SUBSISTENCE AND SPORT FISHING OF SHEEFISH ON THE UPPER KOBUK RIVER, ALASKA

By Susan Georgette and Hannah Loon

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ABSTRACT

This report describes subsistence and sport fishing for sheefish on the upper Kobuk River, Alaska, in 1989. It includes data on participation, seasons, areas, methods, harvests, and preservation techniques. The report also discusses conflicts between subsistence users and recreational users. The research was conducted in response to upper Kobuk residents' concerns about sport fishing and fishery managers' interest in the subsistence harvest. Researchers used key respondent interviews and participant observation methods. The study area extended along the Kobuk River from Shungnak upstream to Selby River, but field work concentrated on the area between *Qala* (Kalla) and the Pah River. The study area included two communities -- Shungnak (pop. 238) and Kobuk (pop. 97) -- which traditionally have used sheefish for food. Field work commenced August 9, 1989 and concluded September 29, 1989.

Sheefish, the largest whitefish species, migrate from coastal waters to upper Kobuk River spawning grounds in summer and return to coastal waters in late fall. Sheefish spawning grounds extend along the Kobuk River from near *Qala* to Beaver Creek, about 50 river miles. Although the last aerial surveys of spawning sheefish were conducted in 1979, Department of Fish and Game biologists believe Kobuk River sheefish stocks are healthy and abundant (Alt 1987:9-16). Subsistence and sport fishermen interviewed during this study also believed the spawning population to be stable.

Shungnak and Kobuk residents harvested sheefish primarily in late August and September. About thirty-seven percent of Shungnak households and 61.5 percent of Kobuk households caught or assisted in catching sheefish in 1989, harvesting a total of 831 sheefish. Set gill nets accounted for the greatest portion of the harvest, followed by rods and reels, and beach seines. High water during the study period created poor fishing conditions, and many families reported catching fewer sheefish in 1989 than in

previous years. Some local families moved to fish camps to catch and process salmon, small whitefish, and sheefish for winter use. In 1989, most Shungnak and Kobuk fish camps were upriver from the village of Kobuk, close to the sheefish spawning areas. There were nine fish camps in this area during the study, and most of the local harvest occurred on the spawning grounds.

Upper Kobuk sheefish were also a popular catch for sport anglers. Researchers identified three groups of sport fishermen, distinguished by their access methods: (1) float trips using rafts, kayaks, and canoes, (2) guided airplane trips, and (3) private airplane trips. Air traffic was concentrated near the Pah River mouth, but most respondents agreed that sport fishing activity there declined in 1989. Bad weather and high water during the study period may have reduced aircraft access. Researchers interviewed 15 parties comprising 62 individuals during the study period. Twelve parties reported fishing. They caught an estimated 197-204 sheefish, of which an estimated 19-21 sheefish were kept. Float trips (about half were guided) accounted for 11 of the 15 parties. One airplane-supported sport fishing guide was interviewed; he reported making 8-12 trips per season to the upper Kobuk for sheefish. Two private airplane parties were interviewed. Because airplanes are so mobile, researchers were able to contact only a portion of aircraft-supported sport fishermen. Thus the total sheefish harvest by sport fishermen is unknown.

For several years, Shungnak and Kobuk residents have been concerned about increasing aircraft traffic on the upper Kobuk River. According to local reports, air traffic increased during most of the 1980s, but in 1989 was similar to that of the previous year or two. Local residents were less concerned about float trip activity. One difference between airplane and float trips was the level of contact between local and non-local people. Contact was low for airplanes and higher for floaters. Local residents' concern may derive from their traditional land use system, in which northwest Alaska Eskimo societies had well-defined territories and strict rules governing access

into another society's territory. Local people still consider certain areas as their territory and desire some knowledge of and control over what occurs there. That was possible only through contact between parties, which was likely to occur with float trips but unlikely with airplane trips.

Shungnak and Kobuk residents also have been concerned about certain sport fishing practices. They objected to catch-and-release fishing and to disposal of fish backbones, heads, and entrails in the river. Local residents considered these practices disrespectful to fish. The practices conflicted with traditional Iñupiat ethics, which decreed that if animals are not treated with respect, the natural order is disrupted, and people risk food shortage.

Sport fishermen interviewed in this study believed that catch-and-release fishing constituted ethical fishing behavior, and river disposal of fish offal to be sanitary. Few were aware of any conflicts.

Similar fishing conflicts have been documented elsewhere in rural Alaska, most notably on the Togiak, Kanektok, and Goodnews rivers in southwest Alaska (Wolfe 1989a, 1989b). Compared to southwest Alaska, the upper Kobuk sport fishery is small. The conflicts between subsistence and sport fishermen on the upper Kobuk appear to spring from cultural differences, and not -- at least so far -- from excessive harvests of a limited resource.

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We know that sport fishermen visit remote areas partly to get away from people. For this reason, we are particularly grateful to the fishing guides, sport fishermen, and floaters for their good-natured patience with our questions. Without their ideas and experiences, this study would not be complete.

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INTRODUCTION

Sheefish (*Stenodus leucichthys*) are one of the Arctic's choicest fish. Their large size and tasty meat appeal to subsistence fishermen, and their reputation for acrobatic display when hooked attracts sport fishermen. Sheefish have a limited distribution in North America, making them an exotic catch for many non-local anglers.

In northwest Alaska, sheefish (*sii* in Iñupiaq) spend the winter in the productive waters of Selawik Lake and Kobuk Lake (Hotham Inlet). After break-up, mature sheefish migrate up the Kobuk and Selawik rivers to feeding areas. Spawning fish continue further upstream to spawning grounds on the upper Kobuk and Selawik drainages. In fall, sheefish migrate back downstream to overwintering areas in brackish coastal waters. Kobuk-Selawik sheefish live considerably longer than sheefish in other parts of Alaska, reaching ages of 21 years and weights of 55-60 pounds (Alt 1987:1).

Sheefish are an important subsistence food for upper Kobuk River residents who catch them during both the upstream and downstream migrations. Each summer, families from the Iñupiat villages of Kobuk (pop. 97) and Shungnak (pop. 238) move to camps along the Kobuk River to fish for salmon (*qalugruaq*), whitefish (*quasriłuk*), and sheefish (*sii*). Unlike the regional center of Kotzebue, where hand-held hook and lines are used to catch sheefish through the ice in winter and spring, upper Kobuk residents catch sheefish in summer and fall with gill nets, seines, and rods and reels.

Sheefish, sometimes called "tarpon of the north," are also a favorite catch of sport anglers from outside the region. The Kobuk River, regarded as a premier sheefish fishing stream, attracts anglers from around the world each August and September. Some of these fishermen come by airplane for a few hours, while others float in rafts or canoes for several days through the spawning grounds to fish.

The Research Problem

Upper Kobuk residents, most of whom are Iñupiat Eskimo, have expressed increasing concern in recent years about sport fishing activities on the upper Kobuk River. Local subsistence fishermen have complained about finding discarded sheefish remains in their traditional fishing eddies, believing that sheefish -- unlike salmon -- are frightened away by fish carcasses. Residents also object to catch-and-release fishing, a common practice by sport anglers, because they believe it is damaging and disrespectful to fish. Lastly, local residents report an increasing number of airplanes at the mouth of the Pah River, a popular sport fishing area for sheefish.

The extent of sport fishing on the upper Kobuk has not been documented on the ground in recent years. Most sport fishermen believe that catch-and-release fishing is an acceptable, if not preferred, fishing method. They likely consider the Kobuk a wilderness river, far removed from human settlement, and might be unaware of the conflict perceived by upper Kobuk residents.

As one of the region's most delectable fish, sheefish are harvested heavily by residents of Kotzebue, Selawik, and the Kobuk River (Noorvik, Kiana, Ambler, Shungnak, and Kobuk). A small-scale commercial sheefish fishery takes place in the Kotzebue area in winter, and interest in developing a Lower 48 market for this product has been reported. For these reasons, fishery managers have been concerned about the status of the sheefish population. Information on subsistence harvest levels has not regularly been collected and would be useful in managing the fishery.

