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PREY UTILIZATION BY WOLVES AND A PRELIMINARY ASSESSMENT OF WOLF AND PREY DENSITIES IN THREE DRAINAGES WITHIN THE ARCTIC NATIONAL WILDLIFE REFUGE, ALASKA

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Prey utilization by wolves and a preliminary assessment of wolf and prey densities in three drainages within the Arctic National Wildlife Refuge, Alaska.

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Abstract: The relative utilization and availability of prey types used by wolves (Canis lupus) in the Kongakut, Hulahula and Canning River drainages was assessed by visual observation and by analysis of wolf scats. Wolves were observed in each of the 3 drainages. Visual assessment indicated that moose (Alces alces), caribou (Rangifer tarandus), and Dall sheep (Ovis dalli) were available to the wolves in the Kongakut drainage. In the Hulahula drainage, sheep seemed to be the prey species most available, while in the Canning moose were present in relatively high densities and caribou at a lower but stable density. Scat analysis indicated that the Kongakut wolves preyed on the 3 available ungulates, but focused on caribou; the Hulahula wolves also utilized all 3 species, but ate relatively more sheep; while no moose remains were found in the scats from the Canning.

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Wolves inhabit much of the remote regions of the Northern Hemisphere (Mech 1970). In North America, wolves once occupied nearly the entire continent, while today they can be found in most of Alaska and Canada, certain parts of Minnesota, Michigan and Wisconsin, the northern Rockies, and regions of Mexico (Mech 1982). In the past, 32 subspecies of wolves were recognized, but this has been reduced over the past century. Pedersen (1982) suggests that the 4 subspecies once recognized in Alaska should be reduced to 2. Wolves inhabiting the coastal plains of the Arctic National Wildlife Refuge (ANWR) have earlier been identified as C.l.tundarum (Hall 1981), but may be classified as C.l.pambasileus, the Alaskan Interior/Southcentral wolf (Pedersen 1982).

The wolf is the largest wild member of the dog family (Canidae). Adult males average 43-45 kg, while adult females average 36-39 kg (Mech 1970). Color ranges from white through gray and brown, to black.

Due to their social behavior, which is primarily manifested in the social unit or pack, wolves have evolved to become one of the most widely distributed species of mammals. Wolf packs are usually descendants from 1 breeding pair (Mech 1970, Peterson 1977, Woolpy 1979), within which a hierarchy system usually limits breeding activity to only the dominant female and the alpha or beta male (1 of the 2 most dominant males) of the pack (Rabb et al. 1967, Zimen 1981). Breeding occurs in Alaska from late February through March (Rausch 1967). Dens are prepared or visited by the pregnant female as early as 4-5 weeks prior to parturition (Chapman 1977). Pups are born in mid-May to early June in arctic areas (Chapman 1977), and the average litter size is 4-6, but may vary somewhat (Mech 1970). Within 11 to 15 days the pups eyes open, and in about 3 weeks the pups can be seen outside the den opening (Chapman 1977). Whelping dens are usually abandoned after 4-14 weeks, but in the arctic dens are usually abandoned in July (Chapman 1977). Rendezvous sites are used during the summer when the pups are left behind while the adults are hunting. Both parents, and usually other members of the pack, hunt and care for the young (Murie 1944, Harrington et al. 1983).

In 1962 it was recognized that wolf numbers on the north slope were reduced from previously relative high numbers, and an annual bag limit of 2 wolves was imposed (Stephenson and Johnson 1972). In 1970 aerial hunting of wolves on the north slope was banned. Wolf populations on the north have remained low, however, due in part to continued aerial hunting and harvest by hunters using snowmobiles (Stephenson per. comm.). Population densities for wolves in northern Alaska range from 1/130 km^2 to 1/594 km^2. The density increases from the coastal plain south into the foothills and mountains, and it is higher in the fall than in the spring. The determination of carrying capacity of wolf habitats is a complex problem, but apparently the density of wolves on a given range is influenced by factors such as prey biomass, social dynamics of packs, disease, human disturbance and harvest levels, and other ecological relationships.

Mortality and population numbers are influenced by several naturally occurring processes. Pre-parturition mortality (in utero) has been reported by Rausch (1967). The causes of such mortality remain undetermined. Other forms of mortality have been documented in the literature and include canine distemper, rabies, parasites, porcupine quill infections, malnutrition, predators (golden eagles, brown bears), cannibalism, and accidents (Murie 1944, Kuyt 1972, Stephenson and Johnson 1972, Chapman 1977, 1978). In analyzing reported data from 22 wolf litters in a variety of locations in North America, Chapman (1977) found an average summer survival rate of 85% for wolf pups. High mortality rates in wolf litters has been reported in cases where food supply is limited or declines (Kuyt 1972, Mech 1977). It is believed that certain social mechanisms such as stress, competition, and subordination may also function to control wolf populations (Mech 1970, Zimen 1976).

It appears that wolves roam throughout the ANWR coastal plain and probably utilize most habitats of the area, but information is insufficient to determine if certain habitat types or portions of the ANWR coastal plain are preferred by wolves. Wolf den sites in arctic Alaska are usually found on moderately steep southern exposures where the soil is well drained and unfrozen (Stephenson 1975). Land forms such as cut banks, escarpments, dunes, kames, and moraines are often associated with wolf dens (Stephenson 1974, Lawhead 1983). Although wolves are known to den on the coastal plain to the west of the refuge (Stephenson 1975), no wolf dens have been found within the ANWR coastal plain even though the basic habitat requirement for denning appear to be present.

During the past 10 years, active wolf dens have been found in mountainous terrain of the Kongakut, Hulahula, and the Canning River drainages. It is generally believed that wolves range primarily in the arctic foothills and mountains of the Brooks Range and are more abundant there because prey species such as Dall sheep and moose are also more abundant in these areas on a year-round basis (Stephenson pers. comm.). During May and June, when caribou are abundant on the ANWR coastal plain, most wolves are occupied with denning activities in the mountains to the south. The hunting range of denning wolves is usually limited to approximately a 32 km radius from the den site (Stephenson pers. comm.), thus, wolf predation on caribou in the ANWR coastal plain during calving and post-calving is probably low. Current numbers, movement patterns, and requirements of wolves which occasionally use the ANWR coastal plain are not known.

