2006/2007 ANNUAL REPORT *of the* WESTERN NORTHWEST TERRITORIES BIOPHYSICAL STUDY

Northwest Territories Environment and Natural Resources

Acknowledgements

Reports and proposals submitted by teams were much appreciated during the compilation of this report. Thank you, your help has been invaluable.

Photograph credits for summaries are acknowledged on each photograph. Thank you to all contributors.

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The Western NWT Biophysical Study

Rationale

The Western NWT Biophysical 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. The program focuses on areas within the mandate of the Department of Environment and Natural Resources (ENR), namely: wildlife, wildlife habitat, forests and air quality.

Background

As the primary authority responsible for managing aspects of wildlife, wildlife habitat and forests in the NWT, the Department of Resources, Wildlife and Economic Development (RWED) initiated a multi-party process to determine what the potential environmental impacts of development could be and to work to find ways to limit possible negative effects. In early 2004, RWED, in collaboration with the Department of Indian and Northern Affairs and Environmental Studies Research Funds, completed a project to identify biophysical information and research gaps associated with hydrocarbon exploration, development and transmission in the Mackenzie Valley. The Western NWT Biophysical Study has allowed the GNWT to initiate research projects necessary to address many of the gaps identified that were within RWED's mandate.

These areas of responsibility now reside within the Department of Environment and Natural Resources (ENR), formed from the partition of RWED into the Department of Industry, Tourism and Investment (ITI) and ENR on April 1, 2005.

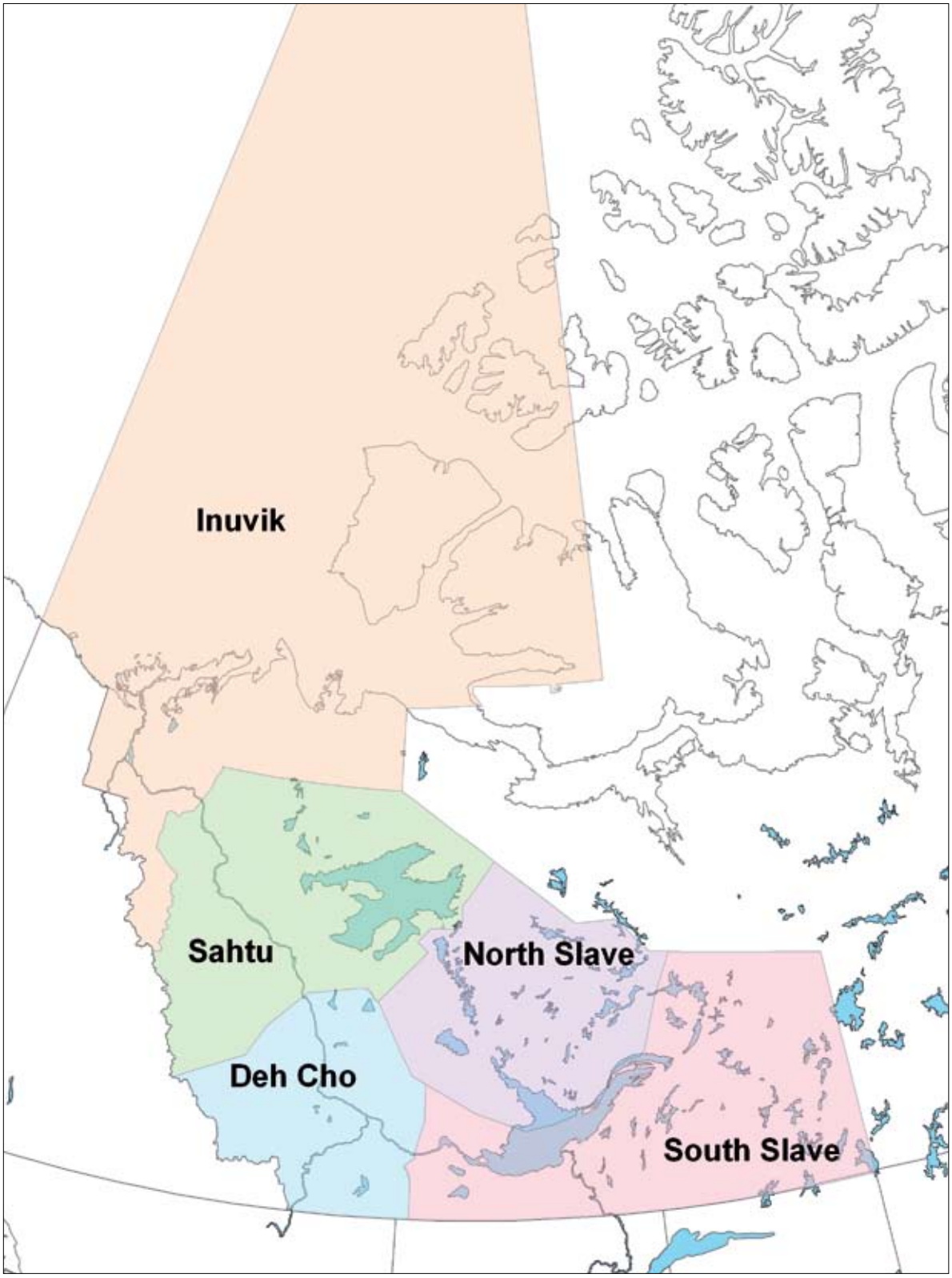
Status

The Western NWT Biophysical Study provided $899,950 towards projects in 2003/2004, $908,000 towards projects in 2004/2005, $894,000 towards projects in 2005/2006 and $803,500 towards projects in 2006/2007. The Study is projected to provide similar levels of funding through to fiscal year 2007/2008. In addition to research projects, workshops are held in each of the Mackenzie Valley regions to review progress of the Study to date and ensure that priority information needs are being addressed. Partnerships with federal agencies, wildlife management boards, universities, non-government organizations and industry have been developed on a project-by-project basis and most projects involve multiple partners. Most projects are now in year two or three of multi-year studies, therefore, results from the studies are limited and, where available, are only preliminary.

Disclaimer

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

ENR Administrative Regions of the NWT



Research Project Summary Structure

Project summaries contain a short caption denoting the lead agency responsible for the project and the location where work was conducted according to the ENR Administrative Regions of the NWT. Each summary also contains:

Rationale	A short paragraph describing why the project was conducted and its importance to the Western NWT Biophysical Study.
Objectives	A description of the main objectives of the project.
Methods and Information Collected	A brief description of where the work was conducted, how the project was conducted and what information was collected.
Results and Deliverables	A summary of the results, reports and deliverables generated.
Long-term Plans and Recommendations	A summary of long-term plans for the project and recommendations generated from project results.
Partners	A list of organizations that were involved in the project.
Funding	A list of organizations that provided funding for the project.
Contacts	Contact information for research team leads.

Photo courtesy of GNWT – Nic Larter

There is a need to assess moose populations prior to additional habitat loss and increased accessibility in the region.

Dehcho Moose Population Monitoring Program

Dehcho Region, ENR

Rationale

Moose is an important traditional wildlife resource for residents of the Dehcho region of the NWT. Current moose density estimates for areas within and adjacent to major harvesting corridors, and current and proposed industrial development are lacking. Limited moose surveys were conducted in the Dehcho in the mid-1980s in relation to the new Liard Highway. Another survey was conducted in the Liard Valley in 1994. Moose in the Dehcho continue to be highly sought after as traditional food by both local residents and hunters residing in other regions of the NWT. Hunting pressure on moose has increased since the last surveys, and concerns that moose numbers appear to be depressed have been voiced from local First Nations throughout the Dehcho region. These concerns, combined with increasing oil and gas activity in the Liard and Mackenzie River valleys, indicate a need to assess moose populations prior to additional habitat loss and increased accessibility in the region. Being an important traditional food source, residents of the Dehcho also want to know about the health and condition of the moose they harvest.

Dehcho Moose Population Monitoring Program

Dehcho Region, ENR

Objectives

- Establish baseline estimates of moose density in the Dehcho region and establish a community-based monitoring program.
- Conduct annual small-scale aerial surveys for moose in areas of interest to five communities in the Dehcho region. Surveys would be conducted with the assistance of local harvesters over a multi-year period.
- Provide information that can be used to determine the timing of further large-scale moose surveys in the region.
- Document health and condition indices of locally harvested moose throughout the region and increase community involvement in harvesting programs.
- Document the levels of various heavy metals and other contaminants found in the organs of moose harvested as a country food source throughout the Dehcho region.

