BEHAVIOR AND HABITAT USE OF GRIZZLY BEARS IN NORTHEASTERN ALASKA

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Abstract: Habitat use and behavior of grizzly bears (*Ursus arctos*) were studied in 3 areas of the Arctic National Wildlife Refuge, northeast Alaska, during 1982 and 1983. Scanning for bears resulted in 386 and 388 h of behavioral and habitat use information. Vegetation on 3,626 ha in the Caribou Pass-Kongakut River study area was mapped to Viereck-Dyrness (1980) level IV. Grizzly bears devoted most of their nonhibernating time to feeding and foraging. Food habits and habitat use were influenced by the phenological development of herbaceous plants and berry-producing plants and availability of animal food items.

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The Alaska National Interest Lands Conservation Act (ANILCA) became law on 2 December 1980 and mandated exploration for oil and gas reserves and assessment of the natural resources on the coastal plain of the Arctic National Wildlife Refuge (ANWR). Subsection (c) of section 1002 of ANILCA required the assessment to emphasize migratory waterfowl and large mammals, including grizzly/brown bears. Reynolds (1980:1) pointed out, "The potential for adverse impact of development on grizzly bears in Alaska is probably greatest from the Brooks Range north to the Arctic Ocean. Here ... the period of food availability is short, the low-growing vegetation of the region provides little cover, bears require large home ranges, and their reproductive potential is low." Possible impacts of development on grizzly bear populations include altered habitat and increased harassment throughout the year from increased human activity.

The purpose of this study was to describe seasonal patterns of behavior and habitat use of grizzly bears in the northeastern portion of ANWR. The information collected should help decision makers assess impacts of development in the arctic. This study also adds to our understanding of grizzly bears in an area that resembles the periglacial environment in which they probably evolved (Herrero 1978). The study was designed to supplement a grizzly bear research program undertaken cooperatively by the U.S. Dep. Int., Fish and Wildl. Serv. and the Alaska Dep. of Fish and Game in 1982 (Garner et al. 1985).

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STUDY AREA

ANWR covers approximately 7.3 million ha of northeast Alaska. The refuge is remote and not served by a road system. Four major physiographic regions are represented in the area from south to north: northern plateaus, mountains, foothills, and coastal plain.

The climate of Alaska north of the Brooks Range is classified as arctic. Winters are long and cold. Summers are short, cool, and cloudy. Usually by early June most snow has melted, and the rivers are flowing. Aufeis, large sheets of ice derived from winter overflow, can be found on many rivers throughout summer. July is the warmest month with an average temperature of 5 C. Temperatures rarely exceed 30 C. Daylight is continuous from late May to late July.

Three study areas were chosen within the refuge on the basis of knowledge of grizzly bear use and presence of observation points (Fig. 1). No geologic barriers prevented bear movement between these sites. The Caribou Pass-Kongakut River study area (base camps) covered about 3,626 ha and consisted of the wide gravel bed of the Kongakut River, the valley flats of Caribou Pass, and foothills. The eastern study area at the coastal plain-foothills (spike camp) covered about 4,400 ha and consisted of foothills and coastal plain. The western study area at the coastal plain-foothills (spike camp) covered about 5,200 ha and consisted of foothills, the wide gravel bed of the Kongakut River, and the coastal plain. Vegetation of the areas was mostly tundra with shrubland associated with the river and streams.

METHODS

All data for this study were collected between 27 June and 11 August 1982 and 24 May and 29 August