Scat analyses show that summer food items of wolves in the north-central Brooks Range are predominantly large ungulates (caribou, Dall sheep, and moose) (Stephenson 1975). Significant quantities of microtine rodents, ground squirrels (Spermophilus parryii), birds, and eggs and insects are often utilized during summer by wolves in arctic Alaska (Stephenson and Johnson 1972). During the rest of the year, large ungulates are often utilized more exclusively. In some locations such as the Northwest Territories in Canada (Kuyt 1972) and northwestern Alaska (Stephenson and Johnson 1973, Stephenson 1979, Stephenson and James 1982), wolves tend to move their ranges in concurrence with the seasonal caribou migrations. Similar shifts may not be as prevalent in the northcentral and northeastern Brooks Range due to a greater abundance of less migratory prey (Dall sheep and moose).

Results and Discussions

Each of the 3 drainages was surveyed for approximately 10 days. A total of 210 km of ground survey was conducted and a variety of weather conditons was experienced, including +30°C and 5 cm of snow. Two active homesites were located, and between 4 and 8 adult wolves and 2 pups were observed.

Kongakut River Drainage

A total of 79.5 hours were spent watching for wolves, 78 scats were collected, and 75 km of ground surveys were performed in this drainage. Ten days (29 June - 9 July) were spent along the Kongakut River. The survey began near Mt. Greenough (Fig. 1, Camp 1) at an altitude of 470 m, and proceeded north to a field camp in Caribou Pass at 330 m. The survey crew returned to Whale Mountain via helicopter (Fig. 1, Camp 4) on the west side of the river.

During the 10 days along the Kongakut, 3-7 wolves were observed. These wolves were along the west side of the river in the Whale Mountain area. Conversations with rafters and M.K. Phillips indicated that there were probably 4 adult wolves in the area: 3 gray and 1 black. No pups were seen in this area, but some smaller tracks (6.5 x 4.5 cm) were seen at the homesite, which might have been from young wolves. Case histories of wolves observed in the Kongakut River drainage are contained in the Appendix.

The wolf homesite was located on the gravel and cutbanks where a smaller creek (hereafter called Den Creek) flows into the Kongakut west of Whale Mountain. Several old and recent bone remains (red meat attached) from ungulates and rodents were found here. The bones seemed to primarily be from caribou and ground squirrels. Twenty-seven scats were collected at the homesite, and 48 along the trail leading north along the river. This trail seemed well used, as the ground was flat and smooth, and some of the scats were found in aggregations and may have represented scent posts.

Caribou, moose, and Dall sheep were often observed at different locations in the area. Several times sheep were observed coming down onto the floodplain, at times crossing water channels, below the salt licks north of Camp 4 (Fig. 1). Both ewes and rams came down to the river, but 1 or 2 rams were often observed on the cliffs next to the lick rather than moving down to the river.

Several individual holes, as well as entire colonies of ground squirrels were excavated in and around the homesite area, but it is not known if wolves were responsible. The frequency of destroyed holes seemed to increase the closer they were situated to Den Creek, and the holes in and around the trail seemed to be more often excavated.

Hulahula River Drainage

A total of 40.3 hours were spent watching for wolves, 79 km were covered by ground survey, and 32 scats were collected. Ten days (9-19 July) were spent along the Hulahula River, and Camp 5 (Fig. 2) was located approximately 5 km north of Chapman's den (Chapman 1977). Two ground surveys were made to the south of this den, and 1 ground survey north to East Patuk Creek, up this creek, and then straight across the mountains (1810 m in elevation) back to

