wildlife management information system from collared barren-ground caribou (and previously boreal caribou and grizzly bear).

LONG-TERM PLANS AND RECOMMENDATIONS:

ENR plans to continue to monitor barren-ground caribou movements. Additional caribou collars will be deployed in March 2015 for a photo survey in July 2015.

COMMUNITY INVOLVEMENT:

Assistants were hired from local communities. Results were presented to GRRB, Renewable Resources Councils, Wildlife Management Advisory Council (NWT), Inuvialuit Game Council and Hunters and Trappers Committees.

Photo: GNWT/S. Yuill, ENR

Mountain Goat Population Status in Southern Mackenzie Mountains

April 2013 - March 2014

MAIN INVESTIGATOR:

Nic Larter, Manager Research and Monitoring, Environment and Natural Resources, GNWT, Dehcho Region

LOCATION:

The study area is the southern Mackenzie Mountains south of 63°N, specifically in zones D/OT/01, D/OT/02, and S/OT/03.

FUNDING:

- Environment and Natural Resources (ENR)
- Nahanni Butte Outfitters
- South Nahanni Outfitters

PARTNERS:

- ENR
- The Association of Mackenzie Mountain Outfitters (AMMO), in particular Nahanni Butte Outfitters, South Nahanni Outfitters, and Ram Head Outfitters

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RATIONALE:

Information on the status of mountain goats in the Mackenzie Mountains is extremely outdated. There has been an increase in the annual mountain goat harvest since 2005. Recent survey information indicates the number of mountain goats in the Mackenzie Mountains is greater than reported in the 2000 status report but it behooves ENR to ensure there is appropriate baseline mountain goat population data to evaluate current harvest levels. Recently it was reported that moose from the Mackenzie Mountains had high levels cadmium resulting in a public health advisory for the consumption of moose organs. Moose, northern mountain caribou, mountain goat and Dall's sheep are all harvested from southern Mackenzie Mountains and their meat and organs are consumed. Therefore, there is a need to determine whether elevated levels in cadmium and other heavy metals also occurs in the other sympatric ungulates of the area.

OBJECTIVES:

- To work cooperatively with members of the AMMO to collect information on the current number and distribution of mountain goats in the southern Mackenzie Mountains;
- To collect harvest information from mountain goats harvested annually in the southern Mackenzie Mountains;
- To monitor the non-resident and non-resident alien harvest of mountain goats;
- To assess the levels of various heavy metals, radionuclides, persistent organic pollutants and stable isotopes in different tissues of mountain goats; and
- To document presence/absence of *Trichinella*.

METHODS AND INFORMATION COLLECTED:

We continued to collect observations, harvest information and DNA samples from mountain goats

Photo: GNWT/N Larter, ENR

Mackenzie mountain range.

harvested in the Mackenzie Mountains during the 2013 hunting season. Outfitters provided us with tissue samples from mountain goats. These included tongue, kidney, liver and muscle. Samples were forwarded to different labs for a variety of analysis including the presence of 33 different heavy metals, various radionuclides, stable isotope levels and persistent organic pollutants. Some kidneys were examined for evidence of cadmium toxicity. Tongue samples were forwarded for analysis of the presence of *Trichinella*.

RESULTS AND DELIVERABLES:

Harvest information from 2012 was published in the annual harvest summary (Manuscript report No. 234); www.enr.gov.nt.ca/_live/documents/content/234_manuscript.pdf.

Some of the preliminary results on the analysis of heavy metals and radionuclides in the tissues of mountain goat were presented at the Northern Contaminant Program results conference. A more detailed analysis of the results is the basis for a presentation at the upcoming 19th North American Wild Sheep and Goat Council Symposium. A government report is being prepared and pending the results from outstanding analyses of the third year of samples, a scientific manuscript will be drafted.

