

**SUBSISTENCE HUNTING OF DALL SHEEP  
IN NORTHWEST ALASKA**

by  
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Technical Paper No. 208

Division of Subsistence  
Alaska Department of Fish and Game  
Juneau, Alaska

December 1991

**This research was partially supported by ANILCA Federal Aid Funds administered through the U.S. Fish and Wildlife Service Anchorage, Alaska, SG-1-4 and SG-1-5**

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## ABSTRACT

Dall sheep (*ovis dalli*) have been harvested in northwest Alaska for meat, fat, skins, and horns at least since the 16th century. This report describes historical and contemporary subsistence uses of Dall sheep by local rural residents of Ambler, Kiana, Kivalina, Kobuk, Kotzebue, Noatak, Noorvik, Point Hope, and Shungnak. Before the 1880s, sheep were hunted primarily in summer, with skin, sinew, dried meat, and fat the primary products. Following a caribou population decline in the late 19th century, sheep became more important as a food resource (especially for Kobuk River communities) and were hunted in winter as well as in summer. Intensive summer and winter sheep hunting is believed to have declined in the 1940s, as caribou populations recovered.

In recent years, Noatak men have been the most active sheep hunters with an annual community harvest estimated at 10 to 30 sheep. Estimates of the annual community harvests in Ambler, Kivalina, Noorvik, and Point Hope ranged from 0 to 5 per community. Kotzebue harvests were estimated at 8 to 13 sheep annually. No contemporary sheep hunting was reported in Kiana, Kobuk, or Shungnak. Estimates of the total annual harvests in the region ranged from 20 to 56, with a 1990 estimate of 30 sheep. These harvests occurred mainly in fall (August to September) and in winter (October through April), except for a small harvest in summer (June to July).

Government regulation of Dall sheep hunting in northwest Alaska began with seasons and bag limits imposed in 1925, which became increasingly restrictive over time. Minimum curl horn size restrictions were imposed in the 1950s. Following statehood in 1959, regulations provided for a six- to nine-week season with a one ram limit until 1982, when local residents were allowed an additional seven-month winter subsistence season. This was in part recognition of customary and traditional Dall sheep harvests by northwest Alaska *Inupiat*. This improved opportunities for subsistence, but several problems persisted. For example, occasional subsistence harvests occurred in June and July, sheep smaller than the required 7/8 curl horn were harvested in August and September, and some hunters harvested more than one sheep annually. In 1991, the Baird Mountains were closed to sheep hunting after spring counts indicated poor winter survival.

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## ACKNOWLEDGMENTS

Research projects in northwest Alaska are typically a joy to work on because of local residents' generosity with their knowledge and time. This research project was no exception. We are especially grateful to the elders who shared their experiences and their homes with us: Wendell and Priscilla Booth, Kenneth Mills, Roland Booth, Dwight and Mary Arnold, Bob and Carrie Uhl, Joy Koenig, Raymond Hawley, Enoch Adams, Truman and Cora Cleveland, Minnie Gray, Tommy Douglas, Wesley Woods, Levi Cleveland, and Larry Westlake. Many other hunters and their families talked with us willingly and openly despite the sensitivity of the subject. For this we are grateful. We hope that this report may prove to be of value to them.

Many others assisted in more tedious but equally important aspects of this project. Elizabeth Andrews and Bob Wolfe each carefully reviewed and edited the report. Carol Barnhill drafted the maps and patiently revised them as requested. Jim Dau provided biological and harvest report information on Dall sheep in GMU 23. Jim Magdanz consistently offered good ideas and encouragement and saw this report through its final stages of editing and layout when neither of us were available. To all of these, we extend our heartfelt appreciation.



## INTRODUCTION

Dall sheep (*ovis dalli*) are high mountain animals that feed primarily on grasses and sedges. In Alaska, Dall sheep can be found in the Alaska Range, Wrangell Mountains, Kenai Peninsula, Chugach Mountains, Talkeetna Mountains, Tanana-Yukon uplands, and Brooks Range. This report describes subsistence uses of Dall sheep in Game Management Unit (GMU) 23 in northwest Alaska. In northwest Alaska, sheep are found in greatest abundance in the western Baird Mountains with smaller populations in the DeLong Mountains and in the headwaters of the Noatak River. Northwest Alaska sheep populations are comparatively small and localized, prompting intensive management through regulation of the more popular hunting areas in the region.

Historically, the northwest *Iñupiat* living in and near the Brooks Range routinely hunted sheep (*ipniaq* in *Iñupiaq*) for food and clothing. Sheep hunting took place in summer by boat and on foot, and in winter by dog team. Although the past 150 years have brought many technological, economic, and cultural changes to the region, residents of northwest Alaska have continued the tradition of hunting and using sheep. However, contemporary uses have not been well-documented on a regional level.

Dall sheep also interest sport hunters, who value the large, curled horns of rams. Sport hunters have been drawn to northwest Alaska in increasing numbers in recent years. With a limited number of sheep, much potential exists for increased competition between subsistence and sport hunters for a variety of reasons. In July 1991, sheep hunting in portions of GMU 23 was closed by emergency order for conservation reasons. Information on subsistence sheep hunting practices is important for management which provides for subsistence uses and sustained yield of the sheep population. In addition, information on subsistence sheep hunting is of interest to federal agencies who are mandated to provide for subsistence sheep hunting in areas of GMU 23 located on federal park and preserve lands.

In 1991-92, Alaska Department of Fish and Game and National Park Service staff planned to review subsistence sheep hunting regulations in cooperation with local communities and advisory committees. As in many Alaska subsistence hunts, local residents only partially complied with harvest reporting requirements, and so available harvest data could not be considered an accurate reflection of actual hunting practices and harvests. This report provides information to assist in regulatory review and other subsistence hunting concerns.

## Purpose of Study

The purpose of this study was to document subsistence hunting of Dall sheep by residents of GMU 23. The project's goals were to:

- (1) identify communities that use sheep for food;
- (2) document subsistence sheep hunting seasons, methods, harvest numbers, and areas;
- (3) describe traditional and contemporary patterns of hunting and using sheep;
- (4) document changes in hunting practices;
- (5) discuss appropriateness of regulations to traditional sheep hunting practices; and
- (6) solicit suggestions regarding sheep hunting regulations.

## The Study Area

The study area encompassed nine communities in GMU 23 having a seasonal round that historically included sheep as reported in the literature or by knowledgeable key respondents. The study communities were Point Hope, Kivalina, Noatak, Kotzebue, and the Kobuk River villages of Noorvik, Kiana, Ambler, Shungnak, and Kobuk (Fig. 1). These communities were within one day's travel by boat (from June through September) or one day's travel by snowmachine (October through May) from sheep hunting areas in the western and central Brooks Range. Occasionally non-Natives from other GMU 23 communities such as Selawik and Buckland reported harvesting sheep, but these were not typical harvest activities for these communities and did not reflect a community pattern. Hunters from outside the region who hunted sheep in GMU 23 were not included in this study.

## Methodology

Data for this project were gathered through key respondent interviews and a literature review. In small communities, key respondent interviews were an effective method for collecting subsistence information, particularly for a big game animal such as sheep that only a few people actively hunted. Except for Kotzebue, it was

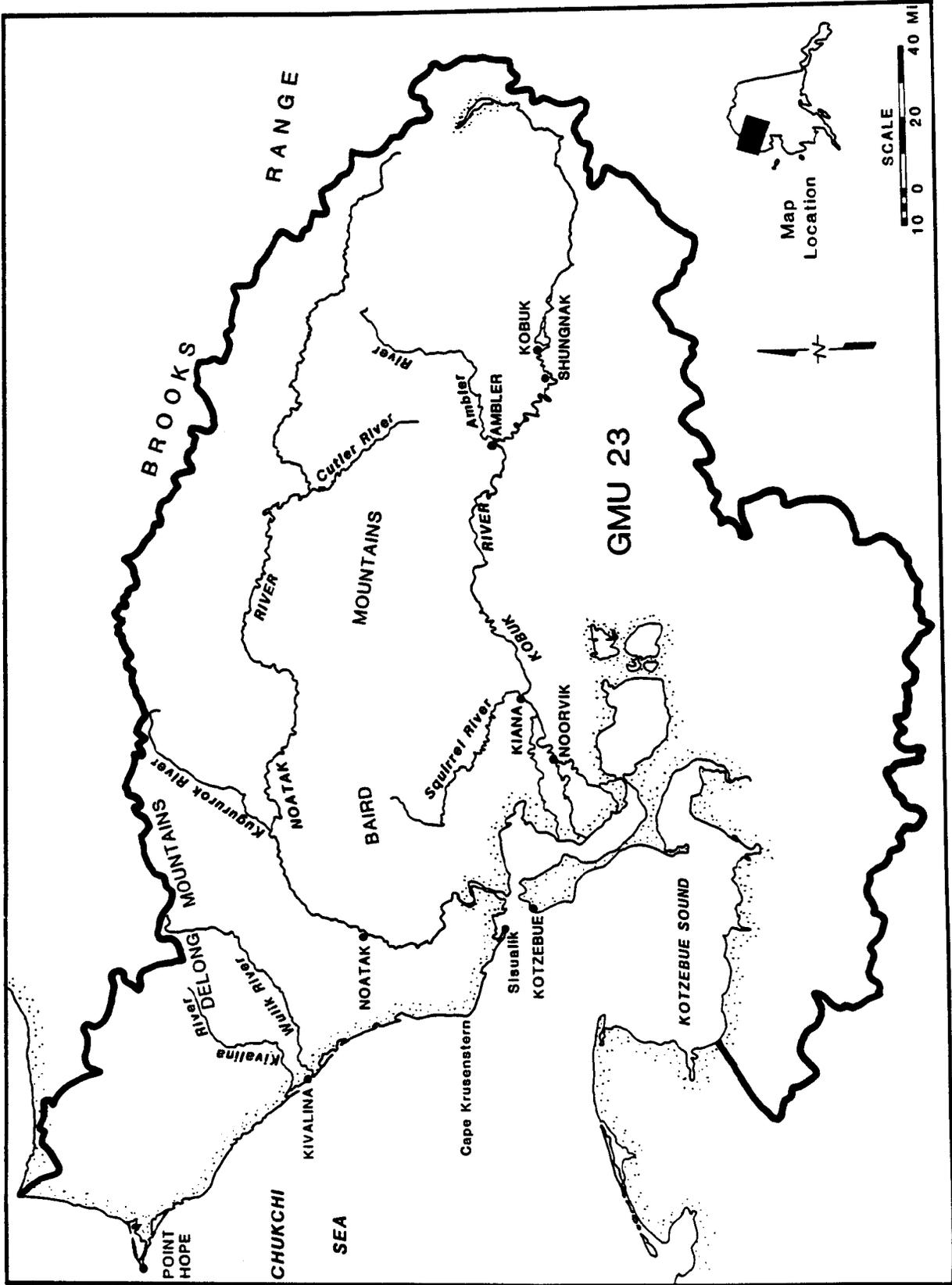


Fig. 1. GMU 23 communities with historic harvest and use of Dall sheep.