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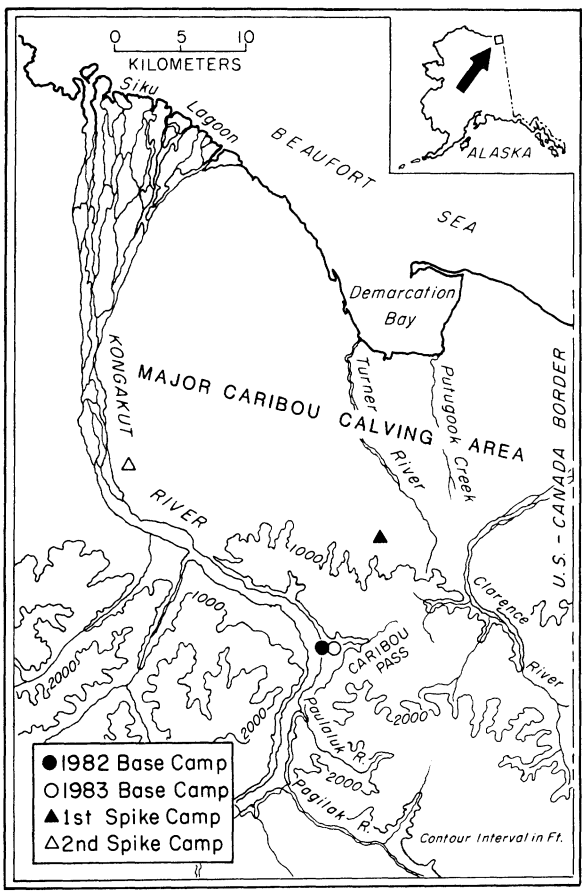

Fig. 1. Location of 3 study areas in the Arctic National Wildlife Refuge, 1982–83.

1983. Work at the coastal plain-foothills sites extended 12–22 June and 29 June–2 July 1983.

Seasonal designations were: spring, 25 May–7 June; summer, 8 June–2 August; and fall, 3–29 August. These divisions were based on my arrival and departure from Caribou Pass and on climatic changes, phenological development of certain plants, and bear behavior. These divisions are similar to those used by Stelmock (1981), Gebhard (1982), and Hechtel (1985).

I collected data on behavior and habitat use by observing from vantage points. Binoculars were used to locate bears, and a spotting scope (15–60 power) was used to observe bears once they were located. Observation distances ranged 35–5,400 m. Data are reported as bear-unit-hours. I defined a bear-unit as a single bear, a family, or a male with 1 or more consorts. I treated the mother of a family and the male of a breeding group as the focal animal of these types of bear-units. Bears were observed nearly continuously for as long as possible, and because of continuous daylight during every hour of the diel period. Throughout the paper "observation time" refers to the time spent watching bears.

The sex of some bears was determined by observing the bear urinating. Behavior and relative size were used to infer the sex of individuals of breeding units and some single bears. We observed some bears that were marked (ear tags and radio-collar) by the U.S. Dep. Int., Fish and Wildl. Serv. Bears exhibiting breeding behavior and those known to have bred were assumed to be mature ($\geq$4.5 years old, Garner et al. 1985). Throughout the paper, "cub" refers to young-of-the-year.

Behaviors

The specific behavior of a bear under observation was recorded and the time of change in behavior noted to the nearest minute. I used the following behavior categories: feeding, foraging, traveling, resting, and intraspecific and interspecific interactions. These categories are similar to those used by Stelmock (1981), Gebhard (1982), and Hechtel (1985). When possible, I divided feeding and foraging by food item; these sub-categories were determined by observing bears and inspecting feeding sites. In many cases the foods selected could not be determined because of the distance from which bears were observed, the diversity of habitat types, or concealment afforded by shrubs or terrain. Because of the small size and dispersed pattern of certain food items (microtine rodents [*Microtus* spp.], arctic ground squirrels [*Spermophilus parryi*], and hedysarum [*Hedysarum alpinum*] roots), bears often spent less than a minute actually ingesting them. For these foods, feeding and foraging can be considered synonyms.

The following are definitions of behavior categories:

Feeding.—Bears under observation spent 50% or more of their time collecting and ingesting food.

Foraging.—The head was lowered to the ground (except when foraging for caribou [*Rangifer tarandus*]), and there were frequent stops to investigate and/or ingest food items. Less than 50% of the observation time was spent ingesting food. In cases where the distinction between feeding and foraging was not clear, the cumulative time spent feeding for a 2–3 min interval was used to determine the appropriate category.

Traveling.—The head was usually held high while running or walking and there were infrequent stops to investigate and/or ingest food.

Resting.—The bear was inactive while lying or sitting.

Intraspecific Interactions.—Proximity to conspecifics caused the following activities: encounters between bears, nursing, and breeding behavior.

Interspecific Interactions.—These occurred when bears were near other wildlife or humans, but the actions were not predatory attempts by bears.

The Mann-Whitney test (Zar 1974) was used to test for significant differences in rest period duration.

