



Examining reproductive behaviour and range use in Arctic grizzly bears

Mark A. Edwards^{1,2,§} and Andrew E. Derocher¹

¹Department of Biological Sciences, University of Alberta, Edmonton, AB, Canada

²Mammalogy Department, Royal Alberta Museum, Edmonton, AB, Canada

§ For a PDF of this poster, use your smartphone to scan this barcode and visit my website or contact me at mark.edwards@gov.ab.ca



ROYAL ALBERTA MUSEUM

Objective

To test the 'roam-to-mate' hypothesis in grizzly bears inhabiting the Mackenzie Delta region of Canada's western Arctic by examining range use during mating and post-mating periods.



Photo by Wayne Lynch

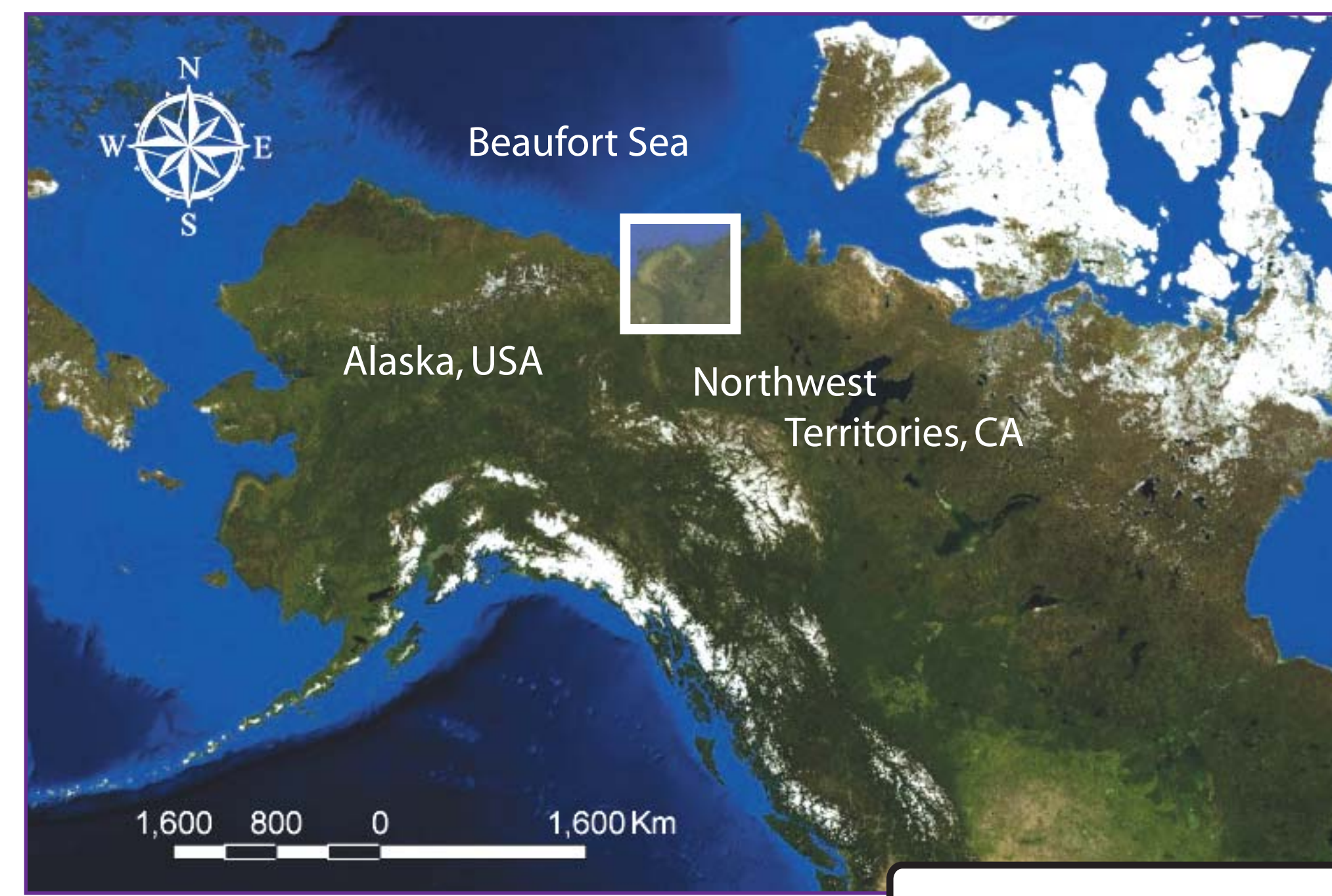
Background

- A home range is the area traversed in acquiring life's requisite resources (Burt 1943). Where there is temporal variation in resource availability the home range is the sum of its parts.
- Depending on time of year and reproductive status the importance of certain resources may differ by gender and affect range use and the area traversed in acquiring said resources (Clutton-Brock and Harvey 1978).
- During the mating period, range use may be influenced by an individual's age and reproductive status, and for females the presence of dependent young (Sandell 1989).
- For reproductively receptive individuals, greater range use during the mating period has been observed (Schwegmeyer 1988; San Jose and Lovari 1998), and may be advantageous for polygamous species like the grizzly bear because of increased chances of encountering asynchronously receptive mates.