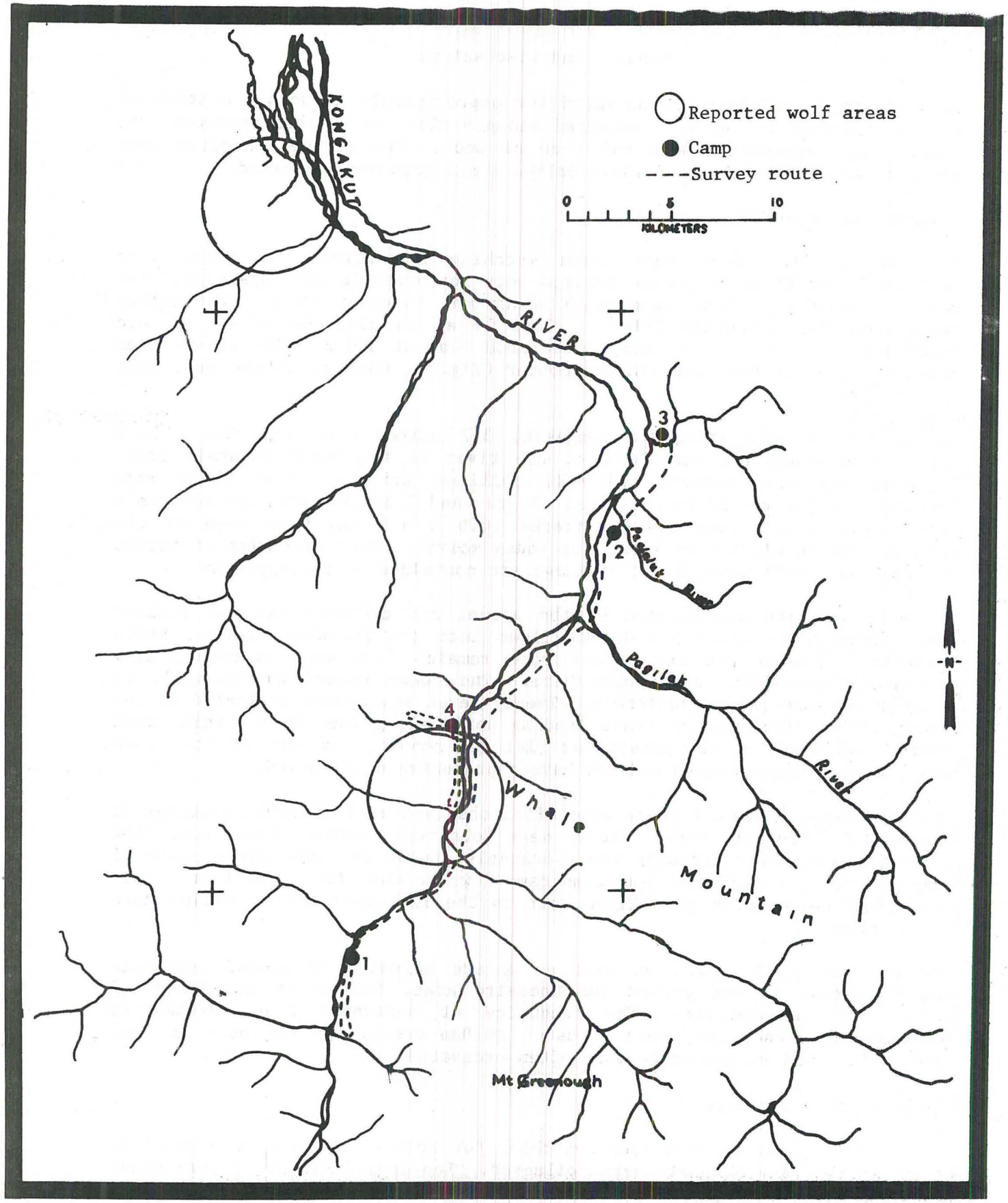

Fig. 1. Kongakut River wolf survey area, 29 June - 9 July 1983.

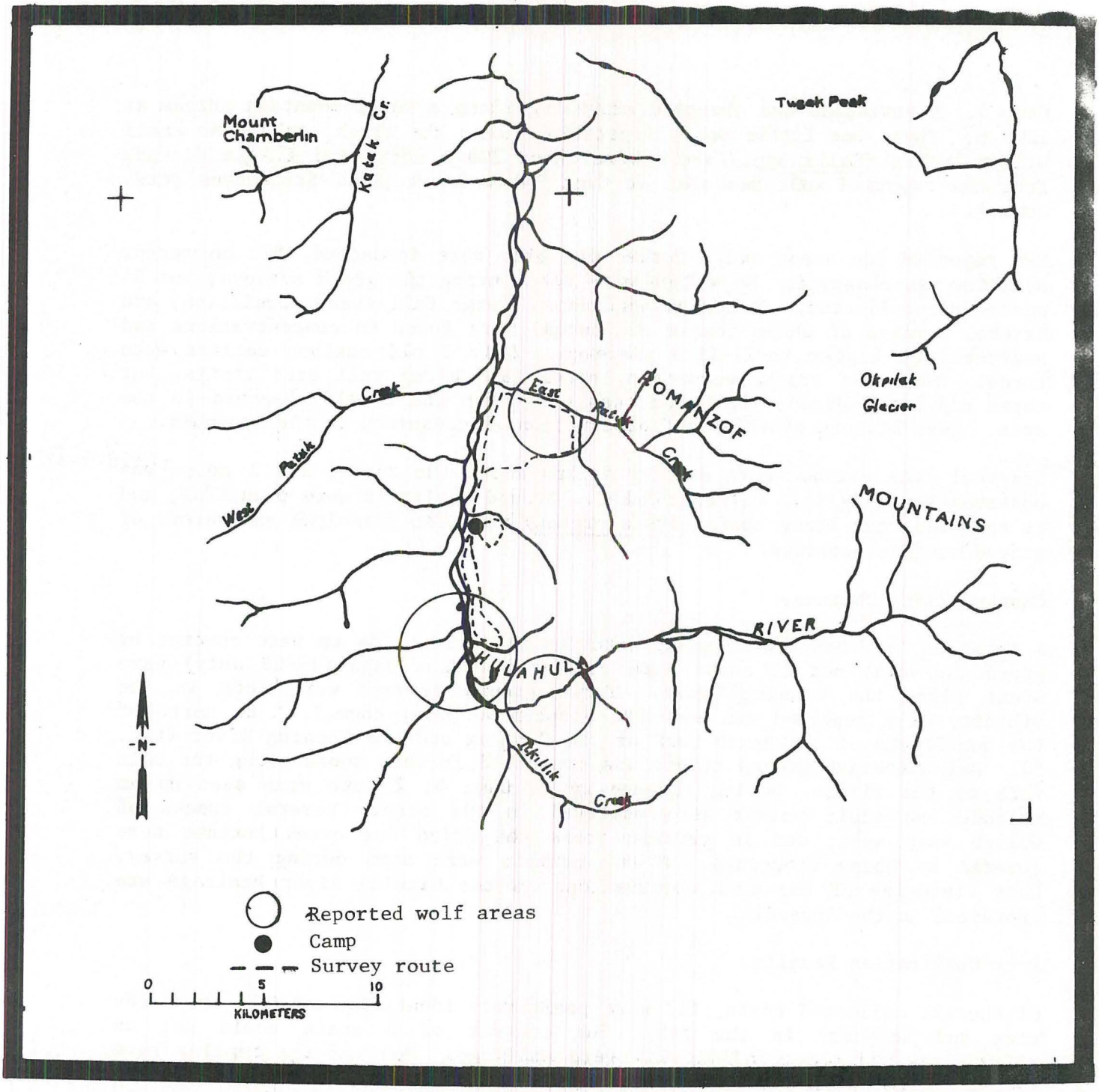

Fig. 2. Hulahula River wolf survey area, 9-19 July 1983.

Camp 5. A porcupine was observed traveling along a small mountain stream at 1200 m. There was little woody vegetation along the creek, only some small willow bushes (Salix spp.) there were about 200 m above and 1.5 km distant from the reported wolf den area at East Patuk Creek (R.O. Stephenson pers. comm.).

