

MOOSE HUNTING IN TWO CENTRAL KUSKOKWIM  
COMMUNITIES: CHUATHBALUK AND SLEETMUTE

by  
Susan Charnley

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## ABSTRACT

Research was conducted in Chuathbaluk (population 132) and Sleetmute (population 101) during the 1982-1983 moose seasons to obtain information on moose hunting and utilization by these communities. Methodology included questionnaire surveys, participant observation, informal interviews, formal mapping sessions, and review of pertinent literature. This information supplements earlier survey work performed by the Division of Subsistence in 1979 and 1981 in response to concern expressed by local residents, the Central Kuskokwim Advisory Committee, and Nunam Kitlutsisti--a branch of the regional non-profit corporation, Association of Village Council Presidents--over increased competition for the moose resource in Game Management Unit 19A. A recognized need for additional information to assist the Board of Game and land planners in resource management and land use decisions instigated the current study.

Moose populations in Game Management Unit 19A are currently considered to be in healthy condition by both managers and local residents. Hunting regulations since the time of Statehood have reflected moose population levels and harvest demands over time. Seasons during the 1982-1983 regulatory year occurred from September 1 to 25, November 20 to 30, and February 1 to 10. Seasons that coincide with below freezing temperatures are preferred by area residents as they rely primarily upon outdoor freezing to preserve their moose meat.

The September season occurs during a time at which moose were traditionally harvested by central Kuskokwim River residents. A large amount of effort was expended by local hunters during the September 1982 season with limited returns. Competition for moose with non-unit residents

during the September season is perceived by unit residents as limiting their hunting success. Hunting success during the November season, which in some years coincides with freeze-up, may be limited by weather and travel conditions. This was the case during 1982. The February season is valuable to local hunters, allowing individuals who failed to harvest moose in earlier seasons to obtain meat. Cow moose are preferred during the November season because bulls taste poorly following the rut. Cows are also preferred during the February season because they are fatter than bulls at this time. Distribution of moose meat along lines of kinship and friendship provide unsuccessful hunting households with meat.

Sleetmute residents have concentrated their moose hunting activities along the Holitna and Hoholitna rivers throughout their lifetimes. Chuathbaluk residents have hunted moose along the Aniak, Kolmakof, Holokuk, Oskawalik, and Kuskokwim rivers, expanding their use areas over time. Place of residence, kinship relationships, quality of available moose habitat, customary laws of land tenure, and traditionally used hunting areas together influence where individuals have hunted moose, both in the past and presently.

During the 1982-1983 seasons, Sleetmute residents harvested .68 moose per village household and Chuathbaluk residents harvested .55 moose per village household. Chuathbaluk residents expended 35.8 hunting person days per moose harvested, while Sleetmute residents expended 9.5 hunting person days per moose harvested. The average number of in-season moose harvested annually over the past five years per household interviewed was .60 for Chuathbaluk households and .82 for Sleetmute households. Moose are a staple of the central Kuskokwim diet and serve as a more reliable resource for Sleetmute residents than for Chuathbaluk residents. Higher

moose densities in hunting areas used by Sleetmute residents, more favorable travel conditions, less local competition for moose, and seasonal settlement patterns of Sleetmute residents contribute to making moose more easily harvested by Sleetmute hunters than by Chuathbaluk hunters.

Households interviewed in Chuathbaluk and Sleetmute having an average household size of 4.7 and 4.4, respectively, stated that 2 moose per household annually would provide them with what they considered to be enough moose meat.

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## INTRODUCTION

The information contained in this paper is condensed from data on wild resource use that will be presented in a comprehensive report that focuses on social, economic, and ecological variables involved in resource use by residents of Chuathbaluk and Sleetmute, two central Kuskokwim River communities (Fig. 1). This study was initiated in part due to a recognized lack of background information on the use of game in Game Management Units (GMUs) 19A and 19B (Fig. 2).

There has been concern expressed by residents and the Central Kuskokwim Advisory Committee about increased competition by non-local users in GMU 19A and 19B which is perceived by local residents as limiting their hunting success, primarily during the fall season. Residents consider non-local users to be those individuals who do not reside within the units. The Division of Subsistence began work in the Central Kuskokwim area in 1979 in response to concerns expressed over the moose resource by local residents, the Central Kuskokwim Advisory Committee, and Nunam Kitlutsisti. In 1979 and again in 1981 food surveys were conducted in communities between Lower Kalskag and Stony River. These surveys provided information which was used by the Board of Game in assessing the game needs of local residents and in establishing moose hunting seasons (Jonrowe 1979; Stickney 1981).

The purpose of this paper is to provide in-depth information on several aspects of the use of moose by residents of Chuathbaluk and Sleetmute, including the following: hunting methods, the ecological framework within which hunting occurs, production units, preservation and preparation methods, the distribution of moose meat, the importance of