Purpose of Study

The purpose of this project was to document subsistence and sport fishing of sheefish on the upper Kobuk River. Specifically, the project's goals were the following:

1. describe sheefish fishing by subsistence and sport fishermen on the upper Kobuk River;

2. describe the expressed fishing ethics and values of both user groups;

3. estimate the sheefish harvest of both user groups;

4. describe local knowledge of sheefish populations and behavior; and

5. describe any changes in fishing practices or any perceived changes in sheefish populations in recent years.

The information will be used to help each user group understand the other and to seek solutions to ease conflicts. In addition, fishery managers will find harvest and use information for sheefish valuable in their management efforts.

Methodology

Data for this project were gathered primarily through key respondent interviews and participant observation. Two interview guides were prepared, one for sport fishermen and one for subsistence fishermen (see Appendix). The study focused on the period from August through September 1989 when sport and subsistence fishing for sheefish occur most intensively.

State regulations currently define all open water rod and reel fishing as sport fishing. Subsistence fishing regulations currently allow the use of nets, hook and line through the ice, fishwheels, and a few other gear types. For this project, however, all local residents were considered subsistence fishermen regardless of the gear type they used. Although some local residents, both Native and non-Native, used rods and reels to fish for sheefish, none, to the researchers' knowledge, released the fish they caught. Their primary interest was in catching and processing food for traditional uses, using whichever harvest methods worked best for them. Sport fishermen, on the other hand, were defined for this project as non-local anglers, whose fishing was characterized by

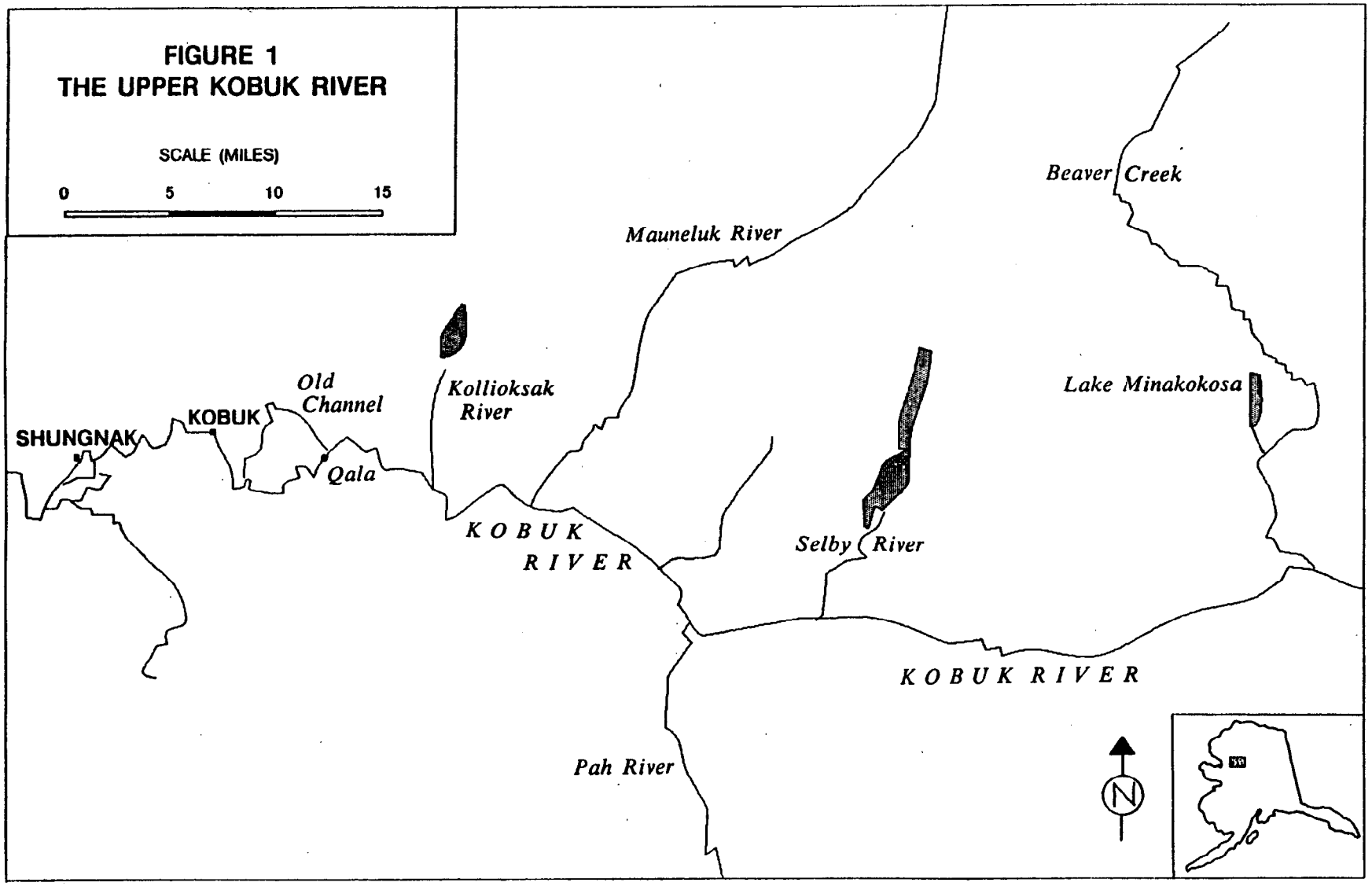
catch-and-release practices. These people enjoyed the sport of catching fish, but made little use of them for food.

Three Division of Subsistence researchers (Susan Georgette, Hannah Loon, and Jim Magdanz) participated in field work to varying extents during the study period. Fred DeCicco of Sport Fish Division assisted in field work August 16-21, 1989. Researchers visited Shungnak (October 24-26, 1989) and Kobuk (January 26, 1990) to collect post-season sheefish harvest information.

Field work commenced August 9, 1989 when researchers arrived in Shungnak after a two-day boat trip from Kotzebue. On August 10, researchers set up camp at a cabin near the mouth of the Mauneluk River. Four seasonal camps and two year-round camps of upper Kobuk residents were located within 11 river miles (5.5 air miles) of this cabin. Researchers also set up a tent camp on August 14 near Pah River mouth, one of the most popular sport fishing areas on the upper Kobuk, at a site suggested by local residents and Sport Fish Division staff. This camp was about 13 river miles upstream from the Mauneluk River cabin. Field work concluded September 29, 1989 when researchers returned to Kotzebue.

The study focused on the area between *Qala* (Kalla) and the Pah River, where numerous upper Kobuk subsistence camps are located and where most sport fishing takes place (Fig. 1). Although researchers spent most of their time between Kollioksak River and Pah River, they also traveled as far upstream as Selby River on three occasions and downriver to Shungnak on six occasions. Sheefish harvest data were collected for all Shungnak and Kobuk families regardless of whether they fished in the study area or near the villages.

Researchers divided their time between the Pah River camp, the Mauneluk River cabin, and the upper Kobuk subsistence camps. Researchers spent 16 days (August 14, 18-20, 22, 26-27, 31 and September 2-4, 9, 12, 16-17, 21) at the Pah River camp and vicinity, mostly on weekends and during clear weather when fly-in fishermen were


FIGURE 1
THE UPPER KOBUK RIVER
SCALE (MILES)
0
5
10
15
Mauneluk River
Beaver Creek
Old Channel
Kollioksak River
Lake Minakokosa
SHUNGNAK
KOBUK
Qala
KOBUK RIVER
Selby River
KOBUK RIVER
Pah River
N

likely to be in the area. Sixteen days were spent visiting or living at subsistence fish camps in the study area. Scattered days were spent at the Mauneluk cabin repairing equipment, writing field notes, or doing other routine tasks.

Researchers did not attempt to statistically survey sport fishermen, but took every possible opportunity to interview them and other groups traveling the river. Most were interviewed between the Mauneluk and Pah rivers, though some were encountered as researchers traveled beyond this area. In total, 15 parties of visitors comprising 62 individuals were interviewed. Four of these parties were traveling with airplanes and 11 were "floaters," the local name for visitors in rafts, kayaks, or canoes. Researchers counted five additional parties of floaters they were unable to interview. It was more difficult to know how many airplanes were missed because these groups were very transient, sometimes fishing in an area for a few hours and leaving before anyone on the river saw them. The researchers knew of eight airplanes that landed on the Kobuk River during the study period in which no one was interviewed. According to local reports, three of these were fishing, three hunting, and two sightseeing.