Vegetation Mapping and Habitat Use

I assigned vegetation categories according to a 5-level hierarchical classification system (Viereck and Dyrness 1980). Nomenclature for plants follows Hultén (1968). Habitat of the Caribou Pass-Kongakut River area was mapped to level IV from elevated points and by on-foot inspection of much of the area. Certain vegetation types were best identified during different phenological stages, so mapping continued into the fall. I estimated areal coverage of vegetation types using a digitizer. Habitats of the coastal plain-foothills areas were not mapped.

Aerial photographs (average scale 1:11,000) and U.S. Geological Survey topographic maps (1:63,360) provided the base for recording habitat use data. Times were noted to the nearest minute when bears changed vegetation types. Sometimes bears disappeared into uniform habitat only to reappear in the same area shortly afterward. In such cases continual data on habitat use were recorded.

Due to serial correlation between observations, habitat use data are summarized as percentages of total bear-unit-hours occupying each vegetation type. An index of bear use of habitat types was calculated by dividing the percent time spent in each vegetation category by the areal coverage of that category.

RESULTS AND DISCUSSION

General Behaviors

During spring, summer, and fall, bears were active for 100%, 71.5%, and 79.0% of the observation time, respectively. The seasonal differences in active time were not tested for significance due to small samples for spring (N = 8.9 bear-unit-hours) and fall from 2400 to 0500 h (N = 3.3 bear-unit-hours). During summer and fall, bears were most frequently active from early evening to early morning and appeared to exhibit crepuscular activity peaks. Detailed treatment of data concerning diel patterns of activity is given by Phillips (1986).

I collected 386.7 bear-unit-hours of behavior information (Table 1). Feeding activities during spring were observed for only 0.9 bear-unit-hours and consisted almost entirely of feeding on a caribou calf or hedysarum roots (Table 2). Foraging for squirrels, microtines, and hedysarum roots accounted for 73.0% of the foraging time (Table 3). During the 1st 2 weeks of summer, bears spent almost 90% of their time feeding on caribou, but hedysarum roots were also consumed. Most foraging during this time was unclassifiable.

From 22 June to 2 August, feeding and foraging on herbaceous vegetation were the predominant activities, although feeding and foraging on rodents were also observed (Tables 2 and 3). Important plants included horsetail (*Equisetum arvense*), grasses and sedges, and the leaves and flowers of boykinia (*Boykinia richardsonii*). Senescence of herbaceous plants was obvious by early August. A 5.5-year-old male was the only bear we saw feeding on these after 3 August. Observations of this animal represent 78.6% of the total feeding time observed during fall and may not reflect the bear population's actual fall food habits.

During fall, crowberries (*Empetrum nigrum*), blueberries (*Vaccinium uliginosum*), and bearberries (*Arctostaphylos rubra*) were important food items until the 1st heavy snow on 19 August at which time hedysarum roots and rodents became important. Of the 16.6 h that I observed bears feeding on berries, 87.4% occurred before 19 August. All 15.4 h of feeding or foraging on roots occurred after the snow, and most (80.9%) of the 13.7 h of feeding or foraging for rodents occurred after the snow.

Only minor differences exist between the food habits of bears in the ANWR and bears elsewhere (Reynolds 1974, Pearson 1975, Russell et al. 1979, Murie 1981, Stelmock 1981, Gebhard 1982, Nagy et al. 1983). For example, Hechtel (1985) reported that floral parts of cottongrass (*Eriophorum vaginatum*) were an important spring food for grizzly bears in northwest Alaska. Kuropat and Bryant (1980) determined that floral heads of cottongrass were a good source of nitrogen and phosphorus, while low in secondary compounds. I did not observe bears feeding

Table 1. Percentage of observation time that grizzly bears spent in 7 behavior categories, 1982–83.

	Spring	Summer				Fall	
	25 May–7 Jun	8 Jun–21 Jun	22 Jun–5 Jul	6 Jul–19 Jul	20 Jul–2 Aug	3 Aug–16 Aug	17 Aug–29 Aug
Intraspecific							
Feeding	10.4	4.3	8.4	32.3	35.9	56.7	47.8
Foraging	34.3	15.8	51.7	32.8	38.1	12.5	33.8
Resting	—	25.5	12.6	29.9	19.2	26.0	16.3
Traveling	55.2	11.1	7.8	3.4	5.1	4.2	1.8
Breeding	—	40.6	19.5	0.6	—	—	—
Other	—	2.0	—	0.9	1.0	—	0.1
Interspecific	—	0.6	—	—	0.5	0.5	0.1
Total bear-unit-hours	8.9	90.5	30.8	85.0	65.4	48.6	57.5

on the floral parts of cottongrass, despite its abundance on the study area.