- Both male and female grizzly bears have been reported to use larger ranges during the mating period compared to the post-mating period, exhibiting roam-to-mate behaviour (Dahle and Swenson 2003).
- Outside the mating period, bears should switch from mating resources to food resources with a resulting change in range use (Erlinge and Sandell 1986).

Literature Cited

- Burt, W.H. 1943. Territoriality and home range concepts as applied to mammals. *Journal of Mammalogy* 24, 346-352.
- Clutton-Brock, T.H. & Harvey, P.H. 1978. Mammals, resources and reproductive strategies. *Nature* 273, 191-195.
- Dahle, B. & Swenson, J.E. 2003. Seasonal range size in relation to reproductive strategies in brown bears *Ursus arctos*. *Journal of Animal Ecology* 72, 660-667.
- Erlinge, S. & Sandell, M. 1986. Seasonal changes in the social organization of male stoats, *Mustela erminea* - an effect of shifts between two decisive resources. *Oikos* 47, 57-62.
- Lindzey, F.G. & Meslow, E.C. 1977. Home range and habitat use by black bears in southwestern Washington. *Journal of Wildlife Management* 41, 413-425.
- San Jose, C. & Lovari, S. 1998. Ranging movements of female roe deer: do home-loving does roam to mate? *Ethology* 104, 721-728.
- Sandell, M. 1989. The mating tactics and spacing patterns of solitary carnivores. In: *Carnivore Behavior, Ecology, and Evolution* (Ed. by J.L. Gittleman), pp. 164-182. Ithica, NY, USA: Cornell University Press.
- Schwagmeyer, P.L. 1988. Scramble-competition polygyny in an asocial mammal - male mobility and mating success. *American Naturalist* 131, 885-892.
- Wielgus, R.B. & Bunnell, F.L. 1995. Tests of hypotheses for sexual segregation of grizzly bears. *Journal of Wildlife Management* 59, 552 - 560