SHEEFISH ECOLOGY

Iñupiat and Western descriptions of Kobuk River sheefish ecology are largely congruent. After break-up, sheefish migrate from their coastal wintering grounds to feeding and spawning areas on the Kobuk River. By late June or July, sheefish reach Shungnak and Kobuk; these are spawning fish destined for spawning grounds farther upriver. Shungnak subsistence fishermen report rarely catching sheefish smaller than about 18 inches, though occasionally they catch ones without eggs as small as 14 inches, called *mayauyuk*.

The upstream migration of sheefish lasts throughout the summer. As mid-September approached, one knowledgeable Shungnak woman told researchers that

sheefish were still going upriver. "Last chance," she said. According to local knowledge, sheefish spawn on the upper Kobuk River anytime after September 20. In 1989, sheefish spawned September 25-27. Shungnak residents said that in 1988 sheefish did not spawn until early October. In years of high water, local residents report that sheefish migrate earlier and spawn farther upriver.

Before spawning season, sheefish lie still along the bottom of deep sections of river in the vicinity of the spawning grounds. As spawning time approaches, sheefish "move around," as local residents describe it, to spawning sites. Sheefish spawn in the evening at the water surface in the main current. Subsistence fishermen said the splashing of spawning sheefish is audible from the river bank, and they often listen for it as a signal to seine. After spawning, sheefish move rapidly downstream toward their wintering grounds, and within a matter of days have all but disappeared from the upper Kobuk, not to return until the following summer.

Shungnak and Kobuk residents catch sheefish most intensively during the spawning period and the post-spawning move downstream. One Shungnak woman said she sometimes does not hear the fish spawn, but knows that spawning has started when she begins catching sheefish in her gill nets. Upper Kobuk residents said that sheefish ask a shorebird (semipalmated plover) to make the weather stormy when the sheefish start moving around to spawn so that no one will catch them. In return the sheefish promise to give the bird a bead necklace. This accounts for the stormy weather that sometimes accompanies spawning and for the beautiful band around the bird's neck.

According to upper Kobuk residents, sheefish spawning areas extend from *Qala* to Beaver Creek (about 50 river miles), and somewhat below and above these points in some years. The scientific literature essentially agrees with this, describing spawning areas in the 1960s as extending from *Qala* to upstream of the Selby River mouth. By the late 1970s, however, spawning areas seemed to have shifted farther upriver toward

Beaver Creek (Alt 1969a as cited in Alt 1987:16). The greatest concentrations of spawning sheefish were found at that time between Mauneluk River and Selby River.

The Alaska Department of Fish and Game conducted aerial surveys of spawning sheefish on the Kobuk River from 1966-1971 and again in 1979. Counts ranged from 1,025 in 1967 to 8,166 in 1971; the 1967 count was thought to be low due to observer error. These numbers were considered minimum abundance counts because of difficulties in aerial enumeration. Although no recent spawning counts or population estimates are available, Department biologists' personal observations and discussions with local residents since then indicate that Kobuk River sheefish stocks are healthy and abundant (Alt 1987:9-16).

Upper Kobuk subsistence fishermen and sport fishermen interviewed in this study agreed with this assessment. Two sport fishing guides, one with seven and one with 15 years of experience on the river, thought the sheefish population was stable. All the subsistence fishermen questioned, many of them elderly, agreed that sheefish continued to be as numerous today as they were in the past.

SUBSISTENCE FISHING

Each summer, families from Shungnak and Kobuk move to camps to harvest salmon, whitefish, and sheefish. Although fishing is the central activity in these camps, camp residents also hunt moose, caribou, bear, and small game and gather berries, roots, and birch bark. Some camps are located within a few river bends of the villages, while others are up to a two-hour boat ride away. Camp locations shift over time in response to changes in water level, river course, accessibility, productivity, and family relationships. Fish camp is the highlight of the subsistence year for many upper Kobuk residents, particularly women, who dominate and direct fish camp activities. It is a welcome change from village life and a time to enjoy the serenity of familiar country.

In 1989, most Shungnak and Kobuk fish camps were located above the village of Kobuk. Nine fish camps (excluding an educational camp for local youngsters) were occupied along this section of Kobuk River during the study period (Fig. 2). Two of these camps were occupied year-round, while the other seven were used seasonally. The seven seasonal camps all belonged to Shungnak residents, though Kobuk residents -- usually relatives -- often assisted in these camps. The nine occupied camps all were located along a 22-mile section of river from the mouth of Old Channel (about four river miles above Kobuk) to the mouth of Mauneluk River, with six camps concentrated within an eight-mile stretch of river immediately downstream of the Mauneluk.

In 1989, Shungnak residents also used two fish camps located between their village and Kobuk. Many other Shungnak and Kobuk residents used the villages as their fishing base, setting nets nearby and cutting and hanging fish on racks along the village beaches.

The fish camps above Kobuk were a one- to two-hour boat ride from Shungnak. Those with camps in this area offered several reasons for camping this far from the villages. First, competition for a limited number of productive fishing sites near the villages motivated some people to move to more distant locations. Second, with fewer people and less river traffic, the upriver camps offered better hunting. Third, upper Kobuk residents preferred to camp in the sheefish spawning areas because sheefish caught there have eggs, a local delicacy. Sheefish caught near Kobuk and Shungnak in fall have already spawned and thus do not have eggs. And, fourth, some Shungnak and Kobuk residents grew up in now-abandoned settlements between *Qala* and Selby River. They know the fishing eddies, berry patches, and productive hunting locations. Returning annually to their camps maintains their connection to the land and to their tradition of procuring wild food. For them, it is like going home.