Several studies have documented the importance of overwintered berries as a spring food for grizzly bears (Kistchinski 1972, Murie 1981, Stelmock 1981, Hechtel 1985). There is evidence that overwintered berries have a higher sugar content than they did the previous fall (Hamer et al. 1977). Stelmock (1981) concluded that the nutritive value and apparent digestibility of crowberries in spring were similar to corresponding values for the fall. I did not observe bears feeding on overwintered berries.

The differences discussed in the 2 preceding paragraphs may be a result of the small number of spring observations of foraging or feeding activities (N = 4.0 bear-unit-hours). Moreover, we did little hiking in Caribou Pass during spring and thus were unable to assess the availability of overwintered berries in the area.

Resting was not observed during spring but was commonly seen during summer and fall. Overall, 86.9 bear-unit-hours were spent resting (Table 1). The bears did not appear to have preferred resting sites; most were at or near the most recently used feeding area. Resting was characterized by a bear occasionally lifting its head and surveying the surroundings. This resting behavior is similar to that exhibited by grizzly bears in north-central and northwest Alaska, and in Denali National Park (Linderman 1974, Murie 1981, Stelmock 1981). Gebhard (1982) pointed out that this type of resting behavior would enable a bear to detect potential enemies and prey items.

Duration of rest periods varied (Table 4). Those for single bears were shorter and more frequent during summer than fall, but these differences were not significant ($U = 230$, $P > 0.20$ and $U = 81$, $P > 0.10$). During summer, rest periods for single bears at caribou carcasses were longer and more frequent that for single bears not at carcasses, but these differences were not significant either ($U = 129.5$, $P > 0.20$ and $U = 43$, $P > 0.20$). I also compared the rest periods of breeding bears to those of single bears not at carcasses and found them to be longer and more frequent for pairs though the differences were

Table 2. Percentage of feeding time that grizzly bears spent on certain foods, 1982–83.

	Spring	Summer				Fall	
Food item	25 May–7 Jun	8 Jun–21 Jun	22 Jun–5 Jul	6 Jul–19 Jul	20 Jul–2 Aug	3 Aug–16 Aug	17 Aug–29 Aug
Unidentified vegetation	1.8	—	91.0	70.3	70.9	21.0	16.5
Horsetail/grass/sedge	—	—	—	29.6	17.0	49.1	—
Boykinia	—	—	—	—	5.4	1.1	—
Hedysarum roots	19.6	11.1	—	—	—	—	50.0
Berries	—	—	—	—	6.6	28.5	30.7
Caribou carcass	—	60.9	—	—	—	—	—
Caribou calf	78.5	27.9	—	—	—	—	—
Squirrels and microtines	—	—	9.0	—	—	0.2	2.8
Total bear-unit-hours	0.9	3.9	2.6	27.4	23.5	27.6	27.5

Table 3. Percentage of foraging time that grizzly bears spent on certain foods, 1982–83.

Food item	Spring	Summer				Fall	
	25 May–7 Jun	8 Jun–21 Jun	22 Jun–2 Jul	6 Jul–19 Jul	20 Jul–2 Aug	3 Aug–16 Aug	17 Aug–29 Aug
Unidentified vegetation	17.3	5.0	12.8	57.3	16.1	3.3	—
Hedysarum roots	22.2	—	—	—	—	—	8.7
Caribou carcass	2.7	7.4	—	—	—	—	—
Squirrels and microtines	50.8	8.3	7.9	16.2	28.4	36.1	54.3
Unclassifiable	7.0	79.3	79.3	26.5	55.4	60.6	36.9
Total bear-unit-hours	3.1	14.3	15.9	27.9	24.9	6.1	19.5

not significant ($U = 317.5$, $P > 0.20$ and $U = 123.5$, $P > 0.20$). Differences between other values (Table 4) were not tested for significance because they were more similar than those tested, sample size was small, and standard deviations were large.

