

2008 - 2010 ANNUAL REPORT

Western Northwest Territories

BIOPHYSICAL STUDY

Photo Credit: B. Tracz



Photo Credit: B. Tracz



Photo Credit: A. Kelly

Photo Credit: B. Tracz

Acknowledgements

Reports and proposals submitted by team leaders were much appreciated during the initial compilation of this report. Later contributions by team leaders were used to construct each summary. Thank you, your help has been invaluable.

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The Western NWT Biophysical Study

Rationale ▶

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 Department of Environment and Natural Resources (ENR): 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 these potential impacts could be and to work to find ways to limit possible negative implications. 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.

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 Government of the Northwest Territories (GNWT) to initiate research projects necessary to address many of the gaps identified within ENR's mandate.

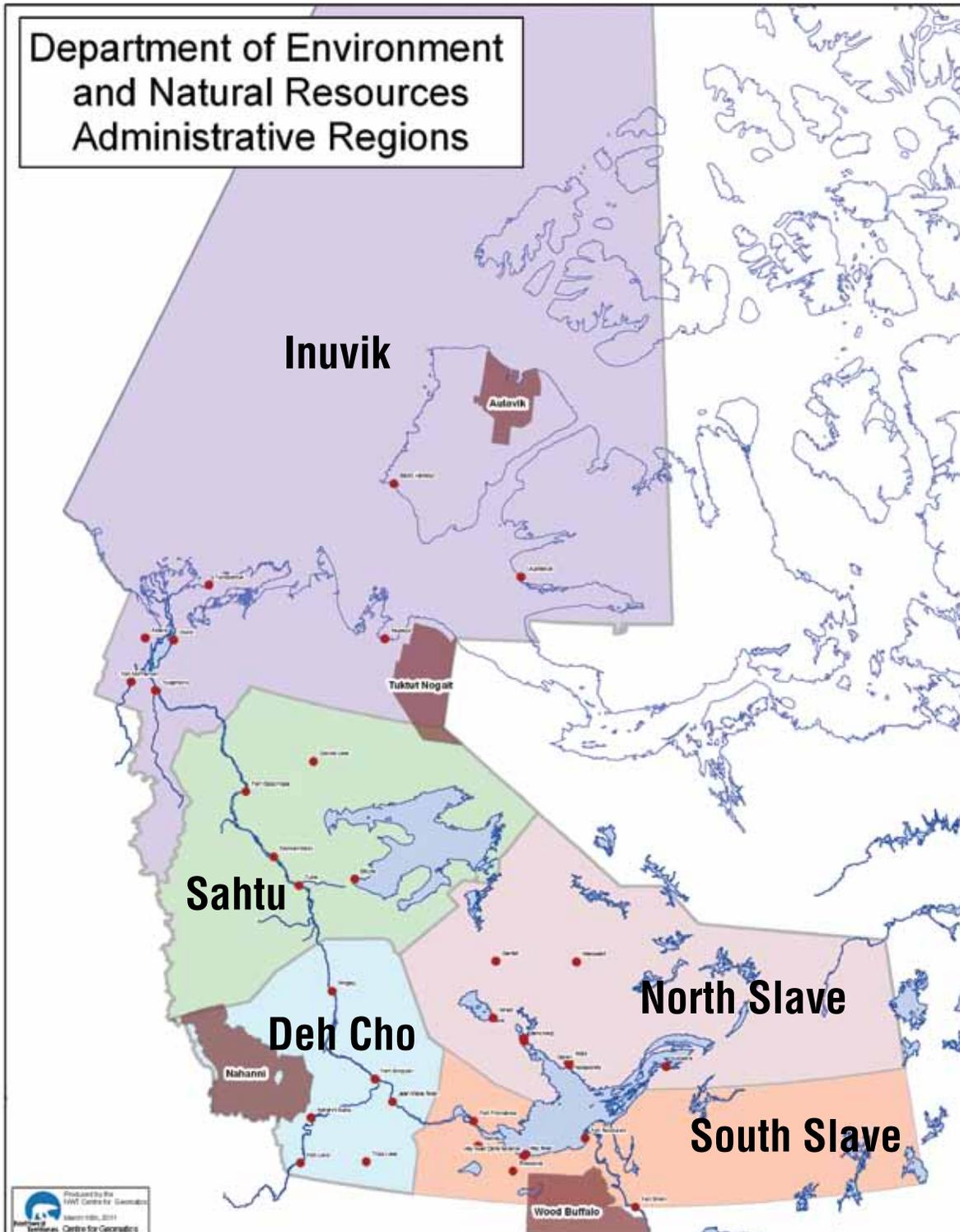
Status ▶

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, \$803,500 towards projects in 2006/2007, \$750,000 towards projects in 2007/2008, \$637,000 towards projects in 2008/2009 and \$390,000 towards projects in 2009/2010. In addition to research projects, workshops are held in each of the Mackenzie Valley regions to review progress of the Study and to ensure 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. Most projects involve multiple partners.

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 the 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.

Ecology of Boreal Woodland Caribou in the Lower Mackenzie Valley

Period: April 2008 – March 2010

Main Investigator: Marsha Branigan, Manager Wildlife Management, Environment and Natural Resources, Inuvik Region

Location ▶

Gwich'in Settlement Area.

Rationale ▶

Boreal woodland caribou are listed as *Threatened* under the federal *Species at Risk Act*. A National Recovery Plan is being developed and an NWT Conservation and Action Plan has been completed.

Until recently, little scientific knowledge was available for boreal ecotype woodland caribou (*Rangifer tarandus caribou*) that occur along the Mackenzie River Valley from the NWT/Alberta border to the area of the Mackenzie Delta. The Mackenzie Gas Project Pipeline will cross through the study area. The process requires sound baseline scientific and traditional knowledge.



Photo Credit: T. Davison

Objectives ▶

- Obtain estimates of home range size and seasonal movements of adult females and adult males.
- Determine patterns of habitat use and selection including use of areas burned by wildfires and use of area in relationship to man-made linear features such as seismic lines.
- Map the relative probability of occurrence of boreal woodland caribou across the Gwich'in Settlement Area using caribou use (satellite tracking) data and existing Landsat TM based vegetation maps.
- Identify seasonal habitats that may be limiting for boreal woodland caribou in the Gwich'in Settlement Area.
- Obtain estimates of productivity, recruitment and survival (calf and adult female) rates.
- To provide baseline information on caribou ecology prior to the construction phase of the proposed Mackenzie Gas Pipeline and possibly during the construction phase and provide the opportunity to compare with animals collared after the pipeline construction phase.

Methods and Information

Collected ▶

Telemetry flights are conducted three times a year (April, May/June and October) to locate collared cow caribou. Composition of the group and whether the collared cow has a calf at side are recorded.

GPS and satellite collars are monitored remotely throughout the year.

Results and Deliverables ▶

Ten new collars were deployed; three of these replaced ones on animals already collared. Late winter 2008, ten collars were located and there was an overwinter calf survival rate of 60%.

During calving, 19 collars were located and all collared cows were pregnant. Twelve collared cows were located during the fall survey in October 2008 with a calf survival of 75%.

Three of the caribou collars went stationary that year, one caribou died, one collar released and one collar was not located.

Long-Term Plans and Recommendations ▶

Collared caribou will continue to be monitored until the last collars release in August 2011.

There are no plans to collar additional boreal woodland caribou in the region at this time as baseline data collection is complete.