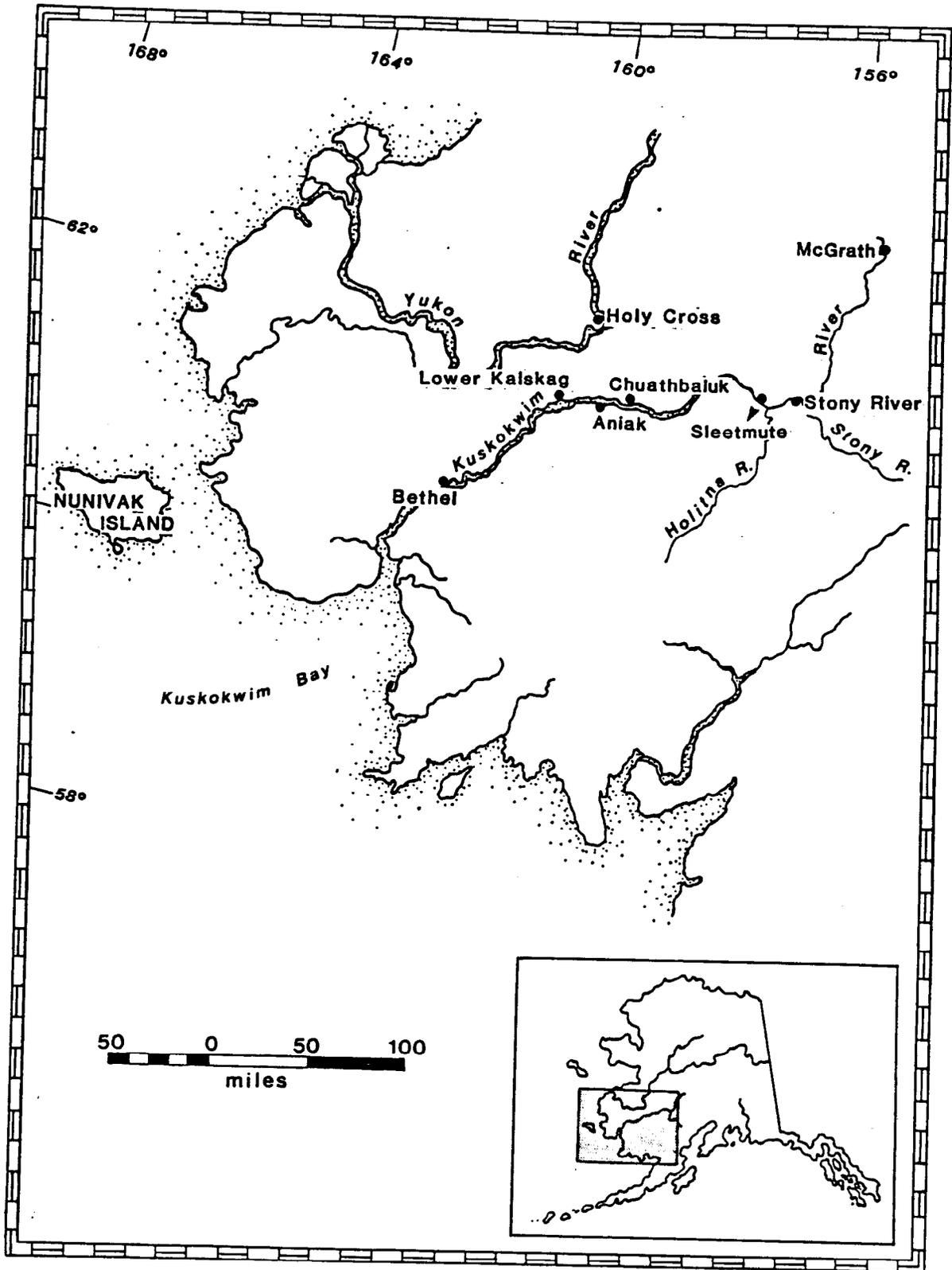


Fig. 1. The Central Kuskokwim region.

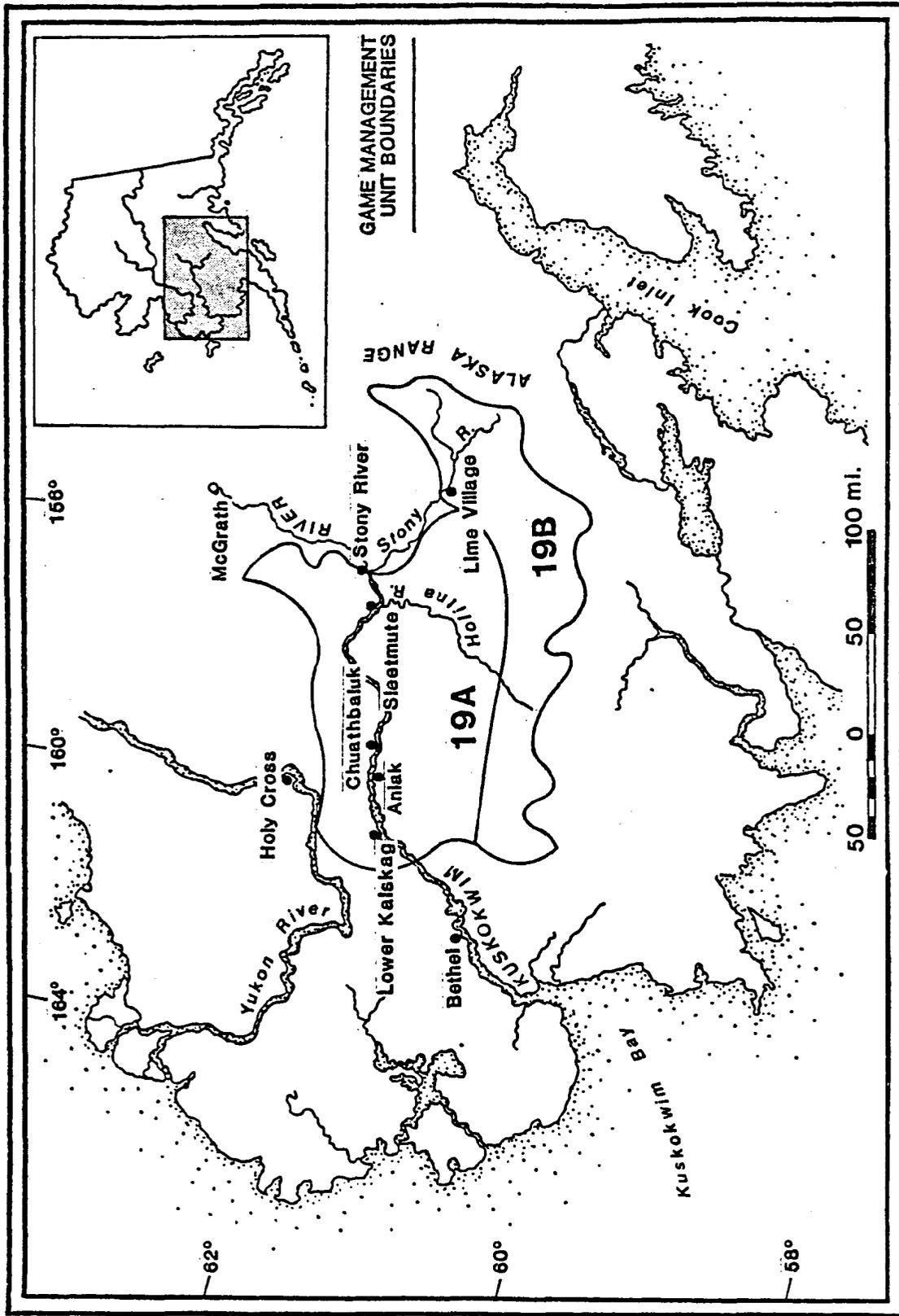


Fig. 2. Game Management Units 19A and 19B.

moose, and land use patterns. Assessments of moose population levels, the 1982-1983 seasons and the regulatory history of moose in units 19A and 19B are presented as well.

Currently, Chuathbaluk is a community of 132 people distributed among 29 households. It is located ten miles upriver from Aniak, the regional center of the central Kuskokwim. Sleetmute has a population of 101, consisting of 28 households. Sleetmute is located at the mouth of the Holitna River, approximately 98 miles upriver from Chuathbaluk. Both are primarily Yup'ik-speaking communities. The central Kuskokwim region falls within the Hudsonian biotic province and is characterized by white spruce and birch forest which covers low-lying hills.