Study Area: Mackenzie Delta

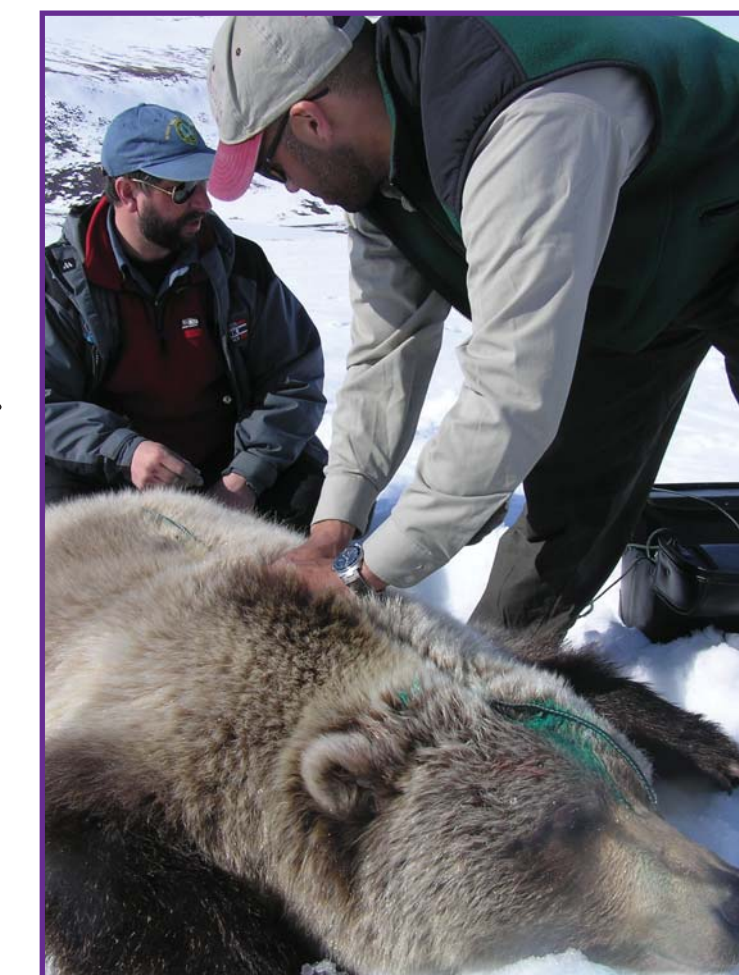


23,000 km²

Methods



Seven male and 34 female bears were immobilized by aerial darting using Telazol[®] (8mg/kg).



Each bear was classed by age, sex and reproductive status and the presence of dependent young.



Demonstrating to local community member how to fit a collar.



Bear range use was monitored from 2003 - 06 using Telonics GPS Argos satellite-linked radio-collars.

Results

- Range size differed by sex and reproductive status and across mating ($n = 75$) and post-mating ($n = 65$) periods.
- Two-factor ANOVA resulted in a significant interaction term indicating that males and females with and without dependent young had ranges that varied in size from mating to post-mating (Table 1; Fig. 1).

Factor	d.f.	SS	MS	F	P
mating period	1	2.77	2.77	12.04	0.001
sex and presence of dependent young	3	12.77	4.26	18.50	<0.001
mating period x sex and presence of dependent young	3	3.385	1.128	4.90	0.003
error	132	30.38	0.23		

Table 1: Two-factor ANOVA with log₁₀ transformed 95% kernel range size (km²) and factors sex and the presence of dependent young and mating period.