Partners ▶

- Environment and Natural Resources
- Gwich'in Renewable Resource Board (GRRB)

Community Involvement ▶

Assistants are hired from local communities of Inuvik and Tsiigehtchic. Results presented to GRRB and Renewable Resources Councils (RRCs).

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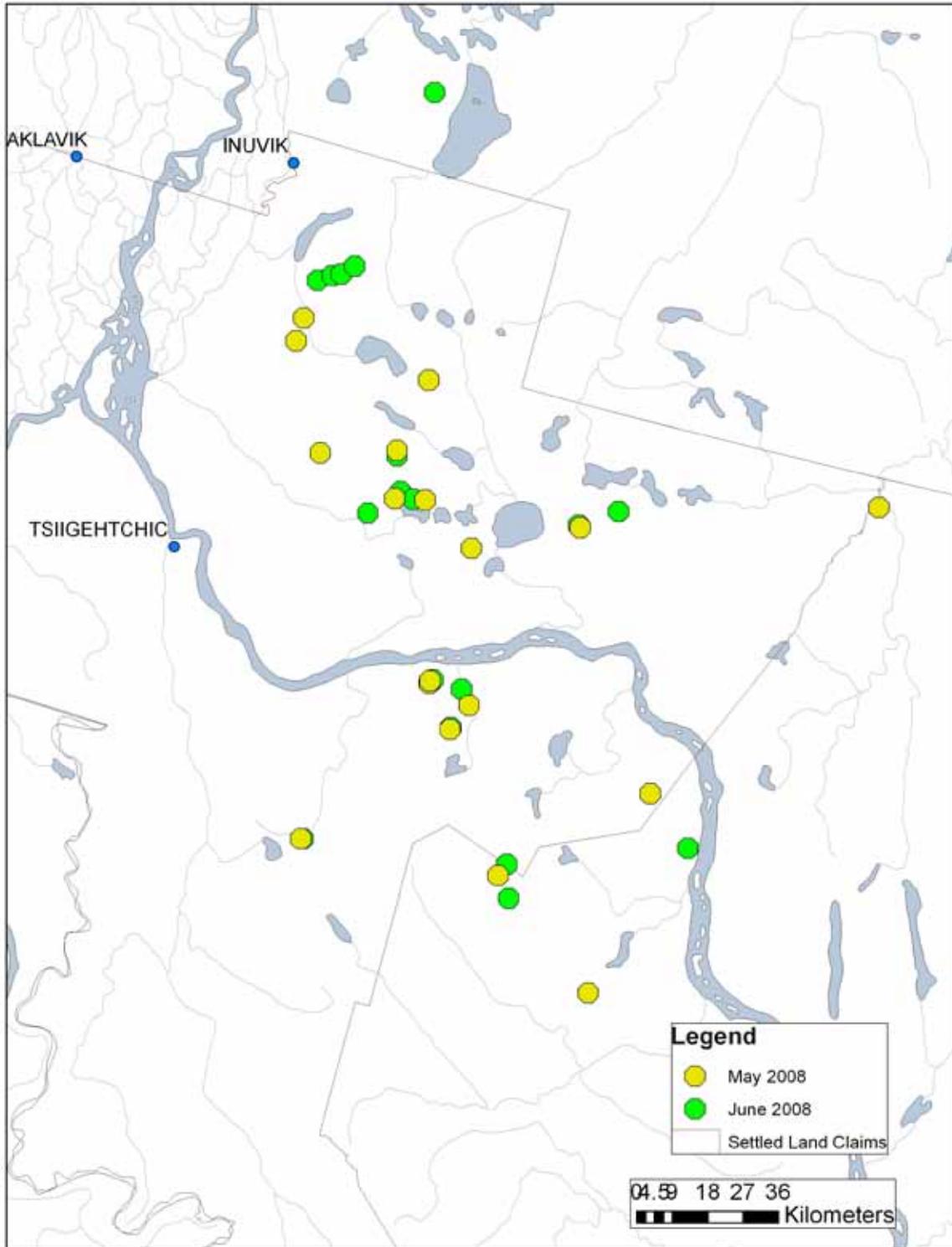
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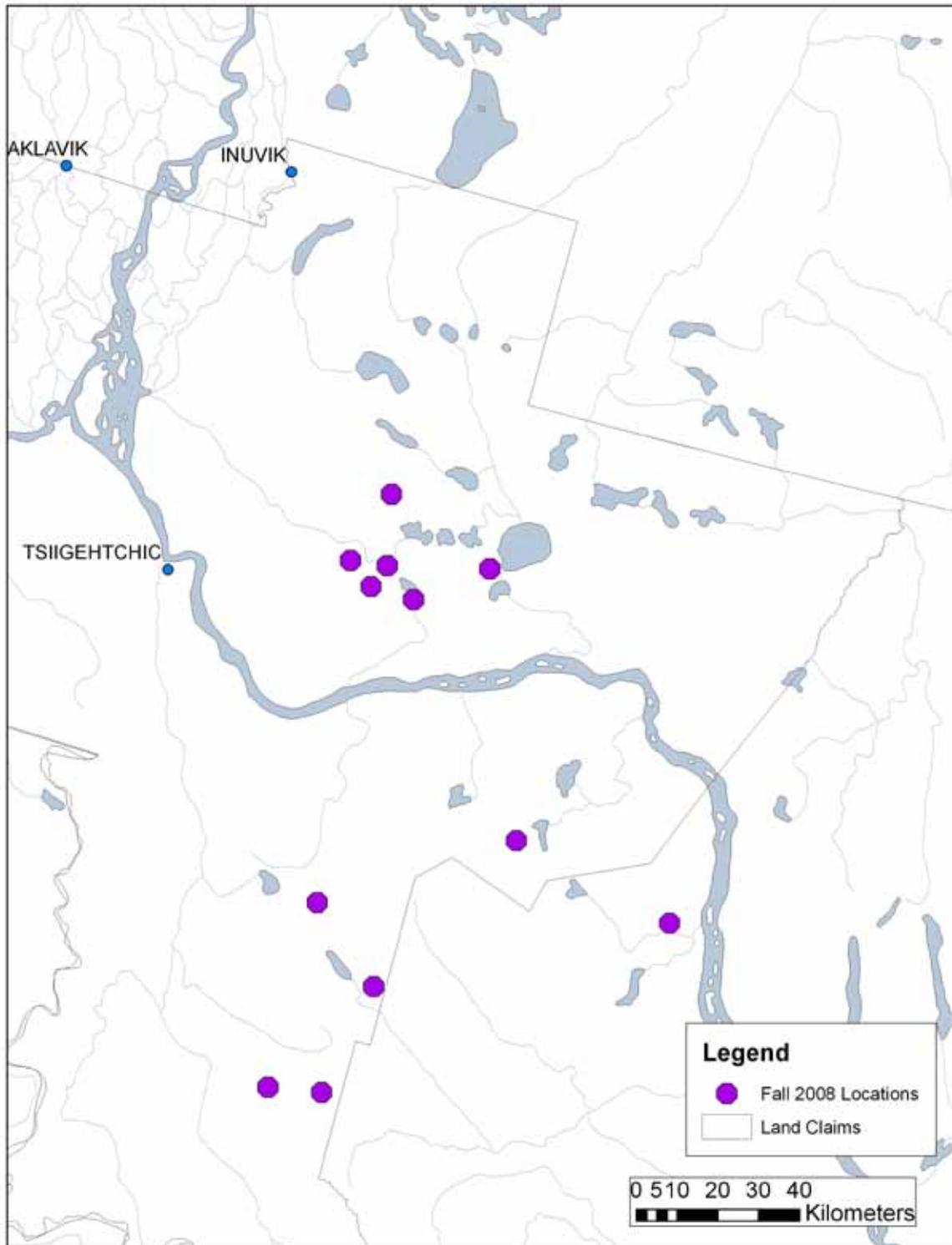
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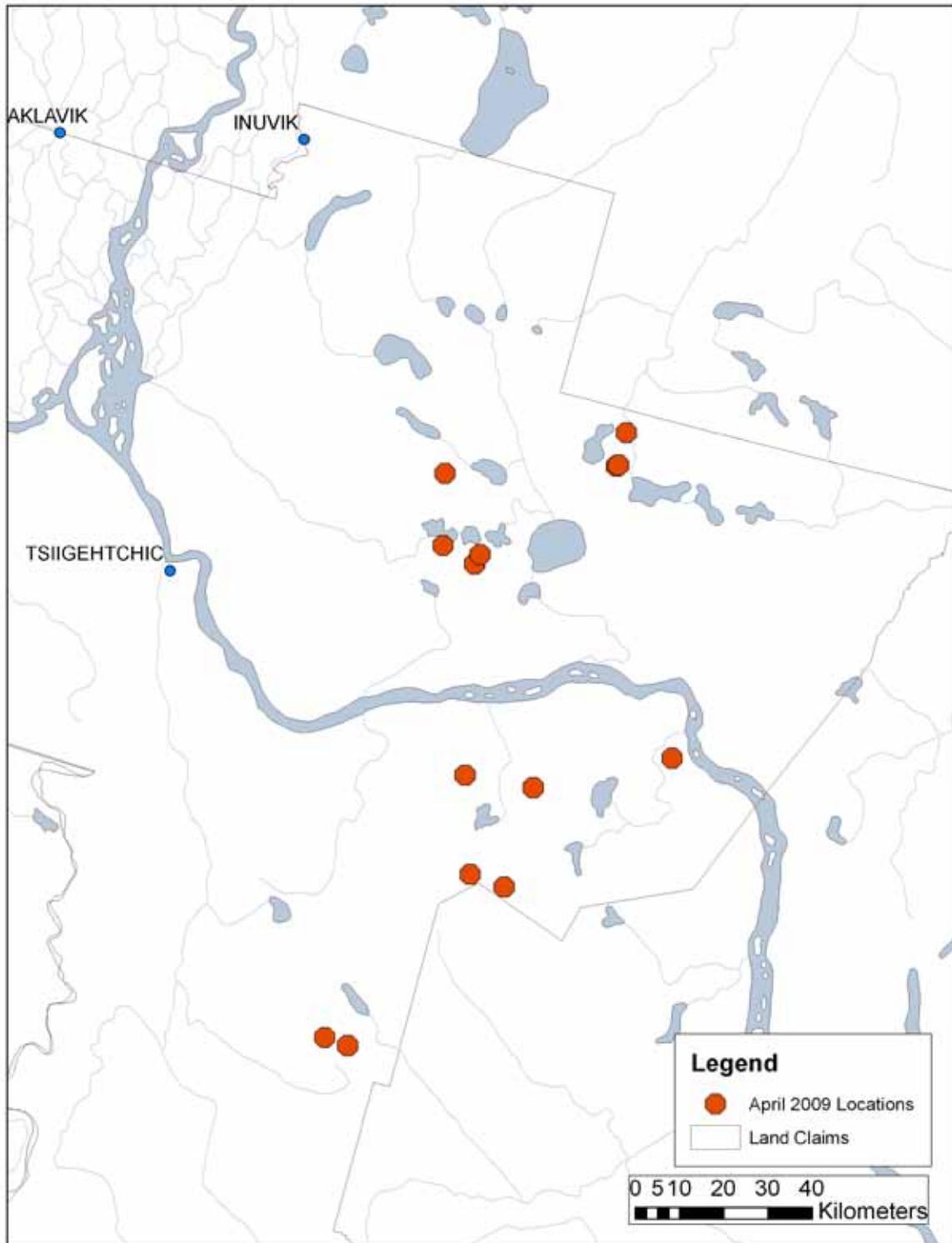
Locations of Boreal Woodland Caribou During Calving