Traveling was the most common behavior during spring but declined thereafter (Table 1). This agrees with observations made by Stelmock (1981) and Gebhard (1982). Bears move between patches of vegetation without depleting the foodstuffs of any 1 patch; frequent movement may indicate attempts to find supplementary animal protein. On a few occasions while hiking across the study area we encountered bird eggs, unfledged birds, and rodents; the potential benefits that may accrue from travel are obvious. Animal protein may be more important to bears during spring than during summer and fall. This and the wide dispersion of spring plant food items like hedysarum roots may partially explain why traveling is most commonly observed during spring. Movements by bears are also influenced by reproductive condition and denning (Craighead and Craighead 1972, Murie 1981).

Consorting bears were seen at the coastal plain-foothills areas from 8 June to 2 July. Overall, 43.3 bear-unit-hours of observations were recorded for breeding units (Phillips 1986). Other intraspecific interactions include playing, nursing, and encounters between bears (Table 1). Most of the play behavior (80%) involved siblings, and the frequency of play behavior declined from early summer to fall. Similar play behavior was reported for families in northwest Alaska and Denali National Park (Murie 1981, Stelmock 1981, Gebhard 1982).

During this study, the average duration of nursing bouts for 2 cubs and a yearling was 3.0 min ($N = 2$) and 2.0 min ($N = 4$), respectively. Gebhard (1982) reported the average nursing bout lasted 4.8 min for 2 yearlings in northwest Alaska. Stelmock (1981) reported the average nursing bout for cubs and yearlings in Denali National Park lasted 4.3 min and 4.0 min, respectively, but determined that these differences were not statistically significant. The differences between the average duration of nursing bouts observed in this study and those cited may be due to my small sample. During this study, cubs initiated most nursing bouts that were associated with periods of rest. Similar nursing behavior was reported for families in northwest Alaska and Denali National Park (Murie 1981, Gebhard 1982).

Table 4. Duration of and interval between complete resting bouts for bear-units, 1982–83.

	Duration (h)			Interval (h)		
	N	Mean	SD	*N*	Mean	SD
Summer						
Single Bears	27	0.9	1.0	13	0.8	1.0
Single bears at caribou carcasses	7	1.5	1.1	5	0.2	0.1
Families	10	0.9	0.9	6	0.6	0.5
Breeding units	21	1.2	1.6	17	0.5	0.5
Fall						
Single bears	15	1.0	0.7	9	1.6	1.5
Families	1	0.7	—	—	—	—

Seven encounters between bears were recorded. Six of these were probably accidental and consisted of detection and mutual avoidance. This behavior is a common response to chance encouters between conspecifics during the nonbreeding season in central and northern Alaska (Murie 1981, J. Hechtel pers. commun.). One deliberate encounter occurred when a mature male followed a 5.5-year-old male for 1 h; the 5.5-year-old walked or ran from the larger bear.

The most frequently observed interspecific interactions, excluding predatory attempts by bears, involved bears and eagles (*Aquila chrysaetos*) or ravens (*Corvus corax*). These were probably attempts by the birds to scavenge a portion of the bear's kill or to make a kill because of the bear's activity (e.g., excavating ground squirrel burrows). A similar situation was reported by Murie (1981).

Bears noticeably detected human observers 11 times. Six times they ran in the opposite direction, and 5 times they left the area slowly. A 5.5-year-old male spent most of August 1983 near our camp. Twice he came into camp and had to be driven away. We attempted to displace him a 3rd time by harassing him with a helicopter; he returned within 6 h. After this he apparently became accustomed to our presence and continued to use the area, giving camp a wide berth.

On 5 and 3 occasions a helicopter and a plane, respectively, flew into the Caribou Pass area while we were observing bears. These incidents involved 2 marked bears and a minimum of 4 unmarked bears. All of these animals, except the 5.5-year-old male, ran out of sight immediately after detecting the aircraft. Because of the terrain, I was unable to collect meaningful estimates of the distance the bears ran; however, 1 unmarked bear ran at least 1.2 km before disappearing from view. This bear reponded to the helicopter when it was at least 4 km away. Other bears responded to aircraft when they were within 1–2 km.