TABLE 1. NUMBER OF MEN AND WOMEN INTERVIEWED BY COMMUNITY.

Community	Men	Women	Total
Ambler	6	2	8
Kivalina	8	2	10
Kotzebue	4	0	4
Noatak	9	2	11
Noorvik	2	0	2
Point Hope	1	0	1
Total	30	6	36

possible to identify virtually all active sheep hunters in the study communities and to contact a majority of them. Active sheep hunters were identified with the help of harvest reports, city officials, and knowledgeable hunters in the community.

In each study community, researchers first contacted local officials, active hunters, and elders by phone to ask if community residents hunted sheep. Responses indicated that there were active sheep hunters in six of the study villages: Ambler, Kivalina, Kotzebue, Noatak, Noorvik, and Point Hope. In Kiana, Shungnak, and Kobuk, respondents reported that sheep were rarely, if ever, still hunted by community residents.

Researchers visited all sheep-hunting communities except Point Hope to interview hunters and collect additional information. Table 1 lists the number of residents interviewed by community. Key respondent interviews were conducted with the aid of interview guides (Appendices 1 and 2). Separate interview guides were prepared for men and for women because each had knowledge of different aspects of sheep hunting and use. Interviews were conducted in *Iñupiaq* when appropriate. Notes were taken by hand during the interviews, then later entered into a computerized database.

Field visits were made to Ambler (February 14-15, 1991), Kivalina (April 4-5, 1991), Noatak (July 1-2, 1991), and Noorvik (August 2, 1991). A Point Hope key respondent was interviewed by phone on July 29, 1991. Interviews with Kotzebue residents were conducted as time allowed between March and July 1991. Field notes collected in a 1987 study of Kotzebue's subsistence uses provided additional information on sheep hunting in that community.

Because the men and women interviewed were not statistically selected, it was impossible to quantify the collected information as representing a percentage of respondents or communities. Such an analysis would have been misleading. However, because most study communities were small and homogeneous, the interviews yielded information representative of the normal practices in the communities today. The existing rapport between the researchers and interviewed individuals enabled the interviewees to talk honestly about their sheep hunting practices, which in some cases violated state regulations.

## REGULATORY HISTORY OF SHEEP HUNTING

Hunting regulations for sheep in northwest Alaska were first published by the federal government in 1925, when Alaska was still a territory. At that time, Dall sheep hunting north of the Arctic Circle opened August 20 and closed December 31 with a bag limit of three rams, excluding lambs. By the late 1930s, the season had been shortened by one month, and by the mid-1940s the season and bag limit had been further reduced and in some years the season closed completely (U.S. Department of Agriculture 1925-39; U.S. Department of the Interior 1940-55). Minimum curl horn size restrictions appeared by the mid-1950s.

After statehood in 1959, Alaska assumed regulatory authority over sheep hunting. During the 1960s and 1970s, sheep hunting in GMU 23 opened for a six- to nine-week fall season with a bag limit ranging from one to two rams having a minimum curl size (Table 2). In 1982, a winter-long sheep hunting season opened in GMU 23 and ewes as well as rams became legal to harvest. Eligibility for this hunt was limited to people living west of the Noatak River (essentially Kivalina and Noatak residents). A winter sheep hunting season has since been opened each year, although eligibility for the hunt has changed from time to time (Table 2). In July 1991 sheep hunting in GMU 23 for the 1991-92 season was unexpectedly curtailed as a result of poor winter survival of ewes and yearlings and low lamb production. The fall and winter seasons were closed completely in a portion of the unit (Baird Mountains). In the remainder, the fall season was shortened by three weeks but the winter season was not changed.

Since passage of the Alaska National Interest Lands Conservation Act (ANILCA) in 1980, the National Park Service also has assumed a role in regulating sheep hunting in portions of GMU 23. ANILCA identified "resident zone communities" for certain national parks and monuments in Alaska, including Ambler, Kiana, Kobuk, Kotzebue,

TABLE 2. DALL SHEEP HUNTING REGULATIONS, 1961-92, GAME MANAGEMENT UNIT 23<sup>a</sup>

Regulatory Year	Seasons	Total Days	Bag Limit, Areas Affected, & Conditions
1961-63	Aug.1 - Sept.20	51	1 ram with 3/4 curl horn or larger
1963-65	July 20 - Sept.20	63	2 rams with 3/4 curl horn or larger
1965-74	Aug.1 - Sept. 20	51	1 ram with 3/4 curl horn or larger
1974-79	Aug.10 - Sept.20	42	1 ram with 3/4 curl horn or larger
1979-82	Aug.10 - Sept.20	42	1 ram with 7/8 curl horn or larger
1982-84	Aug.1 - Apr.30	273	1 sheep; registration permit required; 50 sheep may be taken; GMU 23 residents residing north and west of Noatak River
	Aug.10 - Sept.20	42	1 ram with 7/8 curl horn or larger; all other hunters
1984-85	Aug.1 - Apr.30	273	1 sheep; registration permit required; 30 sheep may be taken; GMU 23 residents residing north and west of Noatak River
	Aug.10 - Sept.20	42	1 ram with 7/8 curl horn or larger; all other hunters
1985-86 <sup>b</sup>	Aug.10 - Sept.20	42	1 ram with 7/8 curl horn or larger
	Oct. 1 - Apr.30	212	1 sheep; registration permit required; 40 sheep may be taken
1986-87 <sup>c</sup>	Aug.10 - Sept.20	42	1 ram with 7/8 curl horn or larger; registration permit required in portion south and east of Noatak River (excluding Gates of the Arctic National Park)
	Oct.1 - Apr.30	212	1 sheep; season closed south and east of Noatak River (excluding Gates of the Arctic National Park) when 30 sheep have been taken; residents of GMU 23
1987-90	Aug.10 - Sept.20	42	1 ram with 7/8 curl horn or larger; registration permit required in portion south and east of Noatak River (excluding Gates of the Arctic National Park)
	Oct.1 - Apr.30	212	1 sheep; season closed south and east of Noatak River (excluding Gates of the Arctic National Park) when 30 sheep have been taken; residents of GMU 23 north of the Arctic Circle
1990-91	Aug.10 - Sept.20	42	1 ram with 7/8 curl horn or larger; registration permit required in portion south and east of Noatak River (excluding Gates of the Arctic National Park); harvest quota announced prior to hunt
	Oct.1 - Apr.30	212	1 sheep; season closed south and east of Noatak River (excluding Gates of the Arctic National Park) when 30 sheep have been taken
1991-92	CLOSED	0	GMU 23 south and east of Noatak River (excluding Gates of the Arctic National Park) and the Igichuk Hills
	Sept.1 - 20	20	1 ram with 7/8 curl horn or larger; remainder GMU 23
	Oct.1 - Apr.30	212	1 sheep; remainder GMU 23

a. This summary does not include non-resident hunting regulations or federal hunting regulations.

b. In 1985-86, hunting regulations were divided into subsistence and general hunts.

c. In 1987, residents of GMU23 were determined to have customary and traditional use of Dall sheep in GMU23 north of the Arctic Circle.

Noorvik, Selawik, and Shungnak for the Kobuk Valley National Park, and Kivalina, Kotzebue and Noatak for the Cape Krusenstern National Monument in GMU 23. Subsistence hunting in each federal park and monument was open only to residents of the specified communities. Aircraft access was generally prohibited. At the time of this report, GMU 23 subsistence sheep seasons and bag limits on federal public lands were the same as on state-managed lands. However, the federal government had the authority to adopt different regulations. Non-subsistence hunting was not permitted in national parks and monuments, but was permitted in national preserves. Most sheep hunting in GMU 23 has occurred on National Park Service lands, except for that near Kivalina and Point Hope. The park and preserve lands are depicted on the maps of natural features in the findings section of the report, below.

Sheep hunting patterns in GMU 23 also may have been influenced by an enforcement action that occurred in March 1986. Acting upon a tip from the National Park Service, a State of Alaska Fish and Wildlife protection officer contacted three hunters in two camps on the Noatak River near the Kuguruk River mouth. Two hunters in the first camp had six Dall sheep (four over their limits) and had not validated their sheep hunting permits. The hunter in the second camp, an *Iñupiat* elder named Clement Downey, had one Dall sheep but no sheep permit, as well as two wolves he allegedly had chased with a snowmachine. The state filed criminal complaints against all three hunters. One pled no contest and another was found guilty, but Downey responded with a class action suit against the U.S. Secretary of Interior. Downey claimed that the hunting regulations did not conform with the requirements of the subsistence title of the Alaska National Interest Lands Conservation Act. In June 1986, the state dismissed all its charges against Downey; in July 1986, the federal government announced that it would not press charges. In the meantime, Downey's case became a celebrated cause in northwest Alaska. Five years later, local leaders still mentioned the case at public meetings as an example of oppressive government regulation of legitimate subsistence activities. Several respondents mentioned it during this study. The Downey case has colored the relationship between wildlife managers and local hunters, and may have affected subsistence sheep hunting patterns and harvest reporting in recent years.

## SUBSISTENCE SHEEP HUNTING AND USE

Historically, northwest Alaska residents have used virtually all available animal resources at one time or another. The precise configuration of each year's seasonal round of hunting activities has shifted from year to year and decade to decade in response to changes in weather, ice and river conditions, migratory routes, species abundance, technology, economic opportunities, and other factors. Although Dall sheep were likely never a staple food in northwest Alaska such as caribou or salmon, they did fill an important niche in some seasons, in some years, and under some circumstances. Historically, their skins and horns provided valuable material for clothing, utensils, and tools, which at times outranked food value in importance.