Locations of Boreal Woodland Caribou in Fall



Locations of Boreal Woodland Caribou in Late Winter



Seasonal Range Use and Movement Patterns of Boreal Caribou in the Dehcho

Period: 2008 – 2010

Main Investigator: Nic Larter, Regional Biologist, Environment and Natural Resources, Dehcho Region



Photo Credit: D. Allaire

Location ▶

The 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). Caribou collared in this area do not respect these arbitrary borders.

Rationale ▶

Boreal caribou are listed as *Threatened* in Canada under the federal *Species at Risk Act*. The cumulative effects of natural and man-made disturbance have been implicated in the declining numbers of this species. Similar studies were initiated during 2002-2004 throughout the range of boreal caribou in the NWT including the Inuvik, Sahtu, South Slave and Dehcho regions.

In partnership with Smbaa K'e Dene Band, ENR initiated this

study in March 2004 by deploying radio collars on caribou in the Smbaa K'e traditional lands. The main study goals were to assess the basic ecology of boreal caribou and collect baseline data on caribou inhabiting areas subjected to limited human disturbance. In partnership with Liidlii Kue First Nation and the Fort Simpson Métis, ENR extended the study in March 2005 when radio collars were deployed on caribou in the Ebbutt Hills area.

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 central Dehcho provided an opportunity to collect key genetic data on historical gene flow corridors of boreal caribou and to 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.

With the success of the initial deployments of collars in 2004 and 2005, there was interest by other Dehcho First Nations in having collars deployed in their traditional lands. Following community consultations, deployments in 2006, 2007 and 2008 included caribou residing in the traditional lands of Jean Marie River First Nation, Pehdzeh Ki First Nation, Nahanni Butte Dene Band, Acho Dene Koe Band and Ka'a'gee Tu First Nation.

Objectives ▶

- To ensure enough collars are deployed on female caribou to document seasonal range use of female caribou over multiple years in areas of the boreal caribou range which has had limited fire and seismic disturbance and areas of the boreal caribou range which has had industrial impacts like the Enbridge Pipeline.
- 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 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 throughout the study area over a minimum three-year period.
- To provide baseline information on caribou ecology in the Arrowhead area prior to additional industrial exploration and activity.
- To document calf production, late-winter female to calf ratios and estimate adult female survival and other demographic parameters.
- To provide additional ecological data on boreal caribou as part of the requirements for procuring Protected Area Status for lands of interest in the Trout Lake, Wrigley, Jean Marie River and Kakisa areas.
- To ensure an adequate sample size of functioning collars on caribou for future population monitoring.