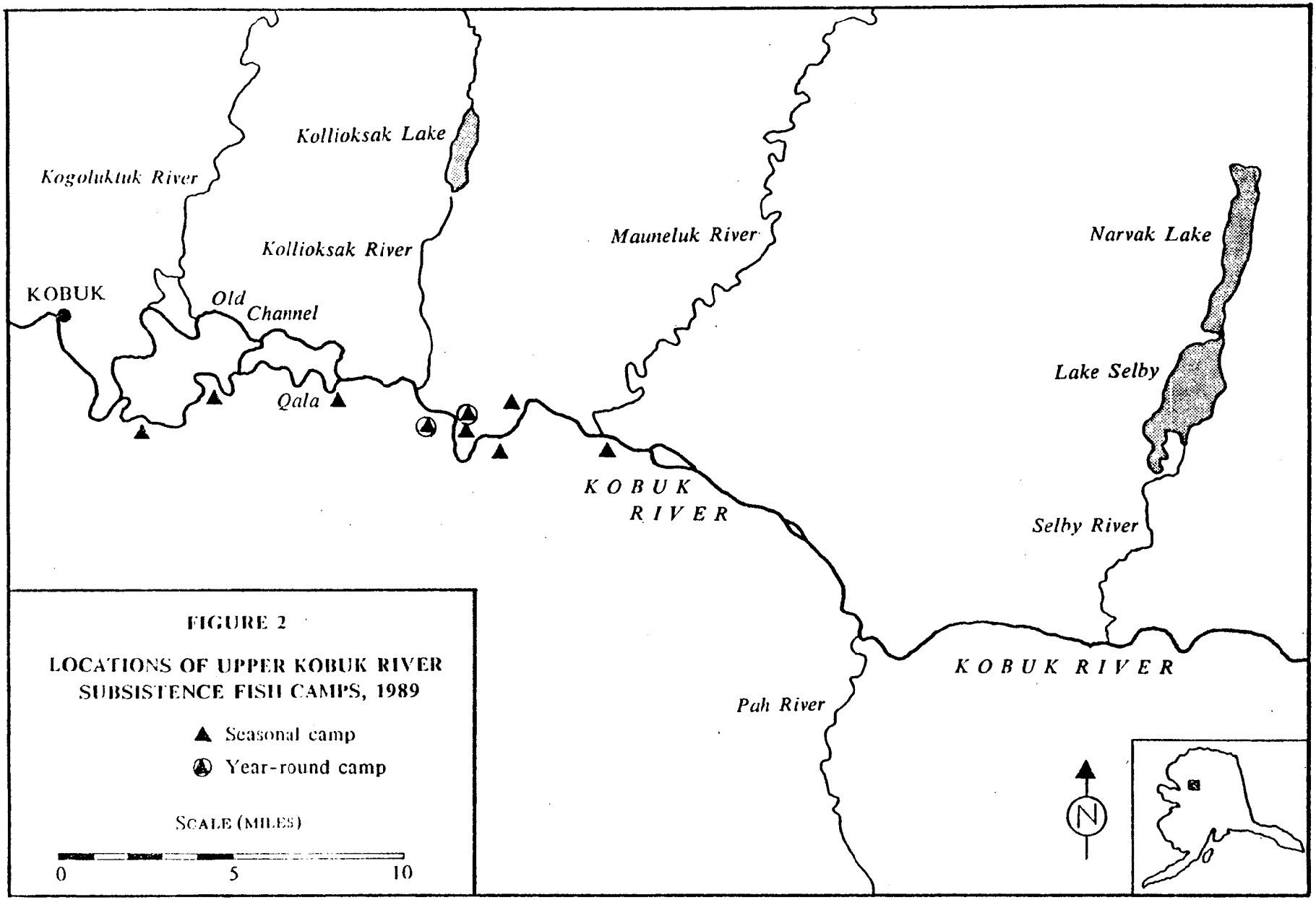


FIGURE 2

LOCATIONS OF UPPER KOBUK RIVER SUBSISTENCE FISH CAMPS, 1989

▲ Seasonal camp

Year-round camp

SCALE (MILES)

Subsistence fishing on the upper Kobuk River, open only to residents of the Kotzebue District, was essentially free of state regulations. There were no closed seasons, no limits, no required license, permit, or reporting, and few gear specifications. The only aspect of the regulations that confused local residents was that rod and reel fishing was not an allowed subsistence method. Upper Kobuk residents regularly used rods and reels to catch sheefish, sometimes in large numbers, and considered this as much a subsistence method as nets.

Rod and reel fishing -- considered sport fishing in regulation -- was subject to greater regulation than subsistence fishing. Although the season was open year-round, the bag limit for sheefish on the Kobuk River was 10 per day below the Mauneluk River and two per day above. An Alaska sport fishing license was required to fish with a rod and reel.

Seasons

Sheefish are caught by upper Kobuk residents throughout the time they are available in the local area. Most sheefish fishing occurs in late August and September, often from camps, though local residents begin catching sheefish in small numbers as soon as they appear in June or July on their upstream migration.

In 1989, Shungnak and Kobuk families began moving to upriver camps in the second week of August. One family moved to camp August 10, another August 11, and a third August 14. Another family moved to camp August 21, and a fifth family moved August 23. Two families lived in upriver camps year-round.

In August, when the chum salmon run reaches the upper Kobuk, local families focus on catching salmon, cutting and drying them for winter use. Sheefish are incidentally caught in salmon nets, along with whitefish and an occasional char. As mid-September approaches and the days grow colder, people's attention turns from

salmon to whitefish and then sheefish. Although sheefish are caught throughout the summer, local residents prefer to catch them late in the season because the fish are fat, the eggs are ripe, and the fish can be left to age and freeze, a storage method preferable to drying. Sheefish are also easier to catch in fall when they begin moving around prior to spawning, as described above. Sheefish fishing concludes after the fish spawn in late September or early October and migrate downstream. Because sheefish pass quickly on their downstream run, upper Kobuk residents said they are easy to miss and it is important to listen and watch for them closely.

Some upper Kobuk residents typically stay in fish camp until the end of September or early October, depending on freeze-up and whether they have caught enough fish. In 1989, one family stayed in camp until September 25, while another stayed until October 5. In three families, the main subsistence fishers -- women in their 50s or 60s -- were employed at the school and had to return to Shungnak by the start of the school term in late August. Because these women were the mainstays of subsistence fishing in their families, their fish camps usually closed down in their absence. These women would have preferred that school started a few weeks later, but adapted as best they could, often traveling back to their fish camps on Friday afternoons and returning to the village on Sundays until freeze-up.

In late September, boat traffic on the upper Kobuk increased as Shungnak and Kobuk residents without camps in the area came upriver to catch sheefish. One camp resident said, "Lots of people come upriver this time of year to fish, hunt, pick berries, and look around. Everyone wants fish but there's not enough fishing sites around Shungnak, so people come up here. Lots of traveling this time of year." Most of this additional boat traffic occurred on the weekends, though some households stayed for part of a week or more with friends or relatives in camps.

Fishing Areas

Sheefish fishing by Shungnak and Kobuk residents occurred most intensively along the Kobuk River between the mouth of Old Channel (above Kobuk) and Selby River. At least 88 percent of the 1989 harvest took place in this stretch of river. Most of the remainder were caught with rods and reels in front of the villages or in gill nets set nearby. In some years, sheefish fishing by upper Kobuk residents occurs above Selby River, but the quantity and cost of gas needed to reach this area are high, and only a small number of local residents use this area regularly.

Within the area between Old Channel and Selby River, local residents know which eddies and gravel bars are productive fishing sites for sheefish. These sites, too numerous to list, are scattered throughout this section of river, though seemed most plentiful near the Selby and Pah rivers, between Kollioksak and Mauneluk rivers, and near *Qala.* Fishing sites above the Selby River are also productive but are a long distance from camps and villages, while fishing sites below *Qala* tend to catch spawned out sheefish.

Most upper Kobuk residents set nets for sheefish within a short distance of their fish camps or villages. Some set nets farther away. For example, one family set sheefish nets near the Pah River, about 45 minutes by boat from their camp. This family traditionally had a fish camp near the Pah, and although they now camped farther downriver with another family, they continued to fish at their traditional site. Other families who had to return to the villages to work during the week sometimes left nets set near their camps; they checked them on weekends or had other family members who were not working check them.

Local residents recognized that particular families had use rights to certain fishing sites, usually near a family's fish camp. However, most apparently felt free to use these sites if unoccupied for even part of the fishing season. According to one

Shungnak resident, net sites on the Kobuk River are "free" and can be fished by anyone if not in use. Field observations confirmed this. One fish camp resident, upon hearing that a nearby fish camp would soon be temporarily vacated, commented, "Good. Now we can set our net there." However, the use of fishing sites by non-local residents might not follow these rules; using a family's net site might not be well tolerated unless permission was first obtained from the person who has use rights to the site.

Fishing Methods

In 1989, upper Kobuk residents caught sheefish with three types of gear: set gill nets, beach seines, and rods and reels. In the past, fish weirs and spears were used, but these have not been used since the 1920s. Each harvest method was best suited to a different combination of circumstances and conditions such as water level, time of year, desired harvest level, preferred method of preservation, and available help and equipment.

Set gill nets were a popular sheefish harvest method in 1989 for upper Kobuk residents equipped for summer subsistence fishing. All of the upper Kobuk fish camps used gill nets for at least part, if not all, of their 1989 sheefish catch. From August until early September, upper Kobuk residents set gill nets primarily to catch salmon, though sheefish were regularly caught as well, usually in small numbers. By mid-September, most salmon were deteriorating, and the weather too cold to dry them. At this time, upper Kobuk residents set gill nets of about five-inch mesh to catch sheefish. Although some sheefish nets had slightly larger mesh than salmon nets, usually the two were interchangeable, and fishermen used net location and timing to target the different species. Salmon, sheefish, whitefish, and occasionally char were nevertheless all caught in any upper Kobuk gill net.

Most families who fished with gill nets used one net, though some set two or more, depending on the number of fish they wanted to catch and the amount of gear they had available. One Shungnak woman used one net while salmon fishing, but set four nets when sheefish fishing commenced in mid-September.