Over the past 150 years, sheep hunting practices in northwest Alaska have been directly influenced by such diverse factors as the introduction of firearms and imported clothing, the rise and fall of reindeer herding and commercial trapping, fluctuations in the caribou population, and changes in transportation technology. Yet even with all these changes, many traditional sheep hunting areas have remained in use into the 1990s and at the time of this study sheep meat was still regarded by most as a favored specialty food. In 1987, Division of Subsistence researchers mapped harvest areas for 19 wild resources, including Dall sheep, for all GMU 23 communities except Kotzebue and Point Hope (Schroeder, Andersen, and Hildreth 1987). Figure 2 depicts the areas used for Dall sheep hunting as reported by the mapping study respondents. The map shows areas used for sheep hunting during the lives of living community residents, and spans a period from about the early 1920s to the mid-1980s.

The following section examines historic and contemporary sheep hunting patterns in the nine study communities. As will be shown, some patterns, such as hunting areas, varied considerably from community to community, while others, such as hunting seasons were similar throughout the region. Sheep were widely regarded as similar to caribou and no rules dictated special hunting behavior toward them as existed for bears (see Loon and Georgette 1989). Most interviewed hunters believed that sheep populations, unlike caribou and moose, have been fairly stable over time. This accounts for the stability of traditional sheep hunting areas.

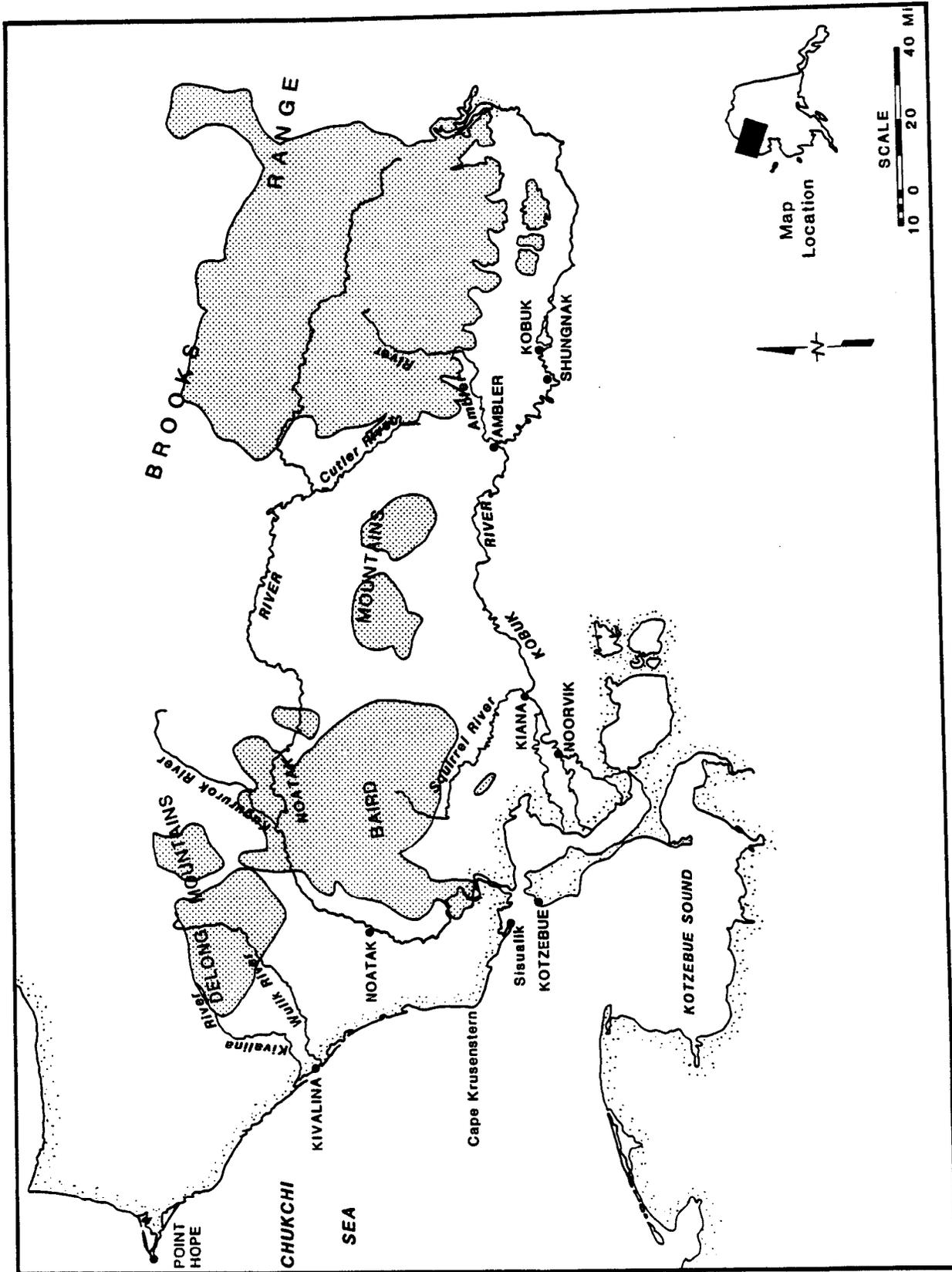


Fig. 2. Dall sheep hunting areas (shaded) regularly used by Kivalina, Noatak, Noorvik, Kiana, Ambler, Shungnak, and Kobuk circa 1920s to 1980s.

## Subsistence Sheep Hunting and Use by Kobuk River Communities

The Kobuk River and its tributaries drain approximately 11,000 square miles of northwest Alaska south of the Brooks Range (Fig. 2). In 1990, approximately 1,533 people lived in five communities along the Kobuk River. Starting from the mouth and moving up river, the communities were Noorvik (531 people), Kiana (385 people), Ambler (311 people), Shungnak (223 people), and Kobuk (69 people). Several families also lived year-round in camps along the Kobuk River or its tributaries.

### Historic Kobuk River Patterns

Before the early 1880s, sheep hunting was primarily a summer (June to August) activity for Kobuk River people. The three *Iñupiat* societies (Kobuk Delta, Middle Kobuk, and Upper Kobuk) described by Burch (1980) as living along the Kobuk River circa 1840 hunted in summer in mountain areas to the north. In the Middle and Upper Kobuk societies most of the able-bodied men spent the summers on foot hunting caribou and sheep in the Brooks Range, while the women stayed in camps along the river to fish. In the Kobuk Delta society, only some men walked north to the Baird Mountains in late summer to hunt large game, while most stayed to hunt seals and caribou (Burch 1980:289-295).

In the mid- to late 1800s, summer hunting for caribou, sheep, marmot, and occasionally bear was aimed more at obtaining hides and sinew for making clothing, tents, and sleeping bags than obtaining food. Sheep skins were widely regarded as superior to caribou skins for warmth and durability. Antlers and horns were saved for making utensils and tools. Much of the meat from the hunts was consumed in the mountains, although hunters prepared and stored as much of it as they could pack home. Fat especially was a choice product. Hunters made packs from caribou or sheep skins by wrapping the meat and fat in the skins and lashing the bundles together. It usually took hunters two round trips to get all their meat to the river (Anderson, Bane, Nelson, Anderson, and Sheldon 1977:122, 301; Giddings 1961:48; Mendenhall, Sampson, and Tennant 1989:31-35). Before the availability of firearms, sheep were killed with snares. By the mid-1880s, rifles were standard technology (Burch 1984:310; Stoney 1899:839).

Between the 1880s and the 1940s, sheep hunting also regularly took place during months of snow cover (November to April). During these decades, caribou were rarely found in the Kobuk River valley, and hunters had to travel north to the Noatak River valley to find them. Trapping also became profitable during this period and hunters found it economical to range widely in search of fur animals. Both these activities drew hunters to the Noatak valley where sheep were more abundant than in the Kobuk River watershed. Hunters killed sheep as needed and considered them an emergency winter food source if caribou were not found. In winter, hunters preferred ewes because they were fatter than rams, whereas in summer and fall hunters preferred rams because their meat and hides were prime (Anderson *et al.* 1977:135-136, 300-302).

Summer caribou hunting grounds of the upper Kobuk River people in the late 1800s and early 1900s were located in the upper Noatak River valley, particularly in the Howard Pass and Etivluk (*Itivliq*) River area (Fig. 3). Winter caribou hunting occurred mostly in the area between Cutler River and Howard Pass, but sometimes as far east as Killik River. Sheep hunting likely took place at productive locations within this general area as well. Lower Kobuk River people walked north in summer to the Noatak River valley through the Squirrel and Salmon River drainages (Anderson *et al.* 1977:144, 271-276). One Kobuk River elder recalled that when upper Kobuk River men reached the Noatak River on summer hunting trips they split into different hunting parties depending on the animal they were hunting. Those hunting caribou went further north beyond the Noatak River, while those hunting sheep went further east up the Noatak River (Mendenhall *et al.* 1989:31). Another upper Kobuk River elder hunted sheep as a young man in the upper Mauneluk (*Maniilaq*) River, while others reported that local people formerly hunted sheep at the headwaters of the Ambler and Reed rivers.

Sheep hunting declined sharply when caribou again began migrating into the Kobuk River valley in the mid-20th century. Anderson *et al.* (1977:300) reported that the last intensive hunting of sheep likely occurred during the 1940s, with summer hunting declining before winter hunting.

