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Work subunit Ic: Differential impacts of predators (brown bears, wolves, golden eagles) on caribou calving in the 1002 area and potential displacement areas: an assessment of predation risks

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INTRODUCTION

Petroleum exploration and development within the Arctic National Wildlife Refuge may displace caribou (Rangifer tarandus granti) from traditional calving grounds within the 1002 area to peripheral areas. Research is being conducted to assess the differential impacts of predators [(brown bears (Ursus arctos), wolves (Canis lupus), golden eagles (Aquila chrysactos)] on calving caribou within the 1002 area and potential displacement areas. Objectives of the study are:

- 1. Compare relative abundance of predators within traditional calving concentration and peripheral areas.
- 2. Determine factors affecting predator abundance in these areas and how they are related to predation on calving caribou.
- 3. Quantify use of caribou as a prey species and ts relation to predator productivity.

DATA COLLECTION

The 1989 field season consisted of three phases: capture and placement of radio-transmitters on brown bears and wolves in order to determine movements and distribution of these predators before, during, and after arrival of caribou on the calving grounds, radio relocation of instrumented brown bears and wolves, and location of nesting golden eagles along the mountains adjoining the coastal plain.

Wolves

Wolf capture efforts were conducted on 28 and 29 May to replace failing radio-collars and to instrument uncollared wolves of the Aichilik, Drain Creek, Egaksrak, and Sadlerochit packs. Wolf den sites were monitored for 2-3 day periods between 19 July and 28 July to assess pup production. Wolves were relocated between 3 April and 5 October and intensive radio-tracking was conducted on a daily basis between 28 May and 8 July.

Brown bears

Radio-collared brown bears were initially relocated in April to determine the locations of den sites and to assess cub production. Brown bear capture efforts were conducted between 24 May and 27 May to replace failing radio-collars and to maintain a representative age and sex distribution of radio-collared bears. Instrumented brown bears were relocated at 3-4 day intervals between 28 May and 8 July to determine distribution and movements in relation to caribou. Collared bears were also relocated in late July, late August, and early October.

Golden eagles

Golden eagle nest site surveys were conducted by helicopter in late May to ascertain occupancy of previously observed nest sites and to locate previously unobserved nest sites. Active nests were visited in late July to band young eagles and to collect prey remains.

RESULTS

Wolves

Capture: Four wolves, all yearlings, were captured and fitted with radio-collars. Two were male members of the Aichilik pack, and a male and female belonged to the Sadlerochit pack. Adult male #31 belonging to the Aichilik pack was also recollared. Attempts to capture individuals belonging to the Egaksrak and Drain Creek packs were unsuccessful. Pack size and number of radio-collared wolves in each pack is presented in Table 1.

Table 1. Pack composition and number of radio-collared wolves on the Arctic National Wildlife Refuge during summer 1989.

Pack	#Adults	#Pups	#Radioed		
Aichilik	5	8	4		
Drain Ck.	5	6	3		
Egaksrak	3	3	2		
Sadlerochit	4	0	4		

Productivity: Three den sites (Aichilik, Drain Creek, Egaksrak) were monitored to assess pup production. The Aichilik and Drain Creek packs produced 8 and 6 pups, respectively. Pup production was not determined for the Egaksrak pack during the den monitoring period, although 3 pups were observed from fixedwing ai graft on 25 August. Average litter size for 1989 was 5.7 pups compared to 4.3 pups for 1988.

Movements: A total of 83 relocations were obtained from wolves belonging primarily to the Aichilik, Drain Creek, Egaksrak, and Sadlerochit packs. Movements data reve ad some interesting patterns in two cases: 1) Wolf #32, a mer of the Deain Creek pack, was relocated on 3 separate occasic - between 30 May and 6 July within the Malcolm pack territory, only a few miles from a den site previously used by this pack; and 2) On 1 July, 2 wolves from the Eqaksrak pack were relocated outside of their established territory on the fringe of the Aichilik packs verritory. The Egaksrak wolves were traveling in a southeast direction and were approximately 45 km from their den site. Six members of the Aichilik wolf pack were within 5 km of the Egaksrak wolves and were approximately 30 km from their den site traveling in a northwest direction. Analysis of wolf movements in relation to caribou use of the coastal plain is continuing to be compiled. Limited sample size dictates that multi-year compilation be used to adequately assess the interaction.