#### METHODOLOGY

Data were gathered by two research staff of the Division of Subsistence during field studies in Chuathbaluk and Sleetmute. Both researchers spent half of the September moose season in Sleetmute and half of the September moose season in Chuathbaluk. Researchers were located in Chuathbaluk during the November season and in Sleetmute during the February season. Information was gathered by participating in moose hunts, observing how moose were processed, informally interviewing community members knowledgeable about moose and its uses, and conducting systematic questionnaire surveys following each established season (Appendices A and B). Every hunter participating in the moose season was interviewed. Locations where individuals had hunted moose throughout their lifetimes and in recent years were recorded during formal interviews on U.S. Geological Survey topographic maps (1:250,000) scale with mylar overlays. A pertinent literature review was conducted.

## POPULATION STATUS OF MOOSE IN GAME MANAGEMENT UNITS 19A and 19B

The draft proposal of the Alaska Wildlife Management Plan for the western region (Alaska Department of Fish and Game 1976) gives an historical overview of the growth of the moose population within the Kuskokwim River drainage. The following account is taken from this source. Prior to 1900, caribou were probably the most abundant ungulate along the middle and lower Kuskokwim. At that time, moose were scarce or absent along the Kuskokwim. A series of severe wildfires early in the century destroyed a wide range of caribou habitat, restricting this species but creating habitat favorable to moose. Moose began to appear along the Upper Kuskokwim in 1915-1920 following this series of wildfires. During the 1920s and 1930s, moose expanded throughout the upper Kuskokwim. By the early 1940s moose were well established between Aniak and the Upper Kuskokwim. Moose populations peaked between 1957 and 1970. Severe winters during 1971 and 1972 dramatically reduced the population, and moose in the central Kuskokwim have been slow to recover. Flooding, predation, and high harvests are thought to have continued to depress population levels in the Holitna basin.

Based on long-term observations, local observers report that the central Kuskokwim moose population is in fairly healthy condition. Cow moose appear to predominate, and large bull moose are reported to be scarce. Moose were more abundant in GMUs 19A and 19B prior to the 1970s, according to local accounts, the decline being attributed to an increased harvest of moose by non-local hunters since that time. Non-local hunters are perceived to be responsible for the decrease in numbers of large bull moose as well. Spring flooding and heavy snowfalls are recognized

as additional factors causing mortality within the moose population.

Local assessments of the moose population are based on observations made from the ground, in contrast with those made by Division of Game biologists.

The Division of Game, Alaska Department of Fish and Game, has conducted aerial surveys of the moose population in GMU 19 to determine sex and age composition. Results of these surveys are presented in the annual Survey and Inventory reports published by the Division. Most population censusing has been performed outside of unit 19A in the McGrath-Farewell area, in the Takotna River drainage, and in the Alaska Range. Little population census data are available for unit 19A. The results of 1980 surveys flown in the Hohlitna, Aniak, and upper Hohlitna river drainages showed increasing populations but low density in some areas, including the Aniak River drainage (Alaska Department of Fish and Game 1981). Surveys also revealed a high rate of calf survival and an abundance of bulls (Alaska Department of Fish and Game 1981). Survey data from 1981-1982 showed excellent survival of calves and a good bull to cow ratio (Alaska Department of Fish and Game 1982).

#### REGULATORY HISTORY OF MOOSE IN GAME MANAGEMENT UNITS 19A AND 19B

Hunting regulations in GMU 19 have varied since Statehood in response to moose population levels and hunting pressure. Bag limits between 1959 and 1964 were one bull moose. Seasons opened August 20, and were gradually increased from 41 to 133 hunting days. By 1963 there was the added option of taking an antlerless moose. The bag limit was increased to two moose during the 1964-1965 season, one of which could be antlerless. The open season was extended during the 1968-1969 regulatory year from December 31

to February 15, and lengthened again in 1970-1971 to February 28, antlerless moose not to be taken prior to October 1. Longer seasons were intended to facilitate the legal spring harvest of moose, a season when moose were traditionally taken by area residents for subsistence use (Alaska Department of Fish and Game 1969).

Following the winters of 1971 and 1972 moose populations in GMU 19 were greatly reduced due to severe weather conditions (Alaska Department of Fish and Game 1972). Seasons and bag limits were not restricted. Managers reasoned that a decreased availability of animals in the latter part of the season would aid in reducing the harvest (Alaska Department of Fish and Game 1972). By 1974 bag limits had been lowered to one moose, however, and the open season was shortened to December 31. In 1975 the season was further reduced by one month to November 30.

Reduced seasons and bag limits were anticipated in response to increased moose harvests in GMU 19 (Alaska Department of Fish and Game 1975). A significant increase in hunting pressure within the Holitna, Hoholitna, and middle Kuskokwim drainages by residents of adjacent GMU 18 and by hunters flying into the Alaska Range required more restrictive regulations in order to protect the moose population (Alaska Department of Fish and Game 1977). Moose population levels were recognized as being low to moderate, although increasing slowly (Alaska Department of Fish and Game 1975). By 1977 GMU 19 had been divided into four subunits--A, B, C, and D. The antlerless season was eliminated in 19B and 19C in 1977 and in the other units in 1978 to 1979 due to hunting pressure (Alaska Department of Fish and Game 1978). Between 1978 and 1981 open seasons in GMU 19A occurred during 20 days in September and 30 days in November, with a one bull moose bag limit. In GMU 19B one bull could be taken

during a September-October fall season which decreased in length from 40 to 30 days.

February and antlerless seasons were reestablished in GMU 19A in 1981-1982 in response to local demand and based on biological data that showed an increase in the size and survival rate of the moose population which was now considered capable of sustaining an additional season (Alaska Department of Fish and Game 1981). Since 1981 open seasons have occurred in GMU 19A from September 1 to 25, November 20 to 30, and February 1 to 10, with a one moose bag limit provided that antlerless moose may be taken only during the November and February seasons. In GMU 19B one bull may be taken between September 1 and 30.

In summary, regulations governing moose harvest in unit 19 were liberalized throughout the 1960s and early 1970s. Severe winters in 1971 and 1972 dramatically reduced the moose population in GMU 19, but regulations were not restricted until the 1974-1975 season. The latter half of the 1970s saw increasingly restrictive regulations that shortened seasons and prohibited the harvest of antlerless moose. Increased moose harvests in unit 19 and heavy hunting pressure by non-unit residents precipitated conservative regulations. The moose population has since been recognized by managers as recovering slowly. Seasons were again liberalized in 1981-1982 when the moose population was considered healthy enough to sustain February and antlerless seasons.

According to local residents, longer, more liberal seasons provide opportunity to maintain hunting patterns that are more representative of traditional patterns. Additionally, they state that the fall season occurs at a time of year when men traditionally go to hunting camps to harvest game animals. Later seasons allow those who are unsuccessful

during the fall hunt to have another opportunity to hunt moose. Residents report that longer seasons allow hunters to hunt when climatic and environmental conditions are advantageous and also allow them to hunt concurrently with other activities such as berry-picking and trapping. The antlerless season provides an opportunity for hunters to take cows at times of the year when bulls taste poorly and lack fat.