The *Iñupiat* of the Kobuk River had many descriptive terms for Dall sheep including *ipniaq* (general term for a Dall sheep), *anuttiisugruk* (an adult male sheep), *nuvak* (a female sheep), *iivutuk* (a sheep less than one year old), *tumutalook* (a yearling sheep), *avaliyalook* (a two-year-old sheep), *navuyaqayak* (a large ram with horns so long it is forced to break them off so that it can graze), and *qalutuksaarak* (a ram with one-half curl) (Anderson *et al.*

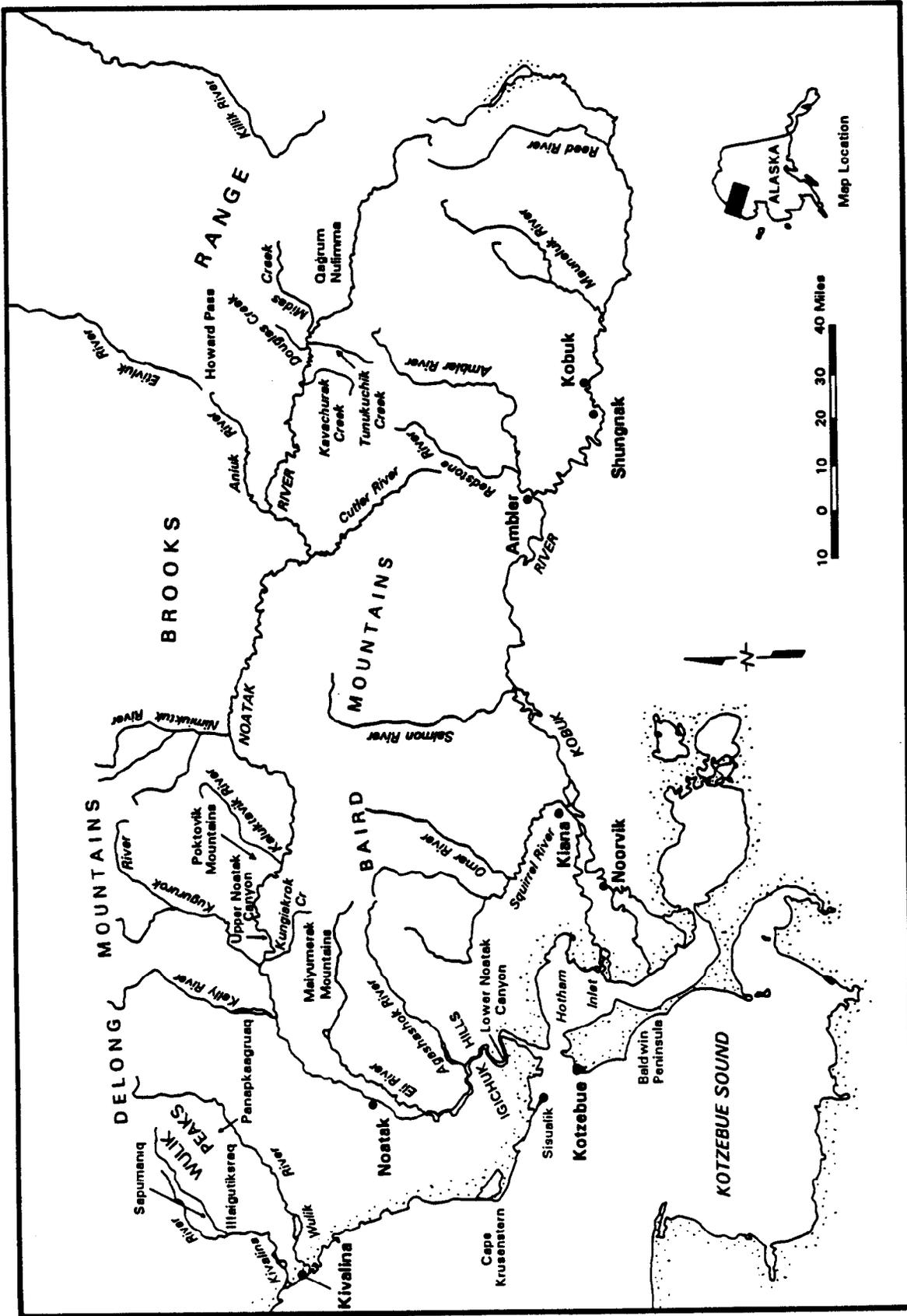


Fig. 3. Natural features of the Kivalina, Wulik, Noatak, and Kobuk river drainages, as named in text.

1977:301). Before the mid-19th century, one traditional rule was that sheep or caribou skins could not be worked when salmon came up river in summer (Giddings 1961:20).

### Contemporary Kobuk River Patterns

In the late 1980s and early 1990s, a few Kobuk River residents continued regularly to hunt sheep. Ambler residents remained the most active sheep hunters of the five Kobuk River villages, perhaps because of their strong sheep hunting tradition and because nearby mountain passes provided them easier access to good sheep hunting areas in the Noatak River valley. Although elderly men in Kobuk and Shungnak in the 1990s had hunted sheep as young men, few younger hunters had done so. Few sheep were available on the Kobuk River side of the Brooks Range and high mountain passes blocked easy access from Shungnak and Kobuk to the Noatak River valley. At least one Shungnak elder said he hoped to take his sons sheep hunting in the near future to teach them about this activity. In the lower Kobuk River village of Noorvik, sheep were taken when encountered in the field, but were not usually the principal object of hunting trips. In Kiana, residents said that sheep were far from the village and were rarely, if ever, still taken.

In Ambler, in the late 1980s and early 1990s, about four or five *Iñupiat* men regularly hunted sheep as well as one or two non-Native village residents. Sheep hunting by Ambler people followed two general patterns. The first took place in fall (August and September) when Ambler hunters chartered a plane to drop them off in the upper Noatak River valley where they hunted sheep on foot. The second took place in spring (March and April) when hunters traveling by snowmachine — often in search of fur animals — killed sheep in the upper Noatak River valley. During these hunting periods, hunters estimated that once afield three to six days were needed to hunt sheep in fall and two days in spring.

Much of Ambler's hunting occurred in traditional sheep hunting areas along the north side of the upper Noatak River valley near Midas Creek (*Ninjuq*), Douglas Creek, and *Qaġrum Nulimma* (west of Nigikpalvgururvrak Creek), about 70 air miles from the community (Fig. 3). Sheep hunting by Ambler residents on the south side of the Noatak River, less common than on the north, often took place near Kavachurak Creek (*Kaviqsuurak*). The *Iñupiaq* name for the area near the mouth of Tunukuchik Creek, just east of Kavachurak Creek, was *Ipnaĭlivik*, meaning

“place having sheep.” Ambler hunters also occasionally traveled to Anaktuvuk Pass in spring and hunted sheep along the way. During months of snow cover, Ambler hunters reached the upper Noatak River valley via the Redstone and Cutler rivers, a traditional route through the avalanche-prone mountains (Fig. 3). Some Ambler hunters preferred not to hunt sheep at all in winter, because of the avalanche danger.

Ambler hunters continued to prefer rams in fall and ewes or young sheep in winter. In general, sheep were treated like caribou in terms of hunting, butchering, and preparation. No cultural rules dictated special behavior toward sheep as existed for bears (Loon and Georgette 1989:33-35). Sheep meat was typically roasted, boiled, or made into soup. Although no longer used for parkas, fall sheep skins continued to be used in making mittens, socks, and mukluks. Sheep horns were made into ulu handles (*paplu*) and large spoons (*qalugiplugich*), and the sinew was used for thread.

Only one Ambler hunter was willing to estimate the village’s annual take of sheep. This hunter, who regularly hunted sheep himself, believed Ambler’s 1990 harvest was about three sheep, representing an average harvest. Some were taken in fall (August to September), and some in spring (March to April). Two of these sheep were young rams (under two years); the sex or age of the other(s) was not known.

In Noorvik, sheep occasionally were taken during months of snow cover by hunters traveling by snowmachine, generally for purposes other than sheep hunting. One hunter said he and two others came across sheep while tracking wolverine one recent March in the northern tributaries of the Squirrel River; they killed four of them: three ewes and one young ram. In 1986, two Noorvik hunters came across sheep while traveling by snowmachine and killed two. They had wanted to take more to distribute to village elders, but were discouraged from doing so by the hunting citation issued that spring against Clement Downey. In another situation, Noorvik residents who had traveled by snowmachine to Noatak on business hunted sheep with friends there in Kungiakrok Creek (*Kaniġaksraq*), a traditional Noatak hunting area.

Interviewed Noorvik hunters estimated that fewer than ten Noorvik residents hunted sheep. In 1990, Noorvik’s sheep harvest was one young ram taken in December. Hunters estimated that the village’s annual sheep harvest ranged from none to five in recent years.

Interviewed Noorvik and Ambler hunters universally felt that the current bag limit for sheep was too low. Hunters had obligations to share their harvest with others in the village and an animal as small and desirable as

sheep did not extend far. Some suggested a limit of two or three sheep; others suggested five. In Ambler, another regulatory concern pertained to the 7/8 curl horn requirement in the fall hunt. Ambler hunters, pragmatic in their approach, often took the more accessible younger rams during the fall hunt and preferred a bag limit of any sheep. Several Ambler residents were also concerned about the amount of low-flying airplane traffic in the upper Noatak River drainage.

Ambler and Noorvik hunters agreed that fewer village residents hunted sheep now than in the past. This was attributed to several factors, including the decline in trapping and the current abundance of caribou, both of which resulted in Kobuk River residents ranging less frequently into the sheep hunting areas of the Noatak River valley. For Ambler residents, the inclusion of the upper Noatak River valley in the Gates of the Arctic National Park discouraged some from sheep hunting, although they had customarily hunted sheep there before. This discouragement grew out of fear of surveillance and enforcement activities by the National Park Service and from uncertainty about the regulations. Kobuk River people reported they craved a taste of sheep from time to time. "We grew up on it because there were no caribou, that's why," one Ambler elder said.

### Sheep Hunting and Use by Noatak

Beginning in the high mountains of the central Brooks Range, the Noatak River flows 325 river miles west through the heart of the western Brooks Range and then 110 river miles south to drain into Kotzebue Sound about six miles north of Kotzebue. The Noatak River watershed encompasses approximately 12,600 square miles, including the southern slopes of the DeLong Mountains and the northern slopes of the Baird and Schwatka mountains. In 1991, there was only one permanent settlement on the Noatak River, the community of Noatak (333 people in 1990), located about 70 river miles from the mouth.