Beach seines, though not as widely used as gill nets, were the best way to catch large numbers of sheefish in a short time. For example, in 1989 one family caught 19 sheefish in gill nets throughout the month of September, but caught 86 sheefish in three days of seining during peak conditions. Successful seining, however, required skill, familiarity with the area, a specialized net, suitable water conditions, and at least three able-bodied adults.

Seine nets (*qaaktuutit*) are expensive and coveted fishing gear. In one upper Kobuk camp, a family had had its home-manufactured seine net for years, gradually adding new sections as the oldest ones wore out. The net had spruce floats, antler sinkers, and 1-1/2 inch mesh. To seine, one person stood on the beach, holding a line attached to one end of the net; this was called *aqulliqsruqtuaq*. Two or three other people remained in a boat, one dropping the net over the side as the others paddled in an arc from the beach to a point farther downstream on the same beach. The person on shore walked downstream slowly to keep the net in the proper shape. When the paddlers reached the beach, one or two people jumped out and started pulling the seine net to shore. One person remained in the boat, untangling the net from underwater snags and slapping the water with a pole to keep the fish from escaping. Pulling in a seine net is strenuous work. A person must bend low and pull carefully but quickly to make sure the sinkers stay on the bottom and the fish are unable to swim away beneath the net. However, the work is worthwhile because a successful seine can catch hundreds of fish that can readily be gathered by hand and placed in tubs or gunny sacks -- a much easier endeavor than untangling each fish from a gill net. Subsistence fishermen also can release fish unharmed from a seine if they catch more than they need or are able to

process. The actual seining usually takes only 10-15 minutes, while gathering the fish in sacks, tubs, or on willow sticks can take up to an hour or more depending on the size of the catch. After a successful seine, upper Kobuk residents often break open the belly of a fresh fish and *suvaktuq* (eat fish eggs), a delightful treat.

Of the nine fish camps above Kobuk, five seined for sheefish and whitefish in 1989. Some of these camps seined together, pooling manpower, equipment, and harvest. Of the camps that did not seine, one did not have enough adults to help, one did not have sufficient skill, one returned to the village before seining conditions were good, and one did not need as many fish as seining yielded. No seining occurred in this upriver area by villagers who were not staying in one of the camps.

With favorable weather and water conditions, seining on the upper Kobuk River often begins in August for salmon, though this harvest method is not as common for salmon as gill netting. Because seining took place from gently sloping gravel bars adjacent to the river current, it was a productive technique only when the water level was low enough to expose gravel bars. In 1989, persistent rain and high water precluded seining until after mid-September. From mid- to late September, however, seining occurred frequently in the fish camps above Kobuk. By this time of year, the days were cool and the nights below freezing, and the hundreds of fish caught in seines were easily preserved outdoors with little or no processing.

At the beginning of seining season, upper Kobuk fishermen targeted whitefish, incidentally catching suckers, char, grayling, and occasional sheefish. Seining for sheefish took place in late September during the two or three days when sheefish spawned. At this time, upper Kobuk residents commonly seined three or four times a day, often catching 20-50 sheefish per day as well as sacks of whitefish, grayling, and suckers.

According to local residents, seining for sheefish is most productive at night when sheefish gather along river bars. One elder said that in the past, when sheefish

were running, his family seined every hour from dark until midnight, then resumed again early the next morning. Seining at night is no longer as common as it once was, though at least one fishing group in 1989 seined for several hours one night.

Rod and reel fishing was the third method upper Kobuk residents used to catch sheefish. Rods and reels were used primarily in summer to catch the fish as they passed the villages on their upriver migration. At this time of year, villagers enjoyed eating fresh sheefish, but generally waited until later in the year to preserve large numbers of them. Rods and reels allowed people to harvest a small number of sheefish for immediate use without a great deal of effort.

Shungnak and Kobuk residents also used rods and reels in fall, though this method was usually secondary to gill nets and seines. Some people who used rods and reels did not have the equipment, knowledge, or time to fish with nets, or did not need many fish. Others idly tried their luck with a rod and reel in particularly good sheefish holes while traveling along the river. Although usually only small numbers of sheefish were caught with rods and reels, some upper Kobuk residents found rod and reel fishing quite productive. In 1989, one party of four adults harvested 200 sheefish with rods and reels during late September.

A fourth sheefish harvest method -- spearing -- was common earlier in this century but is no longer practiced today. With this technique, upper Kobuk residents built weirs of brush and poles, blocking the downriver migration of sheefish. Men speared sheefish at night as the fish passed through narrow openings in the weir, while women seined upstream where sheefish gathered in large numbers. Although elders alive in 1989 did not learn to fish this way, their parents talked about it when they were young.

In summary, upper Kobuk residents caught sheefish with set gill nets, beach seines, and rods and reels in 1989. Choice of gear depended on the time of year, desired harvest, preferred storage method, available equipment, and skill. In 1989, gill

nets and rods and reels were the most widely used methods for catching sheefish, with gill nets usually producing more fish of the two methods. Fewer people used seines, but seining was typically the most productive fishing method for the time invested. Seining required several adults, skill, and a specialized net.

Harvest Levels

After freeze-up, researchers collected sheefish harvest information from the 18 households in Shungnak and three in Kobuk that caught sheefish in 1989. Eleven additional households, including five from Kobuk and one from Ambler, assisted these 21 in fishing, and shared in the reported harvest. Table 1 summarizes Shungnak's and Kobuk's participation in sheefish harvesting in 1989. Six other Shungnak households who usually fish for sheefish were also interviewed, but for various reasons these households did not catch sheefish in 1989. Researchers knew of no Shungnak or Kobuk households whose catch was not included in the following harvest numbers, though two households that resided in camp year-round above Kobuk were not contacted after freeze-up. A few sheefish caught in summer with rods and reels might not be included in the following harvest information, though most interviewed households appeared conscientious in including these fish in their harvest estimates.

TABLE 1. SHEEFISH HARVESTING HOUSEHOLDS, SHUNGNAK AND KOBUK, 1989.

	Harvesting HHs	Helping HHs	Non-Harvesting HHs	Total HHs
Shungnak	18 (29.0%)	5 (8.1)	39 (62.9)	62 (100)
Kobuk	3 (23.0%)	5 (38.5)	5 (38.5)	13 (100)

In 1989 high water created poor sheefish fishing conditions, and many families reported catching fewer sheefish this year than last. Three households, however, said they caught more sheefish this year than last, mostly because they spent more time fishing.

The 21 Shungnak and Kobuk households that caught sheefish -- along with the households assisting them -- took a total of 831 sheefish in 1989. Of this total, 296 were caught with rods and reels (200 by one party of four adults), 226 with set gill nets, 86 with seines, and 223 with gill nets or seines, but the exact breakdown by gear is not known. Most of the 223 were probably caught with gill nets, and if the same proportions of the known catch are used, then approximately 161 were taken with gill nets and 62 with seines. Therefore, the best estimate of the catch by gear type is 296 fish (35.6 percent) with rods and reels, 387 fish (46.6 percent) with gill nets, and 148 fish (17.8 percent) with seine nets (Table 2). In years without high water, seining likely accounts for a greater portion of the harvest than it did in 1989.

The number of sheefish caught by each household ranged from three to 100. Gill nets were the most common harvest gear, used by 15 of the 21 households who

TABLE 2. ESTIMATED SHEEFISH HARVEST FOR SHUNGNAK AND KOBUK, BY GEAR TYPE,* 1989.

	Number of Sheefish	Percent of Total Harvest
Set gill net	387	46.6
Rod and reel	296	35.6
Beach seine	148	17.8
Total	831	100.0

* See text for further explanation of harvest methods.

caught sheefish. By comparison, five households used seines, and seven households used rods and reels.

Preparation and Preservation

Upper Kobuk residents preserved sheefish in different ways depending on whether they were caught in summer or fall. In early summer, sheefish were usually eaten fresh because the weather was too warm to dry them. In August, upper Kobuk residents dried sheefish, the only method for preserving them in late summer unless freezer space is available. According to one Shungnak resident, sheefish dry as easily as salmon, but once dried are too oily to last a long time without refrigeration.