Two reported den areas and 1 rendezvous site were inspected, but no recent activity was observed. No wolves were seen during the gound surveys, but 34 scats were collected. This area supports a large Dall sheep population, and several remains of sheep (bones and horns) were found in concentrations and scattered on higher knoll-like plateaus. Only 2 old caribou antlers were found. Some wolf tracks were seen, singly and along well used trails, but these did not indicate that there was more than the 1 wolf observed in the area. Case history of this wolf observation is contained in the Appendix.

Seasonal lone caribou were seen traveling along the river, and 1 moose was observed foraging in a willow thicket. Ground squirrels were plentiful, and it appeared that brown bears (Ursus arctos) were the principal excavators of ground squirrel borrows.

Canning River Drainage

A total of 16.6 hours were spent watching for wolves, 54 km were covered by ground surveys, and 21 scats were collected. Nine days (19-28 July) were spent along the Canning River. Three ground surveys were made in the vicinity of a reported den area (R. Stephenson pers. comm.), 1 km north of the confluence of the Marsh Fork of the Canning and the Canning River (Fig. 3). One overnight ground survey was conducted further south along the main fork of the river. During the return to Camp 6, 2 pups were seen on an island. No adult wolves were observed in the area. Several tracks of wolves were seen, and in certain areas the dried out creek bottoms were covered by moose droppings. A few caribou were seen during the survey. Case histories of the wolf observations in the Canning River Drainage are contained in the Appendix.

Prey Utilization Results

Of the 131 collected scats, 117 were positively identified as wolf scats (by size and texture) in the lab. The content of 3 scats could not be identified, and the remaining 114 were analyzed. Most of the remains were identified to species and age, but some items could not be aged. In 3 scats the remains could not be identified as any specific ungulate. It is assumed that these unknown food remains are from adult prey, and the 3 Kongakut River scats with unknown ungulate were classified as adult caribou. This classification decreases the overall accuracy of the estimates, however, caribou appear to be the most important food item for the wolves in the Kongakut drainage. Therefore, this lumping of "unknown" with adult caribou will minimize inaccuracies. Results of the scat analyses are presented for the 3 drainages in Tables 2,3, and 4.

Another potential source of error is in the assumption of 1.7 km minimum daily maintenance requirement for wolves (Mech 1970). This value may be low, as values from 1.2 to 6.5 kg/wolf/day can be found in the literature (Mech 1966, Mech and Frenzel 1971, Kolenosky 1972, Kuyt 1972, Mech 1977), therefore, data presented in this report should be regarded as a conservative estimates of wolf diets in the 3 drainages (Tables 2, 3, and 4).

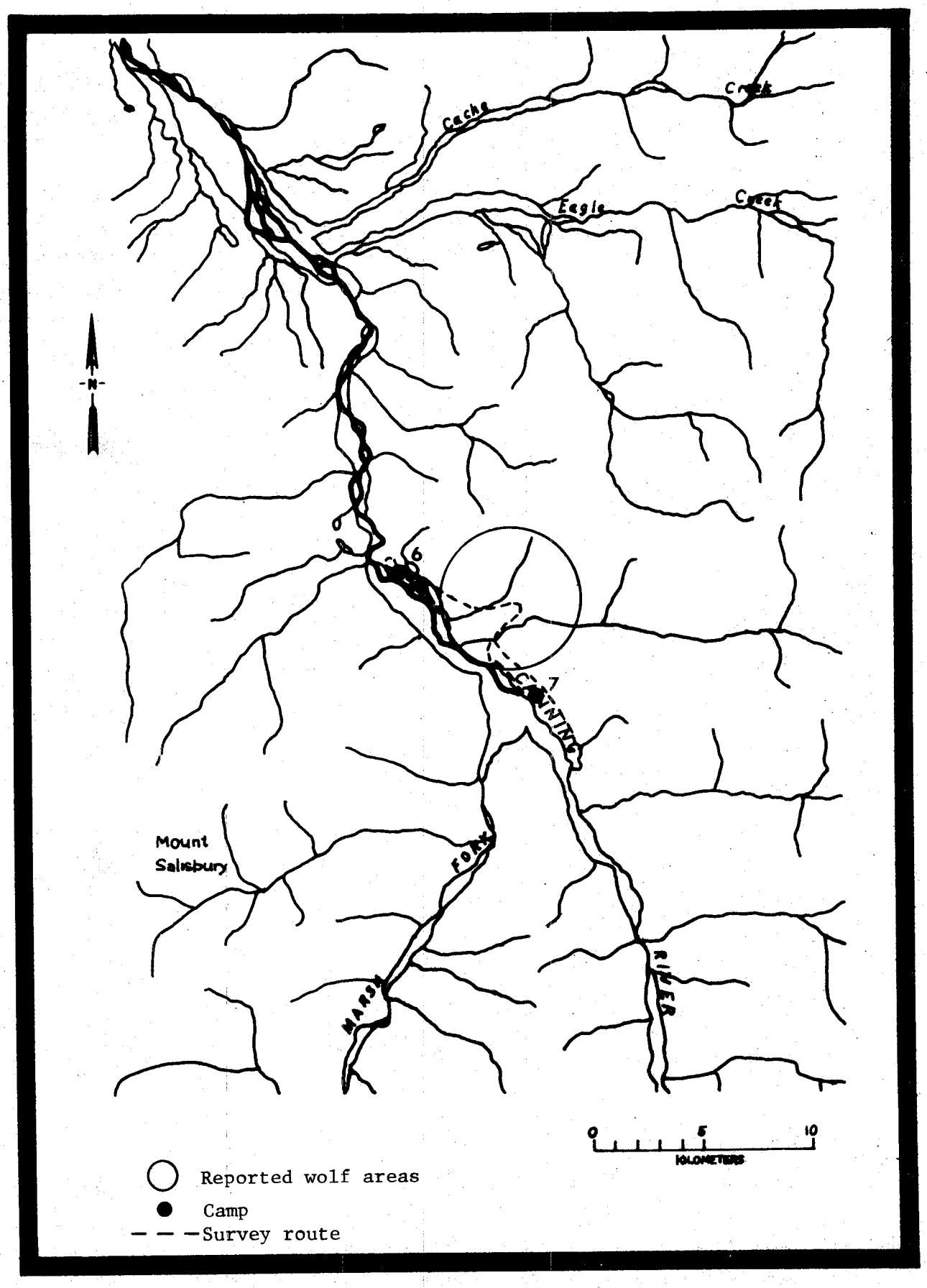

Fig. 3. Canning River wolf survey area, 19-28 July 1983.