Methods and Information Collected

- Traditional knowledge was used to stratify the survey area into high and low moose density areas.
- The ver Hoef geospatial method was used for large-scale moose surveys flown in the Mackenzie River Valley (November 2003) and the Liard River Valley (February 2004).
- Based on the two sources of information, an annual moose monitoring program was initiated with five communities in the Dehcho region (Wrigley, Fort Simpson, Jean Marie River, Nahanni Butte and Fort Liard).
- The monitoring program consists of an aerial survey component (conducted in November) to assess moose distribution, density and calf production, and a biological sampling program component to physically assess animal health and condition.
- Biological sampling has enabled documentation of the incidence of parasites and disease and of various contaminants levels in moose organs.
- Sampling kits and sampling protocols have been circulated to harvesters in all five communities.

Results and Deliverables

- Preliminary results, posters and summary reports have been provided to First Nations.
- Preliminary results of some of the heavy metal work were presented at the 43rd North American Moose Conference and Workshop.
- Scientific publications and government reports will be produced and presented in a variety of formats and forums.

Dehcho Moose Population Monitoring Program

Dehcho Region, ENR

Long-term Plans and Recommendations

- Similar aerial monitoring programs will be conducted annually each November through to 2007/2008.
- It is anticipated that a large-scale moose survey would be conducted in 2008/2009 or 2009/2010 unless preliminary results indicate otherwise.
- Lab analyses of organs for contaminant levels will be completed by September 2007.
- Preliminary results of some heavy metal analyses will be presented at the 15th Northern Contaminants Program results workshop.
- A thorough analysis of contaminant levels in moose organs will continue in 2007/2008, with results and recommendations presented during 2008/2009.
- Basic biological sampling of harvested moose will be ongoing.
- All biological samples collected will be stored frozen should additional analyses be required in future.

Partners

Parks Canada
Dehcho First Nations
Community involvement in sample collection and survey observers.

Funding

Western NWT Biophysical Study
Northern Contaminants Program

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Photo courtesy of GNWT – Danny Allaire

Monitoring of diseases through blood sample collections provides a measure of the effectiveness of the bison control program.

Research on the Nahanni Wood Bison Population

Dehcho Region, ENR

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. Animals were documented dispersing south into B.C. soon after their release. An aerial population survey (March 2004) estimated 399 non-calf animals. 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 provides a measure of the effectiveness of the bison control program in addition to an assessment of disease status of the Nahanni bison population. Male-only hunting was initiated in 1998, with one tag being allocated to each community of Fort Liard and Nahanni Butte. 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 determining population survey estimates.

Research on the Nahanni Wood Bison Population

Dehcho Region, ENR

Objectives	• Monitor adult female survival, 10-month calf recruitment, calf production and population rate of increase (maintain a minimum of 30 collared cows). • Document seasonal ranges and movements. • Model boreal caribou distribution in relation to natural and anthropogenic landscape features. • Monitor presence of disease and parasites (baseline database).
Methods and Information Collected	• In mid-July, bison were classified into the following categories: calves, yearlings, cows, juvenile bulls, sub-adult bulls and mature bulls. • A boat was used to gain access to bison groups along the Liard and South Nahanni Rivers north from the 60th parallel to Blackstone. Observers used binoculars to classify bison. Fresh fecal samples were collected opportunistically during the survey. • Blood samples were collected from hunter-killed bison (community quota) and analyzed for the presence of antibodies to *Brucella abortus*. Hunters are also required to collect teeth, feces and lymph nodes, and to inspect carcasses for tuberculosis lesions or signs of brucella. • Any available biological samples were collected from dead or euthanized animals resulting from collisions with motor vehicles or other accidents.
Results and Deliverables	• Maps of the survey results were circulated to local First Nations.
Long-term Plans and Recommendations	• The results from the first five years of this project (2002 to 2006), long-term plans and recommendations for this program are found in File Report No. 136, which can be accessed from www.nwtwildlife.com
Partners	ENR Community involvement in sample collection and surveys observers.
Contact	Nic Larter Dehcho Regional Biologist, ENR Fort Simpson, NT nic_larter@gov.nt.ca

Photo courtesy of GNWT – Nic Larter

The cumulative effects of natural and man-made disturbance have been implicated in the decline in numbers of this species.

Seasonal Range Use and Movement Patterns of Boreal Caribou Inhabiting Areas of Limited Human Disturbance

Dehcho Region, ENR

Rationale

Boreal caribou are listed as Threatened in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2002). The cumulative effects of natural and man-made disturbance have been implicated in the decline in numbers of this species. Similar studies have been initiated throughout the range of boreal caribou in the NWT, including the Inuvik, Sahtu, South Slave and Dehcho regions. In partnership with Sambaa K'e Dene Band, ENR initiated this study in the area between Celibeta, Cormack, Trainor and Trout Lakes. The first radio-collars were deployed on caribou in March 2004 to assist in assessing the basic ecology of boreal caribou. In addition, the radio-collar information provided baseline information on caribou inhabiting areas in their range that had been subjected to limited human disturbance.

Seasonal Range Use and Movement Patterns of Boreal Caribou Inhabiting Areas of Limited Human Disturbance

Dehcho Region, ENR

Objectives

- To ensure enough collars are deployed on female caribou to document seasonal range use by female caribou over multiple years in an area of boreal caribou range that has had limited fire and seismic disturbance.
- To ensure enough collars are deployed on female caribou to document seasonal movements of female caribou over multiple years, thus permitting us to assess the fidelity of seasonal movements and range use over a maximum four-year period.
- To ensure enough collars are deployed on female caribou to determine the period of calving and whether or not boreal caribou in this area tend to congregate in calving areas.
- To collect detailed daily movements of individual females residing in strategic areas of caribou range (Arrowhead, Trainor Lake) over a minimum three-year period.
- To provide empirical data to test the predictions and robustness of a previous study completed to predict high value boreal caribou habitats in the Dehcho.
- To provide baseline information on caribou ecology prior to the construction phase of the proposed Mackenzie Gas Pipeline and, possibly, during the construction phase. To provide the opportunity to compare data with animals collared after the pipeline construction phase.
- To provide baseline information on caribou ecology in the Arrowhead area prior to additional industrial exploration and activity.
- To document seasonal female:calf ratios of caribou and to estimate adult female survival.
- To assess gene flow of boreal caribou in the NWT.
- To provide additional ecological data on boreal caribou that could be used by Sambaa K'e as part of the requirements for procuring Protected Area Status for lands of interest in the Trout Lake area.

Seasonal Range Use and Movement Patterns of Boreal Caribou Inhabiting Areas of Limited Human Disturbance

Dehcho Region, ENR

Methods and Information Collected

- Because the distribution of previously collared boreal caribou had greatly increased since the study was initiated, ENR consulted extensively with the Sambaa K'e Dene Band and Nahanni Butte Dene Band to delineate the areas where animals were to be collared and determine the number of different collar types to be deployed on animals in these areas.
- Adult female caribou were live-captured using net-gunning techniques approved by the ENR Animal Care Committee and used in previous collar deployments; all collars will be deployed on female caribou in January/ February 2007.
- A limited number of biological samples were collected from each female caribou based upon the opportunity provided during each individual live-capture. Samples included blood, feces and neck measurements.
- Collars deployed included: 1) Refurbished ST- 20 satellite collars (teardrop design) that provide daily locations during the predicted calving period (May 1 to June 14) and locations every three days for the rest of the year. They are equipped with VHF beacons and release mechanisms, and have a lifespan of up to 42 months. 2) GPS collars (TGW-680) that provide three locations daily for an approximate 40-month life span. They are equipped with VHF beacons and release mechanisms.
- Two satellite and five GPS collars were deployed.
- Blood and fecal samples were submitted for a variety of lab analyses.
- Collars were retrieved from deceased animals and refurbished for redeployment.
- Aerial relocation flights were conducted to monitor calf production and overwinter calf survival, and to locate animals wearing VHF collars.