#### ECOLOGICAL FRAMEWORK WITHIN WHICH MOOSE HUNTING OCCURS

Environmental conditions and seasonal habits of moose influence how and where a hunter will hunt, as well as his effectiveness. Knowledge of the behavioral patterns of moose and their responses to varying environmental stimuli is instrumental to success on the part of the hunter. While many local people attribute hunting success primarily to "good luck", technical skills are also integral components of fruitful hunting endeavors. Environmental factors affecting travel capabilities are also of prime importance in hunting success. The following observations on moose behavior are based on local accounts recorded during the field research.

During the summer and early fall months of open water, moose are distributed throughout the spruce-birch forest, along rivers, on sandbars, around lakes, in open wet meadows, and on ridges where they feed on a variety of shrubs. Willows which border rivers, creeks, and lakes are a major food source and moose are often found in these riparian habitats. Moose tend to feed during early morning and evening hours, at which times they are more likely to be encountered by hunters, as compared with during the day when they tend to rest in the brush. On calm and humid days when mosquitoes

are especially dense in the woods, moose often seek relief on sandbars and riverbanks. Bulls and cows are especially fat in July, August and September.

In late September bulls enter the rut. At the onset of below freezing temperatures, moose concentrate along river floodplains in search of food which becomes less available in the upper elevations. At this time of year bulls are on the move in search of cows and respond to sounds with bold curiosity. This proves to be beneficial for the hunter who can generate sounds that arouse and attract bulls. It also allows the hunter to move into closer proximity of the animals, providing better vantage points from which to shoot. At this time, small, mixed age and sex groups of moose can be encountered. It is comparatively easy to hunt in late September and early October when animals are concentrated along rivers where hunters have access to them by boat and on foot. In mid- to late October following the rut, groups disperse again. According to local residents, the meat of the bull moose becomes tough and ill-tasting at this time, making cows the preferred target during the November season.

During cold winter months the movement patterns of moose are largely influenced by snow cover. When there is little snow, the animals remain distributed throughout open upland areas and the spruce-birch forest. Crusted snow in open areas causes moose to favor the forest, where snow tends to be softer. Deep and drifted snow on ridges and in upper elevations drives moose down into riverbeds where they can often be found on islands and in sloughs. Willows are an important winter food source. When moose sense a storm coming they move down to the rivers. Moose may remain solitary at this time of year. Others move in groups of two or three, such as a cow with a yearling, two cows, or two bulls together. Bulls

drop their antlers around February, during and after which animals tend to congregate in large mixed or single sex groups that can number up to twenty animals. Bulls may be seen fighting with one another at this time. Animals disperse back into the open and/or forested upper elevations gradually following snowmelt. Parturition occurs from late May to early June. Cows and newborn calves tend to remain along the rivers which provide routes of escape from predators. By mid- to late summer, moose are distributed throughout their summer habitat. Knowledge of the seasonal distributions of moose is important, allowing hunters to anticipate where animals will be during different seasons and influencing where local people go to hunt.

Climatic variables influence water, ice, and snow conditions as well as moose behavior, affecting hunting patterns and hunting success. Abundant rains during the fall season cause the Kuskokwim and its tributaries to rise, allowing hunters greater access to otherwise shallow and impenetrable waters. However, moose tend to remain sedentary in rainy weather, decreasing the likelihood that they will be encountered by hunters. In addition, high water causes sand and gravel bars to become partly or entirely submerged, diminishing favorable foraging habitat for moose. This forces moose away from riverbeds where hunters may be travelling or drifting in search of game. Leaf fall, triggered by cold weather, increases hunting success by improving visibility in the woods.

During the November and February seasons ice and snow conditions influence hunting patterns. Freeze-up along the middle Kuskokwim usually occurs in November. Around Sleetmute the river and lakes tend to freeze up around Thanksgiving, while the waters near Chuathbaluk freeze approximately two weeks prior to this. Ice conditions often make it unsafe to

travel during the November season because it coincides with freeze-up when there is still open water and overflow. Hunting may be restricted to overland areas where activities become influenced by snow conditions. Deep snow creates improved hunting conditions in overland areas. These conditions make it difficult for moose to run and increases the effectiveness of snowmachine travel for the hunter. Warm spells during winter months cause ice melt, snowmelt, and overflow, creating unsafe travel conditions overland and on rivers and creeks and preventing hunters from hunting.

During months with snow, tracking moose on foot depends on prevailing weather conditions. Loud windy and stormy weather allows a hunter to track moose to the beds in which they are resting without being heard. Calm, still weather enables animals to detect the sound of an approaching hunter and move off before he arrives. Deep, powdered snow allows a hunter to approach noiselessly. Icy or crusted snow amplifies sound, causing the hunter to be heard by the moose.

Wind conditions as they relate to the positioning of hunter and prey must be considered in moose hunting. It is advantageous for the hunter to remain downwind of the animal. Moose have a well-developed sense of smell and will elude an approaching hunter if they detect his scent.

## HUNTING METHODS

### Seasonal Techniques

According to local residents, moose were traditionally harvested throughout the year in the central Kuskokwim drainages, often when encountered in the course of pursuing other activities. Game animals

were actively sought in late August and September when men from the community moved to fall hunting camps. From these camps, bear and caribou were also harvested. Typically, a group of men travelled up a tributary of the Kuskokwim River by birch bark canoe, or travelled overland on foot, and established a hunting camp from which moose, caribou, black and brown bear were harvested over the course of several weeks. A fire was kept going at the camp for the purpose of drying and smoking the meat. When enough animals had been taken, skin boats were constructed using the animal hides, and the hunters drifted back downstream and returned to the winter villages with the supply of meat. The birch bark canoes were left at the hunting camp site.

Moose were traditionally harvested in spring as well, often in April, at which time they provided the best quality hide for making babiche (raw-hide) which was used in manufacturing snowshoes. Spring moose were also valued for the production of dry meat. Dry meat is a favorite food among area inhabitants, providing a source of meat that can be utilized throughout the summer when families are at fishcamp.

Moose hunting currently takes place during the established September, November, and February seasons. During the September season transportation to hunting areas is usually in 16 to 23-foot wooden skiffs powered by 15 to 70 horsepower motors. Wooden boats are preferred to aluminum as they are considered quieter and more capable of hauling larger loads. Smaller motors give the hunters easier access to shallow creeks, sloughs, and the upper reaches of Kuskokwim tributaries. Longer boats are advantageous when travelling in waterways where poling is necessary, as they have a greater tendency to progress in a straight line. During the November and February seasons, transportation is by snowmachine. Individuals who are

in good physical condition and lack boats or snowmachines may hunt on foot near the village using snowshoes. Common rifles used for shooting moose are the .30-.30 and .22 caliber, although anything from a .22 to .300 magnum caliber rifle may be used.