LONG-TERM PLANS AND RECOMMENDATIONS:

- To compile all survey and observation data along with harvest data and the results of the tissue analysis for various heavy metals, radionuclides and stable isotopes to produce an up to date all-encompassing status report on mountain goat in the NWT.
- To make a presentation on the analysis of various tissue samples from mountain goats in the NWT at the 2014 Northern Wild Sheep and Goat Council Symposium.
- To produce government report(s) and scientific manuscript(s) on the comprehensive results of the multi-year tissue analysis.
- To continue to collect sex, age and DNA samples from all goats harvested in the Mackenzie Mountains and publish this information in the annual Mackenzie Mountains harvest report.
- To have all analyses completed in time for the assessment of mountain goat by the NWT Species at Risk Committee.
- To continue to work collaboratively with Yukon biologists to better assess the transboundary status of mountain goats.

COMMUNITY INVOLVEMENT:

Because of their remoteness to communities, there is virtually no community interest in mountain goats and therefore, little community involvement.

Dehcho Moose Population Monitoring Program

April 2013 - March 2014

MAIN INVESTIGATOR:

Nic Larter, Manager Research and Monitoring, Environment and Natural Resources, GNWT, Dehcho Region

LOCATION:

Aerial survey areas are along the Mackenzie and Liard River Valleys from Blackwater Lake in the north to the 60th parallel in the south and from Nahanni Butte in the west to Trout River in the east encompassing an area of *ca.* 33,000 km^2. Most moose are harvested within this area but additionally in Trout Lake traditional hunting areas and in northeastern British Columbia along the Petitot and Liard Rivers.

FUNDING:

- Environment and Natural Resources (ENR)

PARTNERS:

- ENR
- Sambaa K'e Dene Band (Trout Lake)
- Jean Marie River First Nation
- Liidlii Kue First Nation (Fort Simpson)
- Fort Simpson Métis Local
- Nahanni Butte Dene Band
- Pehdzeh Ki First Nation (Wrigley)
- Acho Dene Koe Band (Fort Liard)

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RATIONALE:

Whereas caribou tend to be the primary large ungulate traditional food source of most regions in the NWT, moose are a highly sought after and primary traditional country food source of resident hunters in the Dehcho. Moose in this region are frequently harvested by hunters residing in other regions. Hunting pressure on moose has unquestionably increased since the first surveys were completed. With the recent restrictions on barren-ground caribou harvest in other regions of the NWT, there is a real concern of increasing harvest levels on moose in the Dehcho. Local concerns have been voiced over the past number of years that moose numbers appear to be depressed and there is a need for surveys to monitor moose numbers.

Baseline contaminant levels were determined for moose harvested in the Dehcho during 2005-2007 with a resulting health advisory. Following that study it was suggested contaminant levels be measured every five to six years. Delegates at the regional wildlife workshop in October 2012 requested ENR actively pursue the collection of samples from harvested moose so comparisons could be made with the first study. Local harvesters want to be confident moose remains a healthy food choice.

OBJECTIVES:

- To continue monitoring moose density and distribution by conducting small-scale aerial geospatial surveys in areas of the Mackenzie and Liard River Valleys deemed to be important by local First Nations. Such small-scale surveys would be conducted biannually during the six year interval between large-scale surveys;
- To continue to get estimates of cow:calf and male:female ratios and document the number of females with twins during early winter in the Mackenzie and Liard River Valleys;

- To document health and condition indices of locally harvested moose throughout the region and increase community involvement in harvesting programs;
- To document incidences of diseases and parasites in locally harvested moose; and
- To document the levels of various heavy metals and other contaminants found in the organs and muscle of moose harvested as a country food source throughout the Dehcho region.