When the weather grew colder towards the middle of September, sheefish were no longer dried but laid whole in a bed of grass and willows. This allowed the fish to age and eventually freeze. To keep the ripe roe from discharging, upper Kobuk residents plugged (*simikługich*) the anal vent with short, sharpened sticks. Aged, frozen sheefish, an upper Kobuk delicacy, were eaten later in the winter without further processing or preparation. By spring, these fish were known as *uiłaaq* (thawed, aged sheefish), a meal savored by upper Kobuk residents.

Fresh sheefish were baked, boiled, or fried. The large intestines, full of fat, were boiled. Fish oil (*qaluum uqsruq*) was separated from the boiled water with a large spoon and served with cooked sheefish. Fish oil, along with bear fat, was the equivalent of seal oil to residents of the upper Kobuk, where sea mammals are not available. Upper Kobuk residents rarely used sheefish for dog food, except for ones that spoiled after drying.

SPORT FISHING AND RECREATION

During the 1989 field season which covered the period August 9 through September 29, researchers encountered 20 parties of visitors to the upper Kobuk River, of which 15 parties were interviewed. Of the 20 parties, four were traveling by airplane, and 16 in rafts, canoes, or kayaks. In addition, there were at least eight other reported airplane landings in which researchers were unable to interview the occupants. Of the 15 interviewed parties, all but three fished for sheefish. Visitors to the upper Kobuk River could generally be divided into three groups: (1) "floaters" (the local name for visitors in rafts, canoes, or kayaks), (2) sport fishing guides with airplanes, and (3) other individuals with airplanes. Each group's use pattern differed somewhat from the others and is summarized below.

Floaters

Floaters were the most common group on the river, accounting for 16 of the 20 encountered parties, and 11 of the 15 interviewed parties. However, because they traveled slowly and covered many miles of river, floaters were easier to encounter than airplanes and might in fact account for a smaller proportion of river traffic than the interviewed total suggests.

Floaters typically reached the upper Kobuk by chartered airplane from Bettles, starting their trips at Walker Lake or Lake Minakokosa in the river's headwaters. From there, they usually floated five to ten days to the village of Kobuk, though one party floated as far as Kiana, others floated only as far as Pah River, and one floated the Pah River itself. Two of the 11 parties carried small outboard motors that made their rafts more mobile.

The number of people in each party ranged from two to 11 with an average of 4.6 persons. They originated from many geographic areas, including other parts of Alaska (Anchorage, Fairbanks, Seldovia), other states (Massachusetts, Vermont, Pennsylvania, Montana, Illinois, Washington), and other countries (Australia, Italy, Switzerland, Germany).

Six of the eleven parties were accompanied by river guides, four parties were unguided, and one was National Park Service personnel on patrol from Bettles. Two guides had extensive experience on the Kobuk River, having floated it at least a dozen times. Three guides had never floated the Kobuk River, and one had floated it at least once before. Some guides were proprietors of small, one-person guiding businesses, while others were seasonally employed by larger outfits that ran numerous trips throughout the state.

Floaters said they were attracted to the Kobuk River for a variety of reasons. The opportunity to travel on a remote arctic river and see wildlife appealed to all. For two groups, that was enough, and they did very little, if any, fishing. Six groups considered fishing to be a main part of their trip, having chosen the Kobuk River in part for its sheefish. Two groups were primarily interested in moose and caribou hunting, but also fished for sheefish and other species.

Sport Fishing Guides with Airplanes

Although very few airplane-equipped guides used the upper Kobuk River, the frequency of their use and the number of clients they brought made this group significant. During the 1989 field season, researchers interviewed only one sport fishing guide with an airplane, but encountered him on three occasions. He operated a lodge at Walker Lake, and knew of one other lodge owner who brought clients to the upper Kobuk to fish.

This guide brought two to three clients to the Kobuk River once or twice a week from early August until mid-September. He estimated he had made 8-12 trips each season for the past seven years. He and his clients typically fished for sheefish for a few hours, then flew back to the lodge, fishing or hunting in other locations on the following days. Although he probably used the upper Kobuk more than other guides with airplanes, in other respects his pattern was probably typical of this small but significant group, which likely numbered less than 3-4 guides.

Other Individuals with Airplanes

Researchers interviewed two parties using airplanes without guides during the 1989 field season. Both were from Fairbanks, and used their airplanes to reach good hunting and fishing areas throughout much of mainland Alaska. Their use pattern may resemble that of other urban recreational pilots in Alaska.

Researchers interviewed one of these parties in the village of Kobuk where they had come by airplane to purchase gas. They were camped with another airplane on nearby Kollioksak Lake to hunt caribou. They had first hunted at this lake the previous year, and had had such good success that they returned. Although they were not fishing this time, they had fished for sheefish on the Kobuk in previous years.

The second party was interviewed near the mouth of Pah River on Labor Day weekend. They had made the two-hour flight from Fairbanks to fish for sheefish for a couple hours. The pilot said he has made an annual trip to the Pah River on Labor Day weekend for five of the past six years. He usually stayed only a few hours, but one year camped with three other float planes for three days. Although he enjoyed fishing, he mostly enjoyed just getting out of town and did not care if he caught any fish. He knew six other float plane owners in Fairbanks who also annually flew to the Pah River to fish.

The amount of use by people with airplanes was difficult to quantify because they were very transient, fishing for a few hours and moving on. According to subsistence and sport fishermen familiar with the river, use by this group increased significantly during the 1980s. In 1989, aircraft traffic associated with sheefish fishing seemed to have declined, which some attributed to the Alaska economic recession or to the persistent high water. However, according to local reports, the overall amount of aircraft traffic in the region appeared to be the same as in the past year or two, though the destination of these planes was uncertain.

Seasons

Unlike subsistence fishing, which took place most intensively in mid- to late September, sport fishing for sheefish by non-local residents stretched fairly evenly throughout late summer and fall. From the first day of field work until almost the last, researchers interviewed parties on the river who had caught sheefish. Five fishing groups were interviewed in August, and seven in September. Researchers do not know how many parties fished for sheefish in July, but suspect the number was small because few sheefish had reached the spawning grounds by then.

Visitors to the Kobuk took into account several factors in timing their trips. Many chose August and September because of better sheefish fishing, fewer mosquitoes, and cooler temperatures. By mid-September, most parties interviewed on the river were primarily hunting for moose and caribou with sheefish fishing a side attraction. These September hunting parties were mostly Alaska residents, while groups interviewed in August were mostly from outside Alaska. Local residents reported that in most years when the river drops at the end of September, wheeled planes land on gravel bars near Pah River to fish for sheefish, but researchers did not observe this in 1989.

Fishing Areas

In 1989, sport fishermen caught sheefish throughout the spawning grounds. Most sport fishing, however, occurred between Selby River and Mauneluk River, an 18-mile section of this larger area. The area between Pah River and Mauneluk River was particularly popular for sheefish fishing.

With their versatile transportation and leisurely pace, floaters caught sheefish throughout the spawning area, particularly between Pah and Mauneluk rivers, near Selby River, and below Beaver Creek. Airplane users, on the other hand, were limited to places where landing a plane was convenient, safe, and close to a good fishing spot. By far, the area most commonly used by fly-in sport fishermen was just below the mouth of Pah River. One sport fishing guide also regularly used an area just above Mauneluk River, and a local individual flew to an area above the Selby River to set a sheefish net. Upper Kobuk residents reported that airplanes occasionally used areas below Mauneluk River and near *Qala*, though researchers did not observe this in 1989. One pilot said he stopped using these lower areas because there were too many villagers and fish camps there.

Fishing Methods

Non-local fishermen on the upper Kobuk River were limited by regulation to rod and reel gear. Interviewed sport fishermen said this was their method of choice because they enjoyed the challenge of catching fish and had no desire to obtain large numbers of fish at one time. Most fishermen used spoons and treble hooks, though some switched to single barbless hooks after finding that other hooks caused too much damage to sheefish. Several fishermen fished solely with flies.

Most sport fishermen fished from the river banks near eddies, pools, sloughs, or other areas of deep water. Some fished from their rafts. While some fishermen were quite knowledgeable about how to catch sheefish, others were novices and had little luck. High water throughout much of the sheefish season in 1989 led to poor fishing conditions.