Some individuals have the reputation of being "sharp-shooters", usually killing a moose with one shot. This ability is considered a special gift that has been bestowed upon certain individuals by others, and in turn may be passed on once the bearer no longer feels a need to retain the ability. It is unknown ahead of time who this gift will be passed on to. The bearer typically gives it to whomever he considers the most deserving close relative, such as a son or nephew.

Techniques implemented in moose hunting during the September season include moose calls, drifting along rivers in boats, tracking on foot, and lying in wait. Moose calls are commonly made by scraping a moose scapula against a tree trunk, by pulling a string through a small hole in the center of the bottom of a tin can from which the top has been removed, or by making a vocal utterance. Moose may also respond to the sound of an axe chopping wood.

Feeding moose are encountered by hunters in the course of travelling by boat during hunting trips. The sounds produced by boat motors tend to frighten animals away from the river and into the brush, making drifting a preferred hunting method. Travelling and drifting are best done during early morning and evening hours when moose may be out feeding. The hunting party employs the motor in travelling toward the headwaters of a river or creek. The motor is then shut off and the boat is allowed to drift downstream with the current, being guided by the oars. Hunters can then quietly approach and dispatch a moose along the riverbank. If fresh

tracks are encountered or a distant moose is sighted while drifting, the party usually stops to search for the animal on foot. The group of hunters split up and circle the area where the animal is expected to be.

Most moose hunting takes place within one mile of either side of the waterway which is being hunted. Hunters are reluctant to take moose more distant from their boats due to the time and effort involved in packing the parts of an animal that may weigh up to 1,000 pounds or more. Hunters will often search for moose on foot around meadows or lakes within a hunting area. Another strategy used is to climb a hill fifty to several hundred feet high that is close to the waterway and survey the surrounding countryside with binoculars in an attempt to locate animals which can then be pursued on foot. A hunter may situate himself on a ridge or hillside for several hours waiting for an animal to move. Hunters also may station themselves at a good vantage point along the Kuskokwim River and wait several hours so as to locate a swimming moose which can be taken once it reaches the opposite shore.

Aircraft are seldom used in moose hunting by local residents. A single Sleetmute household uses private aircraft for hunting moose. Close kin relations or friends may accompany household members.

During the November and February seasons snowmachines are the primary means of transportation in moose hunting. Rivers and creeks become major travel corridors along with overland trails which are used during winter months. Hunting methods involve travelling to an area by snowmachine where moose are likely to be found such as along rivers, on islands, and in sloughs, and looking for fresh tracks in the snow. Lakes and meadows are also searched. Once fresh tracks are located they are followed either on foot or by snowmachine. In open tundra areas where

moose can be spotted they are approached by snowmachine until the hunter is within shooting range. If the moose is feeding it usually will not run from a snowmachine, simplifying the task of the hunter. If there is deep snow and a fair wind, moose can be tracked on foot with the use of snowshoes to beds where they are resting during the day. The hunter must remain downwind of the animal. Strategies for hunting moose on foot involve splitting up with one's hunting partner(s) and circling the brush in opposite directions, attempting to flush out the moose in the direction of one of the hunters.

Islands are likely places to find moose in the winter. Islands can be circled and searched for tracks or traversed down the middle in hopes of intersecting tracks. If fresh tracks are found on the island banks, an island drive technique may be employed, assuming that the moose is resting in the brush on the island. The hunters can enter the brush in the location of the tracks or at one end of the island, anticipating where the animal lies. One hunter remains at the opposite end of the island. The hunters in the brush walk toward him in an attempt to flush the moose in the direction of the waiting hunter, who then shoots it. Tracking techniques require an ability to distinguish between fresh and old tracks. A hunter may feel the tracks he is following every few minutes to determine whether the snow is loose, soft, and powdery, indicating fresh tracks, or if it is crusted, hard, and frozen over, signifying old tracks.

When tracks are difficult to locate, feeding signs can be examined and will reveal how recently moose have been in an area as well as what sex of moose have fed there. In places where moose have been eating willows, the tips of the stems are split using a knife. If the stem is

green close to the tip moose have fed there recently. However, if the stem is dried out an inch or more below the tip, moose have not fed there for some time. Bull moose eat brush that is wider in diameter than that eaten by cows. Cows eat the tips of the stems, while bulls break off stems well below the tips. If feeding signs indicate that moose have been in an area recently, the hunters will remain and look for fresh tracks. This hunting method was used more widely in earlier decades when moose populations in the central Kuskokwim were sparse. It was not observed in use as a hunting method in the 1982-1983 seasons during which time tracks were easily located.

#### Production Units

Moose hunting is almost always engaged in by the adult and adolescent male members of the community. Many hunters believe that the company of a female will bring them bad luck. During the September season an extended family group that can include the wife, sisters, mother, and/or daughters of the hunters often camps together for up to a week, during which time the females pick crowberries and lowbush cranberries while the males hunt moose and black bear. Sometimes two or three households that may or may not be related will camp together in one area. These camps are typically in locations where individuals have had berry camps in previous years. The November and February hunts usually involve the male members of a household only. Hunting may be pursued in the course of checking a trapline, or may take place during day or overnight trips from the village. Extensive camping during these latter seasons is limited by cold weather.

The average size of hunting parties during the September 1982 season was 2.8 ranging from 1 to 5. Hunting parties were most typically composed

of fathers and sons or brothers, but included cousins, nephews and uncles, or friends. Individuals between the ages of 11 and 78 participated in documented hunts. The average size of the hunting party during the November season was 1.4 persons, ranging from 1 to 3. Hunting party composition did not differ from that of the September season. The average monetary expenditure for hunting moose during the September season was \$163 with a range of 0 to about \$500. The average monetary expenditure on hunting during the November season was \$59. Data on the size of hunting parties and monetary expenditure during the February 1983 season were not gathered systematically. Observations indicate however that these figures would be comparable to those given for the November season.

Once a moose is killed it is butchered at the kill site by the members of the hunting party. The meat is divided among the party members and taken back to the winter village. There the meat is further processed by either male or female members of the household for storage and distribution. The female members of the household are primarily responsible in preparing the meat for eating.

#### MOOSE HUNTING AREAS

Areas used by Chuathbaluk and Sleetmute residents for hunting moose were documented on U.S. Geological Survey topographic maps (1:250,000 scale) using mylar overlays. Twenty hunters from Chuathbaluk were interviewed, representing 20 households or 69 percent of the total number of village households. Fifteen hunters from Sleetmute were interviewed, representing 14 households or 50 percent of the total number of village households. The sample was composed of the male head of each household interviewed,

who was assumed to be the most active hunter in the household. The most active hunter was interviewed in those households lacking male household heads. The hunter interviewed provided information relating to the hunting areas used by other hunters within his household. If these areas differed greatly from his own, the other hunter(s) were interviewed separately. Those households lacking hunters were not interviewed.