Methods and Information Collected ▶

- Adult female caribou were live-captured using net-gunning techniques approved by the ENR Animal Care Committee and used in previous collar deployments; 18 collars (Telonics) were deployed on female caribou in February 2009 and February 2010.
- Handling caribou is kept to a minimum. Biological samples collected include hair, blood, feces and neck measurements.
- In 2009 we deployed three Gen IV GPS collars (TGW-4680) and six refurbished Gen III GPS collars (TGW-3680). All provide three locations daily for an approximate 40-month life span. We also deployed nine refurbished satellite collars (ST-20) with a duty cycle that provides two locations daily during the peak calving peak period and have a 48-month lifespan. All of these collars will provide adequate movement data to permit us to determine the date and location of a calving event. All collars are equipped with VHF beacons and programmed release mechanisms.
- All collars were deployed in areas requested by First Nations involved in the project.
- Blood and fecal samples were submitted for a variety of lab analyses.
- Collars that released from live animals were retrieved and collars were retrieved from animals that had died. All collars were refurbished for redeployment.
- Limited aerial relocation flights were conducted to locate animals wearing VHF collars.
- An early June survey to locate collared females and the presence of calves was limited to females with VHF or old satellite collars. Calving events were determined for all females with GPS collars based upon analysis of their daily movement.
- A March survey was conducted to document the number of collared females still with calves of the year.

A complete review of all results of the program was presented, discussed and well received at the biannual Dehcho regional wildlife workshop in October 2008 and will be at the October 2010 workshop.

Results and Deliverables ▶

- Posters showing caribou ranges over a three month period are produced quarterly and distributed to First Nation partners on an ongoing basis.
- Community meetings and consultation are conducted annually on an ongoing basis.
- Survey results have been circulated to all First Nation partners.
- The lab analyses of biological samples is ongoing; a paper on the presence of diseases and parasites in boreal caribou is currently in press.
- The *Dehcho Boreal Caribou Progress Report* (April 2010) was circulated to all partners and posted on the ENR website.
- A complete review of all results of the program was presented, discussed and well received at the biannual Dehcho regional wildlife workshop in October 2008 and will be at the October 2010 workshop.
- A presentation was made at the Dehcho Naxehcho (elders) and Harvesters Gathering.

Long-Term Plans and Recommendations ▶

- Monitoring of collars should remain ongoing with flights to retrieve collars being made as required. Retrieved satellite and GPS collars should be refurbished for redeployment.
- Keeping as many GPS collars active as possible in the study is preferable.
- Caribou collared with GPS and the newly programmed ST-20 collars need not be surveyed post calving because analysis of their daily movement patterns can determine if and when they calved.
- All satellite collars retrieved will be programmed so they can determine calving events, thus eliminating the need for June surveys of calf production.
- Meetings to discuss the caribou program with our partners will be ongoing.
- At the Dehcho regional wildlife workshop (October 2008) the program was reviewed and critiqued by representatives from all Dehcho First Nations, recommendations to continue the

program were made.

- The 2010 regional wildlife workshop will have an open forum review of the program.

Partners ▶

- Environment and Natural Resources
- Smbaa K'e Dene Band
- Nahanni Butte Dene Band
- Jean Marie River First Nation
- Fort Simpson Métis Local
- Liidlii Kue First Nation
- Pehzdeh Ki First Nation
- Acho Dene Koe Band
- Ka'a'gee Tu First Nation

Community Involvement ▶

At annual community meetings and biannual 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 and in aerial reconnaissance flights when and if recommended by local First Nations. Because we all want to minimize animal harassment, collar deployment is contracted out to a professional team.

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Boreal Caribou Population Trends and Habitat Use in the Hay River Lowlands and Cameron Hills/Bistcho Lake Area

Period: January 1 to December 31, 2009

Main Investigator: Alicia Kelly, Regional Biologist, Environment and Natural Resources, South Slave Region



Photo Credit: K. Cox

Location ▶

The combined study area 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.

Rationale ▶

Boreal caribou are listed as a *Threatened* species under the federal *Species at Risk Act*. The cumulative effects of habitat destruction, hunting, disturbance by humans (including roads, seismic lines and pipelines) and predation (by wolves and black bears) are implicated in the decline of boreal caribou. The results from this study will assist in assessing the status of this nationally threatened species in the NWT under a new *Species at Risk (NWT) Act*. A proactive approach to monitoring is needed to ensure boreal caribou do not become a species at risk in the NWT and to ensure boreal caribou continue to be sustainable in the NWT. This approach is necessary because these caribou move through habitat between NWT and Alberta through habitat where there is timber harvesting and oil and gas exploration and development.

Objectives ▶

- Monitor population demographics: adult female survival, calf production, ten-month calf recruitment, and population rate of increase.
- Document seasonal range use, annual home ranges and fidelity to calving areas of adult cows.
- Examine boreal caribou habitat use and selection in relation to natural and human caused landscape features.
- Monitor presence of disease and parasites (establish baseline database).

Methods and Information Collected ▶

- Between March 2003 and February 2008, 60 boreal caribou cows were collared in the Hay River Lowlands areas. Fifty-one (51) boreal caribou cows were collared in the Cameron Hills/Bistcho Lake area.
- Calf production is determined by assessing pregnancy rates collected from blood serum during the capture of cows during collaring, and by assessing movement rates of GPS-collared cows during the calving period (period of low movement rates is indicative of calving) or visual surveys for VHF collared cows.
- Cow survival was monitored with GPS collars and by visually locating cows during fixed-wing radio-tracking at the end of calving, mid-summer, fall and late winter.
- Calf recruitment was determined from aerial surveys in March by counting the number of calves and adults in each range associated with collared caribou. Other caribou found with the collared cow were classified as adult female, mature male and calf. Recruitment is expressed as ratio of calves per 100 adult cows.

Results and Deliverables ▶

- Presentations of findings have been delivered to communities including at the 2008 Dehcho regional wildlife workshop and the 2009 South Slave regional wildlife workshop.
- Annual progress reports (April 1 to March 31) have been produced.
- Analysis of collar and survey data is ongoing and information from this study has been included in draft papers that will be submitted to scientific journals.

Long-Term Plans and Recommendations ▶

- It is recommended that this program continue to collect information on seasonal movements and habitat use and continue monitoring demographic parameters in 2010.
- This study was initiated to collect data on boreal caribou, which were previously listed as *data deficient* in the NWT. This baseline study will continue for one more year (with existing collars), at which time boreal caribou research and monitoring needs in the South Slave region will be evaluated. A new program will be developed based on monitoring requirements and information gaps in partnership with First Nations and Alberta.