Catch-and-release fishing was the predominant fishing technique. Fishermen enjoyed catching fish, but had no means to eat or store all they caught, so returned most to the water. This was the case not only for sheefish but also for salmon, pike, grayling, and other species. Some fishermen gently returned fish to the river, while others held up large fish for photographs, then tossed them back into the water.

Harvest Levels

The number of sheefish estimated caught by nine of the 12 sport fishing parties was 148-153 fish. Three of the 12 parties did not estimate the number they caught, but assuming a similar catch rate, the total estimated catch may have been about 197-204 sheefish for all 12 parties. Of the catch, an estimated 19-21 sheefish were kept, or an average of less than two per party. Researchers do not know what percentage of the total sheefish sport catch on the Kobuk River this harvest represented.

The number caught by each party varied widely as a result of their fishing skill, size of party, time spent fishing, and weather and water conditions. Five parties caught 1-2 sheefish, three caught 8-40, and one caught 80. Several fishermen were disappointed at not catching more sheefish.

In 1989, the bag limit for sport-caught sheefish was two per day on the Kobuk River above the mouth of Mauneluk River. The possession limit was also two. Below the Mauneluk, the bag and possession limits were ten sheefish. Interviewed sport fishermen expressed little concern over limits because few wanted to keep more than one

fish. One guide said that bag limits had no effect on him because he and his clients rarely kept the fish they caught.

PERCEIVED CONFLICTS BETWEEN USER GROUPS

For several years Shungnak and Kobuk subsistence fishermen have expressed concern about aircraft traffic and sport fishing practices on the upper Kobuk River. Although these conflicts have surfaced in only the past decade or so, their origin lies far in the past. Understanding the region's culture and history provides insight into the current situation.

In the first half of the nineteenth century, northwest Alaska Eskimo societies had well-defined territories and strict rules governing who could enter another society's territory and under what conditions. The main avenue for gaining access to another's territory was through inter-societal alliances between individuals based on trading or co-marriage. These alliances also allowed movement to and from messenger feasts and during times of famine. In summer, the rules limiting access were suspended to allow travel to large, annual trade fairs held at key locations along the coast (Burch 1980). Strangers encountered in a society's territory who could not justify their presence in one of these contexts were assumed to have warfare as their purpose, and were subject to negative defensive responses from the local society, including potential violence. Local people thus had a system granting control of access into their land to the local group.

By the early 1900s, the enforcement of this system had changed considerably, but its roots remained. Today, strangers from outside the local society are not greeted with hostility, but are still often regarded with suspicion unless their purpose is known and approved. Local residents still consider certain areas as their territory and desire some knowledge and control of what occurs there.

Resentment towards airplanes in the upper Kobuk springs from this historical tradition. Researchers observed that upper Kobuk residents did not seem bothered by airplanes belonging to people they knew, who in most cases were non-Native residents of villages or outlying cabins. These pilots, in turn, knew local people and were careful to avoid intrusive airplane activity. Upper Kobuk residents also did not seem to mind cargo planes or other large commercial aircraft, which flew at higher altitudes. What seemed to disturb upper Kobuk residents most were small, single-engine airplanes they did not recognize. These were regarded with suspicion. Upon seeing one during the study period, one fish camp resident speculated disapprovingly that perhaps its occupants were hunting animals for trophies only. Unlike boats on the river, local residents had no way to know what these airplanes were doing, no way to talk to the pilot or passengers, and no way to find out where they were going to or coming from. Thus the anonymity of airplane traffic seemed to be its most disturbing aspect. In a region with as few people as the upper Kobuk, anonymity is not a normal feature of life, either historically or contemporarily.

The quantity of airplane traffic also disturbed upper Kobuk residents. During the 1989 field season, at least three or four airplanes passed by every day that weather permitted. Local residents reported that this level of traffic was similar to that of the past year or two, but was a significant increase from years prior to that. Airplane traffic had particularly been considered a problem near the Pah River where good sheefish fishing combined with safe landing sites attracted fly-in fishermen. One local family reported seeing seven airplanes at one time at Pah River about two years ago. Sport fishing and river guides familiar with the area also reported that sport fishing activity had definitely increased during the 1980s, evidenced by more airplanes, more worn river banks, and more difficult-to-catch fish. However, they said that sport fishing activity in 1989 at the Pah River seemed less than in previous years. Subsistence fishermen agreed that airplane traffic near the Pah River diminished in 1989 compared

to the few previous years, though felt that the total amount of aircraft traffic in the region appeared to be the same. According to local residents, pilots appeared to be using different areas, particularly lakes in the upper Kobuk area, though the purpose of these trips was uncertain. Frequent rain and high water in 1989 might have discouraged pilots from using Pah River.

In addition to the increasing numbers of aircraft, upper Kobuk residents were concerned about sport fishing practices. Understanding upper Kobuk residents' traditional ethics toward the natural world helps explain their concern. These ethics, distinct from those of Euro-Americans, were developed over centuries and are still central to local people's beliefs and behavior. Fundamental to these ethics is the concept that living things are cognizant of the way people treat them. If animals are treated with respect, they in turn make themselves available for use by humans. If animals are abused, the natural order is disrupted, and people risk not being able to catch enough food.

The sport fishing practices objected to by upper Kobuk residents were catch-and-release fishing and the disposing of fish backbones, heads, and entrails in the river. Both of these practices were considered disrespectful to fish with catch-and-release fishing probably the most offensive. Upper Kobuk residents told researchers they did not object to visitors fishing in the area as long as the fish were used for food. But they found catch-and-release fishing incomprehensible. It violated their beliefs about the proper manner in which animals should be treated, and in the case of sheefish, led to suffering and death.

For instance, when researchers mentioned to one Shungnak woman at a fish camp that a party of floaters had caught dozens of sheefish, but killed only two, she looked puzzled and asked, "What did they do with them?"

"Released them," one of the researchers replied.

She looked surprised and said, "I don't like that."

Her husband agreed. "When you hold fish to get the hook out, you take the slime off them. You know that slime? That keeps them warm in the water. When you take off that slime the fish suffer."

"The fish suffer," his wife agreed. "If people want the fish for food, that is fine. They should take them. But it's not right to play with them. They shouldn't play with food. The fish also get used to hooks if you catch them and let them go. Then when someone needs one for food, they can never catch one."

Other residents echoed similar sentiments. One Shungnak resident, emphasizing the fragility of sheefish, told researchers, "Sheefish die easy." This characteristic, distinguishing sheefish from other fish such as salmon and grayling, was confirmed by other subsistence fishermen, fishing guides, and experienced sport fishermen. Several upper Kobuk residents said they particularly disapproved of catch-and-release fishing for sheefish for this reason. Sheefish did not recover well from being "played with," handled, and released.

The interviewed sport fishermen by contrast believed that these practices constituted ethical fishing behavior. They enjoyed catch-and-release fishing because they valued the fishing experience as much as, if not more than, the actual catch. This was fundamentally different from subsistence fishermen, who also enjoyed fishing, but whose values included the proper use of fish as food.

Although no biological studies have been done on catch-and-release mortalities for sheefish, one knowledgeable Sport Fish Division biologist believed that sheefish were somewhat more sensitive to handling than other fish, such as grayling or pike (DeCicco pers. comm., 1990). The mortality rate for catch-and-release sheefish fishing on the Kobuk River was difficult to estimate because it depended on how carefully a fish was handled. While some sport fishermen were experienced and careful in releasing sheefish, others handled them roughly and with little apparent knowledge of their sensitivity.

Upper Kobuk residents objected to sport fishermen disposing of fish parts in the river because these drifted into eddies and pools where they rotted and scared away fish. They stated that sheefish in particular were sensitive to this, unlike salmon. One knowledgeable subsistence fisherman reported that her dependable fishing eddy was barren of fish until she noticed sheefish remains at the bottom and picked them out with a hooked tool she specifically designed for this purpose. Sheefish then returned to the eddy as before. This occurred on more than one occasion in recent years and to other subsistence fishermen as well, she stated.

Subsistence fishermen -- who typically prepare whole sheefish, eating the heads and organs -- consider the sport fishermen's practice of filleting fish to be wasteful. "They just cut off the sides of the fish and throw the rest away," one Shungnak resident said.