The areas in which residents of Chuathbaluk and Sleetmute hunted moose during their lifetimes are divided into three selected historic time periods. Individuals were asked where they had hunted moose (both successfully and unsuccessfully) during the past three years (1979-1981), representing recent land use patterns. Hunting areas used during the 1982-1983 season were recorded on questionnaires and are included on the maps showing a three-year time depth.

The second and third time periods selected differed for the two villages. Moose hunting areas used by Chuathbaluk residents were documented prior to their time of residency in the village and following the time at which they established residency in the village. The first family moved to Chuathbaluk in 1954 and others arrived throughout the 1960s and 1970s. Moose hunting areas used by Sleetmute residents were recorded prior to 1960 and between 1960 and 1979. The approximate time at which snowmachines began to supplant dog teams as a mode of transportation was 1960. This date was chosen as a time marker to reflect changes in hunting areas that may have resulted from this shift.

Moose hunting areas as they are used over time reflect use patterns which are guided by several principles, some of which prevail in both Chuathbaluk and Sleetmute, and others of which are related to unique circumstances within each community. Land use patterns in the central

Kuskokwim have been influenced by customary laws and traditions relating to land use. Local residents stated that there are areas characteristically occupied and used by residents of particular villages. Use areas generally include Kuskokwim River tributaries in proximity to each respective village. Residents of one community could use the hunting areas of another community if they exhibited close ties of kinship or friendship there or if they were born there and demonstrated a history of using an area. In this regard, use areas may be associated with particular kinship lines independent of place of residence. Otherwise, villagers respected the use areas of other villages and harvested resources only within their own use areas.

Customary laws of land tenure have been disrupted somewhat in recent times with an influx of new residents into the area and the advent of a tendency for non-local people to harvest in the use areas of local residents without recognition of customary concepts of land tenure. An example of this is the extensive amount of use the Holitna River receives during the fall moose season by residents of lower Kuskokwim River villages who do not have ties of kinship or friendship with Sleetmute residents. Historically, the Holitna River was primarily used by residents of Sleetmute and other villages located along the Holitna River. Currently, local residents generally recognize and maintain a sense of respect for the resource harvest areas used by members of each village. Chuathbaluk and Sleetmute residents tend to concentrate their activities within their respective use areas.

Some individuals have special hunting areas, the knowledge and use of which have been passed down to them from members of earlier generations. These places can be a particular stretch of river or an area that encompasses

specific lakes or meadows. The hunting area is one which a hunter can generally rely upon for success in harvesting moose. The hunter does not hold "title" to the area in any formal sense, but the area is protected by "proprietary" knowledge; others in the group may know the general, but not precise, location of the area. These places are regarded with respect and the specific location is not revealed to other hunters until the "user" is ready to pass the area on. This typically occurs once the user has aged and feels that he will not be able to use the hunting ground much longer. The area is usually passed on from a father to a son, or, lacking an appropriate son, to a close friend or relative such as a nephew whom the user deems worthy of it. For example, one individual was given a hunting area by his mother's first cousin who did not choose to pass it on to his own son because he felt that his son would not use it and treat it with respect. The friend was entrusted to pass the area on to the grandson of the original bearer once the grandson became old enough to hunt. The friend intends to pass the area on to this grandson, and would not have handed it down within his own household if there were no already established stipulations because he has only a step-son.

It should be noted that land use concepts are complex. The customary system of land use rules is not yet described or understood in any degree of completeness.

### Chuathbaluk

The changes in historic land use patterns of Chuathbaluk residents appear to be primarily influenced by changing place of residence by its population. Chuathbaluk was reestablished as a village in 1954 when the first family moved there from Crow Village (Oswalt 1980). By 1970 it had

a population of 94, and by 1980 it had grown to 106 people (Alaska Department of Labor 1981). Most individuals came from other central Kuskokwim villages, including Aniak, Crooked Creek, Sleetmute, Kalskag, Crow Village--a now abandoned village site eight miles downriver from Aniak on the Kuskokwim--and Napaimute, an old village site approximately 20 miles upriver from Chuathbaluk, which in 1982 had only one summer resident.

The moose hunting areas used by Chuathbaluk residents as presented in Figures 3 through 5 exhibit some variation within the three time periods selected. Prior to residency in the village (Fig. 3), individuals were hunting along the Kuskokwim River between Kalskag and Stony River and were utilizing the major tributaries that flow into the Kuskokwim between these communities--the Aniak, Holokuk, Oskawalik, George, Holitna, and Hoholitna rivers. This can be understood in light of the fact that current residents of Chuathbaluk were born and raised in other central Kuskokwim communities and utilized hunting areas that were recognized as being within the respective "use areas" of these communities. These areas can be generalized as follows: Kalskag--the Whitefish Lake area; Crow Village Discovery and Swift creeks and the Aniak River; Aniak--the Aniak River; Napaimute--the Holokuk River; Crooked Creek--the Oskawalik and George rivers; and Sleetmute--the Holitna and Hoholitna rivers.

Once individuals settled in Chuathbaluk they continued to use the hunting areas they had utilized previously with the exception of the George River (Fig. 4). Chuathbaluk itself is not located in immediate proximity to a major Kuskokwim tributary that has high natural resource potential, as is Sleetmute, for instance. In fact, Chuathbaluk was first established as a year-round settlement at its present location for religious