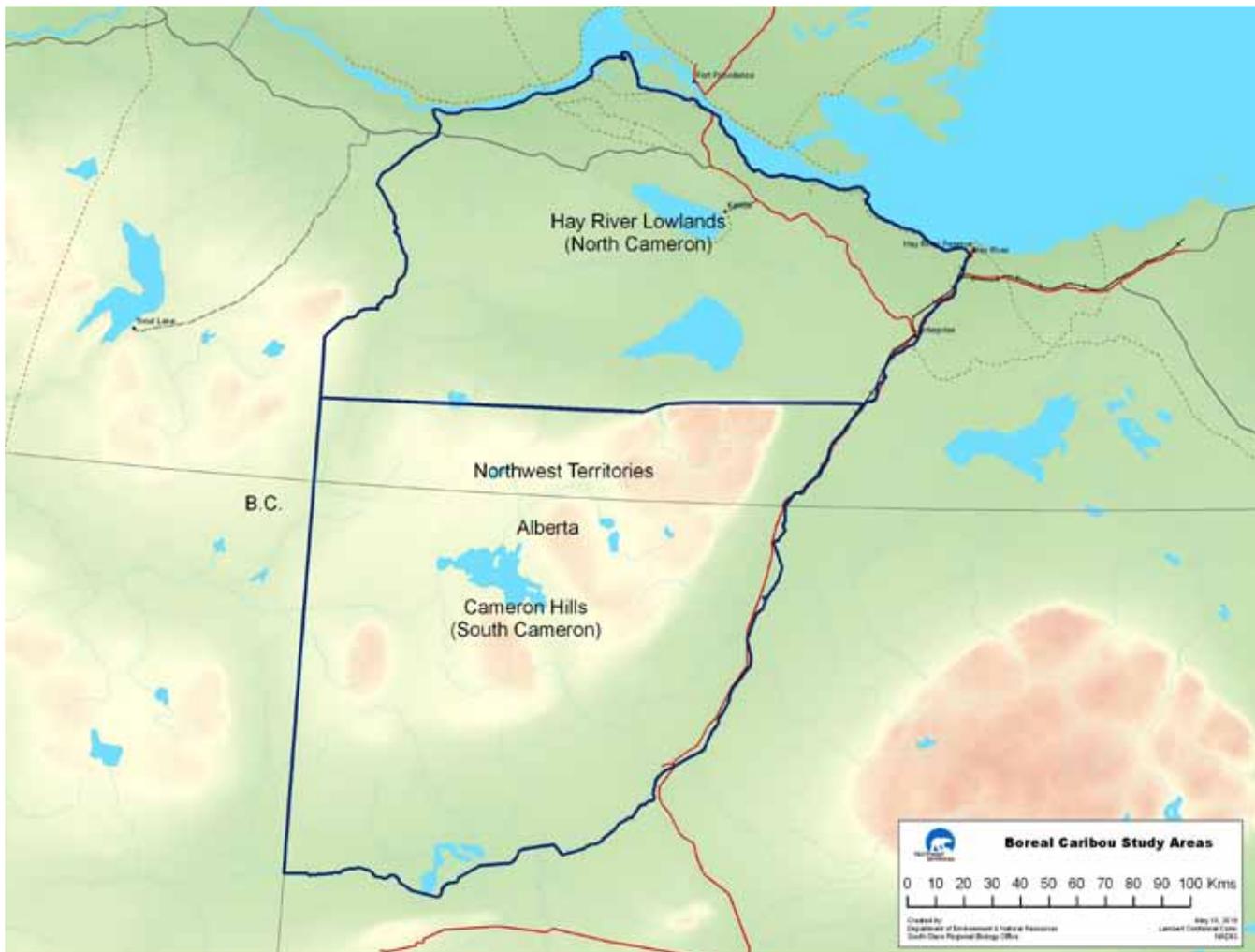
Partners ▶

- Environment and Natural Resources

Community Involvement ▶

Community knowledge of boreal caribou habitat use was used to locate boreal caribou for the initial deployment of the radio collars. Community members participated as observers in some field surveys. Study results were presented and discussed at community meetings and regional wildlife workshops. Local First Nations review the application for a wildlife research permit each year.

Boreal Caribou Study Area

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Boreal Woodland Caribou Response to Industrial Activity in the Summit-Keele Development Area, Sahtu Region

Period: 2008 – 2009

Main Investigator: Heather Sayine-Crawford, Cumulative Effects Biologist, Environment and Natural Resources, Sahtu Region



Photo Credit: B. Tracz

Rationale ▶

A test well for hydrocarbons was drilled 55 km southwest of Tulita in 2004-05 by Husky Oil Operations Ltd. ('Husky'). The well was found to have very high production potential. At the time, Husky expressed considerable interest in additional construction of gathering systems and access. While there was recognition of the potential economic benefits to the region, concern was also expressed that these activities could present potential adverse affects to wildlife and their habitats, particularly for boreal woodland caribou. Therefore, a project was initiated to collect baseline data on boreal woodland caribou in the area; these data were collected through 2008-09.

Objectives ▶

- Determine the response of boreal caribou to industrial activity.
- Map seasonal home range and habitat use.
- Collect baseline population data for caribou in the Summit-Keele area.

Methods and Information Collected ▶

- Beginning in 2005, adult female boreal caribou were captured and fitted with GPS and satellite-tracked radio-collars.
- Digital maps were created using GIS software.
- Recruitment surveys were flown.
- Habitat use models (resource selection function models) were developed.
- Tissue, blood, and fecal samples were taken for genetic and parasite analyses.

Results and Deliverables ▶

- Collar location data were processed and stored.
- A project overview was provided to Environmental Monitors with the Tulita Renewable Resources Council (RRC) that were working at the Husky site.

Long-Term Plans and Recommendations ▶

Hydrocarbon development is not ongoing in the Summit-Keele area. Prospects for future development remain low until a decision is made on the proposed Mackenzie Gas Project. Baseline data collected will be analyzed and a final summary report prepared.

Partners ▶

- Tulita Renewable Resources Council
- Western NWT Biophysical Study
- Husky Oil Operations Ltd.

Funding ▶

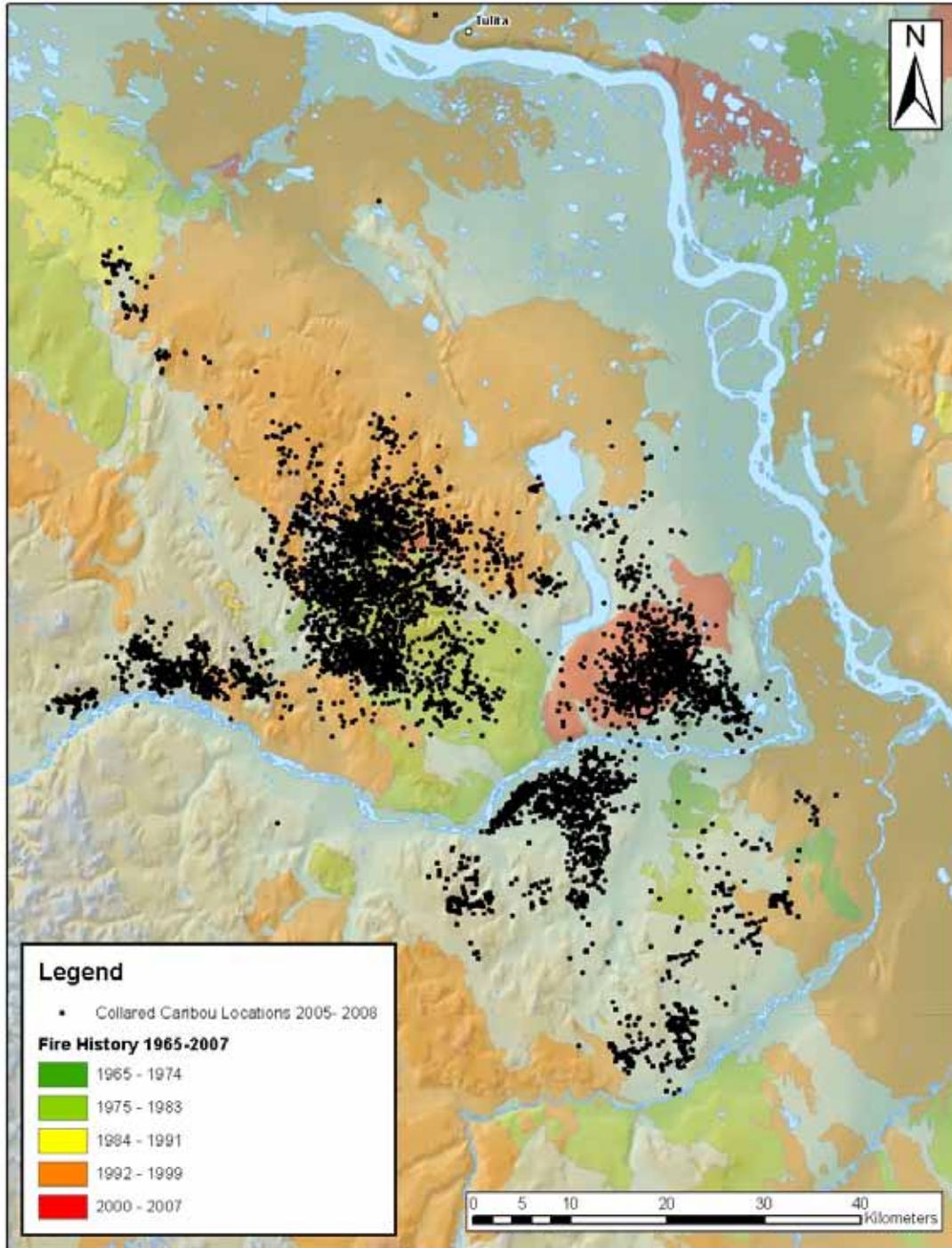
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Boreal Woodland Caribou Collar Locations



