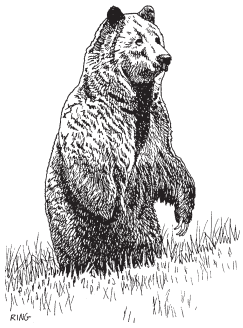
Resources, Wildlife and Economic Development
investing in our future



Bear Tracks

No. 7 **Editors: Dean Cluff, Robert Mulders and Rob Gau** Fall/Winter 2000

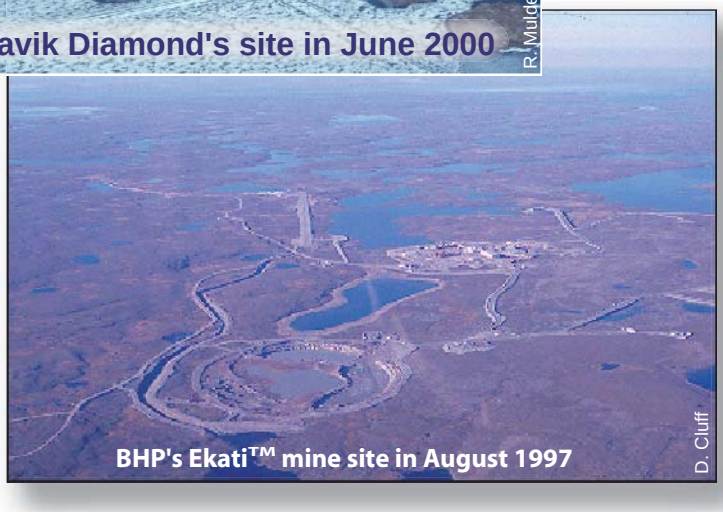
A Newsletter on Grizzly Bear Studies in the Central Arctic, NWT, Canada

Cumulative Effects Concerns for Grizzly Bears

Mineral exploration and economic development on the central barrens is expected to continue over the next several years. Consequently, there is concern over the incremental effects of human activity on grizzly bear populations primarily through direct mortality and habitat loss. Because little is known about how much disturbance barren-ground grizzly bears can tolerate, additional data is needed to assess and mitigate the impact of further development.

Diavik Diamond's site in June 2000 R. Mulders

Much of the economic activity in the area began in 1991 with the announcement of the discovery of diamonds in the Lac de Gras area. This eventually led to BHP's Ekati™ diamond mine, which came into production in October 1998. Since then, Diavik received federal government approval in November 1999 for its diamond mine proposal. Diavik is now in the construction phase and expects to be in production by early 2003.



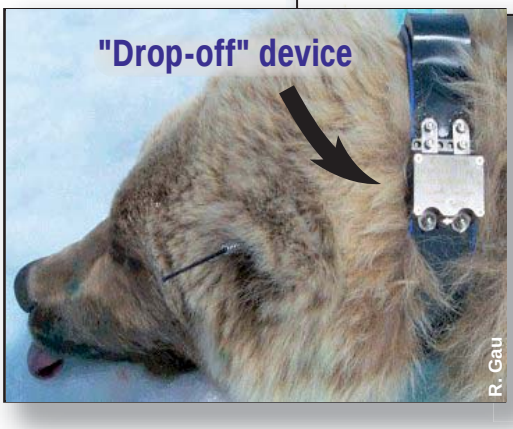
BHP's Ekati™ mine site in August 1997 D. Cluff

Meanwhile, Ekati™ mine has now completed construction of the 29 km access road southeast to the Misery kimberlite pipe as part of its original mine plan. However, BHP has also proposed an expansion of its existing footprint in order to access three new pipes (Pigeon, Beartooth, and Sable). This expansion would involve construction of a 17 km road to its Sable pipe, situated northeast of the mine. It is unclear what impact these incremental increases in road construction and traffic will have on grizzly bear habitat use in the region.

To address this concern, RWED has begun new research in collaboration with the University of Alberta, University of Saskatchewan, Diavik, and BHP. This work builds on our earlier program and will provide us with a more detailed description of how these grizzly bears use available habitat and their response to road development and traffic. We can then develop our cumulative effects models for barren-ground grizzly bears to help predict impacts of future development and mitigation strategies.