Seasonal Range Use and Movement Patterns of Boreal Caribou Inhabiting Areas of Limited Human Disturbance

Dehcho Region, ENR

Results and Deliverables

- Community meetings, consultation and posters showing caribou ranges are provided to all partners on an ongoing basis.
- The results of helicopter calf counts in June and class counts in February have been circulated to all partners.
- The lab analyses of biological samples are ongoing.
- The annual progress report of this program was combined with the progress report for the Ebbutt Hills study area because caribou do not respect our arbitrary boundaries and one detailed progress report on all boreal caribou research in the Dehcho is more appropriate.
- Hard copies of this report were circulated to all partners and this report has been posted on the ENR departmental web site.

Long-term Plans and Recommendations

- Monitoring of collars is ongoing, with flights to retrieve collars being made as required.
- Retrieved satellite and GPS collars will be refurbished for re-deployment.
- Flights to determine the number of calves born and classify animals should continue to be conducted annually with a helicopter to get accurate information as efficiently as possible.
- Meetings to discuss the caribou program with our partners will be ongoing.

Partners

ENR
Sambaa K'e Dene Band
Nahanni Butte Dene Band

Contact

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Photo courtesy of GNWT – Nic Larter

Radio collars were deployed on caribou in the Ebbutt Hills to assist in assessing the basic ecology.

Seasonal Range Use and Movement Patterns of the Boreal Caribou Inhabiting the Enbridge and Proposed Mackenzie Gas Pipeline Route

Dehcho Region, ENR

Rationale

Preliminary DNA analyses indicate that the historical gene flow of boreal caribou in the NWT occurred in both a north-south and east-west direction. Boreal caribou residing in the Ebbutt Hills provide an opportunity to: 1) collect important ecological baseline data in an area of their range that already has one pipeline traversing it and falls within the proposed route of the Mackenzie Gas Pipeline; and 2) collect key genetic data that could shed more light on historical gene flow corridors of boreal caribou. In partnership with Fort Simpson First Nations, ENR initiated this study in March 2005. At that time radio collars were deployed on caribou in the Ebbutt Hills to assist in assessing the basic ecology of boreal caribou and collect baseline information of caribou inhabiting areas with current and potentially future pipeline influences.

Objectives

- To document seasonal range use by female caribou over multiple years in an area of boreal caribou range north and south of the Mackenzie River, within the vicinity of the proposed Mackenzie Gas Pipeline project, and to the north of the Trout Lake boreal caribou study area.

Seasonal Range Use and Movement Patterns of the Boreal Caribou Inhabiting the Enbridge and Proposed Mackenzie Gas Pipeline Route

Dehcho Region, ENR

***Objectives** continued*

- To ensure enough collars are deployed on female caribou to document seasonal movements of female caribou over multiple years, thus permitting us to assess the fidelity in seasonal movements and range use over a maximum 42-month period.
- To ensure enough collars are deployed on female caribou to determine the period of calving and whether or not boreal caribou in this area disperse or tend to congregate in calving areas.
- To collect detailed daily movements of individual females residing in strategic areas of caribou range (Fish Lake, Ebbutt Hills, Rabbitskin River) over a minimum three-year period.
- To provide empirical data to test the predictions and robustness of a previous study completed to predict high value boreal caribou habitats in the Dehcho.
- To provide baseline information on caribou ecology prior to the construction phase of the proposed Mackenzie Gas Pipeline and, possibly, during the construction phase. To provide an opportunity to compare data with animals collared after the pipeline construction phase.
- To document seasonal female:calf ratios of caribou and to estimate adult female survival.
- To assess gene flow of boreal caribou in the NWT.
- To provide additional ecological data on boreal caribou of interest to local First Nations.

Methods and Information Collected

- Because the distribution of previously collared boreal caribou had greatly increased since the study was initiated, ENR consulted extensively with the Jean Marie River First Nations, Fort Simpson Métis Local and Pehdzeh Ki First Nation to delineate the areas where animals were to be collared and the number of different collar types that were to be deployed on animals in these areas.
- Adult female caribou were live-captured using net-gunning techniques approved by the ENR Animal Care Committee and used in previous collar deployments; all collars will be deployed on female caribou in January/February 2007.
- A limited number of biological samples were collected from each female caribou based upon the opportunity provided during each individual live-capture. Samples included blood, feces and neck measurements.

Seasonal Range Use and Movement Patterns of the Boreal Caribou Inhabiting the Enbridge and Proposed Mackenzie Gas Pipeline Route

Dehcho Region, ENR

Methods and Information Collected *continued*

- Collars deployed included: 1) Refurbished ST-20 satellite collars (teardrop design) that provide daily locations during the predicted calving period (May 1 to June 14) and locations every three days for the rest of the year. They are equipped with VHF beacons and release mechanisms, and have a lifespan of up to 42 months. 2) GPS collars (TGW-3680) that provide three locations daily for an approximate 40-month life span. They are equipped with VHF beacons and release mechanisms.
- Six satellite and four GPS collars were deployed.
- Blood and fecal samples were submitted for a variety of lab analyses.
- Collars were retrieved from deceased animals and refurbished for redeployment.
- Aerial relocation flights were conducted to monitor calf production and overwinter calf survival, and to locate animals wearing VHF collars.

Results and Deliverables

- Community meetings, consultation and posters showing caribou ranges are provided to all partners on an ongoing basis.
- The results of helicopter calf counts in June and class counts in February have been circulated to all partners.
- The lab analyses of biological samples are ongoing.
- The annual progress report of this program was combined with the progress report for the Trout Lake study area because caribou do not respect our arbitrary boundaries and one detailed progress report on all boreal caribou research in the Dehcho is more appropriate.
- Hard copies of this report were circulated to all partners and this report has been posted on the ENR departmental web site.

Long-term Plans and Recommendations

- Monitoring of collars is ongoing, with flights to retrieve collars being made as required.
- Retrieved satellite and GPS collars will be refurbished for re-deployment.
- Flights to determine the number of calves born and classify animals should continue to be conducted annually with a helicopter to get accurate information as efficiently as possible.
- Meetings to discuss the caribou program with our partners will be ongoing.

Seasonal Range Use and Movement Patterns of the Boreal Caribou Inhabiting the Enbridge and Proposed Mackenzie Gas Pipeline Route

Dehcho Region, ENR

Partners	ENR Fort Simpson Métis Local Jean Marie River First Nation Pehdzeh Ki First Nation
Contact	Nic Larter Dehcho Regional Biologist, ENR Fort Simpson, NT nic_larter@gov.nt.ca

Photo courtesy of GNWT – John Nagy

The primary focus of work completed during fiscal year 2006/2007 was to obtain baseline demographic information.

Ecology of Boreal Woodland Caribou in the Lower Mackenzie Valley, NWT

Inuvik Region, ENR

Rationale

This project aims to provide baseline demographic and habitat use data, and traditional knowledge, for the eventual creation of a recovery team and plan for the threatened boreal caribou. The study area falls within the northern-most portion of boreal woodland caribou range in Canada and is largely north of the Arctic Circle (66° 33' N). The primary focus of work completed during fiscal year 2006/2007 was to obtain baseline demographic information. In addition, the work helped to develop seasonal resource selection function models to predict probability of occurrence of boreal caribou in the Lower Mackenzie, Peel Plateau and Middle Mackenzie project areas mapped by Ducks Unlimited in the Inuvik and Sahtu regions, particularly in the area of the proposed Mackenzie Valley Pipeline.

Objectives

- Obtain estimates of the number of boreal woodland caribou in the Inuvik region as well as estimates of productivity, recruitment and survival (calf and adult female) rates.
- Obtain estimates of home range size and seasonal movement rates, and determine seasonal patterns of habitat use and selection. These estimates will include looking at the use of areas burned by wildfires and nearby linear anthropogenic features such as seismic lines (avoidance).