Ecology of Boreal Woodland Caribou in the Central Mackenzie River Valley

Period: 2008 – 2009

Main Investigator: Heather Sayine-Crawford, Cumulative Effects Biologist, Environment and Natural Resources, Sahtu Region



Photo Credit: B. Tracz

Rationale ▶

To collect baseline data on boreal woodland caribou in the NWT, which are listed as *Threatened* in Canada under the federal *Species at Risk Act*. Data will help assess any impacts of human activities and cumulative effects on boreal caribou and their habitats. The study provides a baseline that may contribute to 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 potential development in the Sahtu region.
- Collect baseline population data through a combination of GPS and satellite-tracked radio collars.
- Provide information to evaluate the current and potential implications of habitat loss and fragmentation, and cumulative effects of human activities and natural factors on boreal woodland caribou in the Mackenzie Valley.

Methods and Information Collected ▶

- Since 2003, adult female boreal woodland caribou have been captured, collared and radio tracked by GPS and satellite-tracked radio collars.
- Digital maps were created using GIS software.
- Habitat use models (resource selection function models) have been developed as part of a larger study of boreal caribou across their range in the NWT.
- Aerial surveys have collected data on calving and recruitment.
- Blood and fecal samples have been obtained for genetics and parasite analyses.

Results and Deliverables ▶

- As of April 2010, there are 11 operational collars in the Sahtu region.
- Presentations on the study have been given to participants in an Environmental Monitor training program (Tulita) and to the Sahtu Renewable Resources Board (SRRB) and the Renewable Resource Councils (RRCs) during their regular meetings.
- Data were used in the ecological assessment of the Ts'ude Niline Tu'eyeta Candidate Protected Area under the NWT Protected Areas Strategy.
- Collar location data have been used to provide comments and recommendations as part of the response to industrial exploration and development land-use permit applications.
- Collar location data are processed and stored in the database of the Sahtu GIS Project (ENR, Norman Wells). Location data also are stored in GNWT Wildlife Management Information System (WMIS) data storage in Yellowknife. Data will be available to ENR staff (and others upon request) for further analyses.

Long-Term Plans and Recommendations ▶

- While no new collars are to be deployed on boreal caribou in the Sahtu region in the near future, the study will continue through 2010-11 while active collars provide data.
- Traditional knowledge (TK) data is to be collected during 2010-11 from all communities in the Sahtu region. This will supplement TK collected on boreal caribou in 2000-01.
- Radio collar studies and aerial surveys for boreal caribou in the Sahtu region should be resumed if the proposed Mackenzie Gas Project or other significant development activities (e.g., Mackenzie Valley Highway extension) are permitted to proceed.

Partners ▶

- Renewable Resource Councils – Fort Good Hope, Tulita, Norman Wells
- Sahtu Renewable Resources Board
- Environment and Natural Resources – Dehcho region, Headquarters, Inuvik region, Sahtu region, South Slave region
- Faculty of Veterinary Medicine, University of Calgary

Funding ▶

- Environment and Natural Resources - Sahtu region
- Western Northwest Territories Biophysical study

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IN16 Data Acquisition (Caribou and Bear)

Period: April 2008 to March 2009

Main Investigator: Marsha Branigan, Manager Wildlife Management, Environment and Natural Resources, Inuvik Region



Photo Credit: T. Davison

Location ▶

Gwich'in Settlement Area and Inuvialuit Settlement Region.

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.

Objectives ▶

Collect baseline data for boreal woodland and 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 (NWT) Wildlife Care Committee (WCC) applications. Collars were both GPS and satellite collars.

Results and Deliverables ▶

Movements were monitored and archived in the Wildlife Management Information System (WMIS) from collared boreal woodland and barren-ground caribou and grizzly bear.

Long-Term Plans and Recommendations ▶

- Collared boreal woodland caribou will continue to be monitored until last planned collar release date of August 2011. There are no plans to collar additional boreal woodland caribou in the region at this time.
- Collars deployed on barren-ground caribou prior to the 2009 post-calving photographic survey were programmed to last until August 2012.
- GPS Collars deployed on grizzly bears will last two years. Collection of baseline data is considered complete and data is being analyzed as part of thesis projects of several students and within ENR.

Partners ▶

- Environment and Natural Resources
- Gwich'in Renewable Resource Board

Community Involvement ▶

Assistants are hired from local communities of Inuvik and Tsiigehtchic. Results presented to Gwich'in Renewable Resource Board (GRRB) and Renewable Resource Councils (RRCs).