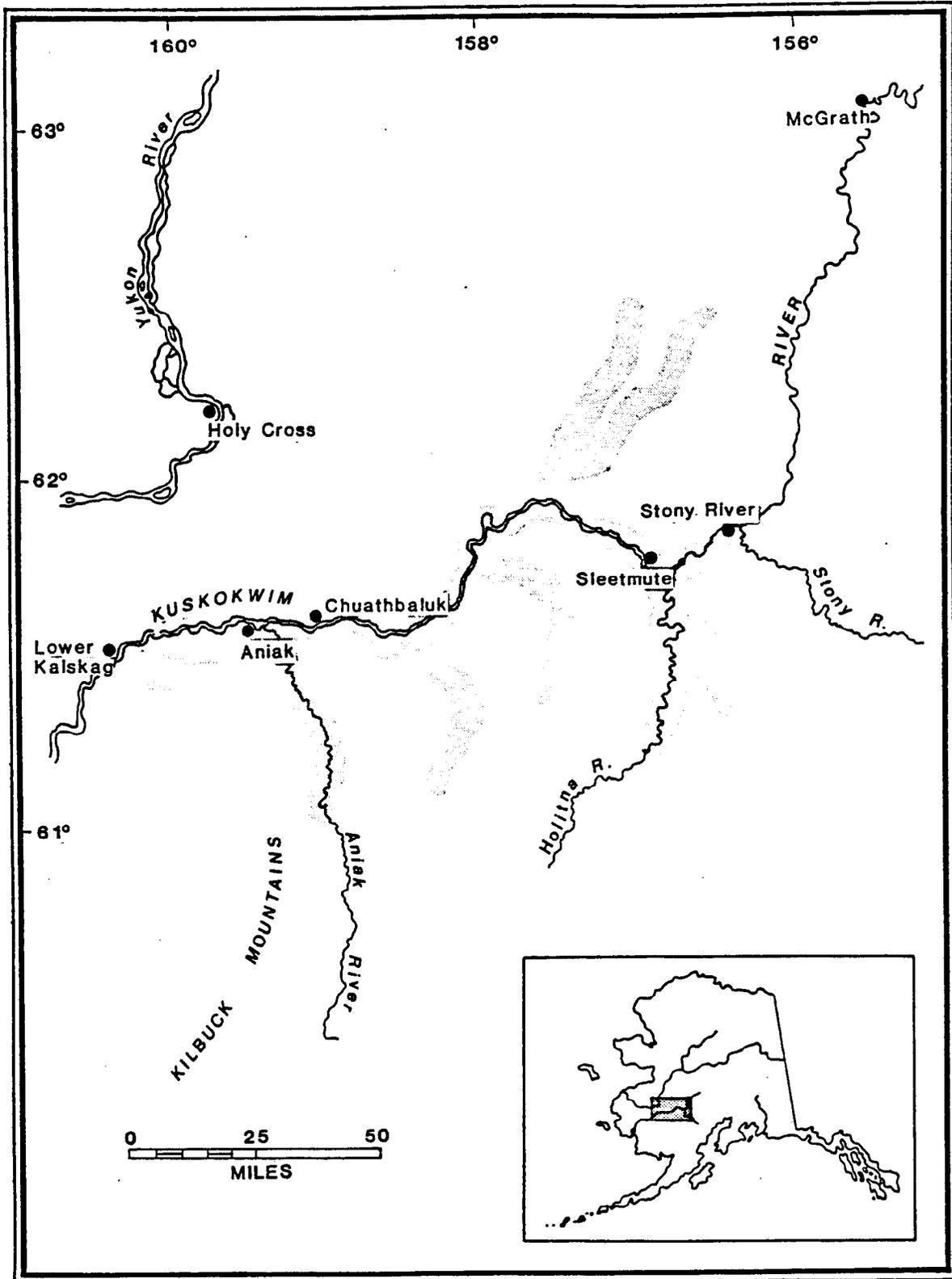


Fig. 3. Areas used by Chuathbaluk residents for hunting moose prior to their time of residency in the village.

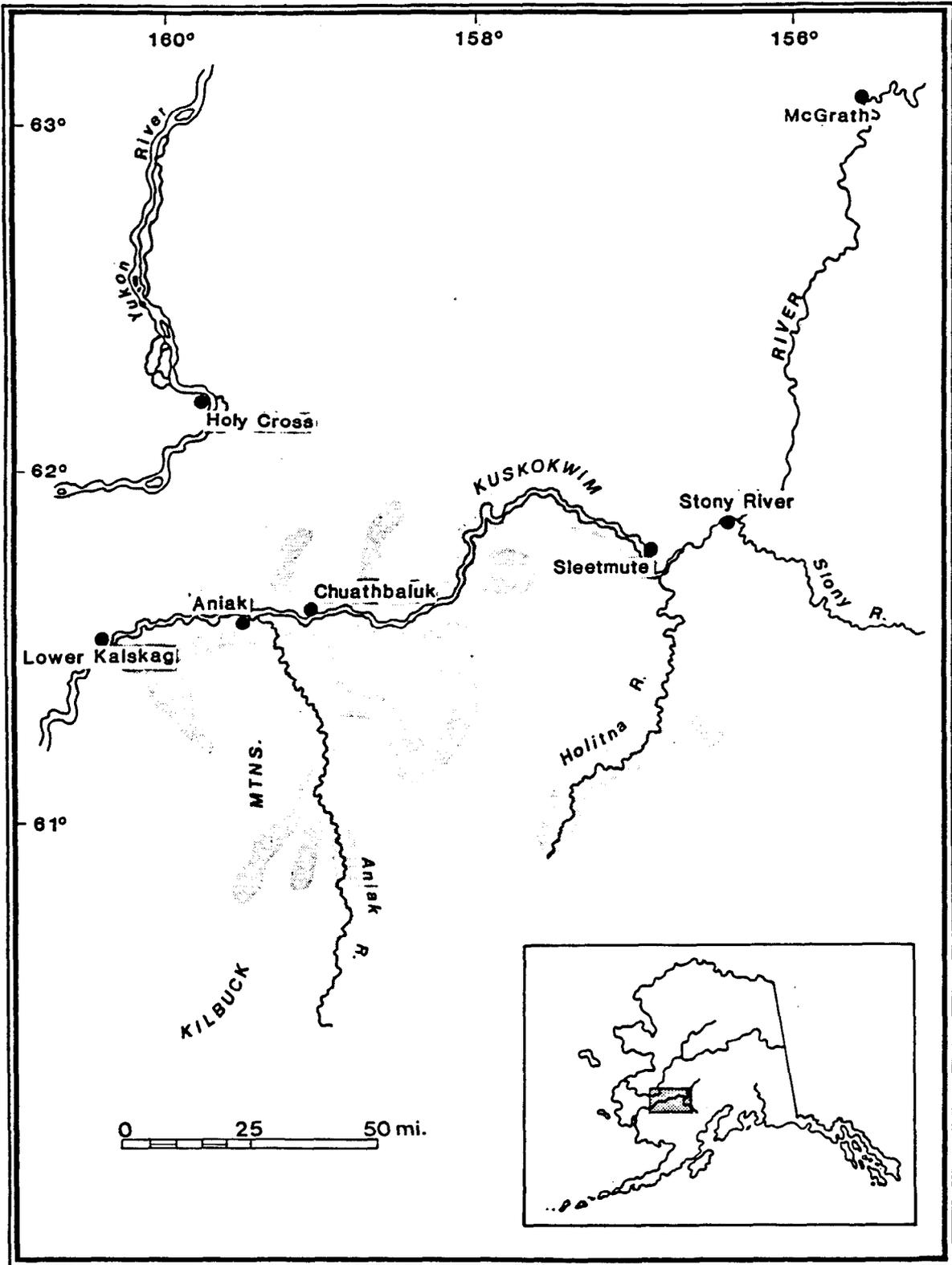


Fig. 4. Areas used by Chuathbaluk residents for hunting moose since their time of residency in the village and prior to 1979.