Following the Bears

We captured three adult female grizzly bears in the BHP Ekati™ claim block area in early June and fitted them with GPS (Global Positioning System) radio-collars. These GPS collars can give us location data with much better resolution than we have ever had before. Our previous, Argos-type satellite collar could provide 2 to 5 locations every 48 hours with a precision of 500 meters or more. GPS locations are now accurate to about 10 meters. For female bears who routinely travel 4 to 7 kilometers per day, this 10 m precision offers a relatively high level of resolution. GPS collars weigh about 1.5 kilograms, which is much less that the 2.0 kg collars we used previously. These GPS collars (from Televilt Positioning) can store up to 9,600 GPS locations in memory and are programmed to record their position every hour.



Once the locations are stored in the collar's memory, the challenge becomes how to recover the data. Rather than capture the bear again, we chose to program a release mechanism on the collar to drop off from the bear on October 10th. We added a VHF (Very High Frequency) transmitter beacon to help us locate the collar when it drops off. Another programming feature allowed us to receive the stored locations each month. By flying within several kilometers from the collared bear at a pre-set time, we can download the locations since last contact. We then retrieve the collars in October, where complete data recovery, re-programming, and battery replacement can be done back at the office.

Rob Gau attaches a GPS radio-collar to grizzly bear G755 near Achilles Lake, NWT.

Deployment Strategy

During our Phase I study, 42 bears (including 10 adult females) were collared in the general area of Lac de Gras. With six GPS collars available for deployment, we wanted to target some of these adult females residing near Ekati™, specifically those females near the new Misery road and the area of the proposed Sable road.

Between May 30th and June 5th, we used a single passenger Husky aircraft (40 hours) and a helicopter (25 hours) to intensively search a 2,300 km^2 area surrounding the mine site. Despite the effort, only 2 female bears were collared in the immediate area of interest. A third female was collared about 55 km west of Ekati™. We believe patchy snow cover may have compromised our ability to spot bears at this time. However, another search in late June and again in late July, although less intensive than done initially, failed to deploy more collars on adult females. Although our GPS collar deployment this year only involved three bears, we are optimistic next year will be better. Also by next year, we expect our collaboration with Phil McLoughlin, Mark Boyce, and Chris Johnson will result in a suitable procedure for incorporating bear location data and habitat classification analysis.

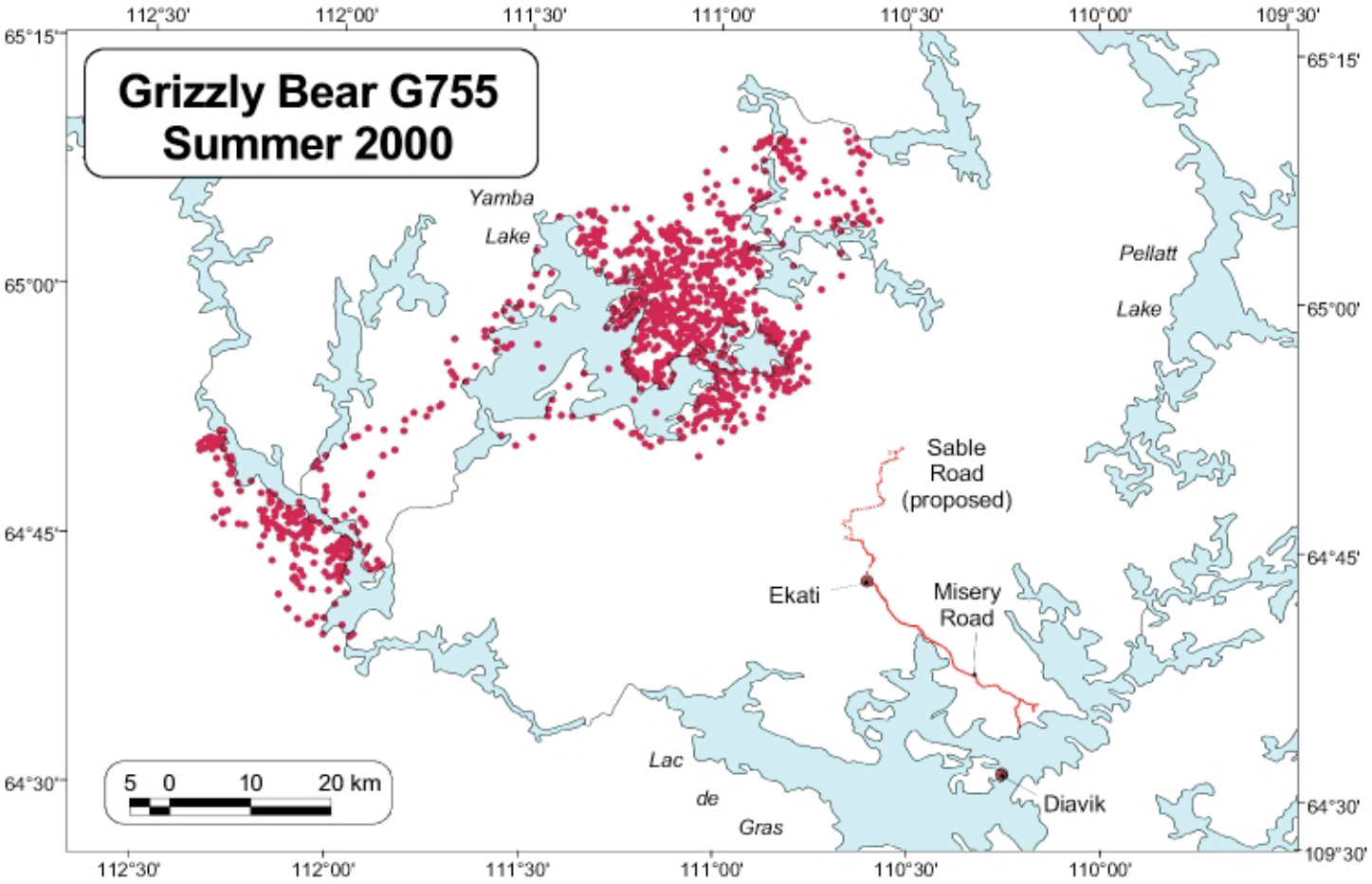
Grizzly bear G755 with her 2 yearling cubs near Achilles Lake.

