

Nevin, Owen and Gilbert, Barrie K. (2005) Observations of autumn courtship and breeding in brown bears, *Ursus arctos*, from coastal British Columbia. *Canadian Field-Naturalist*, 119 (3). pp. 449-450.

Downloaded from: <http://insight.cumbria.ac.uk/id/eprint/786/>

Usage of any items from the University of Cumbria's institutional repository 'Insight' must conform to the following fair usage guidelines.

Any item and its associated metadata held in the University of Cumbria's institutional repository Insight (unless stated otherwise on the metadata record) may be copied, displayed or performed, and stored in line with the JISC fair dealing guidelines (available [here](#)) for educational and not-for-profit activities

provided that

- the authors, title and full bibliographic details of the item are cited clearly when any part of the work is referred to verbally or in the written form
 - a hyperlink/URL to the original Insight record of that item is included in any citations of the work
- the content is not changed in any way
- all files required for usage of the item are kept together with the main item file.

You may not

- sell any part of an item
- refer to any part of an item without citation
- amend any item or contextualise it in a way that will impugn the creator's reputation
- remove or alter the copyright statement on an item.

The full policy can be found [here](#).

Alternatively contact the University of Cumbria Repository Editor by emailing insight@cumbria.ac.uk.

Observations of Autumn Courtship and Breeding in Brown Bears, *Ursus arctos*, from Coastal British Columbia

OWEN T. NEVIN¹ and BARRIE K. GILBERT²

¹Centre for Animal Conservation, University of Central Lancashire, Penrith, Cumbria, CA11 0AH, United Kingdom

²Department of Forest, Range and Wildlife Sciences, Utah State University, Logan, Utah 84322 USA

Nevin, Owen T., and Barrie K. Gilbert. 2005. Observations of autumn courtship and breeding in Brown Bears, *Ursus arctos*, from coastal British Columbia. *Canadian Field-Naturalist* 119(3): 449-450.

Over a period of four years, autumn courtship behaviour in Brown Bears (*Ursus arctos*) was observed on three separate occasions, with copulation observed once and two litters of cubs potentially resulting from autumn breeding. These are the first recorded observations of these behaviours.

Key Words: Brown Bear, *Ursus arctos*, reproduction, autumn, courtship, mating, British Columbia.

Brown Bears (*Ursus arctos*) mate in the spring from May to July. Once the fertilized eggs have developed to the blastocyst stage, further development is delayed until just before denning, typically November. At this time the blastocysts implant and a short pregnancy ensues with one to four cubs born during winter sleep, usually in February. This delayed implantation leads to an apparent gestation period of 6.5 – 8.5 months, although embryonic development occurs only in the last 6 – 8 weeks (Craighead et al. 1969; Hensel et al. 1969; Garshelis 2001).

Between August 1999 and May 2003, Brown Bears in the Glendale Cove area of British Columbia (50°41'N 125°44'W) were individually identified and observed as part of an ongoing study (Nevin 2003). Photo-identification techniques allowed individual bears to be distinguished. Coat coloration and scar patterns were recorded with sketches and descriptions on data sheets, supplemented by a catalogue of reference photographs. Each bear was given a unique numeric code. Sex was determined by urination pattern, direct observation of genitals or the presence of cubs (Nevin 2003; Nevin and Gilbert 2005a).

Autumn courtship was first observed in mid-September 1999; two large adult males (M003 and M004) were observed tracking a lone female (F005). While this close following and olfactory investigation of urine is typical of the breeding season, it was only in light of subsequent observations that this was recognized as out-of-season courtship behaviour.

Two weeks later, at the beginning of October 1999, one of these male bears (M003) was observed courting another lone female (F102). During the 40 minutes that the interactions of these bears were recorded, tracking was again observed; in addition, there was play fighting, genital sniffing and mounting.

In the same week one of the female bears (F009) lost two yearling cubs. The cubs were last seen on 3 October 1999 after which F009 was seen alone. F009 is a highly identifiable bear with distinctive scarring and a muzzle that twists to the right. After the loss of her cubs in 1999 she was not seen in 2000 but returned to

the Glendale spawning channel in early September 2001. At this time she was accompanied by three yearling cubs; these cubs would have been born during the 1999-2000 hibernation. For this to happen, F009 must either have mated in the spring of 1999 while still with her yearling cubs or have mated in the autumn of 1999 after the loss of her cubs. Neither explanation would be considered typical behaviour.