Ecology of Boreal Woodland Caribou in the Lower Mackenzie Valley, NWT

Inuvik Region, ENR

***Objectives** continued*

- Develop seasonal resource selection function models (RSF models) to map the relative probability of occurrence of boreal woodland caribou across the Inuvik and Sahtu regions, using caribou use data obtained through satellite tracking and existing LANDSAT Thematic Mapper based vegetation maps (Ducks Unlimited).
- Identify seasonal habitats that may be limiting for boreal woodland caribou in the Inuvik Region.
- Collect samples required to assess the genetic relationships among boreal woodland caribou in the NWT and adjacent jurisdictions and with barren ground caribou.
- Evaluate the implications of cumulative effects of natural (e.g. wildfires, climatic events) and anthropogenic disturbances on boreal woodland caribou and their habitats.
- Provide recommendations for the long-term management of boreal woodland caribou and their habitats in the Inuvik region.

Methods and Information Collected

- Female boreal woodland caribou were captured and equipped with ARGOS and GPS satellite collars and VHF radio collars.
- Telemetry flights were conducted in mid-May to early June to determine calving rates for collared females. Flights were also conducted in late October and late March to determine summer and overwinter survival of radio-collared cows and their calves. Calf and adult female survival and recruitment rates were determined in this manner.
- GPS satellite tracking data were used to determine seasonal movement rates and to assess seasonal patterns of avoidance of linear anthropogenic features.
- Satellite tracking data (GPS and ARGOS), in combination with earth cover maps produced by Ducks Unlimited, was used to determine seasonal shifts in habitat use and to model seasonal probability of occurrence (RSF models) of boreal woodland caribou in forested areas in the Inuvik region.
- Traditional knowledge was gathered, recorded, compiled and mapped.

Results and Deliverables

- Baseline data on population numbers, productivity, recruitment and habitat use were summarized.

Ecology of Boreal Woodland Caribou in the Lower Mackenzie Valley, NWT

Inuvik Region, ENR

Results and Deliverables *continued*

- Posters were created showing movements of satellite-collared caribou and seasonal resource selection function models and distributed to the Renewable Resource Councils (RRCs) in the Gwich'in Settlement Area. A document summarizing the results of RSF modelling work was completed.
- Updated seasonal RSF models and included this information in a report and presentation given to the Joint Review Panel for the proposed Mackenzie Valley Pipeline in Yellowknife, NWT.
- Summarized demographic information and assessed the response of these caribou to linear features and presented these findings at the Joint Review Panel hearings for the proposed Mackenzie Valley Pipeline in Yellowknife, NWT.
- Presented on the results of the study to fall 2006 at the fall 2006 Gwich'in Renewable Resource Board meeting.

Long-term Plans and Recommendations

- This project will continue to provide baseline data for management of boreal woodland caribou and their habitats in the Inuvik region and other areas of the NWT, and for the development of an action plan for boreal caribou conservation.

Partners

Gwich'in Renewable Resource Board
Inuvik Region, ENR

Funding

Department of Environment, Government of Yukon Territory
Government of Canada Habitat Stewardship Fund for Species at Risk
Gwich'in Renewable Resource Board
Polar Continental Shelf Project
ENR
Western NWT Biophysical Study

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Photo courtesy of GNWT – Boyan Tracz

Data generated will be used to mitigate any impacts of human activities and cumulative effects on boreal caribou habitat.

Ecology of Boreal Woodland Caribou in the Central Mackenzie River Valley

Sahtu Region, ENR

Rationale

This project provides baseline ecological information on boreal woodland caribou in the NWT, which are listed as Threatened in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The project focuses on the Mackenzie River Valley from north of Fort Good Hope to south of Tulita, with particular emphasis on the proposed route of the Mackenzie Valley pipeline. Data generated will be used to mitigate any impacts of human activities and cumulative effects (both natural and human-initiated) on boreal caribou habitat. In addition, this study provides a baseline for further exploration of the impacts of climate change on boreal caribou populations.

Objectives

- Identify, map and verify boreal woodland caribou habitats by season, with particular focus on groups along, or adjacent to, the proposed Mackenzie Valley pipeline and other areas of industrial activity in the Sahtu.
- Continue to obtain baseline data on population dynamics of boreal woodland caribou in the Sahtu and ensure that samples sizes are adequate in the study area through a combination of GPS-tracked (GPS) and satellite-tracked (ARGOS) radio collars.
- Provide information needed to evaluate the current and potential implications of further habitat loss and fragmentation and human activities (cumulative effects) on boreal woodland caribou in the Mackenzie Valley.

Ecology of Boreal Woodland Caribou in the Central Mackenzie River Valley

Sahtu Region, ENR

Methods and Information Collected

- Beginning in 2003, adult female boreal caribou were captured and equipped with GPS and ARGOS satellite-tracked radio collars. However, it is only since 2005 that the sample size has appreciably increased. Currently, GPS collars acquire three locations/day (eight-hour intervals) and ARGOS acquire one location/day, with data from both collar types received at regular intervals.
- Digital maps were created and compiled from aerial classifications of LANDSAT Thematic Mapper (TM) images. Data was modelled using standard geographic information systems (GIS) software.
- Occurrence surveys were flown, with data collected on calving success, calf survival and recruitment. From 2005 sufficient data have been collected to begin to determine the distribution, numbers and calving success for both collared and non-collared boreal woodland caribou.
- Local knowledge was gathered from communities in workshops and community interviews as well as through voluntary reporting of activity and sightings.
- Tissue and fecal samples were obtained for genetic, forage and parasite-load analyses. Parasite analyses are conducted in cooperation with researchers at the Faculty of Veterinary Medicine at the University of Calgary.

Results and Deliverables

- An additional eight GPS collars were deployed on boreal woodland caribou in the Sahtu in March 2007. Also, three collars have been recovered (two GPS and one ARGOS) after successful operation of their pre-programmed release mechanisms. Currently, there are 22 collars active in the Sahtu region, with five collars experiencing regular technical issues (see next bullet).
- Collars deployed in the Stewart Lake (Summit-Keele) region may allow for potential future collaboration with industry on the response of boreal woodland caribou to changes in industrial activity. Unfortunately, all five collars deployed in that area in 2006 have had technical problems, resulting in both a lower number of locations than expected and fewer observations when conducting field surveys. Two new collars were deployed in 2007, with the hope that more collars in 2008 will provide sufficient data to conduct an analysis of caribou response to industrial activity.
- Results have been presented to the Sahtu Renewable Resources Board (SRRB) and the Renewable Resource Councils (RRCs) in the Sahtu.

Ecology of Boreal Woodland Caribou in the Central Mackenzie River Valley

Sahtu Region, ENR

Results and Deliverables *continued*

- Location data from boreal caribou has assisted in the ecological assessment of the Ts'ude niline Tu'eyeta (Ramparts River and Wetlands) candidate protected area. Location data were used by the Canadian Wildlife Service (the sponsoring organization) to help determine the amount of late winter critical habitat within Ts'ude niline Tu'eyeta, and to determine the relative abundance of boreal caribou within the protected area.
- Location data have been combined with data from the Inuvik region for GNWT manuscript and file reports, and currently are part of draft papers for submission to scientific journals.
- Location data have been used to provide comments and recommendations as part of the department's response to industry exploration permit applications. These data have assisted in defining areas where proposed activities and boreal caribou may overlap, and have assisted in discussions with industry and with regional staff addressing Environmental Impact Assessments.
- Two types of parasites were recovered from 2007 boreal caribou fecal samples: *Trichostrongylidae spp*. (gastrointestinal nematodes) and *Eimeria spp*. (protozoan). The prevalence of *Eimeria spp*. is uncharacteristically high in this population of caribou when compared to previous caribou fecal surveys in the Northwest Territories, Yukon and Nunavut. The high prevalence may be the result of the age of caribou sampled (where young caribou are more susceptible to infections by Eimeria) or the sampled caribou may be from a naïve host population. This case is interesting and further investigation into *Eimeria* in this herd may be beneficial.

Long-term Plans and Recommendations

- The study will continue through 2007/2008 and beyond, to obtain additional baseline data and to monitor changes.
- These baseline data are being used in the development of an Action Plan for Boreal caribou conservation in the NWT (as required by federal *Species at Risk Act*) and continue to be used in the assessment of industrial changes, notably the proposed Mackenzie Valley pipeline.
- Recovered collars will be refurbished and re-deployed on boreal woodland caribou along with newly purchased collars. The focus in 2008 will be to deploy collars in areas where there are gaps in location data.