Grizzly Bear G755

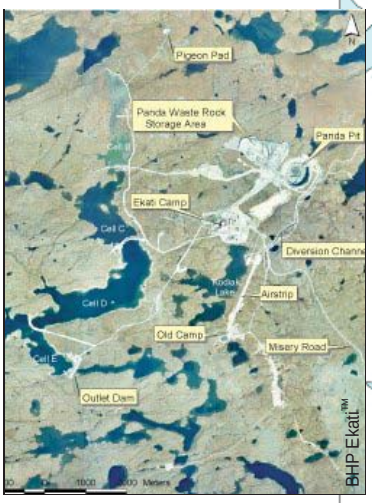
At Achilles Lake, about 30 km northwest of Ekati™, we captured and collared a new female grizzly accompanied by two yearling cubs. On June 26th when we re-visited the area, we noticed she had lost one cub. She apparently lost the second cub a little later because at our second visit on July 25th no cubs were seen. We presume the cubs are dead, but from unknown causes. We have no reason to suspect that the collar or the capture process contributed to this mortality.

Grizzly bear G755 spent most of the summer northeast of Yamba Lake but made a 50 km excursion to the southwest side of Lake Providence between August 18th and September 6th. So far, this female has not used the area near the proposed Sable route development, but her home range appears northeast of it. G755's collar collected 2,379 locations from a possible 2,992 attempts, for a success rate of 80% (about 18.3 locations per day).