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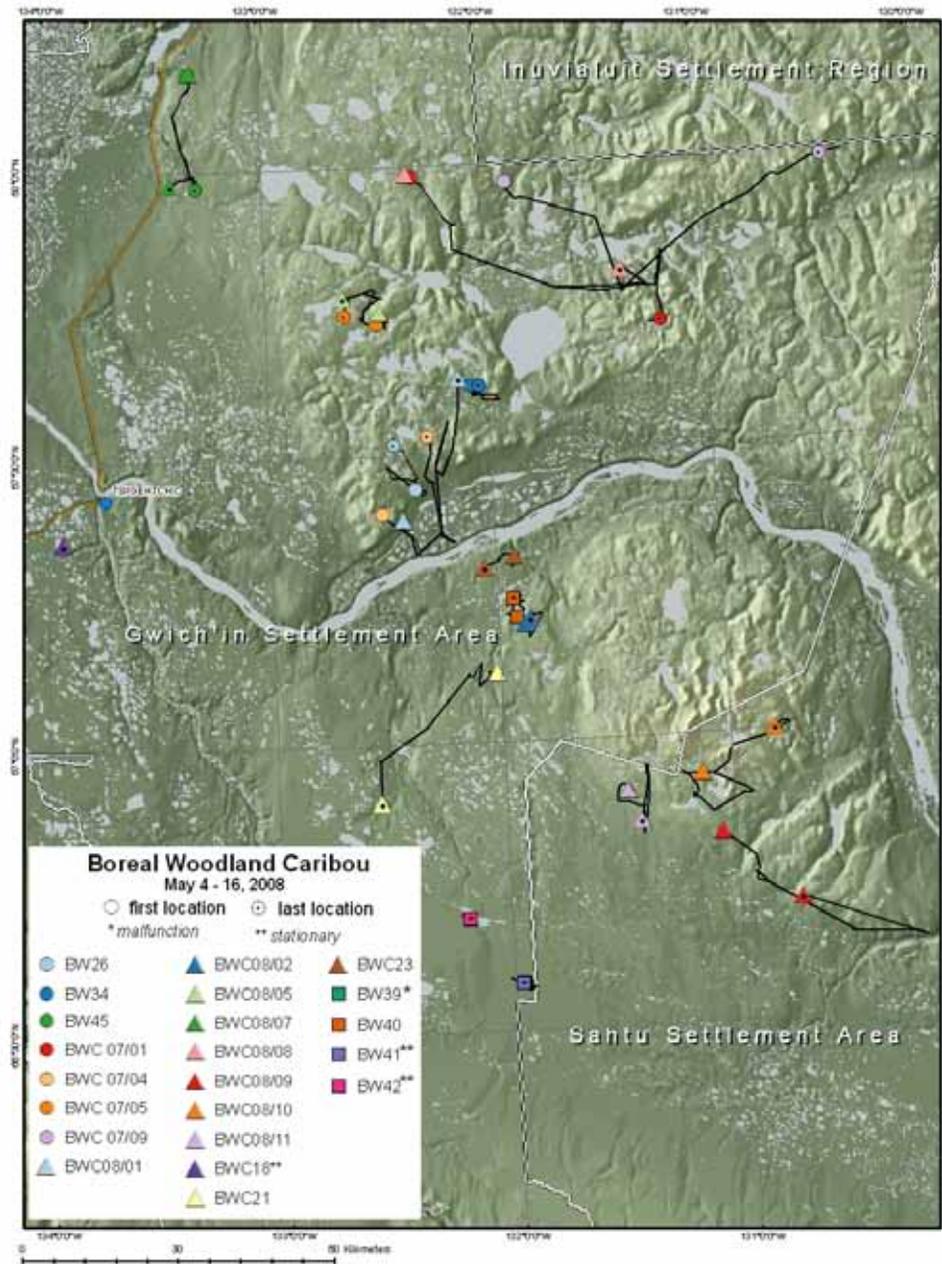
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GPS Collars deployed on grizzly bears will last two years. Collection of baseline data is considered complete and data is being analyzed as part of thesis projects of several students and within ENR.

Locations of Boreal Woodland Caribou Collars



Potential Impacts of Development on Grizzly Bears in the Mackenzie Delta Petroleum Exploration Development Areas

Period: April 2008 – March 2009

Main Investigator: Marsha Branigan, Manager Wildlife Management, Environment and Natural Resources, Inuvik Region



Photo Credit: M. Branigan

Location ▶

Mackenzie Delta Development Area, Inuvialuit Settlement Region.

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 approval 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. A grizzly bear management plan was developed to manage harvest of bears.

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.
- Assist with a mark-recapture program to calculate a regional grizzly bear population estimate.

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

Grizzly bear den in October.



Photo Credit: M. Branigan

Results and Deliverables ▶

- Demographic and morphological information for all captured grizzly bears.
- Maps showing annual home range distribution and movements of collared grizzly bears.
- 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 parryi*), 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.

Partners ▶

- Department of Biological Sciences, University of Alberta
- Environment and Natural Resources
- Wildlife Management Advisory Council (NWT)
- Inuvialuit Game Council

Community Involvement ▶

Assistants are hired from local communities. Results presented to Inuvialuit Hunters and Trappers Committees and Inuvialuit Game Council.

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Dehcho Moose Population Monitoring Program

Period: 2008 – 2010

Main Investigator: Nic Larter, Regional Biologist, Environment and Natural Resources, Dehcho Region



Photo Credit: D. Villeneuve



Photo Credit: D. Allaire

Location ▶

The aerial survey areas include the Liard River Valley and adjacent area and the Mackenzie River Valley and adjacent area south and west from Blackwater River to Jean Marie River. Biological samples come from traditional harvesting areas of members of local Dehcho First Nations.

Rationale ▶

Moose is an important traditional wildlife resource for residents of the Dehcho region of the NWT. Moose density estimates for areas within and adjacent to major harvesting corridors and current and proposed industrial development were lacking. Limited moose surveys were conducted in the Dehcho in the mid-1980s in relation to the new Liard Highway. One survey was conducted in the Liard Valley in 1994.

Moose in the Dehcho continue to be a highly sought after 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 by local First Nations throughout the Dehcho region. These concerns, combined with increasing oil and gas activity in the Liard and Mackenzie River Valleys, indicated 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 wanted to know the health and condition of the moose they harvest.

Objectives ▶

- Establish baseline estimates of moose density in the Dehcho region and establish a community-based monitoring program of harvested moose.
- 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 as observers 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 incidences of disease and parasites in locally harvested moose.
- 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 air survey areas 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 traditional knowledge and these new 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 allowed for the documentation of the incidence of parasites and disease and the documentation of levels of various contaminants in moose organs.
- Sampling kits are made available and sampling protocols have been discussed with all 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, the 15th Northern Contaminants Program Results Workshop, the 4th Biannual Dehcho Regional Wildlife Workshop and at the 14th International Congress on Circumpolar Health.
- Preliminary results were used in the decision for a public health advisory on the consumption of moose organs.
- A plain language poster on the level of cadmium found in moose meat and cigarettes has been made and will be distributed before the 2010 fall hunt.
- A presentation of the entire moose monitoring program was made at the 6th International Moose Symposium and was published in *ALCES* vol. 45:88-89.
- Scientific publications and government reports of additional results will be produced and presented in a variety of formats.

A presentation of the entire moose monitoring program was made at the 6th International Moose Symposium; a scientific paper of the presentation is in press.

Long-Term Plans and Recommendations ▶

- Similar aerial monitoring programs will be conducted annually each November through 2009/2010.
- It is anticipated that a large-scale moose survey would be conducted in 2011/2012 unless preliminary results indicate otherwise.
- Lab analyses of organs for elemental contaminant levels has been completed. A thorough statistical analysis of contaminant levels in moose organs will continue through 2009/2010 with results being presented as analyses are completed.
- Basic biological sampling of harvested moose continues to be ongoing; the collection of organ samples has ended for now.
- All biological samples collected will be stored frozen should additional analyses be required in future.

Partners ▶

- Environment and Natural Resources
- Parks Canada
- Dehcho First Nations

Funding ▶

Previous funding from Northern Contaminants Program.

Community Involvement ▶

Community members were involved in sample collections and assisted as survey observers.

At annual community meetings and regional biannual wildlife workshops the current status of the moose program is presented and critiqued in an open forum setting. Community concerns are raised and addressed at such meetings and the program is modified accordingly.

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South Slave Regional Workshop

Period: October 28 – 29, 2009

Main Investigator: Allicia Kelly, Regional Biologist, Environment and Natural Resources, South Slave Region



Photo Credit: A. Kelly

Location ▶

The regional wildlife workshop was held at the Roaring Rapids Hall in Fort Smith on October 28-29, 2009.

Rationale ▶

In the NWT, the involvement of local Aboriginal organizations is an important component of wildlife monitoring. This regional workshop will increase the inclusion of local and traditional knowledge and priorities into wildlife research, monitoring and management programs. ENR Dehcho region has held a biannual regional wildlife workshop since 2002 that has been very well received by local participant groups. This workshop will provide a similar forum for information sharing and discussion in the South Slave region.