Brown bears

Capture: Of 23 bears captured in 1989, 19 were refitted with radio-collars and 4 were fitted with radio-collars for the first time. Two bears died and 1 bear shed its radio-collar during 1989, resulting in a total sample size of 61 radioed bears (Table 2).

Movement: Spatial distribution of 339 locations for 59 collared bears during June were examined for 10-day intervals to determine if these bears shifted their use areas onto the coastal plain. Brown bear distributions appeared to shift from the foothills to the coastal plain during June (Figs. 1, 2 & 3).

Bears were relocated within the 1002 area 8% (n=9) of the time between 1-10 June, 15% (n=19) of the time between 11-20 June, and 13% (n=13) of the time between 21-30 June. Analysis of individual bear movements to detect shifts in home range use is ongoing.

Productivity and survival: Average size for 24 litters in 1989 was 2.0 cubs, while average size for 22 litters in 1988 was 1.68 cubs (Table 3). Sixty-five percent (n=24) of 37 cubs of the year survived through the final survey conducted in early October 1989 (Table 4), while 78% (n=7) of the cubs of the year survived through approximately the same period in 1988.

Golden eagles

Surveys and Productivity: In late May, surveys to locate nesting golden eagles were conducted using a Bell 206 helicopter. Previously observed nest sites (n=45) were checked for occupancy. Additional areas in the Sadlerochit Mountains, Shublik Mountains, Third Range, and Front Range (Kikiktat Mountain east to the Kongakut River) also were surveyed. Ground fog prevented complete surveys of the Front Range area.



Figure 1. Radio-telemetry relocations from brown bears obtained between June 1-10, 1989 on the Arctic National Mildlife Refuge.



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Radio-telemetry relocations from brown bears obtained between June 21-30, 1989 on the Arctic National Wildlife Refuge. Figure 3.

Age/Sex class		<u>Number of</u> 1987	bears ca 1988	<u>otured</u> 1989	and	<u>l colla</u> Sample ending	<u>red</u> size 1989ª
Adult:							
Male Female		1(1) ^b 25(2) ^c	14(1) ^b 9(1) ^c		0 0		16 35
Subadult:							
Male Female		1 2	3 1	0 0		3 1	
<u>3-year olds</u> :							
Male Female		0 0	3(1) ^b 4	1	1	3	1
<u>2-year olds:</u>							
Male Female		0 0	0 0	1 1		1 1	
Totals	29	34	4	•		61	_
^a Age and ^b Bear d	d sex	composition	n in 1989				_

Table 2.	Age and sex composition of radio-collared
	brown bears on the Arctic National Wildlife
	Refuge during summer 1989.

^c Bear died during 1988 ^c Bear died during 1989

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Cub age	1988			1989			
Class	#litter	#Cubs	Mean	#Litter	#Cubs	Mean	
Cubs of year	: 3	7	2.33	17	37	2.2	
Yearlings	2	3	1.50	3	6	2.0	
2-year olds	10	16	1.60	2	2	1.0	
3-year olds	7	11	1.57	2	4	2.0	
Totals	22	37	1.68	24	49	2.0	

Table 3. Litter sizes for brown bear family groups observed on the Arctic National Wildlife Refuge during summer 1988 and 1989.

Table 4. Percent survival for cubs of year and yearlings observed on the Arctic National Wildlife Refuge during the summer 1989.

Cub age Class	Individuals Initial Survey	Individuals Final Survey	% Survival	Cum % Survival	
Cubs of year	37	24	65	65	
Yearlings	6	5	83	67	
Totals	42	29	67	67	

Golden eagles were found nesting at 14 locations, including six new nest sites (Table 5). Single eagles were seen at three cliffs and 18 eagles (4 adults, 10 subadults and 4 unknown age) were observed in non-nest cliff areas.

In late July, all occupied golden eagle nest sites were surveyed to determine productivity and to band as many nestling eagles as possible. During nest visits, prey remains in the nest and blood samples from chicks were collected. Of the 14 breeding pairs observed in May, 11 pairs produced 14 young. Three of the pairs did not produce young Eight of the 14 young were banded.

