

Myrmecophagy by grizzly bears in north-central British Columbia.

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Introduction

- The grizzly bear (*Ursus arctos*) (Figure 1) is a species of special concern in central British Columbia, Canada.
- The Parsnip Grizzly Bear Habitat Inventory Project (<http://web.unbc.ca/parsnip-grizzly/>), an ambitious two-year study, was conducted between 1998 and 2002 to increase knowledge of grizzly bear ecology in the sub-boreal spruce biogeoclimatic zone.
- Prior to this study, little was known about grizzly bear ecology in the arctic watershed of BC.



Figure 1. Male grizzly bear



Figure 2. Mountain and plateau habitats

- Mountain and plateau (Figure 2) habitat sub-populations were studied.

- The identification and maintenance of important bear foods is a key component for grizzly bear conservation in an increasingly modified landscape.

- The grizzly bear is an omnivore, with food items ranging from vegetation to large prey, such as moose (*Alces alces*).

- Ants, particularly their larvae and pupae, constitute a valuable source of food (Auger et al. 2004), and numerous studies have shown that these insects constitute a very important food source for bears (Raine and Kansas 1990, Noyce et al. 1997, Swenson et al. 1999, Große et al. 2003, Auger et al. 2004).

- In sub-boreal forests, a majority of ant species nest in dead wood (Lindgren and MacIsaac 2002).

- Grizzly bears are well adapted to breaking open even very large pieces of wood with their powerful forelimbs and large claws (Figure 3).



Figure 3. Front paw of grizzly bear, showing the long claws used for digging and tearing apart wood when foraging.

Objectives

The objectives of this research were:

- to determine if ant foraging was significant in the Parsnip bear populations, and
- if bears exhibited any preference for specific ant species, similar to what has been shown for black bears (*Ursus americanus*) (Noyce et al 1997, Auger et al. 2004).

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Methods and Materials

- We investigated use of ants (and their larvae) as food by direct and indirect assessment of bear myrmecophagy.
- Up to 62 radio-collared grizzly bears were located twice per week from the air, their general activity noted, and the plot coordinates recorded by GPS.
- Randomly selected bear locations were visited within 1-14 days, and a habitat-plot survey was conducted.
- Bear foraging activities were evaluated and placed into 9 food-related categories.
- At plots where foraging for ants was identified as a primary or secondary activity, ants were collected.
- Bear scats were washed and sieved to retrieve ant carcasses, or when possible ants were collected with forceps.
- Ants were identified using keys in Naumann et al. (1999), and Francoeur (1973).

Results and Discussion

- Bear foraging was the primary activity identified at 385 of the 538 sites visited.
- Foraging for ants as a primary activity tied with large animal carcasses as the 4th most common food (Table 1).
- Myrmecophagy and predation/scavenging on carcasses were the most important sources of animal-derived food (Table 1).

Table 1. Results of habitat-plot surveys 1998-2002 showing grizzly bear foraging on nine different food categories.

Foraging Category	% of Total Foraging		
	Primary (N=385)	Secondary* (N=158)	Tertiary* (N=36)
Grazing vegetation	40	47	31
Feeding on berries	18	16	25
Digging for vegetation	17	12	17
Foraging for ants	8	17	22
Animal kills or carcasses	8	1	3
Digging for rodents	7	5	3
Feeding on tree cambium	1	1	0
Human-derived food sources	1	1	0
Feeding on wasp nests	<0.5	0	0

*Data for 1999-2002 only

- Myrmecophagy varied through the spring (den emergence to 14 July), summer (15 July to 20 September) and fall (21 September to den entry) seasons.
- Foraging for ants was exploratory in the spring (5.3%), and highest in the summer (7.7%).
- Foraging remained significant into the early fall as a secondary or tertiary activity (after berry feeding), likely while ants remained active.
- When berries were available, feeding on ants was significant but usually secondary, e.g., in 2002 foraging for ants was the most commonly recorded secondary activity at habitat plots.
- Foraging for ants occurred most commonly in burned over landscapes, particularly cutblocks that had been burnt.
- Bears primarily foraged on ants by tearing apart stumps containing ant nests (Figure 4), however, they also dug up open ground nests and flipped over rocks.



Figure 4. Stump opened by grizzly bear to access a nest of the carpenter ant *Camponotus herculeanus*

- Grizzly bears appeared to forage opportunistically for ants, and showed little preference for any particular species (Table 2).

- Several bear scats had a high proportion of ant remains of many species (Figure 5).



Figure 5. Ant remains in bear scat. This scat contained *M. alaskensis*, *C. herculeanus*, *F. aserva*, *L. pallitarsis*, and *L. subumbratus*.

- The most prevalent species foraged for were *Camponotus herculeanus*, *Formica aserva*, *Formica neorufibarbis*, and to a lesser extent *Lasius pallitarsis* and *Myrmica* species (Table 2).

- These species are common in the area, and several develop large nests (Naumann et al 1999).

Conclusion

- This study shows that ants are an important food source for grizzly bears.

- Grizzly bear management should include a focus on the retention of coarse woody debris in harvested and burnt landscapes for ants to colonize, offering bears increased foraging opportunities in the summer and early fall months.

Table 2. Ant species found in samples collected at habitat plots and from grizzly bear scats.

Subfamily	Species	# Samples
Subfamily Myrmicinae		
	<i>Leptothorax canadensis</i>	3
	<i>Myrmica alaskensis</i>	5
	<i>Myrmica detritinodis</i>	1
	<i>Myrmica incompleta</i>	5
Subfamily Formicinae		
	<i>Camponotus herculeanus</i>	17
	<i>Lasius pallitarsis</i>	7
	<i>Lasius subumbratus</i>	1
	<i>Formica fusca</i> group unknown	2
	<i>Formica accreta</i>	1
	<i>Formica argentea</i>	3
	<i>Formica neorufibarbis</i>	11
	<i>Formica obscuriventris</i>	1
	<i>Formica aserva</i>	21

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