Objectives ▶

- Provide a forum for open discussion of regional wildlife issues.
- Provide the opportunity to ensure that all representatives of local First Nation bands and organizations are updated on recent and ongoing wildlife program being delivered by ENR.
- Provide a forum for other agencies, departments and/or ENR programs to present research findings.
- Ensure continued dialogue about wildlife research and monitoring between interested parties in the South Slave region.

Methods and Information Collected ▶

The two-day workshop will be held biannually, alternating years with the Dehcho workshop. The workshop dates will be determined in consultation with local communities. For 2009, each First Nations and local Métis organization was requested to select up to two people to represent them at the workshop. Additional participants were welcome and the workshop was open to the public. Agencies and people conducting research in the South Slave were notified of the workshop and provided an opportunity to give presentations or provide posters of their work. Posters of wildlife work and findings by ENR were posted throughout the workshop. Lunch and breaks were catered by local organizations. This set up promoted informal discussion among participants.

In 2009, the first day of the workshop consisted of presentations and information sharing on wildlife programs taking place in the South Slave region. The second day was dedicated to open discussion and provided all First Nation representatives the opportunity to comment on any and all regional wildlife issues. A list of action items created from the workshop will be reviewed at the next workshop.

Results and Deliverables ▶

This was the first regional wildlife workshop held in the South Slave region. In general, participants were pleased to hear the information that was shared and wanted to see similar workshops occur on a regular basis. The following key priorities and recommendations emerged from the discussions:

- There was a clear message of the need for protection for barren-ground caribou so they can be abundant again. Looking at their food source, winter range, and diseases is important. People need to look at the whole picture and not just numbers. Woodland caribou are also very important to participants.
- Need to look at species that provide food (i.e. woodland caribou, moose, bison) that will be affected with shifts in hunting pressure away from barren-ground caribou. Request for moose surveys, especially around Fort Smith and Fort Resolution. The potential for increased hunting pressure on muskoxen was also raised.
- Address gap in predator information and trends. Participants noted that it is important to understand how wildlife species interact with and affect other species. Examples raised included bear populations along the Slave River and at Pine Point; high wolf populations; lack of moose; predators and boreal caribou.
- Communication and working together are very important. Participants also stressed the need for unity among and between local and territorial governments and the public, especially because animals do not see political boundaries. Everyone needs to work together to ensure wildlife populations are healthy and strong.

Long-Term Plans and Recommendations ▶

- The information gathered at the workshop will help set priorities for wildlife programs and research in the South Slave region.
- It is recommended that this workshop be held biannually in the South Slave region. The next regional wildlife workshop is scheduled for October 2011.

Partners ▶

Participants attended the workshop from the following organizations:

- Aurora College Environment, Natural Resources and Technology Program
- Deh Gah Got'ie First Nation
- Deninu K'ue First Nation
- Fort Providence Resource Management Board
- Fort Smith Métis Association
- Fort Resolution Métis Association
- Environment and Natural Resources
- Hay River Métis Association
- K'atlodeeche First Nation
- NWT Métis Association
- Parks Canada
- Salt River First Nation
- Smith Landing First Nation
- University of Alberta
- members of the public

Community Involvement ▶

The workshop provides an open forum for traditional knowledge to be shared and included in regional wildlife projects. Traditional knowledge holders and/or researchers will be welcome to present at the workshop.

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Dehcho Biannual Regional Wildlife Workshop

Period: October 21 – 22, 2008

Main Investigator: Nic Larter, Regional Biologist, Environment and Natural Resources, Dehcho Region



Photo Credit: D. Allaire

Location ▶

Delegates from all Dehcho First Nations travelled to Fort Simpson where this two-day workshop was held.

Rationale ▶

Shortly after staffing the ENR biological program in spring 2002, Dehcho First Nations and the former Department of Resources, Wildlife & Economic Development (RWED) 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 resulting action item was for RWED 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. ENR has since hosted regional wildlife workshops in October 2006 and October 2008.

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 and direction 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.
- 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 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 the consensus of a list of action items for ENR to address.

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. Color hard copies are provided to all First Nations and associated groups; digital copies are made available on a request basis. Copies of posters presented at the workshop are also available by request. 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 members. This event has become so well known in the region that we had to turn down requests from some University researchers to make presentations.

Partners ▶

- Environment and Natural Resources, South Slave, Dehcho, Headquarters
- Parks Canada
- University of Calgary
- Dehcho First Nations

Community Involvement ▶

This biannual workshop is a key forum for all Dehcho First Nations to comment and make recommendations on all Dehcho ENR wildlife programs. It is well attended by members of the community and action items generated from the workshop are implemented through the appropriate programs and critiqued as part of the agenda for the next meeting. Local schools participate as caterers for the event.

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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 members.

Air Quality and Monitoring Program

Period: 2008 – 2009

Main Investigator: Aileen Stevens, Air Quality Programs Coordinator, Environment and Natural Resources, Yellowknife, NT.

Location ▶

Daring Lake, Tundra Ecosystem Research Station

Rationale ▶

The purpose of the sampling program was to measure “background levels” of fine particulate matter (PM_{2.5}) in the ambient air.

The Daring Lake Research Camp is an ideal location to establish background air quality levels because it is located outside the immediate influence of settled populations or industrial activity. Background air quality data is useful to government and industry of the NWT for establishing baseline conditions for air quality assessment and management at proposed developments, for comparison to community monitoring, and for tracking trends in the background environment.

The data gathered from this monitoring program would be compared to other PM_{2.5} monitoring programs throughout the territory to consider effects from anthropogenic sources, effects from forest fire events, and seasonal trends.

Objectives ▶

The objective of the study was to measure “background levels” of PM_{2.5} in the ambient air, over the course of the summer.

Methods and Information Collected ▶

The sampler used for this study was a Thermo Scientific Mini-Partisol Particulate sampler, powered by solar panels and a battery

bank. The sampler operates by drawing air through the PM_{2.5} sample head at a specific flow rate for a 24 hour period. PM_{2.5} particles are collected on a 47 mm Teflon filter. The sampler is configured to sample every 3 days from midnight to midnight. Specific diagnostics are collected by the operator, including air flow rate and pressure, that correspond with each sample and are required for filter sample lab analysis. The samples are submitted to Environment Canada for analysis at the Environmental Technology Center.

The following link provides more in depth details about the sampler:

<http://www.thermo.com/com/cda/product/detail/1,1055,10122699,00.html>

Photo Credit: J. McKay

Photo Credit: J. McKay



The findings to this point have shown that the overall levels of PM_{2.5} are in the range of true background with a few elevated concentrations, which have historically resulted from forest fire smoke.

Long-Term Plans And Recommendations ▶

The results for 2008 were compared with previous Daring Lake data (2002 to 2007) and to Yellowknife PM_{2.5} data collected by the same method. Findings to this point have shown that the overall levels of PM_{2.5} are generally lower at Daring Lake than those in Yellowknife. These results are expected based on the remote location of the Daring Lake site and the lack of immediate influences on air quality impacts; however, the degree of difference between the locations is minimal, relative to the ambient air quality objective (30ug/m³). Influences from forest fire smoke were observed in both locations.

Additional years of data with a longer sampling season would be beneficial to assess any trends. Speciation analysis on the filters would be recommended to establish general composition of the PM_{2.5} in background air to compare it to the speciation observed in Yellowknife.

* Note: The sampler suffered irreparable mechanical problems in 2008, suspending the air quality monitoring program at Daring Lake for both the 2009 and 2010 seasons.

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