Table 2. Prey utilization by wolves in the Kongakut River drainage based upon analysis of 73 scats[a] collected during summer 1983.

Prey item	Frequency	Volumetric total	Kg eaten	Ratio of kg eaten	#individuals eaten	Ratio # individuals eaten	Individuals/ wolf/ year
Caribou:							
adult	5	5.0	8.70	0.23	0.13	0.23	0.73
young	33	32.9	15.79	0.41	3.16	5.54	17.82
unknown age	16	15.9	27.67	0.73	0.41	0.72	2.31
Moose:							
adult	1	1.0	8.56	0.22	0.02	0.04	0.11
young	4	4.0	3.96	0.10	0.13	0.23	0.73
unknown age	4	4.0	34.24	0.90	0.08	0.14	0.45
Dall sheep:							
adult	2	2.0	2.94	0.08	0.05	0.09	0.28
young	1	1.0	0.46	0.01	0.12	0.21	0.68
unknown age	3	3.0	4.41	0.12	0.08	0.14	0.45
Unknown ungulate:							
young	2	2.0	0.96	0.03	0.19	0.33	1.07
unknown age	1	1.0	1.74	0.05	0.03	0.05	0.17
Rodents:							
ground squirrel							
microtines	1	0.1	0.04	0.001	0.40	0.70	2.26
others	2	0.2	0.08	0.002	0.80	1.40	5.51
Miscellaneous:							
porcupine							
wolverine							
other mustelids	1	0.9	0.49	0.01	0.06	0.11	0.34
brown bear							
unknown bird							
vegetation							
Totals	76	73.0	110.04				

[a]4.1% of scats contained more than 1 prey item.

A reconnaissance survey of 3 river drainages (Kongakut River, Hulahula River, and Canning River) was conducted during July 1983 to collect preliminary data on use of each drainage by wolves and the prey species utilized by wolves in each drainage. The objectives of this preliminary field study were as follows:

1) Determine the relative utilization of the available prey species.

2) Verify reported wolf homesites.

3) Determine the relative availability of major prey species.

4) Determine which wolf pack(s) would be best suited for further study.

Methods and Materials

Visual observations were made of prey species as well as signs of and remains from these animals during extensive ground surveys in the 3 drainages. Binoculars and spotting scopes were used to scan available terrain identifying animals in the vicinity. These watches were primarily intended for spotting wolves in areas already identified as probable wolf areas through information received from R.O. Stephenson (pers. comm.) and from scats and other wolf signs. Wolf scats were collected in each drainage and analyzed in the laboratory with the aid of reference collections and manuals.

Prey items in scats were recorded as frequency of occurrence and volumetric portion (ocular estimate). The sum of the volumetric portions of all scats for each prey type was identified as the volumetric total. These volumetric totals were converted to weight of prey consumed (Kg eaten) by use of the equation: $Y = 0.38 + 0.02X$, where X is the average live weight of an individual of the prey type, and Y is the weight represented per volumetric total in scats (Floyd et a.l 1978). Average live weights and weight eaten per scat containing each prey item are listed in Table 1. Kg eaten was determined by multiplying volumetric totals for each prey item by the corresponding volumetric occurrence value for that prey item. The sum of adult caribou, unknown age caribou, and unknown age ungulates was established as the common base for comparing the prey utilized within the 3 drainages. Ratio kg eaten was calculated by dividing the kg eaten for each prey item by the sum of kg eaten for adult caribou, unknown age caribou, and unknown age ungulate. Number of individuals eaten was calculated by dividing the kg eaten for a prey item by the correpsonding assumed live weights for that prey item. The ratio of the number of individuals eaten was determined in the same manner as for ratio kg eaten.

To estimate the minimum number of individuals of prey items that a wolf would have consumed each year to duplicate the food habits depicted by scat analyses, it was assumed that 1.7 kg per day of total food material was the minimum daily maintenance requirement for each wolf (Mech 1970). By multiplying this value by the number of days in a year, a total of 620.5 kg are required by each wolf for maintenance purposes. The minimum annual maintenance requirement was divided by the total kg eaten as represented in the scat analysis data for each drainage, and this correction factor was multiplied by number of individuals eaten to determine the number of each prey item eaten by each wolf throughout the year.

Table 1. Assumed live weights and calculated weight consumed per volumetric occurrence of each prey item in wolf scats collected along 3 drainages in the Arctic National Wildlife Refuge, summer 1983.

Prey item	Assumed live weight (kg)	Calculated weight eaten per volumetric occurrence (kg)
Caribou:		
adult or unknown age	68.2	1.74
young	5.0	0.48
Moose:		
adult or unknown age	409.0	8.56
young	30.4	0.99
Dall sheep:		
adult or unknown age	54.5	1.47
young	4.0	0.46
Unknown ungulate:		
young	5.0	0.48
unknown age	68.2	1.74
Rodents:		
ground squirrel	0.8	0.40
Microtine	0.1	0.38
other	0.1	0.39
Miscellaneous:		
porcupine	8.6	0.55
wolverine	21.5	0.81
other mustelids	7.8	0.54
brown bear	264.0	5.66
unknown bird	0.1	0.38
vegetation	-	-

Table 3. Prey utilization by wolves in the Hulahula River drainage based upon analysis of 24 scats[a] collected during summer 1983.