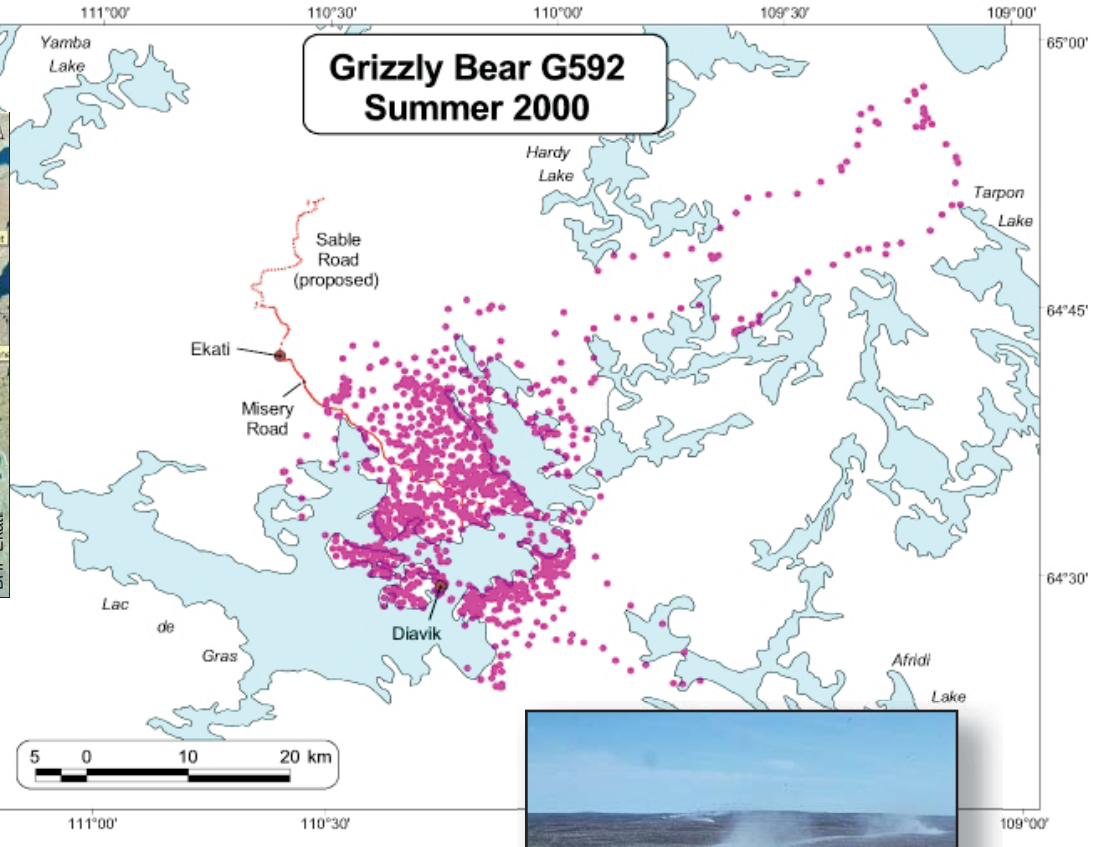
Grizzly Bear G755 - GPS Locations



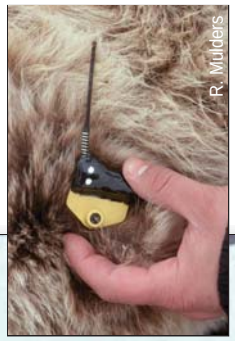
Grizzly Bear G592 - GPS Locations



An aerial view of the Ekati™ mine footprint. Grizzly bear G592 frequents the area southeast of the mine, but has not been at the mine site itself.



Misery Road construction



Left and Below, Ear-tag transmitter and grizzly bear G592 showing GPS neck collar and ear-tag transmitter on left ear.

Grizzly Bear G592

We recaptured a 13-year old female (G592) accompanied by a previously captured male (G637). This female was first collared between June 1995 - September 1996 and occupied a 1,800 km^2 area centered over the newly constructed Misery road. This bear should provide valuable data on how she interacts with human activity along the Misery route. So far, female G592 has remained mostly within the vicinity of the Misery road and Diavik. In mid-July, G592 made a 65 km excursion to the northeast towards Ghurka Lake. G592's collar recorded 2,567 locations from a possible 2,946 locations between June 3rd and October 10th, for a success rate of 87% (about 20.0 locations per day).