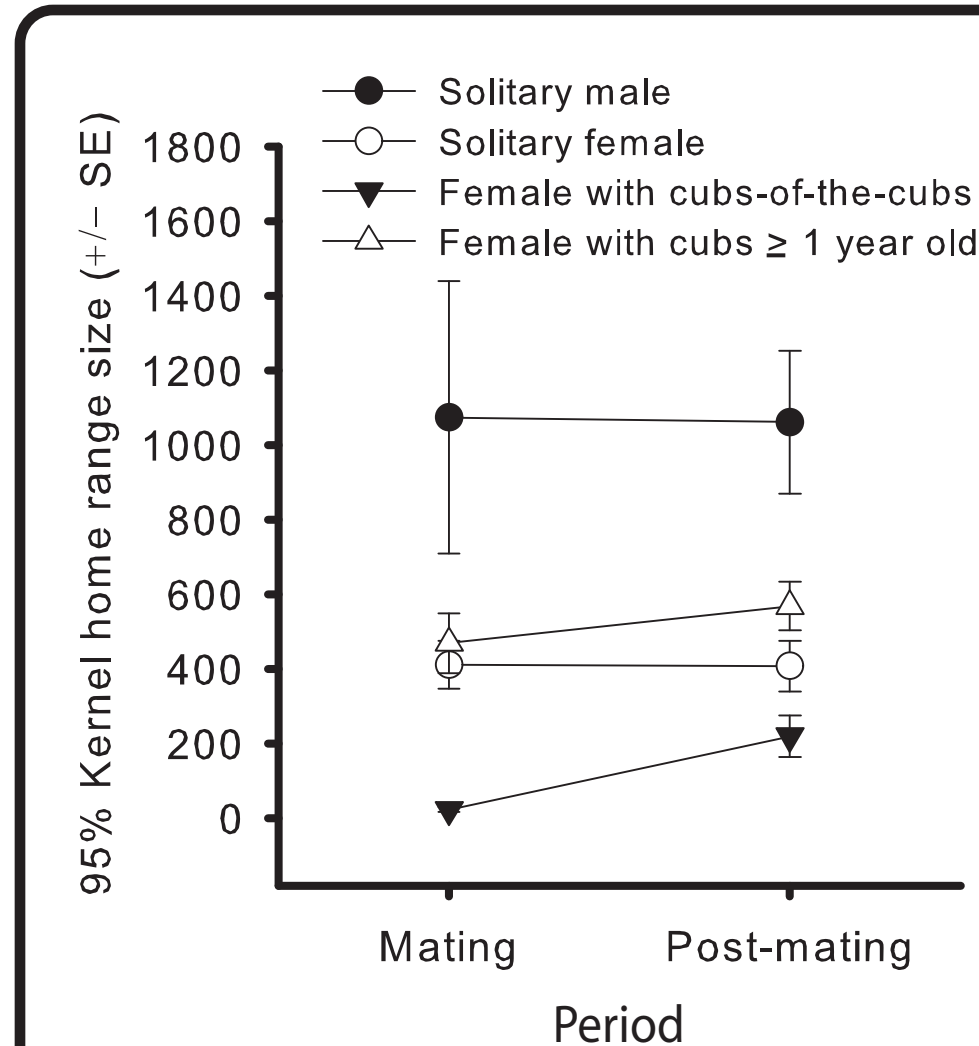
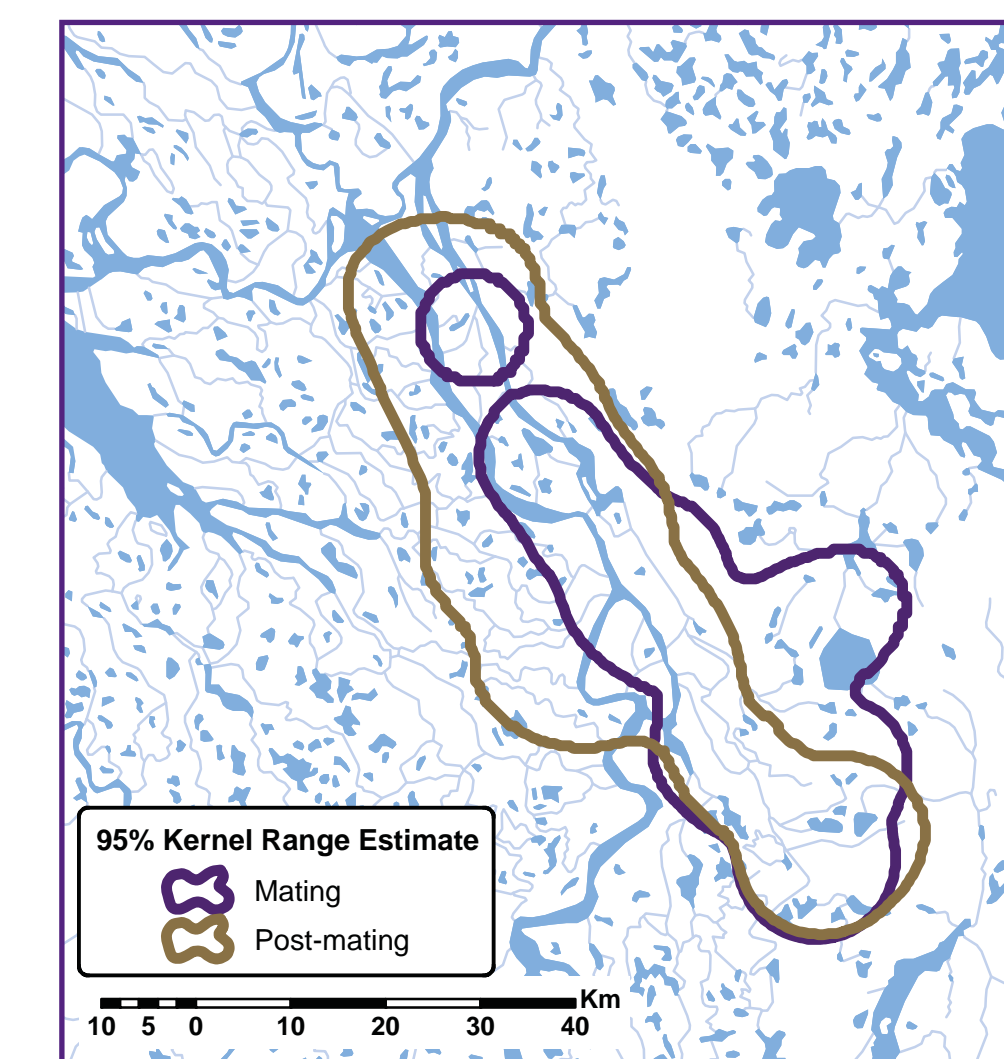