Prey item	Frequency	Volumetric total	Kg eaten	Ratio of kg eaten	#individuals eaten	Ratio # individuals eaten	Individuals/ wolf/ year
Caribou:							
adult							
young	6	5.1	2.45	1.41	0.49	16.33	20.36
unknown age	1	1.0	1.74	1.00	0.03	1.00	1.25
Moose:							
adult							
young	2	2.0	1.98	1.14	0.07	2.33	2.91
unknown age							
Dall sheep:							
adult	1	1.0	1.47	0.84	0.03	1.00	1.25
young	4	4.0	1.84	1.06	0.46	15.33	19.12
unknown age	2	1.3	1.91	1.10	0.04	1.33	1.66
Unknown ungulate:							
young							
unknown age							
Rodents:							
ground squirrel	3	2.9	1.16	0.67	1.45	48.33	60.26
microtines	2	1.1	0.42	0.24	4.20	140.00	174.55
others							
Miscellaneous:							
porcupine	1	0.9	0.34	0.19	0.04	1.33	1.66
wolverine	2	2.0	1.62	0.93	0.08	2.67	3.32
other mustelists							
brown bear							
unknown bird							
vegetation	3	2.7	-	-	-	-	-
Totals	27	24.0	14.93				

[a]12.5% of scats contained more than 1 prey item.

Table 4. Prey utilization by wolves in the Canning River drainage based upon analysis of 17 scats[a] collected during summer 1983.

Prey item	Frequency	Volumetric total	Kg eaten	Ratio of kg eaten	#Individuals eaten	Ratio # individuals eaten	Individuals/ wolf/ year
Caribou:							
adult							
young	3	3.0	1.44	0.08	0.29	1.04	6.32
unknown age	11	11.0	19.14	1.00	0.28	1.00	6.10
Moose:							
adult							
young							
unknown age							
Dall sheep:							
adult							
young							
unknown age	1	1.0	1.47	0.08	0.03	0.11	0.65
Unknown ungulate:							
young							
unknown age							
Rodents:							
ground squirrel	1	1.0	0.40	0.02	0.50	1.79	10.90
microtines							
others							
Miscellaneous:							
porcupine							
wolverine							
other mustelids							
brown bear	1	1.0	5.66	0.30	0.02	0.07	0.44
unknown bird	1	0.01	0.38	0.02	3.80	13.57	82.76
vegetation							
Totals	18.0	17.0	28.49				

[a]5.9% of scats contained more than 1 prey item.

Table 6. Relative rank of importance for the major prey categories within each of 3 drainages on the north slope of the Arctic National Wildlife Refuge, summer 1983.

River/prey item	Frequency	Ratio of kg eaten	Ratio # individuals eaten	Importance rank[a]
Kongakut River:				
caribou	57	1.45	6.87	1
moose	9	1.22	0.41	2
dall sheep	6	0.21	0.44	3
other species	4	0.013	2.21	4
Hulahula River:				
caribou	7	2.41	17.33	1
moose	2	1.14	2.33	4
dall sheep	7	3.00	17.66	2
other species	11	2.03	192.33	3
Canning River:				
caribou	14	1.08	2.04	1
moose	-	-	-	4
dall sheep	1	0.08	0.11	3
other species	3	0.34	15.43	2

[a]Importance rank determined by assessing the magnitude of energy gained (ratio of kg eaten) and energy spent (Ratio of #individuals eaten).