Ecology of Boreal Woodland Caribou in the Central Mackenzie River Valley

Sahtu Region, ENR

Long-term Plans and Recommendations *continued*

- As with the Ts'ude niline Tu'eyeta PAS candidate area, caribou location data may be used to identify other candidate protected areas and as part of renewable resource assessments of candidate protected areas. For example, in 2007 collars were deployed near Willow Lake north of Tulita with the intent to provide additional information on the importance of that area to boreal woodland caribou, combining existing field observations and traditional knowledge.
- The proposal provided to Husky Oil Inc. for a collaborative boreal caribou project in the Stewart Lake (Summit-Keele) area southwest of Tulita is still under review. However, there continues to be positive discussions with both Husky Oil Inc. representatives and their associated environmental consultants during community consultations. Though there were no industrial activities during the 2007/2008 winter season, there is still potential for future collaboration(s).
- Enhanced vegetation classification using Ducks Unlimited (DU) methods will provide greater classification accuracy for boreal woodland caribou habitat use analysis (via resource selection function analysis, as already completed in the Inuvik region). DU staff are continuing with analysis of selected LANDSAT™ imagery in the Mackenzie River Valley and Sahtu-specific data have recently been obtained.
- The start of a new project on the ecology of muskoxen in the Franklin Mountains near Norman Wells (slated for November 2007) offers an opportunity to examine the feasibility of addressing local concerns within the Sahtu about negative muskox/caribou interactions. We hope that, at minimum, there can be a quantitative assessment on the overlap of annual and seasonal ranges between the two species, with examination of more detailed habitat-use a topic for later discussion.

Ecology of Boreal Woodland Caribou in the Central Mackenzie River Valley

Sahtu Region, ENR

Partners	Renewable Resources Councils – Fort Good Hope, Tulita and Norman Wells Sahtu Renewable Resources Board ENR Dehcho, Inuvik, Sahtu, South Slave and Headquarters Faculty of Veterinary Medicine, University of Calgary
Funding	Western NWT Biophysical Study
Contacts	Boyan Tracz Sahtu Cumulative Effects Biologist, ENR Norman Wells, NT boyan_tracz@gov.nt.ca

Photo courtesy of GNWT – Boyan Tracz

Data has included delineation of important caribou habitats as Protected Areas and Conservation Zones.

Seasonal Ranges of the Bluenose-East Barren Ground Caribou Herd as Determined by Satellite Telemetry

Sahtu Region, ENR

Rationale

Satellite and GPS-tracked radio collars on adult female caribou have been used to map the seasonal ranges of Bluenose-East caribou since 1996. Use of these data has included delineation of important caribou habitats as Protected Areas (NWT Protected Areas Strategy; NWT PAS) and Conservation Zones (Sahtu Land Use Plan).

The study area covers north and east of Bluenose Lake, south and east of Kugluktuk, and east and south of Great Bear Lake towards the Deh Cho region.

Objectives

Satellite-tracked (ARGOS) and GPS-tracked (GPS) radio collars have been deployed to:

- identify seasonal ranges and habitat use patterns of the herd;
- assist with various aerial surveys which span large areas, including recruitment, calving distribution and classification, and photocensus (next in 2009);
- assist with identification and delineation of Protected Areas under the NWT Protected Areas Strategy and Conservation Zones under the Sahtu Land Use Plan;
- assist with implementation of proposed Mobile Caribou Protection Measures proposed under the Great Bear Lake Watershed Management Plan.

Seasonal Ranges of the Bluenose-East Barren Ground Caribou Herd as Determined by Satellite Telemetry

Sahtu Region, ENR

Methods and Information Collected

- As a result of some technical issues only two ARGOS collars were deployed on Bluenose-East caribou in March 2007. Currently, nine ARGOS, three GPS and an estimated 20 conventional VHF radio collars are operational on Bluenose-East animals. We plan to increase our sample size in 2008 and 2009 with additional collars to maintain functioning GPS/Argos (approximately 20 in total) collars in preparation for the next photocensus (planned for July 2009).
- Locations of ARGOS-collared female caribou are received every four to five days during the eight seasons that we have identified for barren-ground caribou. GPS collars provide three locations daily at eight-hour intervals and, thus, provide more detailed data for future habitat-use assessment.
- The boundaries of the eight seasonal ranges were created via a fixed-kernel home range estimate with least-squares cross-validation. Caribou movements were overlaid on each seasonal range to show direction of movement (migration).
- Biological sampling kits were sent to harvesters, along with instructions for the collection process and data forms. Harvesters collected samples from caribou they harvested and the samples were submitted to ENR.
- Two trained Wildlife Health Monitors (WHM) continue to provide caribou samples out of Deline. The WHM samples provide information on animal condition, diseases and parasites, and hunting/snow conditions in the Deline/Great Bear Lake area.
- During meetings to discuss research and management of the Bluenose-East caribou herd, scientific and traditional knowledge continue to be freely exchanged. Elders from Tulita and Deline continue to provide their observations on any changes to health and condition of caribou over the last 50 years, and about their opinions on changes occurring to wildlife, fish and their habitats.

Results and Deliverables

- Presentations on the status of the Bluenose-East herd have been made to the Sahtu Renewable Resources Board (SRRB), Renewable Resources Councils (RRCs) and other organizations as requested. Staff and board members of the SRRB generally accompany ENR staff during community meetings.

Seasonal Ranges of the Bluenose-East Barren Ground Caribou Herd as Determined by Satellite Telemetry

Sahtu Region, ENR

Results and Deliverables *continued*

- A photocensus was successfully completed in the summer of 2006, which provided a population estimate that was very similar to one obtained in the summer of 2005. Through joint consultation with the SRRB and RRCs it was recommended that changes in barren ground caribou harvest (numbers and sex ratio) should be maintained to assist in the recovery of the herd.
- The WHM program in the Sahtu provides data that will be used in a larger scientific context, notably via proposals submitted to the International Polar Year (IPY 2007/2008). The proposals fit under the umbrella of the Circum Arctic Rangifer Monitoring and Assessment (CARMA) network, whose mission is to monitor and assess the impacts of global change on the human/Rangifer system across the Arctic through cooperation, both geographically and across disciplines. As of January 2007, the CARMA program has been fully endorsed by the International Polar Year.
- Caribou telemetry data have assisted the community of Deline in choosing Edaiila (Caribou Point) as a candidate protected area under the NWT Protected Area Strategy (PAS) and in the delineation of the boundaries of that area. Caribou telemetry data have also assisted with the identification and selection of Conservation Zones within the Sahtu Land Use Plan.
- Ongoing telemetry data will help the Deline RRC, the SRRB, Indian and Northern Affairs Canada, and ENR design and implement mobile caribou protection measures as outlined in the Great Bear Lake Watershed Management Plan (2005).

Long-term Plans and Recommendations

- This project is ongoing with continued herd monitoring and extensive consultation with communities and co-management boards.
- Baseline data have been instrumental in tracking the recent decline in numbers of barren ground caribou, and have assisted the establishment of new harvest recommendations. Continued use of collars is vital for assessing whether management actions have been effective, allows continued monitoring of caribou movements and range use, and assists in the planning of surveys.
- A recruitment survey will be conducted in April 2007, calving area distribution in June 2007 and a calving classification survey in June/July 2007.

Seasonal Ranges of the Bluenose-East Barren Ground Caribou Herd as Determined by Satellite Telemetry

Sahtu Region, ENR

Partners	Nunavut Wildlife Management Board Department of Environment, Government of Nunavut (Kitikmeot Region) Sahtu Renewable Resources Board Sahtu Renewable Resources Councils Wek' èezhìi Renewable Resources Board ENR Sahtu, Inuvik, North Slave, Dehcho and Headquarters
Funding	Western NWT Biophysical Study Sahtu Renewable Resources Board
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Photo courtesy of GNWT – Deborah Johnson

In the NWT, the Cameron Hills represents an important area to investigate interactions between boreal caribou and industrial developments.