### Historic Noatak Patterns

At the time of European contact, two *Iñupiat* societies inhabited the Noatak River, the *Napaaqtugmiut* who inhabited the timbered lower river as far down as the lower canyon, and the *Noatagmiut* who lived between the

upper canyon and Aniuk River (Fig. 3). Estimates of the mid-19th century population of the *Napaaqtuġmiut* ranged from 196-225 people and of the *Noatagmiut* from 550-945 people (Foote 1965:251-256; Burch 1980:290-294). Both followed seasonal rounds in which fish, caribou, and marine mammals figured prominently. In fall and winter, Noatak River women fished and hunted small mammals while the men hunted caribou. In March, the *Napaaqtuġmiut* moved to the coast to hunt seals and beluga before returning up river in summer to fish for salmon and hunt caribou in the DeLong Mountains. The *Noatagmiut* remained inland until after breakup, when most traveled down river to the coast for beluga hunting, returning home in fall to resume caribou hunting and fishing. Some *Noatagmiut* remained inland year-round (Burch 1980:290-294).

A reconstruction of *Napaaqtuġmiut* and *Noatagmiut* resource harvests and seasonal round circa 1850 suggested that sheep were hunted in fall and winter by the *Napaaqtuġmiut* and in all seasons by the *Noatagmiut* remaining year-round in the Noatak River basin. Ten sheep was the estimated annual kill by the lower river *Napaaqtuġmiut* circa 1850, while the larger, up river *Noatagmiut* society took an estimated 144 sheep in winter and 70 sheep in summer (Foote 1965:286-292). These estimates were based on the caloric needs for protein and carbohydrates given the principal seasonal foods available and the possible seasonal population distributions at the time, and did not consider the need for skins for clothing. Of all the traditional societies in northwest Alaska in the mid-19th century, the *Noatagmiut* living year-round in the Noatak River valley probably used sheep most extensively as a food source because resources such as salmon and marine mammals were not readily available or accessible.

As in the Kobuk River valley, summer and fall (June to October) sheep hunting by Noatak River people in the mid-19th and early 20th centuries supplied skins for clothing as well as food. Winter sheep skins were occasionally kept if the hair was not too thick. Sheep parkas were highly prized because sheep hair broke off rather than pulled loose like caribou hair, so they lasted longer and remained warmer. Summer hunting declined after the mid-20th century when skin clothing fell into disuse (Uhl and Uhl 1979:19). Sheep skins, particularly from rams, were highly valued for sleeping bags because of their lightness and warmth. Several middle-aged Noatak residents in 1991 recalled using sheep-skin sleeping bags in the past.

The decline of caribou in the 1870s and 1880s severely affected the *Napaaqtuġmiut* and *Noatagmiut*. Most dispersed to the Arctic coast or Kotzebue Sound, disrupting their customary patterns of seasonal movement and

harvest (Burch 1980:290-294). In 1908, when a mission school opened at the present site of Noatak, most of the surviving *Napaaqtuġmiut* and *Noatagmiut* converged in the new village (Foote and Williamson 1966:1050).

As in the Kobuk River valley, Noatak hunters had to range far to the north to find caribou in the early 20th century. Hunters sometimes killed sheep along the way, particularly in the Kivalina River drainage, the route often used to the northern hunting areas. Sheep were also taken by trappers traveling by dog team when no caribou were available. In the 1940s, caribou returned to the lower Noatak River valley and hunters no longer had to travel far to find them. Yet sheep hunting by Noatak residents continued to a greater degree than in the Kobuk River communities because sheep were considerably more accessible. For this reason, sheep hunting was not as closely intertwined with caribou hunting in Noatak as it was in the Kobuk River valley.

During the reindeer era in the first half of the 20th century, Noatak herders in the mountains sometimes hunted sheep, particularly in the Kivalina River area. One Noatak elder and former reindeer herder said people especially liked to catch spring lambs, which had “delicious” white fat.

Several elders described Noatak’s sheep hunting patterns in the 1940s and 1950s when they were young men. In late fall (October), Noatak men traveled by dog team to the Wulik River to seine for char. Afterwards they hunted sheep in the nearby mountains, about a day’s dog team journey from the seining area. Often a group of six or seven hunters and dog teams traveled together, with each hunter trying to get one or two sheep. Rams with big horns were preferred, but hunters took whatever they could catch.

In winter and spring, Noatak people also hunted sheep. At this time of year, they hunted in the upper Kivalina River, Maiyumerak Mountains (*Mayuumarut*), Kungiakrok Creek (*Kaniġaksraq*), the upper canyon (*Ipnaġruat*), and Kaluktavik Creek (Fig. 3). Noatak people typically did not hunt sheep after March because the skins were shedding by then and were considered unusable.

In summer, Noatak people hunted sheep by boat and on foot in the upper canyon (primarily the south side), Poktovik Mountains (*Pauktuġvik*), and Kungiakrok Creek. Before boat motors were available, hunters walked with pack dogs up the Kelly (*Kuuġruuraq*) and Kugururok (*Kuugruaq*) rivers to get sheep, then dried the meat, packed it to the river, and floated in small boats back to the village. Because these were long trips up rivers too shallow for a motor boat, the areas fell into disuse in summer once motorized transportation developed.

## Contemporary Noatak Patterns

Noatak residents remained the most active sheep hunters in the region in the late 1980s and early 1990s, as a result of their proximity to good sheep habitat and hunting areas. As one hunter said, “We see sheep wherever we go.” Most contemporary sheep hunting by Noatak residents took place in fall (August-September) and spring (March-April). Some also occurred in summer (June-July).

During fall and summer, hunters traveling the Noatak River by boat often killed sheep they saw near the river, typically in the upper Noatak River canyon (*Ipnaġruat*) and near the Poktovik Mountains (*Pauktuġvik*) which come close to the river’s edge. Noatak people traveled these sections of river — at least three hours by boat from the village — most frequently in fall for caribou hunting, but occasionally some boated up there immediately after breakup, accounting for the early summer (June) harvest. Hunting sheep in the upper canyon was a very old tradition. Some Noatak residents said they found sheep less often in the canyon now than they once did, which they attributed to increased sport hunting to the south, more boat traffic, and more recreational camping by visitors floating the Noatak River. Noatak residents also occasionally walked into the Poktovik Mountains in fall to hunt sheep, but caribou hunting was the main harvest activity at this time of year and few expended the time and energy to climb the mountains for sheep.

In winter and spring, hunters traveled by snowmachine to good sheep hunting areas in the western Baird Mountains, primarily in Kungiakrok Creek (*Kaniġaksraq*), the Maiyumerak Mountains (*Mayuumarut*), and the upper Eli River where they often set up camp and stayed a few days (Fig. 3). Hunters also occasionally took sheep in the upper Wulik and Kivalina rivers when traveling in the area by snowmachine. Sheep were less abundant in these areas than in the Baird Mountains. In October, as soon as snowmachine travel was possible, one Noatak man occasionally hunted sheep at *Panapkaagruaq* on the upper Wulik River. All these were traditional sheep hunting locations.

Because of the long distance (60-100 miles one way) and the localized nature of the sheep population, Noatak residents seldom hunted sheep in the DeLong Mountains other than the Wulik Peaks area. A few young hunters, however, hunted sheep in spring on several occasions in the upper Kugururok (*Kuugruaq*) and Kaluktavik river drainages. On rare occasions, Noatak people hunted sheep in the headwaters of the Noatak River, particularly near

Midas Creek (*Umiakuvik*) where one hunter said the sheep were so plentiful “they looked like snow moving around.”

Noatak hunters estimated the village’s annual harvest at 10 to 20 sheep, with up to 30 being taken in productive years. In 1990, Noatak’s harvest was estimated by respondents to be closer to 10 sheep. Some hunters killed sheep every year, but most took sheep less often. For example, one Noatak hunter last killed a sheep 12 years ago (a young ram in fall in the upper canyon), while another last killed a sheep seven years ago (a young ram in fall in the Poktovik Mountains). As in other villages, hunters often killed more than one when they did get sheep, frequently two and sometimes three. One hunter said that in good years he killed up to ten sheep: two or three in summer, two or three in fall, and several in winter and spring. In poor hunting years, he killed one or two sheep. Another hunter killed three sheep in the past five years: two in one year and one in another. One elder estimated he had killed about 50 sheep over his life, most recently in the late 1980s when he and another hunter killed four.

Noatak hunters said they had little preference for ewes or rams and simply took whatever they could catch. Sheep meat was prepared like caribou, usually roasted, boiled, or made into soup. One hunter ranked sheep meat as the finest, followed in order by reindeer, caribou, and moose. Fat from fall sheep was used in the preparation of *akutuq* (Eskimo ice cream), a favored dish which typically combined whipped fat, berries, and sometimes dried fish. Although sheep skins were no longer widely used, hunters sometimes kept fall skins in good condition. Spring sheep skins were usually shedding and considered worthless. Sheep horn was valued as a better material than caribou antler for *ulu* handles because it did not crack.

Noatak hunters widely agreed that less sheep hunting occurred now than in the past. One elder said that much less game in general was taken now than in former days. Hunters also thought the sheep population had generally been stable in their hunting areas over the years, and there were as many sheep in 1990 as in former times.

Noatak hunters objected to the one-sheep bag limit because sheep were small animals and hunters were obliged to share the meat widely, especially with elders. Some recommended a bag limit of at least five sheep. Noatak residents believed the season should open earlier to accommodate their traditional summer hunting in the upper canyon area. They also supported elimination of the 7/8 curl requirement for fall sheep. Few Noatak residents followed these state regulations because they conflicted with their traditional subsistence practices.

## Sheep Hunting and Use by Kivalina

Kivalina is a coastal community (317 people in 1990) located on the ocean beach just north of an entrance into Kivalina Lagoon, about 75 miles northwest of Kotzebue. Both the Kivalina and Wulik rivers, whose headwaters were in the DeLong Mountains at the western tip of the Brooks Range, empty into Kivalina Lagoon (Fig. 4).

### Historic Kivalina Patterns

Researchers found few references in the literature pertaining to a historic use of sheep by Kivalina residents. In the mid-19th century, Kivalina people lived in small settlements along the Wulik, Kivalina, and upper Kukpuk rivers during fall and winter, where they subsisted on fish, caribou, and small game (Fig. 4). In summer, some Kivalina people hunted caribou on foot in inland areas (Burch 1980:289). North of Kivalina along the Chukchi Sea, coastal bluffs in the Cape Seppings and Cape Thompson areas supported sheep until the early 1920s. It is likely that sheep were hunted for food and skins during the seasons that people lived and traveled near sheep habitat. Before snowmachines became available in the 1960s, Kivalina hunters reported hunting sheep on foot or by dog team in late fall after seining for char on the upper Wulik River.