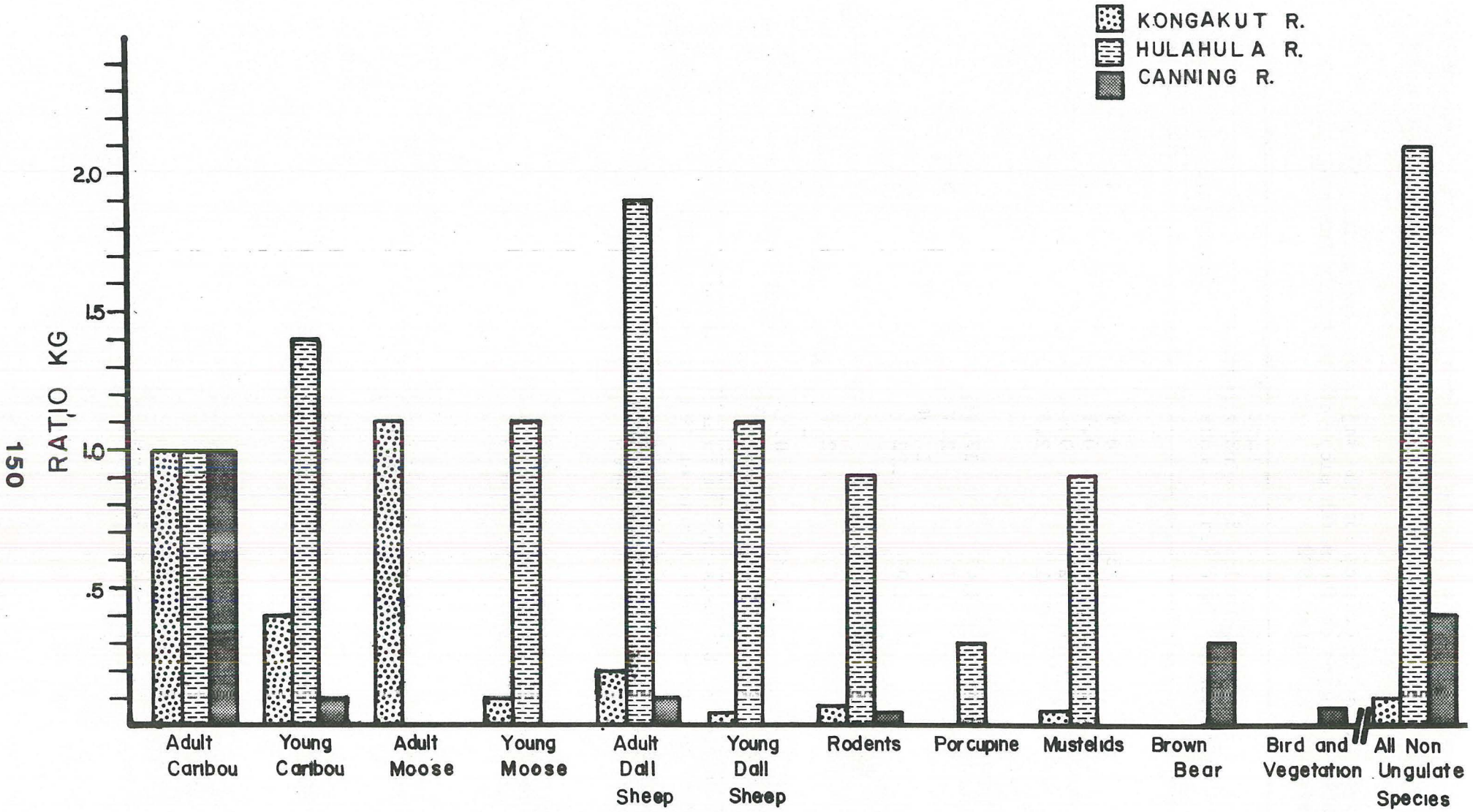

Fig. 4. Relative utilization of prey species in 3 drainages on the Arctic National Wildlife Refuge, summer 1983.

Literature Cited

Chapman, R.C. 1977. The effects of human disturbance on wolves (Canis lupus L.). M.S. thesis, University of Alaska, Fairbanks. 209pp.

Floyd, T.J., L.D. Mech, and P.A. Jordan. 1978. Relating wolf scat content to prey consumed. J. Wildl. Manage. 42:528-532.

Hall, E.R. 1981. The mammals of North America. John Wiley & Sons, New York.

Harrington, F.H., L.D. Mech, and S.T. Fritts. 1983. Pack size and wolf survival: their relationship under varying ecological conditions. Behav. Ecol. Sociobiol. 13(1):19-26.

Kolenosky, G.B. 1972. Wolf predation on wintering deer in east central Ontario. J. Wildl. Manage. 36:357-369.

Kuyt, E. 1972. Food habits of wolves on barren-ground caribou range in the Northwest Territories. Can. Wildl. Serv. Rep. Ser. No. 21, 36pp.

Lawhead, B.E. 1983. Wolf den site characteristics in the Nelchina Basin, Alaska. M.S. Thesis, University of Alaska, Fairbanks. 65pp.

Mech, L.D. 1966. The wolves of Isle Royale. U.S. Natl. Park Serv. Fauna Ser. No. 7. Washington, D.C., Govt. Printing Office. 210pp.

Mech, L.D. 1970. The wolf: the ecology and behavior of an endangered species. Natural History Press. 384pp.

Mech, L.D. 1977. Population trend and winter deer consumption in a Minnesota wolf pack. p. 55-83. In. R.L. Phillips and C. Jonkel (eds.). Proc. 1975 Predator Symp., Montana Forest and Conservation Experimental Station, University of Montana, Missoula. 268pp.

Mech, L.D. 1982. The IUCN-SSC wolf specialist group. In. F.H. Harrington and P.C. Paquet. (eds.). Wolves of the world: perspectives of behavior, ecology, and conservation. Noyes Publ., Park Ridge, New Jersey. 447pp.

Mech, L.D., and L.D. Frenzel. (eds.) 1971. Ecological studies of the timber wolf in Northeastern Minnesota. USDA Forest Serv. Res. Paper, NC-52, St. Paul, Minnesota.

Murie, A. 1944. The wolves of Mt. McKinely. U.S. Nat. Park Serv. Fauna Ser. No. 5, Washington, D.C., Govt. Printing Office.

Pedersen, S. 1982. Geographic variation in Alaskan wolves. p. 345-361 In. Harrington and P.C. Paquet. (eds.). Wolves of the world: perspectives of behavior, ecology, and conservation. Noyes Publ., Park Ridge, New Jersey. 447pp.

Peterson, R.O. 1977. Wolf ecology and prey relationships on Isle Royale. U.S. Natl. Park Serv. Fauna Ser. No. 11, 210pp.

Rabb, G.B., J.H. Woolpy, and B.E. Ginsburg. 1977. Social relationships in a group of captive wolves. Am. Zool 7:305-311.

Rausch, R.A. 1967. Some aspects of the population ecology of wolves, Alaska. Am. Zool. 7:253-265.

Stephenson, R.O. 1974. Characteristics of wolf den sites. Alaska Fed. Aid to Wildl. Rest., Final Report, Project W-17-2 through 6, Job 14.6R. Alaska Dep. Fish and Game, Juneau, 27pp.

Stephenson, R.O. 1975. Wolf report. Fed. Aid. Wildl. Rest. Proj. W-17-7, Jobs 14.3R through 6R, Alaska Dept. Fish and Game, Juneau.

Stephenson, R.O., and D. James. 1982. Wolf movements and food habits in northwest Alaska. p. 26-42. In. F.H. Harrington and P.C. Paquet. (eds.). Wolves of the world: perspectives of behavior, ecology, and conservation. Noyes Publ., Park Ridge, New Jersey. 447pp.

Stephenson, R.O., and L. Johnson. 1972. Wolf report. Fed. Aid. Wildl. Rest. Proj. W-17-3, Jobs 14.3R through 6R, Alaska Dept. Fish and Game, Juneau.

Stephenson, R.O., and L. Johnson. 1973. Wolf report. Fed. Aid Wildl. Rest. Proj. W-17-4, Alaska Dept. Fish and Game, Juneau.

Woolpy, J.H., and I. Eckstrand. 1979. Wolf pack genetics, a computer simulation with theory. p. 206-224. In. E. Klinghammer. (eds.). The behavior and ecology of wolves. Garland Press, New York.

Zimen, E. 1976. On the regulation of pack sizes in wolves. Z. Tierpsychol. 40:300-341.

Zimen, E. 1981. The wolf, a species in danger. New York, Delacorte Press.