Grizzly Bear G608

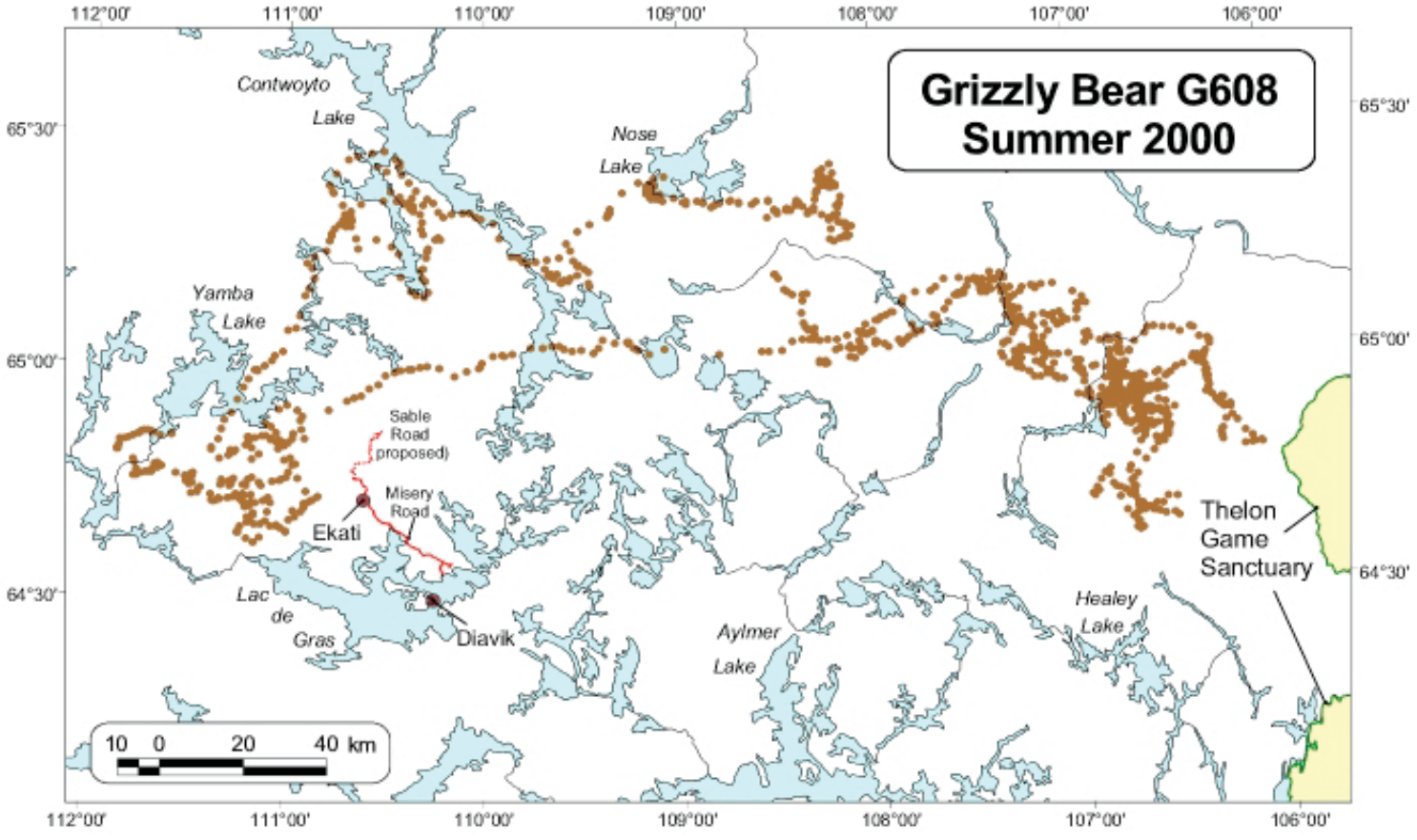
Grizzly Bear G608

On 5 June, we captured and collared a third female (G608) to the southeast of Daring Lake, about 48 km west of Ekati™. We first captured this bear 5 years ago when she was a cub-of-the year. This time she was captured with an adult male, also previously captured (G596). Because we were unable to locate her during our monthly tracking flights to download location data, we suspected that the collar's VHF transmitter had failed shortly after deployment.

Although we expected the independent drop-off mechanism would function properly in October, without a VHF signal we would not have had no way of recovering the collar. Therefore, we were pleased to hear her VHF signal in October which allowed us to retrieve all the locations stored in the collar. The movement map below shows a major excursion to the east, which explains why we could not pick up her signal until she returned to the area.

G608's collar acquired 2,092 locations from a possible 2,900 locations between June 5th and October 10th, for a success rate of 72 % (about 16.6 locations per day).