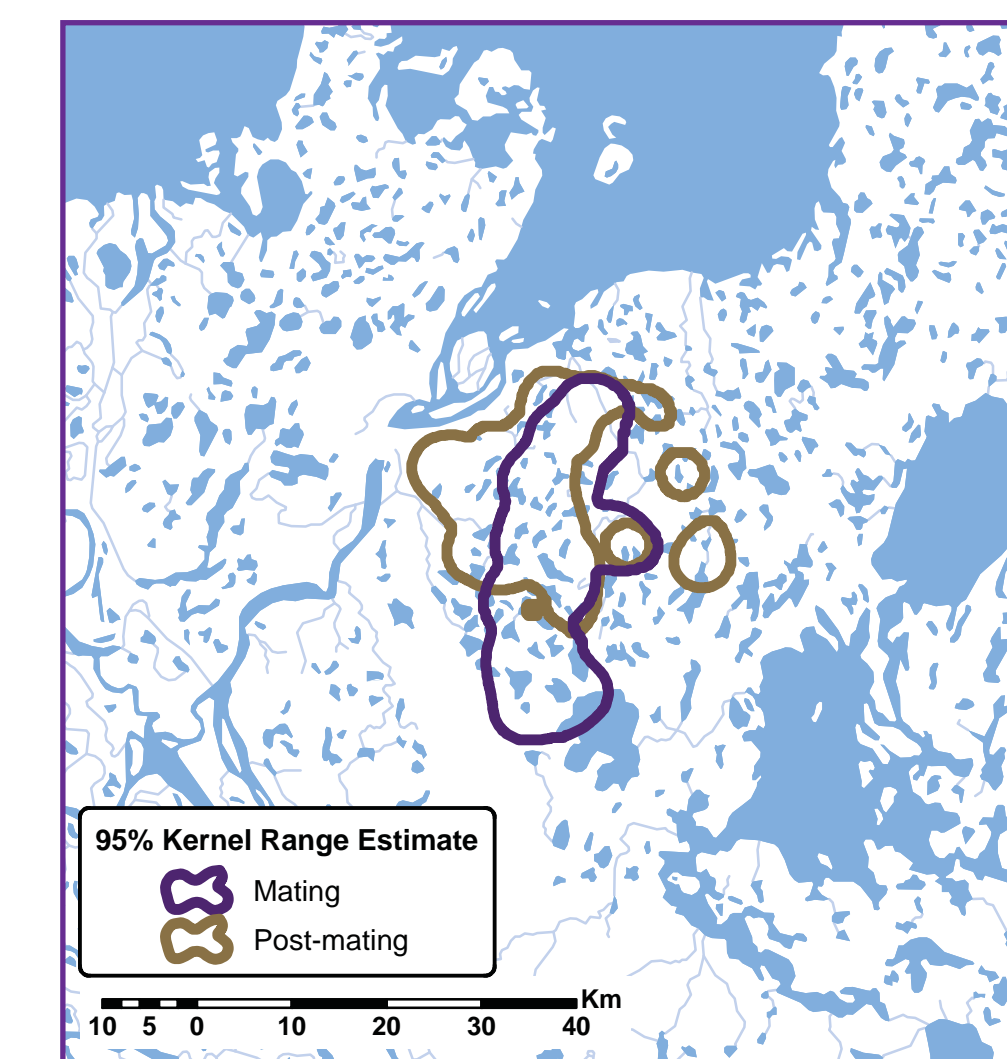