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APPENDIX
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Overall impressions from the visual observations of prey availability in the 3 drainages this summer are summarized in Table 5. Each prey species was assigned a prey importance in an attempt to assess the availability of the prey species for wolves within each drainage. All minor food items are combined under other species.

The relative rank of the major prey species is depicted in Table 6. This relative rank was determined through comparisons of the energy gained (ratio kg eaten) and energy spent (ratio of the number of individuals eaten) which formed the analytical basis for the ranking scheme. It appears that other species are an important food source for Hulahula River and Canning River wolves, but small sample sizes and seasonal availability are believed to influence this apparent disproportionate dependence upon minor prey species.

Discussion of Prey Utilization

Comparing the results of the scat analysis, it seems that the wolves in all 3 drainages focused on the abundant caribou (Fig. 4, Table 2). The Kongakut River wolves utilized the 3 available ungulate species in proportion to the relative availability of each species. Caribou are relatively easy to catch, while moose protect and defend themselves relatively well. Dall sheep are probably difficult to capture because of the terrain they occupy. The Kongakut River wolves diet is supplemented with smaller mammals.

The Hulahula wolves apparently depend more heavily upon Dall sheep (Fig. 4, Table 3). There are few moose in the area, and wolves concentrate their activity on Dall sheep. The few caribou that enter this drainage may be from either the Central Arctic or the Porcupine caribou herds. A diet based on Dall sheep might cause competition with other predators, therefore, it is not surprising that 2 scats contained remains from an adult wolverine(s).

It was unexpected not to find remains from moose in the scats collected along the Canning river, but the scats were collected in a period when caribou were present on the floodplains (Fig. 4, Table 4).

The 3 packs apparently have different prey bases and would all be of interest for further work. The Hulahula River wolves apparently feed heavily on Dall sheep, and the Kongakut River wolves, with their apparent dependence on caribou, would both be candidates for further study of wolves with contrasting prey bases. For purposes of observing wolf denning behavior, the visibility of the homesites of the Hulahula and the Kongakut River wolves is relatively good, thus, these 2 packs seem to be better suited for further study of denning ecology. If only 1 wolf is present in the Hulahula drainage, the Canning River wolves should be considered for further study also.

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Table 5. Visual assessment of the relative seasonal availability of the various prey species by drainage, Arctic National Wildlife Refuge, summer 1983.

River drainage/ wolf status prey importance[a]	Caribou	Moose	Dall sheep	Other species
Kongakut River:				
wolf migratory	spring/summer	summer	summer	summer
wolf nonmigratory	spring	yearlong	summer	summer
prey importance	1	1	1	4
Hulahula River:				
wolf migratory	NA[b]	NA	NA	NA
wolf nonmigratory	spring	winter	yearlong	summer
prey importance	2	2	1	4
Canning River:				
wolf migratory	NA	NA	NA	NA
wolf nonmigratory	spring	yearlong	-	summer
prey importance	2	1	4	4

[a]prey importance scalar from 1 = most important to 4 = least important.
[b]NA not applicable, assuming Hulahula and Canning River drainages are not major caribou migratory areas, therefore wolves would not be migratory.

Case histories of wolves observed in ANWR during field work the summer of 1983.

Case history 1

June 30, Whale Mountain at Kongakut River, time: 2252 h. Two wolves, a dark (black) and a light (grey), were seen trotting along a trail on the west side of the river leading south from the homesite (Den Creek), and around the bend by Mt. 4880. The black wolf was seen first as it howled, and the gray was seen following behind. They both urinated at several locations, the black with raised hind leg while the gray squatted. I howled at them and they stopped to look in our direction. The gray wolf gave a short reply after having walked up to and above the black one. The black's tail was often lifted high up as they walked. They disappeared out of sight at 2323 h.

Case history 2

July 1, Whale Mountain at Kongakut River, time: 0100 h. One dark wolf was seen 1.5 km north of Den Creek where the trail leads down onto the riverbar.

Case history 3

July 1, Whale Mountain at Kongakut River, time: 0345 h. Two sightings of a dark wolf (wolves) seen in the same area as where the dark wolf was discovered howling on June 30.

Case history 4

July 1, Den Creek at Kongakut River, time: 1425 h. Two gray wolves were seen resting and wandering around among the willows along the gravel bar at the homesite where Den Creek enters the Kongakut. One gray laid down next to the willow thickets after the other gray had faced the spot (as if smelling), and this second wolf took off approximately 100 m upstream and laid down on the mudflats.

Case history 4b

July 1, Den Creek at Kongakut. This is the area where the rafters, at approximately the same time as case history 4a, saw 4 wolves. They also told us that they had seen 1 light wolf following us as we hiked along the hillside on the east side of the river. This wolf followed us for quite some distance, approximately 100 m behind us. Unfortunately we did not turn around to check behind us.

Case history 4c

Kongakut. Two other rafters told us that they had seen a gray wolf cross (swim) the southernmost creek we checked, on the west side of the Kongakut, west of Mt. Greenough.

Case history 5

July 17, Camp 3, north of Chapman's Den at Hulahula River. One white wolf was seen checking the ground approximately 100 m south of camp at 1035 h.

Its fur was very long (perhaps molting), nearly hanging to the ground. The wolf was in view for approximately 5 minutes, during which it interrupted its travel a couple of times facing the ground and raising its head.

Case history 6

July 25, by Moose Creek at Canning River, time: 1210 h. One brown wolf pup was seen searching in the grass along the edge of an island. Detecting us it ran and hid, so we sat down on top of a nearby knoll to investigate. After 1 hour without seeing anything, I howled. A pup answered from the center of the island. It came out of the brush, approaching our sound, but stopped when the pup we first observed replied and met this second pup. They greeted and ran around for a while before entering the bushes again. Losing sight of them, we investigated the island but found only 2 pup scats, mainly pup tracks spread over the entire island, some adult tracks and a short section of a well used trail. Adult howling had been heard the night before from this area, and the following night howling was heard again.