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Prey seen at golden eagle nests included: caribou, dall sheep (Ovis dalli), ptarmigan (Lagopus sp.), arctic ground squirrel (Citellus partyi), short-eared owl (Asio flammeus), and common raven (Corvus corax).

Table 5.	Observations of	Golden Eagles	(Aquila chrysactos)	at
	nesting cliffs,	ANWR, 1989.		

Map Name		Latitude	Longitude	Species	БA	Vna	Eaa
Demarcation Pt	B2	69.4744	141.8897	GOEA	2	0	1
Demarcation Pt	B4	69.3639	143.0430	GOEA	ī	?	-
Demarcation Pt	B4	69.3825	143.1098	GOEA	ī	?	
Demarcation Pt	B4	69.4077	143.1349	GOEA	ī	?	
Demarcation Pt	B4	69.4421	143.0245	GOEA	1	1	
Demarcation Pt	C3	69.5003	142.3333	GOEA	1	1	
Mt Michelson	B1	69.4038	144.5374	GOEA	1	2	
Mt Michelson	B1	69.4328	144.2533	GOEA	1	0	1
Mt Michelson	B2	69.3582	144.6273	GOEA	1	2	
Mt Michelson	B2	69.4237	144.8185	GOEA	l	2	
Mt Michelson	B2	69.4347	145.1820	GOEA	1	1	
Mt Michelson	B 3	69.3021	145.0274	GOEA	1	1	
Mt Michelson	B 3	69.3188	145.2019	GOEA	1	1	
Mt Michelson	C1	69.6290	144.4608	GOEA	1	1	
Mt Michelson	C2	69.5048	145.0158	GOEA	1	1	
Mt Michelson	C2	69.6403	145.0402	GOEA	1	1	
Mt Michelson	C4	69.5423	146.0275	GOEA	1	0	?

? = unknown

DISCUSSION

Wolves

Pup production in 1989 was similar to the 5.23 pups/litter reported by Stephenson and Johnson (1972) for wolves in the north central Brooks Range.

Wolf #32 of the Drain Creek pack was observed with 2 uncollared wolves (1 brown and 1 gray) on 1 of the occasions when it was relocated within the Malcolm packs territory. Mech (1970) noted that packs of wolves occasionally split temporarily, only to reunite sometime later. Wolf #32 returned to the Drain Creek pack by late July when it was relocated on several occasions at the Drain Creek den site.

The extensive movements made by the wolves of the Egaksrak and Aichilik packs appeared to be in response to the distribution of \cdot Porcupine Caribou herd, which was aggregating approximately 40 km northwest of where the two packs were relocated on 1 July. Both wolf packs were τ_{0} ocated while traveling in opposite directions along the statistic line of travel between the caribou aggregation and their respective den sites. Both wolf packs were also outside of their established territories as defined by Garner and Reynolds (1986).

Brown bears

The sample of 61 brown bears radio-collared between 1987 and 1989 was selected to reflect the overall sex and age composition of bears on the north slope of ANWR and are assumed to be a representative sample of that population.

Bear distribution data for June indicated a shift in use onto the coastal plain, apparently in response to distributions of calving caribou. Radioed bears were relocated nearly twice as often inside the 1002 area between 11-20 June and 21-30 June as they were between 1-10 June. Caribou calving peaked on 2 June in the general vicinity of VABM Bitty which is located on the coastal plain within the 1002 area (see WSUIA). Garner et al. (1984,1985) reported shifts in bear use onto the coastal plain in years when caribou calving occurred there. In 1988, when the majority of calving occurred in the foothills, brown bears did not shift their use areas onto the coastal plain, but remained in the foothills where they had access to calving caribou (Weiler et al. 1989). Radioed bears were observed feeding on caribou carcasses on 4.6% of the relocations in June 1988 compared to 2.3% of the relocations in June 1989.

Brown bear litters were larger on average in 1989 than in 1988. Conversely, survival rates for cubs of year were lower in 1989 than in 1988. Bears appeared to be in poorer physical condition during spring of 1989 than they were during that same timperiod in 1988 based on a qualitative measure of fat recurves (Reynolds - pers. comm.). Caribou calves were also less av ilable to bears in 1989, since calving took place on the condition of females with young in spring and lack of carving caribou available to bears in the foothills may have contributed to the lower survival rate of cubs of year in 1989 as compared to 1988.