### Contemporary Kivalina Patterns

As in other northwest Alaska villages, particularly those of the Kobuk River drainage, sheep hunting by Kivalina residents in the latter 20th century has been tied to the abundance and availability of caribou. One hunter said that as long as caribou were available, Kivalina men only occasionally hunted sheep. Other residents reported that sheep hunting was more common in former years when there were no caribou nearby.

In the late 1980s and early 1990s, Kivalina residents primarily hunted sheep in winter, particularly in March and April when days were long. Inland access to sheep at other seasons of the year was difficult because the local rivers were too shallow to reach mountain areas by motor boat. In summer, Kivalina residents occasionally sighted sheep during trips to collect bird eggs from cliffs at Cape Thompson. Burch (1985:83-84, 233) reported two sheep

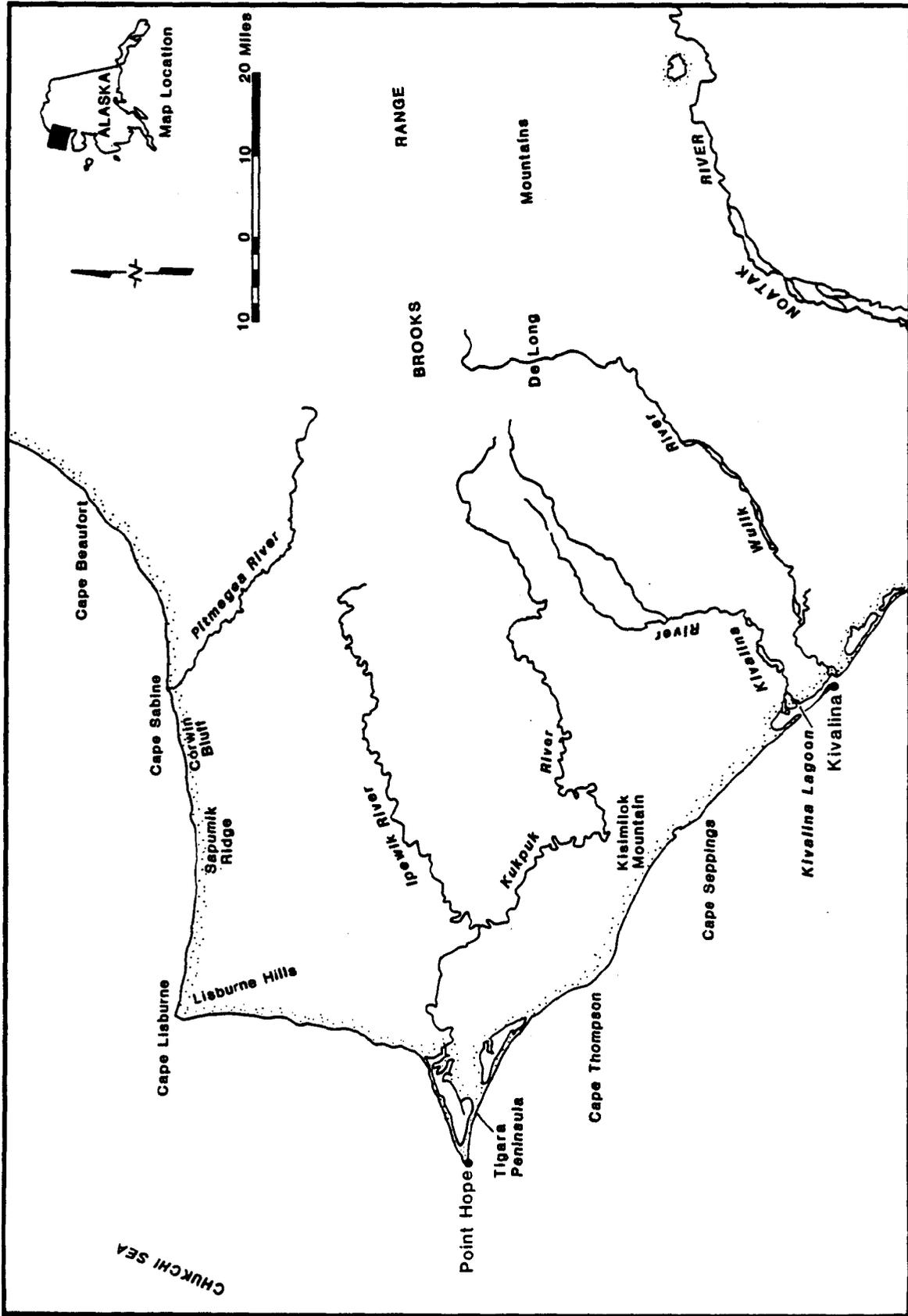


Fig. 4. Natural features of the Arctic coast from Kivalina to Cape Beaufort, as named in the text.



Most Kivalina hunters agreed that fewer sheep were taken by village residents now than in former years when caribou were scarce or absent. Evidence of this pattern surfaced in spring 1991 when Kivalina whaling captains, in need of meat to feed their crews, were considering hunting sheep because few caribou had wintered in the area.

Kivalina hunters widely believed that the bag limit for sheep should be more than one. Several suggested a five sheep bag limit, citing their responsibilities to share meat with many village households and the small size of sheep. One hunter said, "When a hunter encounters lots of sheep, it is not appropriate to get only one. Five sheep is a good bag limit." Some Kivalina hunters were not aware that a winter sheep season was open for subsistence hunting even though this had been in effect since 1982-83.

Since 1985-86, when the revised winter sheep season in GMU 23 was established, only one *Iñupiat* hunter has obtained a harvest report for the hunt along with two non-Native residents. Other sheep kills by Kivalina residents were simply not reported. In essence, Kivalina hunters continued to follow long-established hunting patterns that made sense to them, regardless of regulatory constraints.

### Sheep Hunting and Use by Point Hope

The community of Point Hope (639 people in 1990) is near the tip of the Tigara Peninsula, the western-most extension of Alaska's Arctic coast (Fig. 4). The Tigara Peninsula itself is flat and low, more water than land. But along the coast to the north and south, the Tigara Peninsula gives way to sheer 500-foot cliffs at Cape Lisburne (50 miles north) and Cape Thompson (30 miles south). The Lisburne Hills are 25 miles east of Point Hope.

### Historic Point Hope Patterns

In the 19th century, sheep were common in the Lisburne Hills and along coastal cliffs in the Point Hope area, but by the 1920s these animals were nearly gone. Pruitt (1966:527) reported that elderly Point Hope hunters recalled hunting sheep in the Lisburne Hills and on the Cape Thompson cliffs, while others reported seeing sheep at Cape Beaufort and near Cape Seppings (Fig. 4). Foote and Williamson (1966:1047) cited the rifle for leading to the decline of sheep in the Point Hope area. Burch (1981:30) had a similar assessment, reporting that sheep's wariness

and steep habitat made them difficult to hunt with a bow, but rifles changed sheep hunting into a relatively simple activity.

In the 19th century, sheep were killed in summer by Point Hope people remaining along the coast to harvest sea-cliff birds, eggs, marine mammals, and fish and in fall by people living near Cape Lisburne (Burch 1981:56-59). Places in the Point Hope region historically significant for their sheep hunting opportunities included Corwin Bluff (*Aatqigzaqtuq*) and Sapumik Ridge (*Sapummiq*), both located between Cape Lisburne and Cape Sabine (Burch 1981:68) (Fig. 3).

### Contemporary Point Hope Patterns

After an absence of 25 to 30 years, Point Hope hunters have recently encountered sheep again in the local area. In each of the last two years (1991 and 1990), Point Hope hunters killed one sheep, most recently near Cape Thompson and the previous year near Cape Lisburne (Fig. 4). Both were young sheep killed early in summer (June to early July) and both were found a short distance inland from the coast. For Point Hope hunters, the recent sheep harvests were very special events, "almost like catching a whale," one hunter said.

In the 1970s, Point Hope people occasionally hunted sheep in winter when village elders craved a taste of the meat. With no sheep near Point Hope, hunters traveled east by snowmachine to sheep hunting areas between the Kivalina and Noatak rivers. One Point Hope hunter said they rarely hunt there now, possibly because they have plenty of caribou nearby to satisfy their need for fresh meat.

### Sheep Hunting and Use by Kotzebue

Kotzebue is located about five miles south of the northern tip of the Baldwin Peninsula, which separates Hotham Inlet from Kotzebue Sound. The Kobuk River flows into Hotham Inlet which, along with the Noatak River, drains into Kotzebue Sound. Kotzebue is located near the juncture of the largest drainages in GMU 23, facilitating travel into much of the region. In part because of its location, Kotzebue has become the regional service center and the largest community in GMU 23 (2,751 people in 1990).

## Historic Kotzebue Patterns

Few accounts of 19th-century sheep hunting by Kotzebue people, the *Kikiktagrumiut*, exist in the literature. The seasonal round of the *Kikiktagrumiut* in the first half of the 19th century included fall caribou hunting in the western Baird Mountains (Burch 1980:290), and sheep may have been taken incidental to this. Archeologists unearthed a large ladle made of sheep horn in a 1951 excavation near Kotzebue that dated to the period between 1400 A.D. and 1550 A.D. (VanStone 1955:116-133). VanStone (1955) surmised that sheep horns were likely traded to Kotzebue people by interior groups along the Kobuk and Noatak rivers who hunted sheep in the Brooks Range. In any case, the 19th-century *Kikiktagrumiut* primarily depended on seals, beluga, caribou, and fish (Burch 1980:290). Sheep were, in all likelihood, a minor resource.

Uhl and Uhl (1977:55) reported that early in the 20th century men from Sisualik (a summer camp 10 miles northwest of Kotzebue) hunted in summer on foot for caribou, sheep, and bear. Obtaining skins was the main purpose of this hunt as summer caribou and sheep skins were the most suitable for clothing. During the reindeer herding era (1910-45), herders working in the mountains in summer also hunted sheep. As late as the 1940s, Kotzebue area men took kayaks up the Noatak River to the mouth of the Agashashok River (*Iggisisuat*) and from there walked to sheep hunting areas (Fig. 3). In the 1970s, sheep moved into the western Igichuk Hills behind Sisualik after an absence of at least 100 years and possibly much longer (Uhl and Uhl 1977:55).