Fig. 1: 95% kernel range size (km²) for mating and post-mating periods for different reproductive classes.

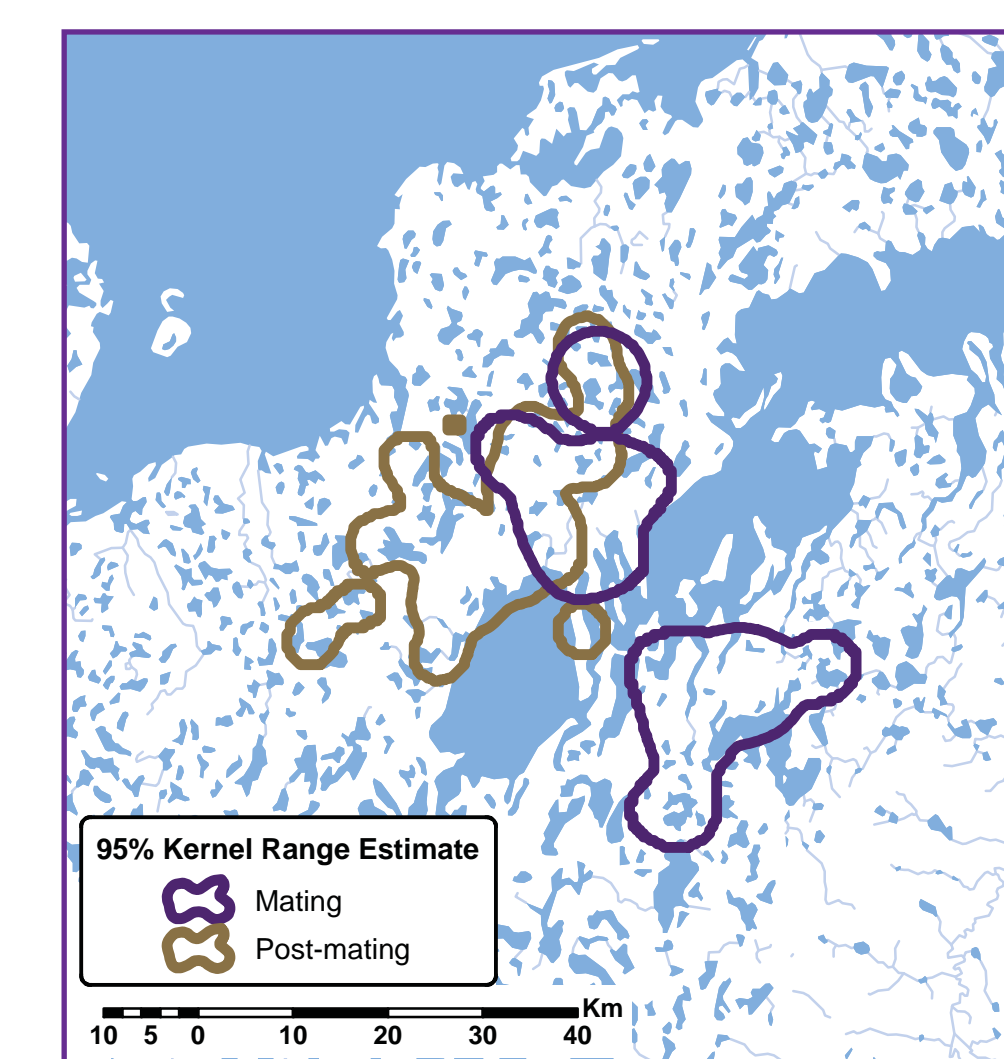
- However, examination of range size by mating and post-mating period indicated that the significant interaction term resulted from females with cubs-of-the-year behaving differently (Fig. 1).
- Below, examples of average mating and post-mating range sizes for different sex and reproductive classes:



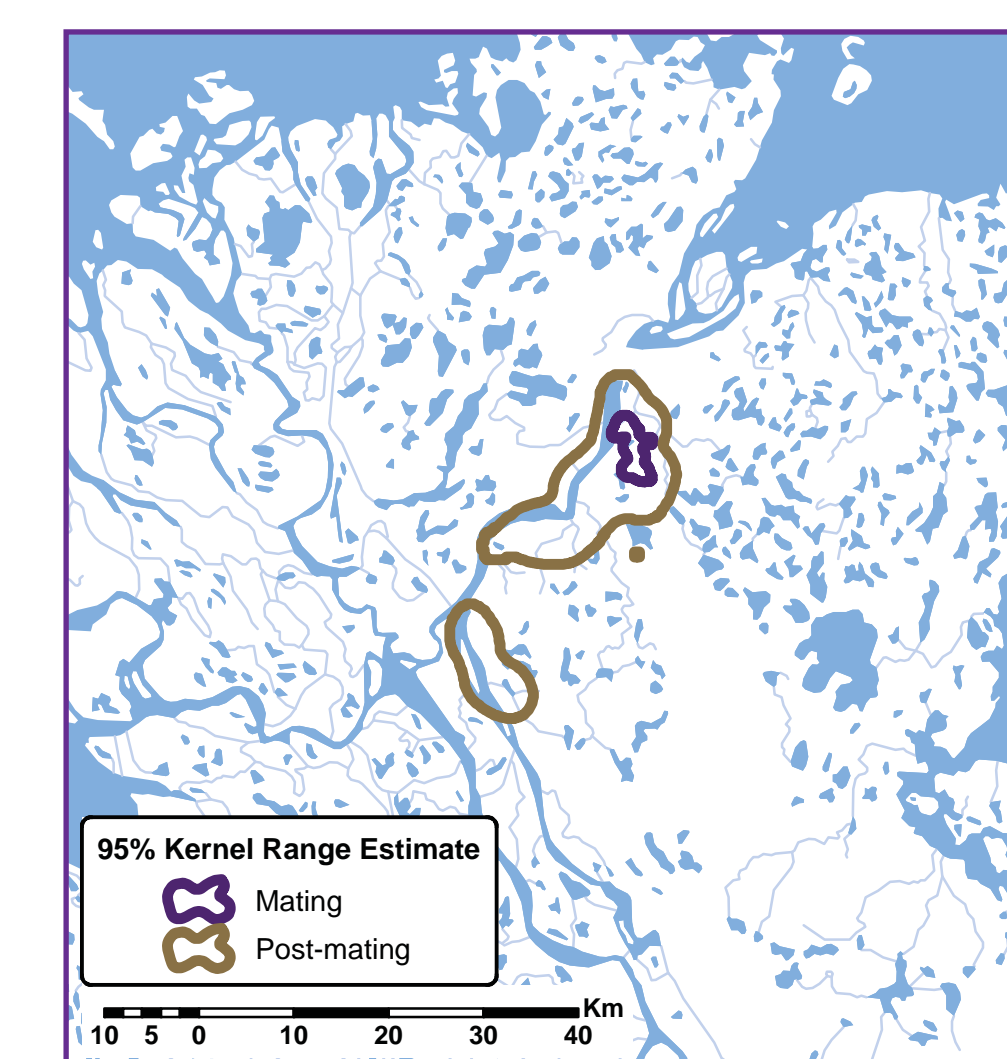
Solitary male



Solitary female



Female with cubs ≥ 1 year old



Female with cubs-of-the-year

Results of a posteriori analysis

- Therefore, an *a posteriori* two-factor ANOVA omitting females with cubs-of-the-year was conducted, resulting in no mating period effect ($F_{1,121} = 0.77, P = 0.38$).
- Our results suggest that only the females with cubs-of-the-year had smaller ranges during the mating period. When compared to all other bears, they continued to use smaller areas than all other sex and reproductive classes in the post-mating period.

Discussion and Conclusions

- The absence of a change in range size from the mating to the post-mating period across all sex and reproductive classes does not support roam-to-mate behaviour for grizzly bears inhabiting the Mackenzie Delta region.
- Given that roam-to-mate behaviour has been observed in other grizzly bear populations, for example, Dahle and Swenson's (2003) study on the bears in central Scandinavia, we suggest that further research is needed on the reproductive behaviour and range use in grizzlies.
- With the exception of females with cubs-of-the-year that used smaller ranges during the mating period, we observed no difference in range size for other sex and reproductive classes.
- We attributed the smaller range size of females with cubs-of-the-year during the mating period and subsequent increase during post-mating to be the result of females either reducing their movements during the mating period to avoid infanticidal males, which confers improved fitness to the perpetrator (Wielgus & Bunnell 1995) or from females being encumbered by less mobile atricial young (Lindzey & Meslow 1977).

Acknowledgements

- This study would not have been possible without the logistical and financial support from Marsha Branigan, Ray Case, and John Nagy of the Government of Northwest Territories (GNWT).
- We greatly appreciate the support received from the following community organizations:
 - The Wildlife Management Advisory Council (NWT)
 - The Inuvialuit Game Council
 - The Inuvik Hunters and Trappers Committee
 - The Tuktoyaktuk Hunters and Trappers Committee
- We are grateful to the following organizations for the generous financial support of the project:
 - University of Alberta
 - Royal Alberta Museum, Government of Alberta
 - GNWT, Dept. of Environment and Natural Resources (Inuvik)
 - The Inuvialuit Land Claim Wildlife Studies Implementation Fund
 - ConocoPhillips (North) Canada Limited
 - Alberta Cooperative Conservation Research Unit
 - Western Biophysical Program of the GNWT
 - Polar Continental Shelf Project
 - Endangered Species Recovery Fund - World Wildlife Fund
 - Lorraine Allison Scholarship Trust Fund
 - Circumpolar/ Boreal Alberta Research Grant
 - Indian and Northern Affairs Canada, Northern Scientific Training Program
 - Natural Sciences and Engineering Research Council of Canada