These encounters suggest that conflicts between bears and people will result if oil and gas reserves are developed in ANWR. Others have reported that such development can cause loss of habitat, disturbance of denning areas with subsequent abandonment of dens, a need to relocate or kill nuisance bears, intentional and unintentional harassment of bears by aircraft (especially helicopters), and an increase in consumptive and nonconsumptive use of the bear population (Weeden 1971, Hinman 1974, Klein 1979, Follmann et al. 1980, Harding and Nagy 1980, Schallenberger 1980, USFWS 1983). I believe these impacts should be considered in the cost-benefit analysis of any proposed development in the ANWR.

Habitat Use

Almost 95% of the Caribou Pass-Kongakut River study area was tundra, with shrubland restricted to the river and stream flats (Table 5). Tussock tundra and sedge-grass tundra were the 2 most common level II vegetation types, comprising 63.8% of the study area. These types usually covered large areas (≥ 1 km^2) and were common in the valley flats up to and including the base of rolling hills and mountains. Mat and cushion tundra was the 3rd most common level II vegetation type and usually covered medium-sized areas (< 1km^2) in well-drained upland sites and rocky outcrops. Shrub tundra was limited to gullys, draws, and cutbanks of the river and streams. Herbaceous tundra was restricted to wet lowland sites. Tall and low shrublands were limited to the river and stream flats. These final 4 habitat types usually covered small areas (< 0.25 km^2).

During spring, tussock tundra and tall shrubland were used slightly more frequently than expected based on availability, whereas low shrubland was used much more frequently than expected (Fig. 2, Table 6). Bears usually passed through tussock tundra quickly as they were traveling or foraging for caribou or rodents. All feeding on caribou occurred on tussock tundra. Bears observed in tall and low shrubland were usually digging hedysarum roots. Moose (*Alces*

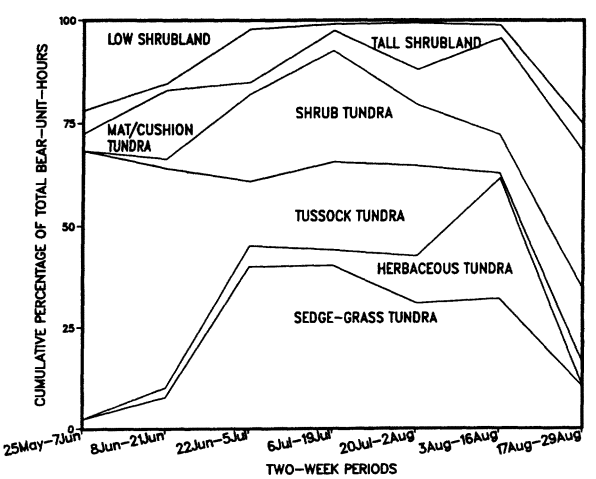

Fig. 2. Percentage of observation time that grizzly bears (excluding breeding pairs) spent in level II vegetation types, 1982–83 (N = 388.9 bear-unit-hours).

Table 5. Classification scheme for vegetation and percent areal cover of vegetation types in the Caribou Pass-Kongakut River study area.

Classification level I II III	IV	Percent areal cover
TUNDRA		94.1
Sedge-Grass		29.6
Wet sedge-grass	Wet sedge meadow	1.2
Sedge-shrub	Sedge-willow	17.4
Sedge-mat and cushion	Sedge-dryas	11.0
Herbaceous		0.9
Low-elevation herb tundra	Seral shrubs	0.9
Tussock		34.2
Sedge-tussock shrub	Sedge-tussock mixed shrub	34.2
Shrub		6.6
Willow	Willow-sedge	1.3
Birch/ericaceous shrubs	Birch/ericaceous shrub sedge	0.3
Mixed shrub	Undifferentiated understory	5.0
Mat and cushion		22.8
Open	Dryas-herb	1.5
	Ericaceous shrubs	3.1
	Open lichen	0.7
Closed	Mat and cushion sedge	0.2
	Dryas-herb	17.3
SHRUBLAND		5.8
Tall shrub		2.8
Open	Willow	2.7
Closed	Willow	0.1
Low shrub		3.0
Open	Willow	3.0

alces) are common in the Kongakut River drainage (Martin and Garner 1985) and may influence bear use of riparian areas.