## Contemporary Kotzebue Patterns

By the latter half of the 20th century, Kotzebue had evolved into a regional trade and service center with a diverse population. Hunting patterns, too, were more diverse in Kotzebue compared to the smaller, more homogeneous villages in the region. In the case of sheep, Kotzebue's hunting was characterized by two general patterns: fall (August through September) hunting by airplane and winter (December through April) hunting by snowmachine. Other less prevalent patterns involved fall hunting by boat and by all-terrain vehicle.

Kotzebue hunters with suitable private airplanes were able to reach fall sheep hunting areas not accessible to river-based hunters. Some of these pilots made annual sheep hunting trips. These hunters primarily used areas in

TABLE 3. REPORTED FALL DALL SHEEP HARVESTS BY KOTZEBUE RESIDENTS, 1987-89.

Year	Baird Mountains	DeLong Mountains	Total
1986	*	*	1
1987	3	1	4
1988	4	0	4
1989	4	1	5

\* Not available

the Maiyumerak (*Mayuumarut*) Mountains, particularly Kungiakrok Creek (*Kaniġaksraq*) and the upper Eli River, although some also hunted sheep on the north side of the Noatak River in the DeLong Mountains (Fig. 3). These hunters generally sought large rams as required by regulation and complied with harvest reporting requirements. Most of the reported fall sheep harvest by Kotzebue residents was taken by airplane-equipped hunters.

Kotzebue hunters also used boats for hunting sheep. Kotzebue hunters traveling by boat on the Noatak River came across and killed sheep in the upper canyon or hiked into the Poktovik Mountains (*Pauktuġvik*) to get sheep. One Kotzebue hunter described the upper canyon as a traditional sheep hunting area, saying that his father taught him how to hunt there. Compared with airplane hunters, river-based hunters were probably less likely to report their harvests. In fall 1986, for instance, one river-based Kotzebue hunter killed three sheep and another killed one sheep, none of which was reported.

A small number of Kotzebue residents hunted fall sheep by "four-wheelers" in the Igichuk Hills, transporting the vehicles by boat from Kotzebue. In terms of land use, this was a fairly new hunting pattern as sheep first moved into the Igichuk Hills in the 1970s after an absence of at least 100 years. In other respects, this represented a very old pattern of adaptation by subsistence hunters to shifting species abundance and availability.

In the late 1980s, the annual reported fall sheep harvest by Kotzebue residents ranged from four to five sheep, which is a low estimate because some sheep kills were not reported (Table 3). Researchers did not know what percentage of the actual harvest the reported harvest included, although department staff believed most airplane-based hunters complied with reporting requirements. The harvest in the Baird Mountains was all taken by hunters using airplanes. In the DeLong Mountains, information on hunter transportation was not available.

TABLE 4. NUMBER OF PERMITS ISSUED AND RETURNED AND NUMBER OF SUCCESSFUL AND UNSUCCESSFUL HUNTERS, WINTER SUBSISTENCE DALL SHEEP HUNT, KOTZEBUE, 1985-91.

Year	Number of Permits Issues	Number of Successful Hunters	Number of Unsuccessful Hunters/Did Not Hunt	Number of Permits Not Returned
1985-86	46	7	39	0
1986-87	19	7	11	1
1987-88	28	5	23	0
1988-89	28	9	19	0
1989-90	40	8	20	12
1990-91	36	5	4	27

The second main sheep hunting pattern, probably more prevalent than the fall hunt, took place in winter with snowmachines. Although most Kotzebue hunters believed that fall sheep meat was of higher quality than winter meat, the ubiquitous snowmachine made sheep hunting areas considerably more accessible in winter than in fall. Kotzebue hunters used many of the same sheep hunting areas in winter as in fall, primarily in the Maiyumerak (*Mayuumarut*) Mountains and the upper Eli and Agashashok (*Iggisisuat*) rivers (Fig. 3). Sheep hunting areas in the DeLong Mountains were far from Kotzebue and thus less commonly used. Most snowmachine-based sheep hunting took place during the longer days of March and April. Hunters also reported taking sheep from December through February.

Since 1985-86 when Kotzebue residents first became eligible for a winter (October to April) subsistence sheep hunt (see Table 2), the number of reported successful Kotzebue hunters ranged from five to nine. Table 4 summarizes the number of permits issued to Kotzebue hunters, the number of successful and unsuccessful Kotzebue hunters, and the number of permits not returned for each winter subsistence hunt from 1985 through 1991. The decline in permits in 1986-87 was likely attributable to the enforcement action against Clement Downey the previous spring which discouraged some hunters from killing sheep or from participating in the regulatory system.

The annual reported winter (October to April) sheep harvest by Kotzebue residents since 1985-86 ranged from 5 to 12 sheep, slightly more of which were rams than ewes (Table 5). The percentage of the actual harvest the

TABLE 5. REPORTED WINTER SUBSISTENCE DALL SHEEP HARVEST BY KOTZEBUE RESIDENTS, 1985-91.

Year	Rams	Ewes	Unknown	Total
1985-86	2	3	7	12
1986-87	2	5	0	7
1987-88	2	3	0	5
1988-89	6	3	0	9
1989-90	4	3	1	8
1990-91	5	0	0	5
Total	21	17	8	46

reported harvest represents was not known. Researchers believed the winter harvest was generally poorly reported, particularly by *Iñupiat* hunters who followed traditional hunting patterns not accommodated in the regulations. In 1985 the number of sheep killed (Table 5) exceeded the number of successful hunters (Table 4) because two hunters were known to have taken more than one sheep that year.

An examination of the winter subsistence season harvest reports revealed that non-Native hunters took trophy rams (32 inches or more curl) far more often than Native hunters. Eleven of the 19 rams (58 percent) taken by Kotzebue hunters between 1986-87 and 1990-91 had a curl of 32 inches or more. (Data for 1985-86 were not included because few harvest reports specified curl size). Non-Natives took 73 percent of these large rams, while Native hunters took 18 percent (Table 6). One large ram was taken by a hunter of unknown identity (9 percent). In contrast, the number of Natives and non-Natives taking ewes and smaller rams was about equal.

In summary, Kotzebue's sheep hunting took place primarily in fall and winter with airplanes and snowmachines respectively as the primary means of access. Some sheep were also taken by river-based hunters in boats and with "four-wheelers." The combined fall and winter harvests reported by Kotzebue residents between 1986-87 and 1989-90 ranged from 8 to 13 sheep. In the winter subsistence hunt, non-Native hunters took large, trophy rams much more frequently than Native hunters. The fall sheep hunting regulations, which required a 7/8 curl ram, were oriented to the sport hunter and essentially precluded many subsistence hunters from lawfully participating. As in

TABLE 6. NUMBER OF RAMS BY SIZE AND EWES REPORTED KILLED IN WINTER SUBSISTENCE DALL SHEEP HUNT BY NATIVE AND NON-NATIVE HUNTERS, KOTZEBUE, 1986-91

	Ewes/Small Rams	Large Rams (+32" curl)
Native hunters	11 (55%)	2 (18%)
Non-Native hunters	9 (45%)	8 (73%)
Unknown		1 (9%)

(Size and/or sex of sheep unknown=3 sheep)

the villages, *Iñupiat* hunters in Kotzebue objected to the bag limit of one sheep which, because of the small size of sheep, made it difficult for them to fulfill their cultural obligation to share food widely.

#### SUMMARY AND DISCUSSION

Dall sheep hunting by northwest *Iñupiat* living in and near the Brooks Range has a long history. In the 19th century, sheep hunting took place in summer by boat and on foot and in winter by dog team. Sheep skins were more highly valued than caribou for clothing, and the meat provided diversity in the diet and emergency sustenance when caribou were not available. Over the past 150 years, northwest Alaska hunters have adapted their sheep hunting practices to technological and economic changes and to changes in species abundance and in other aspects of the natural environment.

During the late 1980s and early 1990s, subsistence hunting of Dall sheep continued in several northwest Alaska (GMU 23) communities, namely Ambler, Kivalina, Kotzebue, Noatak, Noorvik, and Point Hope. In Kiana, Shungnak, and Kobuk, hunters rarely, if ever, hunted sheep during the early 1990s, citing the long distances involved and the availability of caribou nearby. Noatak remained the most active sheep hunting community in the region, likely due to its location near good sheep hunting areas.

Most sheep hunting in northwest Alaska in the 1990s took place in traditional hunting areas. These have changed little over the decades, likely owing to the reported stability of the sheep population. Kivalina residents hunted sheep near Cape Thompson and in the upper Kivalina and Wulik rivers. Noatak residents hunted in the

TABLE 7. ESTIMATES BY INTERVIEWED HUNTERS OF DALL SHEEP HARVESTS IN GMU 23 STUDY COMMUNITIES

Community	1990 Sheep Harvest	Average Range of Harvest
Ambler	3	2-4
Kiana	0	0
Kivalina	2	0-3
Kobuk	0	0
Kotzebue	13	8-13
Noatak	10	10-30
Noorvik	1	0-5
Point Hope	1	0-1
Shungnak	0	0
Total	30	20-56

NOTES: Kivalina harvest is for 1990-91; Kotzebue harvest is for 1989-90.

DeLong and western Baird Mountains, particularly in the upper Noatak canyon, Maiyumerak Mountains, upper Eli River, Kungiakrok Creek, and Poktovik Mountains. Kotzebue residents used many of these same areas with the addition of the Igichuk Hills and the upper Agashashok River. Ambler residents hunted in the upper Noatak valley. In Noorvik, sheep hunting was more occasional, occurring in the northern tributaries of the Squirrel River. In Point Hope, hunters recently began encountering sheep again in the Cape Lisburne and Cape Thompson areas after a long absence. Hunting sheep with the use of an airplane was common only in Kotzebue in fall, with a small amount also taking place in Ambler.