Boreal Caribou Fitness and Habitat at Use in the Bistcho Lake/Cameron Hills Area of the Dehcho, NWT

South Slave Region, ENR

Rationale

The Bistcho Lake/Cameron Hills boreal caribou study was initiated in March 2005, after preliminary movement data from a small sample of collared cows showed a distinct differentiation in areas used from adjacent collared cows immediately north of the Cameron Hills plateau. The few sampled cows also readily moved back and forth between the Alberta and territorial border. Furthermore, in the east portion of the Cameron Hills, cows moved in a southeast direction off the plateau in late winter months onto the lowlands east to the Hay and Meander Rivers in Alberta. In the NWT, the Cameron Hills has past and existing oil and gas activities, and represents an important area to investigate interactions between boreal caribou and industrial developments. The study area was extended south into Alberta due to the free movement of collared animals between the two jurisdictions.

Boreal Caribou Fitness and Habitat at Use in the Bistcho Lake/Cameron Hills Area of the Dehcho, NWT

South Slave Region, ENR

Objectives	• Monitor adult female survival, 10-month calf recruitment, calf production and population rate of increase (maintain a minimum of 30 collared cows). • Document seasonal ranges and movements. • Model boreal caribou distribution in relation to natural and anthropogenic landscape features. • Monitor presence of disease and parasites (baseline data).
Methods and Information Collected	• Information on caribou gender and age was gathered by helicopter to assess calf survival rates. • Data was gathered from a sample size of 30 collared animals (net-gun) deployed with 10 VHF and 20 GPS-ARGOS (Telonics TGW-3680) collars to measure adult female caribou survival and calf recruitment rates after release. • Telonic TGW-3680 collars provide three locations per day and VHF collars are used to increase the sample size to aid in monitoring caribou population demographics. • Blood and fecal samples were collected from captured adult female caribou to measure pregnancy rates and previous exposure to disease and parasites.
Results and Deliverables	• Draft report of population demographics and seasonal habitat use and movement rates has been produced for April 1, 2006 to March 31, 2007. • Presentations of relevant findings will be delivered to communities in the Dehcho at the next Decho regional wildlife workshop. • Detailed analysis of species distribution modeling and avoidance of anthropogenic and natural disturbances is still on-going.
Long-Term Plans and Recommendations	• It is planned that the study will continue over the long-term to capture the natural variation in environmental conditions. • VHF collars will be replaced with GPS collars where and when possible. (There will be no more than 10 VHF collars deployed at one time.)

Boreal Caribou Fitness and Habitat at Use in the Bistcho Lake/Cameron Hills Area of the Dehcho, NWT

South Slave Region, ENR

Partners	Western NWT Biophysical Study
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Photo courtesy of GNWT – Deborah Johnson

This project aims to gather baseline information on boreal caribou well-being in the Hay River Lowlands.

Boreal Caribou Fitness and Habitat Use in the Hay River Lowlands Area of the Dehcho, NWT

South Slave Region, ENR

Rationale

In the NWT, boreal caribou are currently listed as data deficient. This project aims to gather baseline information on boreal caribou well-being in the Hay River Lowlands (north of the Cameron Hills plateau), and to evaluate the population demographics and habitat use in an area that has relatively little past or current industrial developments. The effectiveness of mitigation measures and guidelines for proposed developments in the study area will also be monitored. Local communities play a large role in land-use planning and need the information to make decisions based on traditional knowledge and sound scientific research.

Objectives

- Monitor adult female survival, 10-month calf recruitment, calf production and population rate of increase (maintain a minimum of 30 collared cows).
- Monitor presence of disease and parasites.
- Broadly document seasonal range use, annual home ranges and fidelity to calving areas.

Five-year Peregrine Falcon Survey– Mackenzie Valley 2005

Wildlife Division, ENR

Methods and Information Collected

- From March 2003 to February 2007, 49 boreal caribou cows were fitted with 46 conventional VHF radio collars and 3 satellite radio collars (Telonics ST-18).
- Collared cows were located by fixed wing aircraft once per month during the year, weekly during calving (May to June) and twice during the rut (September 10 to September 30) periods. Telonic ST-18 collars provided locations every day from May 1 to 31 and locations every three days for the remainder of the year (June 1 to April 30).
- Blood and fecal samples were collected from captured adult female caribou to measure pregnancy rates and previous exposure to disease and parasites.
- The collared boreal caribou cows were monitored to measure annual adult female caribou survival and calf recruitment rates, and calculate population rate of increase for each year.

Results and Deliverables

- Draft report of population demographics and seasonal habitat use and movement rates has been produced for April 1, 2006 to March 31, 2007.
- Presentations of relevant findings will be delivered to communities in the Dehcho at the next Dehcho wildlife workshop.

Long-term Plans and Recommendations

- It is planned that the study will continue over the long-term to capture the natural variation in environmental conditions. The study may, however, be scaled down to only monitor long-term population demographics.
- It is recommended that a sample of 10 satellite collars be deployed in 2007/2008 to provide more detailed information on seasonal habitat use in this area and to replace the original VHF collars deployed in March 2003.

Funding

Western NWT Biophysical Study

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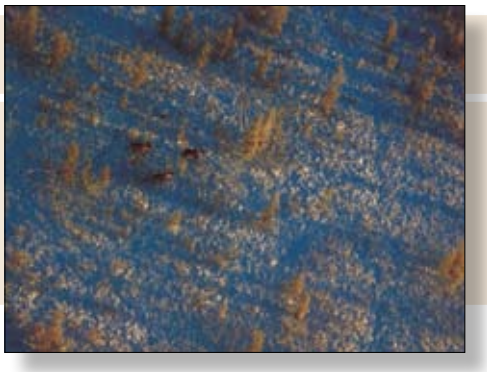

Photo courtesy of Oliver Barker

The goals of this study are to collect baseline information, describe grizzly bear distribution and movement patterns, and identify important grizzly bear habitats.

Effects of Oil and Gas Exploration, and Development Activities, on Grizzly Bears (*Ursus arctos*) in the Mackenzie Delta Development Area

Inuvik Region, ENR

Rationale

Beneath the Mackenzie Delta region, with its river channels and rolling tundra, there is an estimated 7 billion barrels of oil and 65 trillion cubic feet of natural gas that has fostered renewed interest in hydrocarbon extraction and economic renewal. The proposed development of a pipeline and gathering system to transport hydrocarbon-based products to southern markets will result in increased levels of human activity in this once-remote landscape. Wildlife managers and the affected communities are concerned that increased human-related disturbance has the potential to put additional pressure on grizzly bears as they forage for resources required for successful reproduction and over-winter survival. Current information of the ecology and distribution of north-coastal grizzlies is necessary for effective management and conservation of this vulnerable population at the edge of its geographical range. The goals of this study are to collect baseline information, describe grizzly bear distribution and movement patterns, and identify important grizzly bear habitats. This information will form the foundation required to assess the effects of development on grizzly bears and the associated increase in human activity on the landscape.

Effects of Oil and Gas Exploration, and Development Activities, on Grizzly Bears (*Ursus arctos*) in the Mackenzie Delta Development Area

Inuvik Region, ENR

Objectives

- Produce a Vegetation Classification Model for the development area.
- Quantify habitat use and identify important grizzly bear habitats and forage resources in the Mackenzie Delta region.
- Identify critical denning habitats by modeling grizzly bear den site selection.
- Model spatial-temporal movement patterns of grizzly bears in the Mackenzie Delta.
- Assess the potential influence of increased oil and natural gas development on grizzly bear habitat use and movement patterns.
- Assess the potential implications of mortalities resulting from development-related activities on the local and regional population of grizzly bears.
- Work with wildlife managers to mitigate the influence of exploration, development and production activities in bear habitat, with the goal of securing critical habitat and reducing adverse effects.
- Link empirically derived results to management strategies, thereby reducing the chance of population declines for grizzly bears in the Delta.
- Determine the diet of Arctic grizzly bears using stable isotope analysis and GPS-location site investigations.

Methods and Information Collected

- Grizzly bears were captured, collared and monitored via GPS/Argos satellite-linked telemetry to quantify fine-scale habitat use and movement patterns.
- Data is being used to develop habitat selection models to identify important habitats.
- Information from collared grizzlies is being used to assess the potential effects of future pipeline development on seasonal and annual habitat use strategies.
- Models are being developed to describe movement patterns of grizzly bears relative to existing human activities on the landscape.
- Using remote sensing, image analysis and training site surveys, a Vegetation Classification Model and Arctic ground squirrel distribution model are being developed.
- Dietary analysis using stable isotope analysis is being conducted using samples of grizzly bear hair, claw shavings and prey items.