In mid September 2001 M004 was again seen tracking F005; this is the same pairing seen in September 1999 and F005 still had no cubs. On this occasion they approached another female (F103) and her two-year-old cubs. F103 charged F005 and after a brief agonistic interaction F005, the larger of the females, backed away approximately 10 m and sat down. At this point F103 was approached by M004; after another brief agonistic interaction, F103 moved away from her cubs and offered no resistance to mounting by M004. Copulation began immediately and continued for at least 10 minutes at which time continued observation became impossible. This is the first recorded observation of autumn copulation in Brown Bears. It should be noted that F103 had been involved in courtship behaviour in the spring (e.g. 15 May 2001 with M301); she had separated from her cubs in late May and was seen mating with M301 in May and June. F103 and cubs had reunited by 16 September 2001. F103 was seen in May 2002 with two young-of-year cubs but it is not known whether these are from spring or autumn mating in 2001.

With only four observations over a period of four years during which 341 days of systematic behavioural observations were conducted for ongoing research projects (Nevin 2003; Nevin and Gilbert 2005a, b) on the approximately 40 individual bears using the area, we are clearly discussing rare events; during this period more than 30 breeding events were observed during the spring breeding season. It should be noted that although all the observations of autumn courtship and breeding involve one of two male bears (M003 and M004) these were two of the five largest males in the area.

Very little is known about the reproductive biology of any bear species and new insight into Brown Bear

breeding may have impacts on the conservation and management of other bear species, many of which are threatened or endangered (Spady 2002). The potential of successful autumn breeding will also add a new dimension to the ongoing debate on infanticide in Brown Bears (Wielgus et al. 2000, 2001; Swenson et al. 2001a, b; Dahle and Swenson 2003; Miller et al. 2003; Ben-David et al. 2004; Nevin and Gilbert 2005a, b). With the possibility of same-season breeding opportunities associated with cub-killing events throughout the non-denning period, the selective advantage associated with this behaviour would be much higher than it has been assumed to be under the prevailing view that breeding is restricted to the spring period.

Acknowledgments

This research was funded through ongoing support from Knight Inlet Lodge and the Glendale Grizzly Trust. Special thanks go to Barbara Bull, Dean Wyatt and the staff of Knight Inlet Lodge.

Literature Cited

- Ben-David, M., K. Titus, and L. R. Beier.** 2004. Consumption of salmon by Alaskan brown bears: A trade-off between nutritional requirements and the risk of infanticide? *Oecologia* 138: 465-474.
- Craighead, J. J., M. G. Hornocker, and F. C. Craighead, Jr.** 1969. Reproductive biology of young female grizzly bears. *Journal of Reproduction and Fertility Supplement* 6: 447-475.
- Dahle, B., and J. E. Swenson.** 2003. Seasonal range size in relation to reproductive strategies in brown bears *Ursus arctos*. *Journal of Animal Ecology* 72: 660-667.
- Garshelis, D. L.** 2001. Bear family. Pages 70-85 in *The new encyclopedia of mammals*. Edited by D. Macdonald. Oxford University Press, Oxford.
- Hensel, R. J., W. A. Troyer, and A. W. Erickson.** 1969. Reproduction in the female brown bear. *Journal of Wildlife Management* 33: 357-365.
- Miller, S. D., R. A. Sellers, and J. A. Keay.** 2003. Effects of hunting on brown bear cub survival and litter size in Alaska. *Ursus* 14: 130-152.
- Nevin, O. T.** 2003. The influence of prey abundance and risk-sensitive behavioral change on individual access to high-energy food (salmon): impacts on the density and viability of bear populations. Ph.D. dissertation, Utah State University, Logan, Utah.
- Nevin, O. T., and B. K. Gilbert.** 2005a. Perceived risk, displacement and refuging in brown bears: positive impacts of ecotourism? *Biological Conservation* 121: 611-622.
- Nevin, O. T., and B. K. Gilbert.** 2005b. Measuring the cost of risk avoidance in brown bears: Further evidence of positive impacts of ecotourism. *Biological Conservation* 123: 453-460.
- Spady, T.** 2002. Joint ursid reproduction study. *International Bear News* 11(3): 14.
- Swenson, J. E., B. Dahle, and F. Sandegren.** 2001a. Intra-specific predation in Scandinavian brown bears older than cubs-of-the-year. *Ursus* 12: 81-92.
- Swenson, J. E., F. Sandegren, S. Brunberg, and P. Segerstrom.** 2001b. Factors associated with loss of brown bear cubs in Sweden. *Ursus* 12: 69-80.
- Wielgus, R. B., and F. L. Bunnell.** 2000. Possible negative effects of adult male mortality on female grizzly bear reproduction. *Biological Conservation* 93: 145-154.
- Wielgus, R. B., F. Sarrazin, R. Ferriere, and J. Clobert.** 2001. Estimating effects of adult male mortality on grizzly bear population growth and persistence using matrix models. *Biological Conservation* 98: 293-303.

Received 9 August 2004

Accepted 22 August 2005