Golden eagles

Little work has been done on golden eagles in northern Alaska. Surveys in 1988 and earlier years were opportunistic, and generally only known nest sites were visited. The survey in 1989 was the most intensive ever undertaken in and near the 1002 area although a portion of the study area was not surveyed due to poor weather. A total of 51 nest sites are now known in the study area, but many of these are probably alternate nest sites within a single nesting territory.

Productivity averaged 1.27 young per successful pair in 1989 and 1.25 young per successful pair in 1988. These figures are lower than the 1.45 young per successful pair observed in Denali National Park in 1988 by C. McIntyre (pers. comm.) and the 1.5 average reported by Ritchie and Curatolo (1982) in interior Alaska. Campbell (1960) suggested that the northern Brooks Range was near the northern limit for successful nesting by golden eagles. The low productivity figures in the study area could be a reflection of the marginal nesting conditions, although more years of study are necessary to confirm this.

Prey remains collected and identified in 1988 and 1989 indicate that nesting golden eagles take a variety of prey species. An accurate assessment of the proportion of caribou in the diet of nesting golden eagles, and the importance of caribou relative to productivity, will require more intensive study.

RESEARCH PROSPECTUS

Wolves and brown bears

Radio-tracking efforts will be reduced in 1990. The April bear denning survey will not be conducted. Individual radioed brown bears will be relocated once every 5 days between 29 May and 18 June to measure any shifts in bear distributions concurrent with shifts in caribou distributions. Radio-tracking of wolves will be done incidental to that of brown bears. All other 1990 research efforts will be maintained at 1989 levels.

Golden eagles

Radio-tagging and radio-tracking of golden eagles will not be conducted in 1990 for reasons previously mentioned in this report. Nest site surveys and nest site visits to band young birds and to collect prey remains will be continued in 1990.

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LITERATURE CITED

- Campbell, J.M. 1960. sting of the golden eagle in the central Brooks Range of arctic Alaska. Condor 62(4):298.
- Garner, G. W., H. V. Reynolds, L. D. Martin, T. J. Wilmers, and T. J. Doyle. Ecology of brown bear inhabiting the coastal plain and adjacent foothills and mountains of the northeastern portion of the Arctic National Wildlife Refuge. Pages 330-358 in G.W. Garner and P.E. Reynolds, (eds.) 1984. 1983 update report baseline study of the fish. wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK. 680pp.
- Garner, G. W., H. V. Reynolds, L. D. Martin, G. J. Weiler, J. M. Morton, and J. M. Noll. 1985. Ecology of brown bear inhabiting the coastal plain and adjacent foothills and mountains of the northeastern portion of the Arctic National Wildlife Refuge. Pages 268-296 <u>in</u> G.W. Garner and P.E. Reynolds, (eds.) 1985. 1984 update report baseline study of the fish. wildlife, and their habitats. U.S. Fish and Wildl. Serv., Anchorage, AK. 770pp.
- Garner, G.W. and P.E. Reynolds, eds. 1986. Final report baseline study of the fish, wildlife, and their habitats. Pages 316-337. U.S. Fish and Wildl. Serv., Anchorage, AK. 695pp.
- Mech, L.D. 1970. The wolf: the ecology and behavior of an endange ed species. Natural History Press, New York. 384pp.
- Litchie, R.J. and J.A. Curatolo. 1982. Notes on golden eagle productivity and nest site characteristics, Porcupine River, Alaska, 1979-1982. Raptor Research 16(4):123-127.
- Stephenson, R.O., and L. Johnson. 1972. Wolf report. Fed. Aid Wildl. Rest. Prol. W-17-3, Jobs 14.3R 4.4R, 14.5R, and 14.6R. Alaska Dept. Fish and Game, Jameau. 52pp.
- Weiler, G. J., G. W. Garner, R. Ambrose. H. V. Reynolds, and T. R. McCabe. 1989. Differential impacts of predators (brown bears, wolves, eagles) on caribou calving in the 1002 area and potential displacement areas: an assessment of predation risk. Pages 25-37 in T.R. McCabe, ed. Terrestrial research: 1002 area - Arctic national Wildlife Refuge, Ann. Prog. Rep., 1988. U.S. Fish and Wildl. Serv., Anchorage, AK. 168pp.

TERRESTRIAL RESEARCH



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