Effects of Oil and Gas Exploration, and Development Activities, on Grizzly Bears (*Ursus arctos*) in the Mackenzie Delta Development Area

Inuvik Region, ENR

Methods and Information Collected *continued*

- Locations of grizzly bear activity, as derived from GPS/Argos satellite-linked telemetry, were investigated to determine grizzly bear feeding patterns and forage selection.

Results and Deliverables

- Demographic and morphological information for all captured grizzly bears.
- Maps showing annual home range distribution and movements of 47 collared grizzly bears using over 43,000 location data points.
- Analysis of the repeated use of areas by bears over time.
- Vegetation inventories from over 500 training sites resulted in the development of a Vegetation Classification Model for the oil and gas development area, with an 84% classification accuracy assessment.
- Distribution model of Arctic ground squirrels (*Spermophilus parryii*), an important grizzly bear food source, within the Mackenzie Delta development area, developed from over 1,100 squirrel colony locations.
- Analysis of data for Habitat Selection model development.
- Map showing the within-population structure (i.e. subpopulation) delineation for partitioning development influence for various factions of the regional population.
- Stable isotope analysis of hair and claw samples from 63 bears and 39 potential prey items.
- Publication in peer-reviewed and popular media.
- Presentations to public, national and international forums.

Long-term Plans and Recommendations

- Establish a long-term monitoring program for grizzly bears in the Mackenzie Delta.
- Reconfiguration of grizzly bear management zones based on subpopulation structure and the spatial contiguity of the Mackenzie Delta grizzly bear population.
- Complete model of grizzly bear habitat selection strategies and movement patterns.
- Increased focus on coastal and off-shore habitat use by grizzly bears.
- Implementation of a mark-recapture program to calculate a regional grizzly bear population estimate.

Effects of Oil and Gas Exploration, and Development Activities, on Grizzly Bears (*Ursus arctos*) in the Mackenzie Delta Development Area

Inuvik Region, ENR

Long-term Plans and Recommendations *continued*

- Expansion of grizzly bear sampling and monitoring east of the Husky Lakes region to investigate the ecology of grizzly bears inhabiting the eastern regions of the Inuvialuit Settlement Region.

Partners

Department of Biological Sciences, University of Alberta
ENR

Funding

Western NWT Biophysical Study

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Photo courtesy of GNWT – Lisa Smith

The project will assist with land use planning and management decisions, and provide data for climate change modelling and carbon accounting.

Establishment of Permanent Monitoring Plots for Growth and Yield, National Forest Inventory and Cumulative Impact Monitoring

Forest Management Division, ENR

Rationale

These plots will provide baseline information on the state of the forest resource, to be used to assess forest growth and yield, and to monitor long-term change and cumulative impacts. This is a long-term project with plots surveyed periodically in perpetuity. The project will ultimately assist with land use planning and management decisions, and provide data for climate change modeling and carbon accounting. This project satisfies requirements of the Five-year Growth and Yield Strategy for the NWT 2001 and addresses several priority Valued Ecosystem Components.

Objectives

- Growth and yield information will be gathered to assess rates of forest growth under disturbed (i.e. regeneration after fire) and undisturbed conditions for various forest types. Potential yield volumes will be determined to assess economic potential and sustainability.
- Cumulative impact monitoring data will contribute to the Western NWT Biophysical Study and will satisfy four components of the Cumulative Effects Assessment and Management (CEAM) Framework: land-use planning, baseline studies and monitoring, research and information management.
- National Forest Inventory (NFI) data will be gathered to provide national data on the status of NWT forests and trends over time, for use by interested parties.

Establishment of Permanent Monitoring Plots for Growth and Yield, National Forest Inventory and Cumulative Impact Monitoring

Forest Management Division, ENR

Methods and Information Collected

- A grid system was established and a permanent plot system consisting of large, small and mini tree plots, as well as transects and plots for visual and soil assessment, were created within the Taiga Plains and Boreal Plains ecozones.
- On-site surveys were conducted on plots accessible by road, ATV or helicopter.
- Data collected includes tree measurements, shrub and herb species identification, biomass measurements, detailed soils assessments and site assessments, including disturbances and stand structure.
- Non-forested plots were monitored via remote sensing.

Results and Deliverables

- In 2006, 24 permanent monitoring plots (PMPs) were established in the Sahtu and Inuvik administrative regions.
- An additional 12 plots were visited and assigned an aircall based on overstory vegetation and percent cover shrubs, herbs/grasses and moss/lichens.
- Soil samples were collected and sent to a laboratory for detailed soils analysis.
- Tree cores were collected and sent to a laboratory for counting under a microscope.
- Data has been input to a database and, once validated, will be available for use by interested parties.

Long-term Plans and Recommendations

- Forest Management Division plans to establish/re-measure several hundred PMPs over the next five to 10 years.
- To date, the GNWT has established 133 NFI plots and 75 growth and yield plots.
- The completion of the NFI plots fulfills our establishment criteria for ground plots to the National Forest Inventory database.
- The re-measurement period for established PMPs will be every 10 years.

Establishment of Permanent Monitoring Plots for Growth and Yield, National Forest Inventory and Cumulative Impact Monitoring

Forest Management Division, ENR

Partners	Canadian Forest Service, NRCAN Forest Management Division, ENR Gwich'in Renewable Resource Board
Funding	Western NWT Biophysical Study
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This project will enhance and more completely describe the physiographic landscape, vegetation and wildlife of each of the revised Taiga Plains ecoregions.

Ecosystem Classification and Mapping of the Northwest Territories – Taiga Plains

Wildlife Division and Forest Management Division, ENR

Background and Rationale

Ecologically-based landscape stratification that can be meshed with national classification efforts is required for forest management, wildlife habitat management, protected areas and environmental assessments in the Northwest Territories. A complete description of the rationale for the Taiga Plains Ecoregion was provided in the *2005/2006 Annual Report of the Western Northwest Territories Biophysical Study*.

Objectives

- Refine and revise boundaries of the *National Ecological Framework for Canada* (1996) NWT ecozones and ecoregions, and finalize the initial revisions proposed for the Taiga Plains in 2004.
- Incorporate regional and sub-regional climate patterns described in *Ecoclimatic Regions of Canada* (1989) in the delineation and naming of the Taiga Plains ecoregions.
- Enhance and more completely describe the physiographic landscape, vegetation and wildlife of each of the revised Taiga Plains ecoregions.

Ecosystem Classification and Mapping of the Northwest Territories – Taiga Plains

Wildlife Division and Forest Management Division, ENR

***Objectives** continued*

- Integrate the revisions within a continental ecological classification scheme (Canada, United States and Mexico).
- Produce a high-quality publication and associated posters in hard-copy and web-accessible format.
- Provide supporting background information (photographs and related comments) for public viewing.
- Apply the same data collection, analysis and presentation methods for consistency in subsequent work on the Taiga Shield Ecoregion (other funding sources) and NWT Cordillera Ecoregion.

Methods and Information Collected

- A description of methods and information collected for the Taiga Plains Ecoregion is provided in the *2005/2006 Annual Report of the Western Northwest Territories Biophysical Study*; a detailed description of methods and information collected is provided in Section 2 of the final report, available at www.nwtwildlife.com

Results and Deliverables

- A final report and educational poster have been prepared and are available on the Internet at www.nwtwildlife.com
- A final report and poster for the Taiga Shield is scheduled for publication in late 2007 or early 2008; a final report and poster for the NWT Cordillera is scheduled for publication in 2009.

Long-term Plans and Recommendations

- Mid- to longer-term goals for the Taiga Plains are to eventually re-classify smaller sub-regions and ecosites within each of the 45 new ecoregions, and to develop field-guides for the Taiga Plains. Similar goals pertain to the Taiga Shield and NWT Cordillera Ecoregions.
- Data acquisition, storage and analysis are constantly in a state of revision and improvement, with an update to the revised classification likely required in five to 10 years.
- Assembly of information using more advanced GIS software and more accurate classification schema, and exposure to more training, will be needed by ENR staff to improve our understanding of ecosystem classification and mapping.