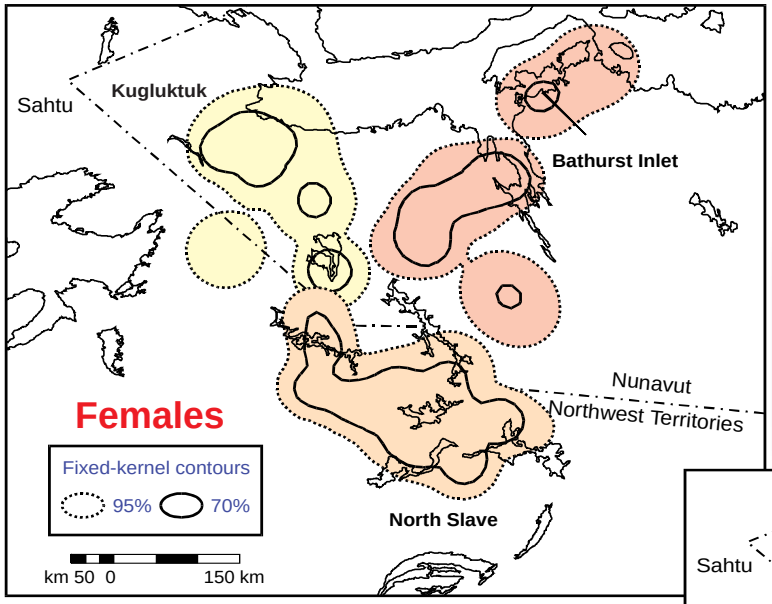
Grizzly Bear G608 - GPS Locations



Phil McLoughlin, Ph.D.

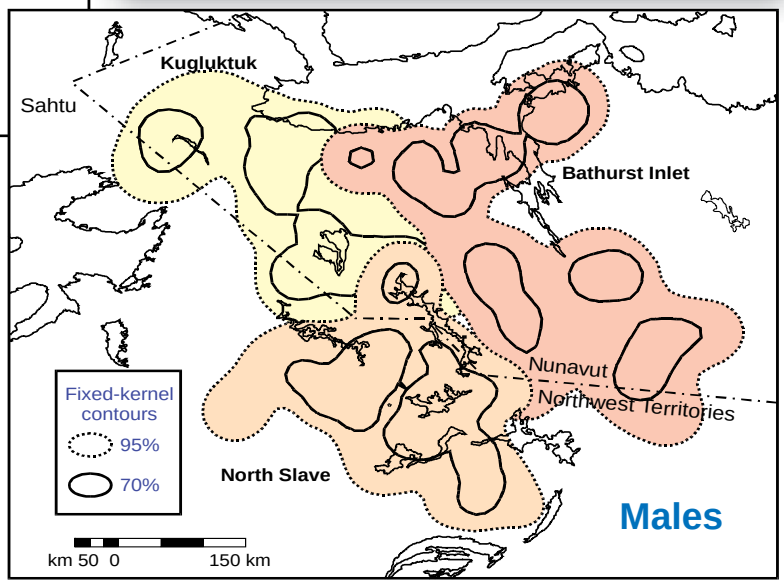
Phil McLoughlin successfully defended his Ph.D. dissertation on 30 August 2000. His thesis, *The spatial organization and habitat selection patterns of barren-ground grizzly bears in the central arctic*, was the underlying work at delineating population boundaries for these bears.

Phil tracked 81 grizzly bears equipped with satellite radio-collars over 4 years. The main purpose of the study was to determine the number of population units of bears over a 235,000 km^2 area. By statistically analyzing the movements of these bears, Phil identified 3 broad clusters of grizzly bears on the barrens. However, movement of bears between these units was high for both males and females, which suggests that these grizzly bear groupings cannot be managed separately from one another. This level of movement between different units is important because it is a measure of population closure. If closure is not met, then management practices adopted in one unit will likely affect adjacent units. Therefore, Phil's work leads us to consider managing these bears as one complete population unit. Cluster area boundaries were considered at the 70% probability contour level as estimated from the analysis of the movement data.



Left, *Statistical probability contours from the fixed kernel method for female grizzly bears in the central Arctic. Shown are the North Slave Bathurst Inlet, and Kugluktuk clusters.*
-- from McLoughlin 2000

Below, *Statistical probability contours from the fixed kernel method for male grizzly bears in the central Arctic. Shown are the North Slave Bathurst Inlet, and Kugluktuk clusters.*
-- from McLoughlin 2000



The extensive movements and home range areas of adult bears contributed to the large overlap observed between the cluster units. Annual ranges were the largest reported for grizzly bears in North America. Annual ranges of 19 adult females averaged 2,100 km^2 while those of 35 adult males were significantly larger and averaged 7,245 km^2.