METHODS AND INFORMATION COLLECTED:

- Survey areas of interest to local First Nations were determined (*ca.* 7,200 km^2 total survey area) and traditional knowledge was used to stratify the potential survey blocks.
- The aerial survey followed the VerHoef geospatial method and was conducted November 18-23 with 69 blocks of 16-17 km^2 size flown.
- All flight lines were digitally recorded using GPS and all wildlife observations were recorded with GPS waypoints.
- Local harvesters were requested to provide biological samples from harvested moose for a reimbursement fee agreed upon at the regional wildlife workshop.
- Sample kits with a checklist were provided to local band offices and were available at ENR.
- A complete sample kit provided the following information/samples: the front teeth from the lower jaw, a minimum 6" portion of leg bone with marrow (or an ankle bone), one kidney and surrounding fat, 4" x 4" piece of liver, 4" x 4" piece of meat and some poop pellets or stomach contents as well as the sex, date and rough location of where the moose was harvested.
- Teeth were sent to a lab for cementum aging; marrow and kidney fat analysis were conducted at

Photo: GNWT/D. Allaire, ENR

Moose survey observers preparing for an aerial survey.

ENR Fort Simpson; fecal samples were analyzed for a various diseases and parasites at southern labs; and organ and tissue samples were analyzed for 33 metals, radionuclides, stable isotope, and persistent organic pollutants at southern labs.

RESULTS AND DELIVERABLES:

- A briefing letter and a poster of the results from the moose survey were produced and distributed to our First Nation partners.
- Biological samples have been received from harvested moose but we require more sampled individuals in order to be able to compare the content of metals etc. with those determined from a similar study in 2007.
- Some biological samples have been forwarded to labs for various analyses and we have some preliminary results.

LONG-TERM PLANS AND RECOMMENDATIONS:

- Continue documenting moose density and distribution with another small-scale geospatial survey in November 2015. A third large-scale geospatial survey is planned for winter 2017/18.
- Continue actively pursuing the collection of biological samples from locally moose harvested throughout the Dehcho until we have a sample size comparable to the 2005-2007 study.
- Complete all analyses on all of the biological samples from harvested moose.
- Provide final results of all testing to our First Nations partners by making community presentations and providing plain English summaries, posters and brief reports.
- More detailed reports and scientific publications will be completed, as required.

Photo: GNWT/D. Allaire, ENR

Local observers assisting with the moose survey.

- Results may be presented at local, national and international conferences/workshops, as required and was the case after the previous study was completed.

COMMUNITY INVOLVEMENT:

At annual community meetings and biennial regional wildlife workshops, the Dehcho moose monitoring program is discussed in an open forum format. Community issues and concerns are addressed. Local residents want to know the moose they are eating continue to be a healthy food choice. Local harvesters from all communities actively participate in the program by providing samples from harvested animals. They also have been actively involved in the design of moose surveys and as observers for the surveys. An annual application for wildlife research permitting provides additional avenues for community input.

Seasonal Range Use and Movement Patterns of Boreal Caribou in the Dehcho

April 2013 - March 2014

MAIN INVESTIGATOR:

Nic Larter, Manager Research and Monitoring, Environment and Natural Resources, GNWT, Dehcho Region

LOCATION:

The *ca.* 80,000 km^2 study area includes both the south central and north central portions of the Dehcho, roughly bounded to the north by Blackwater Lake, to the south by the 60th parallel, to the east by the Redknife Hills (south) and the Horn Plateau (north), and to the west by the Liard Highway 7 (south) and the Mackenzie River (north). Collared boreal caribou have and will likely, continue to move back and forth across the NWT-British Columbia and NWT-Alberta borders and expand the current boundary as described.

FUNDING:

- Environment and Natural Resources (ENR)
- Cumulative Impacts Monitoring Program (Aboriginal Affairs and Northern Development Canada).

PARTNERS:

- ENR
- Sambaa K'e Dene Band (Trout Lake)
- Jean Marie River First Nation
- Liidlii Kue First Nation (Fort Simpson)
- Fort Simpson Métis Local
- Nahanni Butte Dene Band
- Pehdzeh Ki First Nation (Wrigley)
- Acho Dene Koe Band (Fort Liard)
- Ka'a'gee Tu First Nation (Kakisa)

RATIONALE:

Boreal caribou are designated as Threatened by the Committee on the Status of Endangered Wildlife in Canada and the NWT Species at Risk Committee. Shorter-term studies on the basic ecology of boreal caribou have been conducted in other parts of their range in the NWT (Inuvik, Sahtú and South Slave). Because of the likelihood of increased resource development throughout their range, there is a need to collect as much information over as wide an area of boreal caribou range as possible prior to large-scale resource development. Local First Nations saw the benefits of combining their own traditional knowledge with information gathered from collared caribou and collars have been deployed on caribou in their traditional areas at their request since 2004. This study has the longest time series of demographic data for boreal caribou in the NWT, based upon collared caribou, and has the continued support of its First Nation partners and the Dehcho Boreal Caribou Working Group (DBCWG).