Upper Kobuk residents believed that the proper place to dispose of fish remains was on a river bar or bank so that this food was shared with other creatures. "The river is not a dump," one Shungnak resident said. "They should leave it on the bank where animals can clean it up."

Upper Kobuk residents otherwise did not object to visitors camping in the area or floating the rivers, as long as they did not behave offensively such as drink alcohol, cut firewood on private property, or shoot animals for trophies only. Local residents understood that most floaters were simply enjoying the country, as they themselves do. One camp resident even felt that floaters broke the monotony of camp life. "It's good to see something go by once in awhile," he said.

The views of upper Kobuk residents towards sport fishing practices are not unique. Similar views exist among Yup'ik subsistence fishermen in southwest Alaska. Research on the Togiak River, for instance, found that subsistence fishermen viewed catch-and-release fishing as an abuse of the natural world, leading to the death and

waste of fish. Yup'ik fishermen further believed that if fish remains were not properly disposed of, fish runs in the river would decline (Wolfe 1989a, 1989b).

During 1989 field interviews with sport fishermen, researchers took the opportunity to explain subsistence fishermen's concerns. Many sport fishermen were curious about the local way of life, and unaware of the way their fishing practices were perceived. Most were receptive to suggestions to ease their impact. Not throwing fish carcasses in the river was an easily accommodated change, though most fishermen said they feared attracting bears to their camps by leaving fish remains on the bank. Catch-and-release fishing was more problematic, of course, because Kobuk River visitors who came specifically to fish would in a short time catch all the fish they could consume or preserve, terminating their fishing opportunities. Sport fishermen generally valued the fishing experience as much as successful fishing. One guide, believing he was doing subsistence fishermen a favor by releasing fish (so there would be more available for subsistence), asked, "Would subsistence fishermen rather have us kill all the fish we catch?" The answer, researchers believe, is yes, as long as the fish were eaten.

DISCUSSION

From a statewide perspective, the sheefish sport fishery on the upper Kobuk River is small compared to sport fisheries in southwest Alaska, the Kenai Peninsula, or near Anchorage and Fairbanks. Yet its growth in the past decade has been substantial and local residents have become concerned, not about the sheer number of visitors but about such impacts as increased air traffic and improper treatment of fish. As the state's population has grown and tourism has expanded, urban residents and visitors have sought new, uncrowded areas for recreation, fishing, and hunting, reaching into rural regions previously unfrequented. The number of first-time guides on the Kobuk River in 1989 indicated that interest in seeking new areas was not waning.

The conflicts between subsistence and sport fishermen on the upper Kobuk River spring from cultural differences, and not -- at least so far -- from excessive competition for a limited resource. For subsistence fishermen, the upper Kobuk River is home. Their long-standing relationship with the area is evident on the land: in the old village sites, the graves, and the summer and winter camps. Nearly every bend and feature has a name, and usually a story accompanying it. Upper Kobuk residents do not mind sharing this land with visitors, as long as others' behavior is respectful of their home. But that is exactly the problem: the two cultures -- Iñupiat subsistence fishermen and Euro-American sport fishermen -- espouse fundamentally different and conflicting views of appropriate behavior towards fish and access of land.

Solutions to the conflicts on the Kobuk River are not easy. Local residents desire some control over their land and their future, as they had in previous generations. Urban Alaskans and non-residents desire access to uncrowded public lands and unexhausted public resources. Both groups feel they have rights to the resources. Some sport fishermen see little legitimacy to upper Kobuk residents' concerns, given what they perceive to be abundant sheefish, a small sport harvest, and few actual encounters between sport and subsistence fishermen.

Upper Kobuk residents' concern about sheefish carcasses in the river is perhaps the most resolvable. Printed information on the Kobuk River -- whether sport fishing articles, National Park Service brochures, or Department publications -- could advise fishermen to leave fish remains on the bank. Flyers could be distributed to all commercial outfitters using the river, instructing them in locally acceptable, culturally appropriate behavior. Many sport fishermen were simply not aware that some of their practices conflicted with local people's beliefs.

Aircraft traffic and catch-and-release fishing elude any simple solutions. When researchers asked local residents for answers to their problems with airplanes, no one offered any. Local residents did offer a solution to catch-and-release fishing: prohibit

this fishing method in the sheefish spawning grounds, if not the entire river. This is a possible regulation which could be adopted by the Alaska Board of Fisheries. However, this regulation would conflict with the dominant view of the sport fishing industry and sport fishery managers who promote catch-and-release fishing as a sound conservation strategy for a growing number of rivers, because it allows more fishing opportunities and larger fish for more sport fishermen.

The problems on the Kobuk River are unlikely to vanish on their own, and might indeed grow worse if sport fishing and airplane traffic increased. Similar conflicts are occurring in a few other areas of rural Alaska, most notably along the Togiak, Kanektok, and Goodnews rivers in southwest Alaska (Wolfe 1989a, 1989b). Researchers hope that information collected in this study could assist in a satisfactory resolution of the problems.

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APPENDIX

Upper Kobuk Subsistence Sheefish User Interview Guide

While visiting in the Upper Kobuk communities, we have heard subsistence fishermen express concern about summer sport fishing activities for sheefish in the area. We are doing research this year to look into these concerns. We work with the Alaska Department of Fish and Game in Kotzebue. Would you be willing to help us document your sheefish use and your concerns? Your participation is voluntary and anonymous.

1. Do you or members of your family fish for sheefish?

2. What methods do you use to catch sheefish?

3. How many years have you fished for sheefish?

4. What areas do you use for fishing sheefish? Do you have a camp that you use? Have the areas you use for fishing changed?

5. In what month do you start catching sheefish? When do you stop?

6. What makes sheefish special to you?

7. How are sheefish prepared and preserved? What do you do with bones and entrails? Do you use sheefish for dogfood? If so, what percent of your catch?

8. How many sheefish did you catch last year (this year)? Was this an average amount?

9. What do you know about sheefish movements and behavior? Where are they found at night? During the day? Where do they winter? Where do they spawn?

10. Have you ever seen or caught sheefish less than 10"? If so, where, when, and how many?

11. Have you noticed any changes in sheefish populations or behavior? If so, what? When did these changes take place?

12. How do you feel about sport fishing? How do you feel about catch-and-release fishing? Why? What do you think are appropriate sport fishing practices?

13. Has sport fishing had an effect on the sheefish? Has it affected your fishing? If so, how?

14. Has sport fishing changed? For instance, do you see more or less sport fishermen now than in the past? In different areas? When did you first see sport fishermen?

15. Do you have any other concerns?

Upper Kobuk River
Sport Fishermen Interview Guide

We are doing a study on sheefish use by subsistence fishermen and sport fishermen in the upper Kobuk River area. We work with the Alaska Department of Fish and Game in Kotzebue. We are interested in your personal fishing experiences in this area. Would you be willing to answer some questions? Your participation is voluntary and anonymous.

1. Where do you live?

2. How many years have you fished in this area (upper Kobuk River)? How often? When? How long do you stay? Where do you camp?

3. What do you fish for? How many do you catch?

4. What makes sheefish (or other fish) special to you?

5. What type of fishing gear and methods do you use here (fly, bait, spoon, etc.)?

6. What other locations do you use for fishing around here? Have the areas you use for fishing changed?

7. Who do you usually fish with here? Do you ever fish with a guide?

8. How did you find out about this place? How did you get here?

9. What do you like about this area? What do you not like about this area?

10. How do you prepare or preserve sheefish? What do you do with the flesh, bones, and entrails? Do you use any for dogfood?

11. Have you noticed any changes in sheefish populations or behavior? If so, what?

12. Have you ever seen or caught sheefish 10 inches or less? Where, when, and in what numbers?

13. How do you feel about subsistence fishing in this area? Why?

14. Has subsistence fishing had an effect on your fishing here? Or on the sheefish? If so, how?

15. Have you noticed any changes in sport fishing in this area? If so, what? Are there more or less fishermen? Different fishing areas?

16. How do you feel about the fishing regulations? Do you have any other concerns?