These large ranges resulted from seasonal changes in the distribution and abundance of their food supply. Poor quality habitats for bears were associated with the larger range sizes of bears occupying these areas while bears occupying better quality habitat did not have to range as far to find food. Bears did show preferences in their use of habitat types, which included eskers, riparian shrub areas, and tussock/hummock type tundra.

Since receiving his Ph.D. degree, Phil has accepted a term position as an assistant professor at the University of Saskatchewan, Saskatoon.

Congratulations Phil !!

REPORTS & FURTHER READING

REFEREED PUBLICATIONS

McLoughlin, P.D., R.L. Case, R.J. Gau, H.D. Cluff, R. Mulders, and F. Messier. (*in review*). Effect of temporal and spatial differences in habitat on home ranges of barren-ground grizzly bears in the central Arctic. *Canadian Journal of Zoology.*

McLoughlin, P.D., H.D. Cluff, and F. Messier. (*in review*). Denning ecology of barren-ground grizzly bears in the central Arctic. *Journal of Mammalogy*.

McLoughlin, P.D., H.D. Cluff, R.J. Gau, R. Mulders, R.L. Case, and F. Messier. (*in review*). Population delineation of barren-ground grizzly bears in the central Arctic. *Journal of Wildlife Management*.

McLoughlin, P.D., R.J. Gau, H.D. Cluff, R. Mulders, R.L. Case, and F. Messier. (*in review*). Hierarchical habitat selection patterns of barren-ground grizzly bears in Nunavut and the Northwest Territories, Canada. *Journal of Animal Ecology.*

McLoughlin, P.D. 2000. The spatial organization and habitat selection patterns of barren-ground grizzly bears in the central Arctic. Ph. D. Thesis, University of Saskatchewan, Saskatoon, SK. 151 pp.

Gau, R.J. and R. Case. 1999. Evaluating nutritional condition of grizzly bears with select blood parameters. *Journal of Wildlife Management* 63(1):286-291.

Gau, R.J., S. Kutz, and B.T. Elkin. 1999. Parasites in grizzly bears (*Ursus arctos*) from the central Canadian Arctic. *Journal of Wildlife Diseases* 35(3):618-621.

McLoughlin, P.D., R.L. Case, R.J. Gau, S.F. Ferguson, and F. Messier. 1999. Annual and seasonal movement patterns of barren-ground grizzly bears in the central Northwest Territories. *Ursus* vol. 11.

Gau, R.J. 1998. Food habits, body condition, and habitat of the barren-ground grizzly bear. M. Sc. Thesis. University of Saskatchewan, Saskatoon, SK. 77 pages.

Case, R.L., and L. Buckland. 1998. Reproductive characteristics of grizzly bears in the Kugluktuk area, Northwest Territories, Canada. Ursus 10:41-47.

Gau, R.J., R.L. Case, D.F. Penner, and P.D. McLoughlin. (*in preparation*). Feeding patterns of barren-ground grizzly bears in the central Canadian Arctic.

Gau, R.J. and R.L. Case. (*in preparation*). Evaluating nutritional condition of grizzly bears via ^{15}N signatures and insulin-like growth factor-I.

TECHNICAL REPORTS

McLoughlin, P.D., F. Messier, R.L. Case, R.J. Gau, R. Mulders, and H.D. Cluff. 1999. The spatial organization and habitat selection patterns of barren-ground grizzly bears (*Ursus arctos*) in the Northwest Territories and Nunavut. Final report to the West Kitikmeot Slave Study Society. Yellowknife, NT. 54 pages + appendices.

Strom, K.B., and P.D. McLoughlin. 1998. Habitat effectiveness model for grizzly bears in the Lac de Gras region, Northwest Territories, Canada. Technical report for the Diavik Diamonds Project Environmental Effects Report for Wildlife. Calgary, AB

PRESENTATIONS WITH ABSTRACTS PUBLISHED IN PROCEEDINGS

McLoughlin, P.D., R.L. Case, H.D. Cluff, R.J. Gau, and F. Messier. 1999. Movement patterns of grizzly bears on the central barrens of the Northwest Territories and Nunavut, Canada. Presented at the Third European Congress of Mammalogy. Jyvaskyla, Finland.