OBJECTIVES:

- To document and monitor annual calf production, calf survival and adult survival in order to make annual estimates of λ, by maintaining a minimum of 30 collars on females in the population.
- To ensure the distribution of collared boreal caribou covers key areas throughout the range of boreal caribou in the Dehcho region.
- To provide empirical data to determine areas of secure boreal caribou habitat, given the current human footprint and natural disturbance, and use for RSF modeling to assist with assessing important habitat types/areas.
- To use daily movement data from female boreal caribou collected over multiple years to determine

Photo: GNWT/N. Larter, ENR

Boreal caribou observed in the Dehcho region.

the period of calving, whether or not females show fidelity to calving areas and individual calving traits for female caribou in the Dehcho study area.

- To provide current knowledge of boreal caribou research/ecology to the DBCWG and for use in evaluating regional land use applications.
- To provide empirical data and current knowledge for use in the development of range management plans for boreal caribou as part of the National Recovery Strategy.
- As development occurs, to be able to assess responses of female caribou in relation to their use of space in the landscape.
- To continue screening for disease and parasites from blood and fecal samples and collect fecal samples to assess alternate methods for estimating population parameters, assess genetic diversity in boreal caribou and investigate subpopulation units, as part of a larger collaborative project with studies in other regions of the NWT.
- To provide baseline information on caribou ecology in the Arrowhead area prior to additional industrial exploration and activity and for a seismic line regeneration study being initiated in the area.

METHODS AND INFORMATION COLLECTED:

- In February 2014, collars were deployed on 12 female caribou throughout the Dehcho and where requested by our First Nation partners.
- Blood samples were tested for serum progesterone, cortisol and a biochemistry panel.
- Fecal samples were analyzed for a various diseases and parasites.
- Daily satellite collar location data were received, entered into a database and analyzed as required.
- Seven collars were retrieved and another returned to ENR. We refurbished collars that could be refurbished in time for the February 2014 deployment.

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- Calving events for 2013 were determined for all collared females based upon daily movement patterns during May and June.
- A March 2014 survey was conducted to document the number of collared females still with calves of the year and to classify all caribou observed into different sex/age groups.

RESULTS AND DELIVERABLES:

- Posters showing individual caribou ranges over a three-month period were produced quarterly and distributed to our First Nation partners on an ongoing basis.
- Survey results and a summary of the collar deployment were circulated to all First Nations partners on a timely basis.
- The Dehcho Boreal Caribou Study progress report (April 2013) was circulated to all partners and posted on the ENR website. The April 2014 progress report has been drafted and will be circulated.
- Data from this study was provided to the DBCWG as and when requested.
- Two scientific manuscripts using location data from this study are in review.

LONG-TERM PLANS AND RECOMMENDATIONS:

- This is a long-term ongoing program to monitor population demographics of boreal caribou in the Dehcho, which requires the use of collars, and has the support of eight Dehcho First Nation partners.
- Continue annual deployment of enough collars to maintain a minimum of 30 active collars during the calving period.
- Continue determining annual calving events and conducting annual March surveys to determine overwinter survival of calves.

- Continue analysis of location data to refine areas of secure habitat and to assist with assessing regeneration of disturbed areas.
- Continue providing information to the DBCWG and for use in formulating range management plans, cooperative research programs and evaluating land use permitting applications.
- Continue to provide empirical data for modeling studies related to range and land use planning.