During the 1st 2 weeks of summer, tussock tundra, mat and cushion tundra, and shrubland were frequently used by bears (Fig. 2). We often observed caribou in these habitats; probably explaining the presence of bears. Bears observed in shrubland vegetation types were usually digging roots.

From midsummer until early August, bears used sedge-grass tundra almost as frequently as expected, whereas shrub tundra and herbaceous tundra were used much more frequently than expected (Fig. 2, Table 6). While on sedge-grass and shrub tundra, bears foraged for plants that were usually unidentifiable. While on herbaceous tundra, bears usually fed on horsetail, grasses and sedges, and the flowers and leaves of boykinia. Senescence of herbaceous vegetation was obvious by early August. A 5.5-year-old male was the only bear we saw in herbaceous tundra after 5 August. From 3 to 16 August, 55% of the observation time was of this animal. During these

Table 6. An index of grizzly bear use of level II vegetation types, 1982–83.

Level II vegetation type	Spring	Summer			Fall		
	25 May–7 Jun	8 Jun–21 Jun[a]	22 Jun–5 Jul	6 Jul–19 Jul	20 Jul–2 Aug	3 Aug–16 Aug	17 Aug–29 Aug
Sedge-grass tundra	0.1	—	1.4	1.4	1.1	1.1	0.5
Herbaceous tundra	—	—	5.8	4.2	12.9	32.7	0.2
Tussock tundra	1.9	—	0.5	0.6	0.6	0.1	0.2
Shrub tundra	—	—	3.2	4.1	2.2	1.4	2.8
Mat/cushion tundra	0.2	—	0.1	0.2	0.4	1.0	1.5
Tall shrubland	1.3	—	4.6	0.6	4.1	1.1	2.4
Low shrubland	8.0	—	0.7	0.2	0.2	0.4	8.4

[a] All data collected at coastal plain/foothills sites that were not mapped.

observations he spent 40% of his time in herbaceous tundra (Fig. 2, Table 6). Observations of this male may not reflect the bear population's actual fall habitat use pattern. From 22 June to 5 July and 20 July to 2 August, tall shrubland was used more frequently than expected. Although bears in tall shrubland were difficult to see, they were observed feeding on the herbaceous plants in the understory and resting. The time bears spent in tussock tundra was likely due to the prevalence of the vegetation type rather than selection by bears (Fig. 2, Table 6).

By early fall, use of mat and cushion tundra and shrub tundra increased (Fig. 2). After the 1st heavy snow, tall and low shrublands on the river flats were also important. During fall, mat and cushion tundra, shrub tundra, and tall shrubland were used slightly more frequently than expected (Table 6). Before the snowstorms on 19 and 27 August, bears observed in mat and cushion tundra and shrub tundra were usually feeding on berries. After the snowstorms bears observed in these vegetation types were usually foraging or feeding on ground squirrels.

Bears observed in shrubland habitats were usually digging roots. Patterns of seasonal habitat use similar to what I observed have been reported for bears in numerous locations: north- central and northwest Alaska (Quimby 1974, Curatolo and Moore 1975, Hechtel 1985); Denali National Park (Murie 1981, Stelmock 1981); Glacier National Park, southwestern Yukon Territory, and Northwest Territories, Canada (Mundy 1963, Mundy and Flook 1973, Pearson 1975, Nagy et al. 1983). From these studies it is apparent that habitat use by grizzly bears is generally an adaptation to exploit changes in availability of food resources that occur in seasonal environments. Families that select habitats because of their remoteness rather than nutritional offerings are an exception to this pattern (Pearson 1975, Murie 1981, Gebhard 1982, Phillips 1986). This is probably an attempt by the family to reduce contact with other bears. Other factors including reproductive condition, denning, and human activity also influence habitat selection by grizzly bears (Craighead and Craighead 1972, Herrero and Hamer 1977, Garner et al. 1985).

The preceding paragraphs deal primarily with habitat use by bears within the foothills region of ANWR. The physiography of this area supports greater temporal and spatial diversity of plant and animal foods over relatively small areas compared to coastal plain and mountain regions. This may explain why foothill habitats generally support more bears than coastal plain or mountain habitats (Reynolds 1979). This observation points out the dependence that grizzly bears have on areas that provide a complex of habitats.

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