McLoughlin, P.D., H.D. Cluff, D.F. Penner, and F. Messier. 1998. Denning ecology of barren-ground grizzly bears in the central Northwest Territories. 11th International Conference on Bear Research and Management, April, Gatlinburg, TN, USA.

Gau, R.J. 1997. Seasonal cycles in the forage ecology of free roaming barren-ground grizzly bears. Presented at 31st Annual Prairie Universities Biology Seminars (PUBS), February, Edmonton, AB

McLoughlin, P.D., H.D. Cluff, and V. Banci. 1997. Accuracy and precision of satellite radio-collars deployed on free-ranging barren-ground grizzly bears in the central Northwest Territories. Forum on Wildlife Telemetry, September, Snowmass, CO, USA

Gau, R.J. 1996. Food habits, body condition, and habitat of the barren-ground grizzly bear. Presented at 30th Annual Prairie Universities Biology Seminars (PUBS), February, Lethbridge, AB.

McLoughlin, P.D. 1996. Spatial characteristics of barren-ground grizzly bears (*Ursus arctos*) in the central Northwest Territories. 30th Annual Prairie Universities Biology Seminars (PUBS), February, Lethbridge, AB

Future Plans

Although this summer's limited collar deployment to the north of Ekati™ only involved three bears, we're optimistic that additional resident females will be found and collared next spring. The quantity and quality of individual bear locations collected this summer are impressive, and the prospects are excellent for addressing cumulative effects in the Lac de Gras area. This fall, we are collaborating will Phil McLoughlin, Chris Johnson, and Mark Boyce to develop protocols for data analysis and to incorporate habitat classification data.

We plan to further consult with Ekati™ and Diavik to review our research design and solicit their continued support. We can then complement industry's wildlife monitoring programs and address cumulative effects concerns raised by the Mackenzie Valley Environmental Impact Review Board and by the Independent Environmental Monitoring Agency. For example, we believe obtaining more quantitative data on traffic patterns on access roads should be in everyone's interest. We are also optimistic that a planned Cumulative Effects Assessment and Management framework will further consolidate interest and effort. These bear movement data should accommodate many of their objectives. Therefore, subject to further consultation, we hope to deploy 6 GPS collars in the Ekati™ area next May with plans to continue this effort into 2003.

We are still committed to addressing the issue of determining grizzly bear productivity and abundance on the barrens, however, the timing of this initiative is uncertain. Prerequisites include: 1) finalizing an appropriate study design, 2) reviewing co-management issues with the Nunavut government, 3) obtaining community support, and 4) acquiring sufficient funds for this expensive multi-year effort.

PROJECT SPONSORS (Cumulative Effects)

Resources, Wildlife and Economic Development
investing in our future

Northwest Territories
Resources, Wildlife, and Economic Development

UNIVERSITY OF ALBERTA

UNIVERSITY OF SASKATCHEWAN

BHP

DIAVIK DIAMOND MINES INC.

Acknowledgments

We gratefully acknowledge the support and contributions-in-kind from our project sponsors represented by the logos above We appreciate the effort of the many other individuals and agencies who assisted in the population delineation study (Phase I) to get us to this new step. Nunasi Helicopters and Air Tindi skilfully assisted our bear capture efforts.

The NWT Barren-Ground Grizzly Bear Project

Dept. of Resources, Wildlife & Economic Dev.

Robert Mulders, Wildlife & Fisheries Division
Rob Gau, Wildlife & Fisheries Division
Ray Case, Wildlife & Fisheries Division
Dean Cluff, North Slave Region

University & Industry

Mark Boyce, University of Alberta, Edmonton
Chris Johnson, University of Alberta, Edmonton
Philip McLoughlin, University of Saskatchewan, Saskatoon

For More Information:

visit us at: www.nwtwildlife.com and follow the links.

Contact: Robert Mulders, Wildlife & Fisheries Division, Department of Resources, Wildlife & Economic Development
600, 5102 - 50 Ave., Yellowknife, NT X1A 3S8 (867) 920-6315 (tel) (867) 873-0293 (fax) or email: robert_mulders@gov.nt.ca