Sheep hunting in the region was most common in March and April when daylight lasted longer and traveling conditions were good. In some communities, sheep hunting at this time of year took place in conjunction with wolf and wolverine hunting. Only Ambler, Noatak and Kotzebue residents hunted sheep in fall; other study communities generally did not have access to sheep at this time of year. In Point Hope, recent sheep kills took place in early summer. Summer sheep hunting also occurred in Noatak and Kivalina.

The total 1990 sheep harvest by residents of the study communities, based on community estimates by key respondents, was estimated to be about 30 sheep (Table 7). This included five sheep taken in fall by airplane-

equipped Kotzebue hunters. Based on hunters' estimates for their individual communities, the regional sheep harvest by local residents in contemporary times (circa 1970s to the present) typically ranged from 20 to 56 sheep annually. Subsistence hunters tended to kill sheep only occasionally but to take more than one when they did. Only a few individuals hunted sheep on an annual basis.

Interviewed residents widely agreed that subsistence hunters took fewer Dall sheep now than in the past. This was not attributed to any one factor; subsistence activities formed a complex pattern responding to a variety of influences. The abundance of nearby caribou in the latter 20th century was probably a leading cause for the decline of sheep hunting, but other factors such as the availability of imported clothing and the demise of reindeer herding and commercial trapping also contributed. In more recent years, the establishment of national park areas and a 1986 enforcement action against a Kotzebue sheep hunter discouraged some from sheep hunting. Nevertheless, sheep meat has remained a favored food in many communities today and continues to provide diversity to the usual meat fare of caribou and moose.

After decades of relatively restrictive seasons and bag limits, state sheep hunting regulations became increasingly liberal in the early 1980s, allowing a winter-long hunting season for both ewes and rams. This substantially improved regulatory conditions for the subsistence hunter. Yet several traditional subsistence hunting practices still were not accommodated by regulation. These included no open season in early summer, a 7/8 curl horn requirement for sheep in the fall hunt which precluded taking younger sheep for food, and a one-sheep bag limit which precluded efficient hunting for sharing in the community.

In general, only hunters in Noatak, Kivalina, and Point Hope took sheep in early summer. In Noatak, hunters killed sheep they encountered in the upper Noatak canyon during summer boating trips, while in Kivalina and Point Hope sheep were sometimes killed when seen in coastal areas. Sheep hunting at this time of year was highly opportunistic, and few sheep in total were taken. This hunting pattern, however, was quite traditional.

Fall sheep hunting by river-based hunters from Kotzebue and Noatak was also traditional and highly opportunistic, with hunters taking rams or ewes when encountered in the upper Noatak canyon and Poktovik Mountain area. This traditional practice conflicted with the requirement that sheep taken at this time of year be rams with at least 7/8 curl horn. Such a regulation was oriented to sport hunters who desired large rams, including many of the

airplane-equipped Kotzebue sheep hunters, but did not accommodate the traditional river hunting patterns of *Iñupiat* residents.

The one-sheep bag limit was probably the most problematic regulation for subsistence sheep hunters throughout the region. Village hunters, although seldom taking sheep every year, often killed more than one when they did get sheep. With an animal as small, desirable, and uncommon in the subsistence diet as sheep, one animal did not extend far enough for *Iñupiat* hunters to fulfill their cultural obligation to share their harvests with other community members. Hunters recommended two to five sheep as a more appropriate bag limit. As an alternative, a few hunters suggested that transferable harvest tickets be instituted which would enable them to lawfully hunt for others.

Harvest reporting by northwest Alaska hunters was generally poor for most wildlife species, including Dall sheep. Local hunters were reluctant to report their traditional sheep harvest activities when they were in conflict with regulatory seasons and bag limits. It is likely that improving regulations to accommodate traditional *Iñupiat* hunting practices would be a first step towards improving harvest reporting. It would also be a step toward a formal recognition of traditional hunting patterns that continue to be practiced within the region.

## REFERENCES

- Anderson, Douglas D., Ray Bane, Richard Nelson, Wannu W. Anderson, and Nita Sheldon  
1977 *Kuvvangmiut Subsistence: Traditional Eskimo Life in the Latter Twentieth Century*. National Park Service, U.S. Department of the Interior, Washington, D.C.
- Burch, Ernest S., Jr.  
1980 *Traditional Eskimo Societies in Northwest Alaska*. In *Alaska Native Culture and History*, Y. Kotani and W.B. Workman, eds. pp 253-304. *Senri Ethnological Studies No. 4*, National Museum of Ethnology, Osaka, Japan.  
1981 *The Traditional Eskimo Hunters of Point Hope, Alaska: 1800-1875*. North Slope Borough, Alaska.  
1984 *Kotzebue Sound Eskimo*. In *Handbook of North American Indians*, Vol. 5, pp. 303-319. Washington: Smithsonian Institution.  
1985 *Subsistence Production in Kivalina, Alaska: A Twenty-Year Perspective*. Division of Subsistence, Alaska Department of Fish and Game, Juneau, Technical Paper No. 128.
- Foote, Don Charles  
1965 *Exploration and Resource Utilization in Northwestern Arctic Alaska Before 1855*. Unpublished Ph.d dissertation, Department of Geography, McGill University, Montreal.
- Foote, D.C. and H.A. Williamson  
1966 *A Human Geographical Study*. In *Environment of the Cape Thompson Region, Alaska*, Chap. 36, pp. 1041-1107. Washington: U.S. Atomic Energy Commission.
- Giddings, J.L.  
1961 *Kobuk River People*. *Studies of Northern Peoples*, No. 1, Department of Anthropology and Geography, University of Alaska, College, Alaska.
- Loon, Hannah, and Susan Georgette  
1989 *Contemporary Brown Bear Use in Northwest Alaska*. Division of Subsistence, Alaska Department of Fish and Game, Juneau, Technical Paper No. 163.
- Mendenhall, Hannah, Ruthie Sampson, and Edward Tennant, editors  
1989 *Lore of the Inupiat: The Elders Speak*. Vol. 1. Northwest Arctic Borough School District, Kotzebue, Alaska.
- Pruitt, William O.  
1966 *Ecology of Terrestrial Mammals*. In *Environment of the Cape Thompson Region, Alaska*, Chap. 20, pp. 519-564. Washington: U.S. Atomic Energy Commission.
- Schroeder, Robert, David B Andersen, and Grant Hildreth  
1987 *Subsistence Use Area Map Atlas for Ten Kotzebue Sound Communities*. Maniilaq Association and Division of Subsistence, Alaska Department of Fish and Game, Juneau.
- Stoney, George M.  
1899 *Explorations in Alaska*. Annapolis, Maryland: U.S. Naval Institute.

**Uhl, William R. and Carrie K. Uhl**

**1977** Tagiumsinaaqmiit. Ocean Beach Dwellers of the Cape Krusenstern Area: Subsistence Patterns. Cooperative Park Studies Unit, University of Alaska, Fairbanks, Occasional Paper No. 14.

**1979** The Noatak National Preserve: Nuatakmiit, A Study of Subsistence Uses in the Noatak River Valley. Cooperative Park Studies Unit, University of Alaska, Fairbanks, Occasional Paper No. 19.

**U.S. Department of Agriculture**

**1925-39** Laws and Regulations Relating to Game, Land Fur-Bearing Animals, and Birds in Alaska. Alaska Game Commission, Bureau of Biological Survey, Washington, Circulars 1-17.

**U.S. Department of the Interior**

**1940-44** Regulations Relating to Game, Land Fur Animals, and Birds in Alaska. Alaska Game Commission, Fish and Wildlife Service, Washington, Circulars AGC-18 - AGC-21.

**1944-55** Regulations Relating to Game and Fur Animals, Birds, and Game Fishes in Alaska. Alaska Game Commission, Fish and Wildlife Service, Washington, Regulatory Announcements 10, 13, 16, 20, 23, 26, and 43.

**VanStone, James W.**

**1955** Archaeological Excavations at Kotzebue, Alaska. Anthropological Papers of the University of Alaska 3(2):75-155.

## APPENDIX 1. SHEEP HUNTER INTERVIEW GUIDE

The purpose of the sheep study is to find out what villages depend on sheep for subsistence food, clothing, or tools. The information we receive from hunters about sheep hunting will be useful in future subsistence sheep regulations. You do not have to answer any of the questions. However, if you do, your name will be kept confidential.

1. How far back do you remember hunting for sheep?
2. Has sheep hunting changed now than in the past? For instance, since there are more caribou now, are people using less sheep?

For retired hunters only: Do younger men hunt for sheep in the village? If so, are they using the same areas their fathers and grandfathers used in the past?

3. Are there more, fewer, or about the same number of people hunting sheep now? If the number of people who hunt Dall sheep has changed, why?
4. During the years you have been associated with sheep hunting, is it your impression that sheep numbers have:

Increased? Why and when?

Decreased? What are the factors that cause Dall sheep population to decline? When did it happen?

Stayed the same?

5. When do people in this village hunt for sheep?
6. Are there any traditional considerations regarding the way you hunt, butcher or any other aspects of sheep harvesting?
7. Where do people hunt for sheep?
8. What are sheep parts used for?
9. Did you hunt sheep last year? If yes, where and with whom? How did you get there?

Did you kill any? How many?

How many male? (See attached sheet on age)

How many female?

How many lamb?

10. How many days does it normally take for you to harvest sheep?
11. How many times have you hunted for sheep in the last five years? If you have hunted, do you recall how many sheep you caught?
12. How many sheep did the entire village harvest in the last year?
13. Are you familiar with sheep hunting regulations?
14. If you are familiar with sheep hunting regulations, do you think they should be changed? If so, how?
15. Do you have any questions or concerns about sheep or any other matters?

## APPENDIX 2. SHEEP PROCESSOR INTERVIEW GUIDE

I am looking into the use of sheep in villages where they are still used. I will be asking how sheep are prepared and stored today and in the past. You do not have to answer any of the questions. If you do, your name will be kept confidential.

1. How are sheep preserved today?
2. How were sheep preserved before refrigeration?
3. Are there different ways of cooking sheep? Can they be served frozen?
4. What is the skin used for?
5. How are the horns used?
6. Does it matter if sheep taken are males, females, or young one?
7. What is special about sheep? In what way is sheep processing different from other large animals?
8. May I use your name in the report to thank you for providing me this information?
9. Do you have any questions or concerns about sheep or any other species or matters?