COMMUNITY INVOLVEMENT:

At annual community meetings and biennial regional wildlife workshops the caribou program is discussed in an open forum format. Community issues and concerns are addressed and collar deployment takes direction from these meetings. An annual application for wildlife research permitting provides additional avenues for community input. Local residents have participated in collar retrievals, in aerial reconnaissance flights, when and if recommended by local First Nations, and have returned downed collars. Because we all want to minimize animal harassment, collar deployment is contracted out to a professional team with the full support of delegates at the most recent regional wildlife workshop. Community members sit on the DBCWG. As part of its mandate, the group not only solicits information from this study but also provides recommendations for this study which include caribou capture and the deployment of collars.

Dehcho Boreal Caribou Working Group

April 2013 - March 2014

ENR MEMBER:

Nic Larter, Manager Research and Monitoring, Environment and Natural Resources, GNWT, Dehcho Region

LOCATION:

The core area of interest for the group is bounded by the range of boreal caribou to the west, the NWT border to the south, the Dehcho border to the north and the Hay River to Great Slave Lake, west following the Mackenzie River to 118°W and north to the Dehcho border as the eastern boundary.

FUNDING:

- Environment and Natural Resources (ENR)

PARTNERS:

- ENR
- Sambaa K'e Dene Band (Trout Lake)
- Ka'a'gee Tu First Nation (Kakisa)
- Jean Marie River First Nation
- Nahanni Butte Dene Band
- Dehcho First Nations

RATIONALE:

Boreal caribou is a culturally important wildlife species in the Dehcho and elsewhere in the NWT. They have been designated as threatened by Committee on the Status of Endangered Wildlife in Canada and the NWT Species at Risk Committee. There has been ongoing interest in forming a group to ensure boreal caribou and their habitat are conserved for current and future generations in the Dehcho region. This group was established in February 2011.

OBJECTIVES/MANDATE:

- To conserve boreal caribou and their habitat in the Dehcho region;
- To provide a forum for information exchange and ensure the most current information is disseminated to all stakeholders;

Surveying for boreal caribou.

Photo: GNWT/N. Larter, ENR

- To provide direction and advice to the Dehcho leadership, Dehcho communities, Dehcho Land Use Planning Committee, the Government of the Northwest Territories, and the Government of Canada on the conservation of boreal caribou and their habitat in the Dehcho region;
- To assist in the development of a management plan and range management plan for boreal caribou in the Dehcho region. Developing these plans will include discussion of cumulative effects, climate change, natural disturbance (like fire), anthropogenic disturbance, land use planning, mitigation and habitat reclamation planning, and research monitoring and management activities; and
- To review and make recommendations on data requests pertaining to collared boreal caribou in the core area of interest.

METHODS AND INFORMATION COLLECTED:

The working group had two face-to-face meetings: one in Fort Simpson in October and a second in Kakisa in January. The working group had one teleconference in May. At the face-to-face meetings, presentations were made by ENR Wildlife and Forest Management on current and upcoming research programs and proposed funding applications. At the January meeting, ENR made a presentation on a draft guidance document for developing a range plan for boreal caribou. The working group reviewed this document and provided comment.

RESULTS AND DELIVERABLES:

- The second and third editions of a Dehcho Boreal Caribou Working Group (DBCWG) newsletter were published and circulated.
- Letterhead with the DBCWG logo was created.
- Comments were provided on reports and presentations of research programs.
- Recommendations were made on areas to protect from forest fires for the 2013 fire season.
- Comments on collaring programs and advice on data sharing agreements were provided.

LONG-TERM PLANS AND RECOMMENDATIONS:

As part of its mandate, the DBCWG will assist with the development of range management plans. Therefore, it is anticipated that the working group will have a long-term presence in the Dehcho.

COMMUNITY INVOLVEMENT:

Five of the six members of the working group are from different communities in the Dehcho. There are at least two face-to-face meetings held annually. One is in Fort Simpson and the other is held in one of the four outlying communities. Open houses for additional local involvement are held in conjunction with face-to-face meetings.

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Photo: GNWT/N. Larter, ENR

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Photo: GNWT/S. Yuill, ENR