Ecosystem Classification and Mapping of the Northwest Territories – Taiga Plains

Wildlife Division and Forest Management Division, ENR

Partners	Agriculture and Agri-food Canadat Forest Management Division, ENR Wildlife Division, ENR
Funding	Forest Management Division, ENR Western NWT Biophysical Study Wildlife Division, ENR
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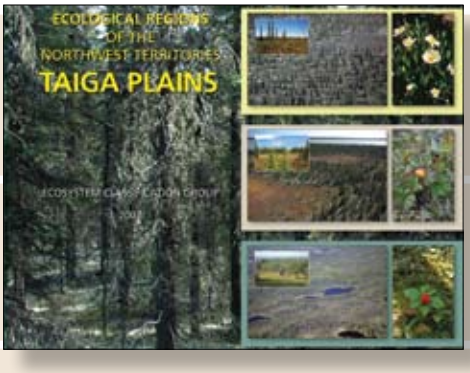

Photo courtesy of Ducks Unlimited Canada – Shannon Hazard

The earth cover inventory will result in an accurate digital inventory of wetland and upland habitats throughout the project areas.

Trout Lake and Dehcho Earth Cover Inventory

Ducks Unlimited Canada

Rationale	The earth cover inventory will result in an accurate digital inventory of wetland and upland habitats throughout the project areas. The final product provides a user-friendly means with which land managers and biologists can better assess the potential impacts of various land use practices and/or future resource extraction activities on wetlands, upland vegetation and wildlife in the region.
Objectives	• To create a digital earth cover inventory of wetland and upland habitats throughout the project areas.
Methods and Information Collected	• Field work is completed to assess, measure and document the on-the-ground earth cover variation within the project area, which is used to classify the imagery and help determine the accuracy of the classes mapped. A helicopter is used to visit sites representing all types of earth cover. At each site the crew hovers above the ground in the helicopter and collects data on the vegetation species present, tree and shrub heights, total percent cover of each species, etc.

Trout Lake and Dehcho Earth Cover Inventory

Ducks Unlimited Canada

Methods and Information Collected *continued*

- The classification process has two major steps: a multi-resolution segmentation process and the classification process. The main purpose of the segmentation is to take the various separate pixels throughout the image and group them into representative "image objects", which are homogeneous groupings of pixels. This process results in a significant data reduction without losing the spectral information contained in single pixels. The classification process used in these projects is a combination of rule-based classification (via user-defined membership functions) and a supervised nearest neighbour approach. By integrating both of these algorithms into one classification, it allows for more flexibility in the classification.

Results and Deliverables

- The final products will consist of a DVD/CD containing ESRI GIS format digital earth cover datasets, the raw TM imagery, digital project and 1:50K scale plot maps (PDF format), all field data, and a detailed documentation of the analysis methods and products.

Long-term Plans and Recommendations

- Not applicable.

Partners

Canadian Boreal Initiative
Ducks Unlimited Canada
Ducks Unlimited Inc.
ENR
North American
Waterfowl Conservation Act
Pew Charitable Trusts
United States Forest Service

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Photo courtesy of GNWT – Nic Larter

The fall 2004 workshop was another well-attended success and again RWED was requested to continue hosting workshops every two years.

Dehcho Biannual Regional Wildlife Workshop

Dehcho Region, ENR

Rationale

Shortly after staffing the GNWT biological program in spring 2002, Dehcho First Nations and the then Department of Resources, Wildlife and Economic Development co-hosted a regional wildlife workshop to discuss local wildlife issues, introduce the newly hired biological staff and get direction for pertinent regional wildlife research programs. The workshop was such a success that one of the resulting action items for RWED was to ensure that similar workshops would be held every two years. The fall 2004 workshop was another well-attended success and again RWED was requested to continue hosting workshops every two years, hence the October 2006 Regional Wildlife Workshop.

Objectives

- To facilitate the ongoing communication between wildlife researchers and Dehcho First Nations membership.
- To provide an open forum for the discussion of wildlife issues of concern to Dehcho First Nations members.
- To provide an open forum for wildlife researchers, from a variety of organizations, to present results of their work and receive feedback.
- To provide an open forum for the discussion of proposed wildlife research.

Methods and Information Collected

- ENR covers the expenses for up to two delegates from each Dehcho First Nation to attend the workshop.
- The workshop is open to the public and there are often many First Nation members in addition to the delegates in attendance.

Dehcho Biannual Regional Wildlife Workshop

Dehcho Region, ENR

Methods and Information Collected *continued*

- There are two days of presentations and discussions, with coffee breaks and lunches on site being catered by local schools. This type of relaxed atmosphere facilitates viewing the many poster presentations and continued less formal discussions.
- Day 1 consists mostly of presentations of research programs (proposed and ongoing) by various government and non-government agencies. It always begins with a presentation on how well ENR has responded to the action items tabled at the previous workshop.
- Day 2 consists mostly of open discussions revolving around First Nation concerns, comments and critiques about wildlife issues and wildlife programs. It results in consensus on a list of action items for ENR.

Results and Deliverables

- After each workshop, a final report is generated and circulated to all Dehcho First Nations and participating organizations. This report includes a summary of all discussion topics, a list of action items, a list of all in attendance and copies of all of the presentations. Both digital and colour hard copies are provided. Copies of posters presented at the workshop are available by request. Taped or digital transcripts of the workshop are kept on file.

Long-Term Plans and Recommendations

- Long-term plans are to continue to hold Regional Wildlife Workshops as a biannual event in the Dehcho and to continue encouraging the exceptional attendance by all Dehcho First Nation Membership.

Partners

ENR South Slave and Dehcho
Parks Canada
University of Alberta,
Integrated Landscape
Management Group
Canadian Wildlife Service
Dehcho First Nations

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Photo courtesy of GNWT – Graham Veale

There was a need to gather baseline air quality data ahead of ongoing and planned industrial and community development activities.

Air Quality Monitoring

Environmental Protection Division, ENR

Rationale

Prior to this project there was very little monitoring of air pollutants conducted in the NWT outside of Yellowknife. Therefore, there was a need to gather baseline air quality data ahead of ongoing and planned industrial and community development activities. The placement of monitoring stations in Inuvik, Norman Wells and Fort Liard provides a wide geographic coverage across the NWT.

Objectives

- To provide baseline data on air pollutants in selected NWT communities.
- To provide ongoing data for trend and cumulative effects assessment as development activities continue.
- To make the data easily accessible to interested users such as the public, other government agencies, consultants and industry.

Methods and Information Collected

- Data are collected on a continuous basis for air pollutant concentrations of hydrogen sulphide, sulphur dioxide, nitrogen oxides, ground level ozone and particulates (fine and coarse fraction) using instantaneous gas analyzers and particulate monitors installed in monitoring stations in Inuvik, Norman Wells and Fort Liard.
- Meteorological variables such as temperature, wind speed, wind direction and turbulence are also monitored on an instantaneous, continuous basis at the monitoring stations.
- The data is stored as hourly averages by station dataloggers and collected every hour by a data acquisition, management and reporting system at ENR headquarters in Yellowknife.

Air Quality Monitoring

Environmental Protection Division, ENR

Results and Deliverables

- Continuous monitoring of air pollutants and meteorological variables is now conducted in the selected communities. The monitoring stations are on-line and raw data are automatically downloaded every hour and posted to the ENR Air Quality Monitoring Network web site at http://lisin.rwed-hq.gov.nt.ca/NWTAQ/NetworkSummary.aspx, enabling 'almost real-time' review by Environmental Protection Division staff and the public. Validated data are electronically archived and also available via the ENR web site.

Long-term Plans and Recommendations

- ENR will continue to operate the NWT Ambient Air Quality Monitoring Network and make the data available to the public and other users.
- ENR will continue to explore opportunities to upgrade and expand the Network by addition of new stations and/or monitors to existing stations.

Partners

Environment Canada
(Yellowknife Office)
Environmental Protection Division,
ENR

Funding

Environmental Protection Division,
ENR
Government of Canada,
Environment Canada (Yellowknife Office)
Western NWT Biophysical Study

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