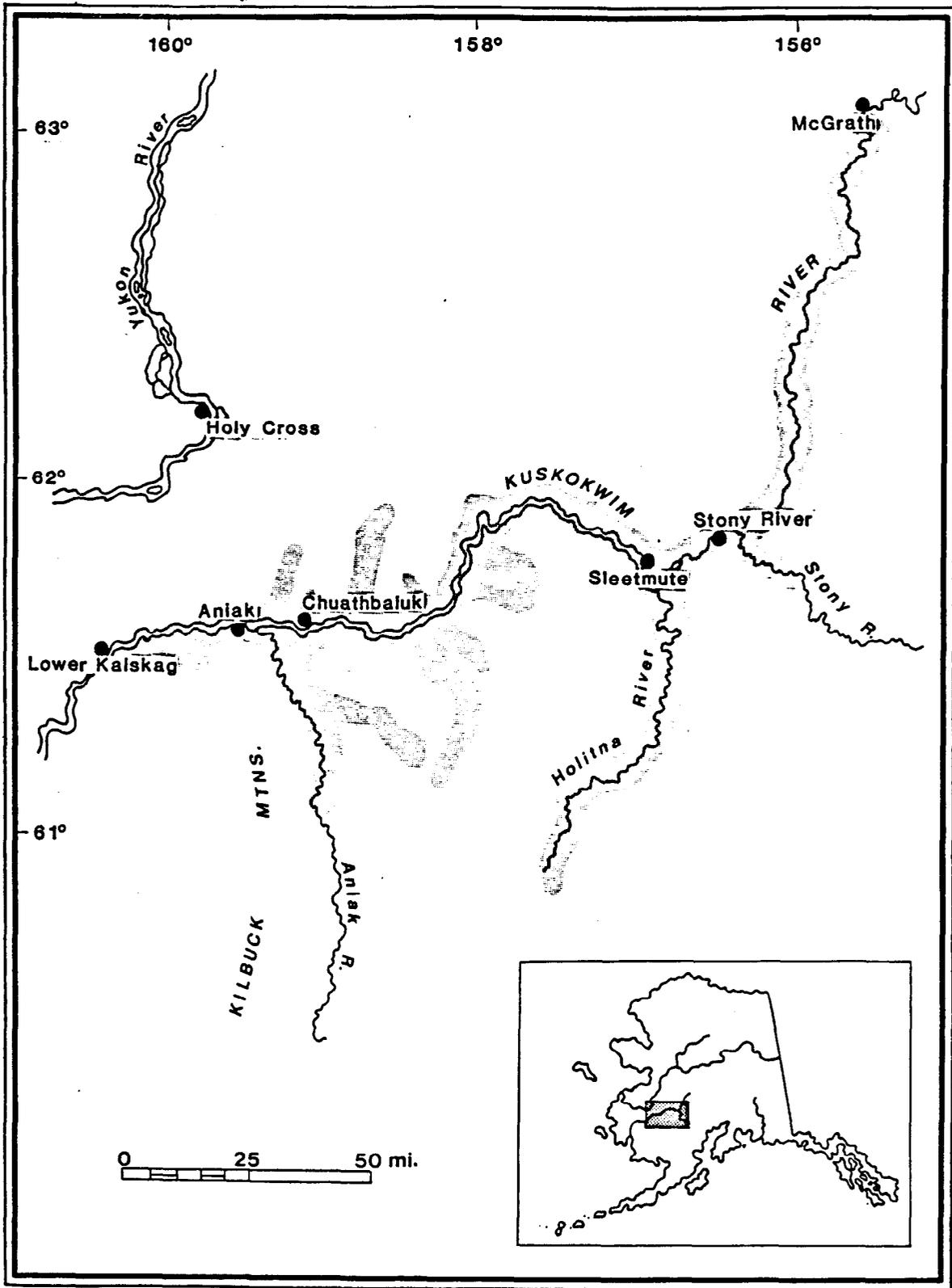


Fig. 5. Areas used by Chuathbaluk residents for hunting moose between 1979 and 1982.

purposes rather than for its attributes as a resource use area. This was the site at which a Russian Orthodox church was constructed and a priest stationed in the 1890s (Smith 1980). Several of the inhabitants after this time were affiliated with the church (Oswalt 1980). The family that settled in Chuathbaluk in 1954 did so in order to be close to the church, of which the household head was Chief of the Church (Mary Kelila, pers. comm.). The only earlier documentation of Chuathbaluk as a settlement was by Glazunov in 1833-34 when it was reportedly a "summer village" used by Ingalik Athabaskans (Oswalt 1980). Because community residents must spread out in order to hunt moose which are not locally abundant, they continue to use a wide range of hunting areas with which they have already established ties based on prior place of residency and along kinship lines. These ties have been formed in accordance with the customary system of land use rules, allowing Chuathbaluk residents to utilize hunting areas that are also used by hunters from Aniak and Crooked Creek without creating local conflict. Since living in Chuathbaluk, residents have also begun to utilize smaller tributaries in the vicinity of the village, including Veahna Creek, the Kolmakof River, and the Owhat River.

Figure 5, representing use over the last three years, demonstrates that Chuathbaluk residents have maintained hunting areas used in previous years, and have extended their use of the Kuskokwim River as far upriver as McGrath. Individuals travel this far during the fall season only, stating that increased competition within their traditional hunting areas requires them to go further from home to hunt moose successfully.

#### Sleetmute

A majority of the present-day inhabitants of Sleetmute were born either

in the village itself, on the Holitna or Hoholitna rivers, or on the Kuskokwim within approximately ten miles of the village. The time periods within which past hunting areas were recorded are distinguished by the years when snowmachines began to be used as a means of transportation, replacing dog teams (approximately 1960). Areas used for moose hunting by Sleetmute residents (Figs. 6 through 8) are similar within the three selected time periods. Individuals appear to have been using basically the same hunting areas throughout their lifetimes, with few exceptions. Moose are reportedly numerous within the Holitna and Holitna drainages. Sleetmute residents do not feel a need to go elsewhere in order to harvest moose, considering their own range to be rich in this resource. The change in technology from dog teams to snowmachines does not appear to have influenced the moose hunting areas used by Sleetmute residents.

Hunting areas used prior to 1960 (Fig. 6), between 1960 and 1979 (Fig. 7), and between 1979 and 1982 (Fig. 8) do not differ greatly from one another. Some individuals have gone further down the Kuskokwim in the past three years than they did previously and have utilized the Stony River as well. Overall, moose hunting areas have been concentrated primarily within the Holitna and Hoholitna river drainages throughout the lifetimes of the current Sleetmute residents.

In summary, the moose hunting areas presented in Figures 3 through 8 have been established in accordance with certain principles such as customary laws of land tenure and inter-generational transmission of specific hunting areas along lines of kinship and friendship. Individual circumstances influencing each community have caused the general patterns to vary somewhat, however. The moose hunting areas used by Chuathbaluk residents have been influenced by place of residency of the hunters and

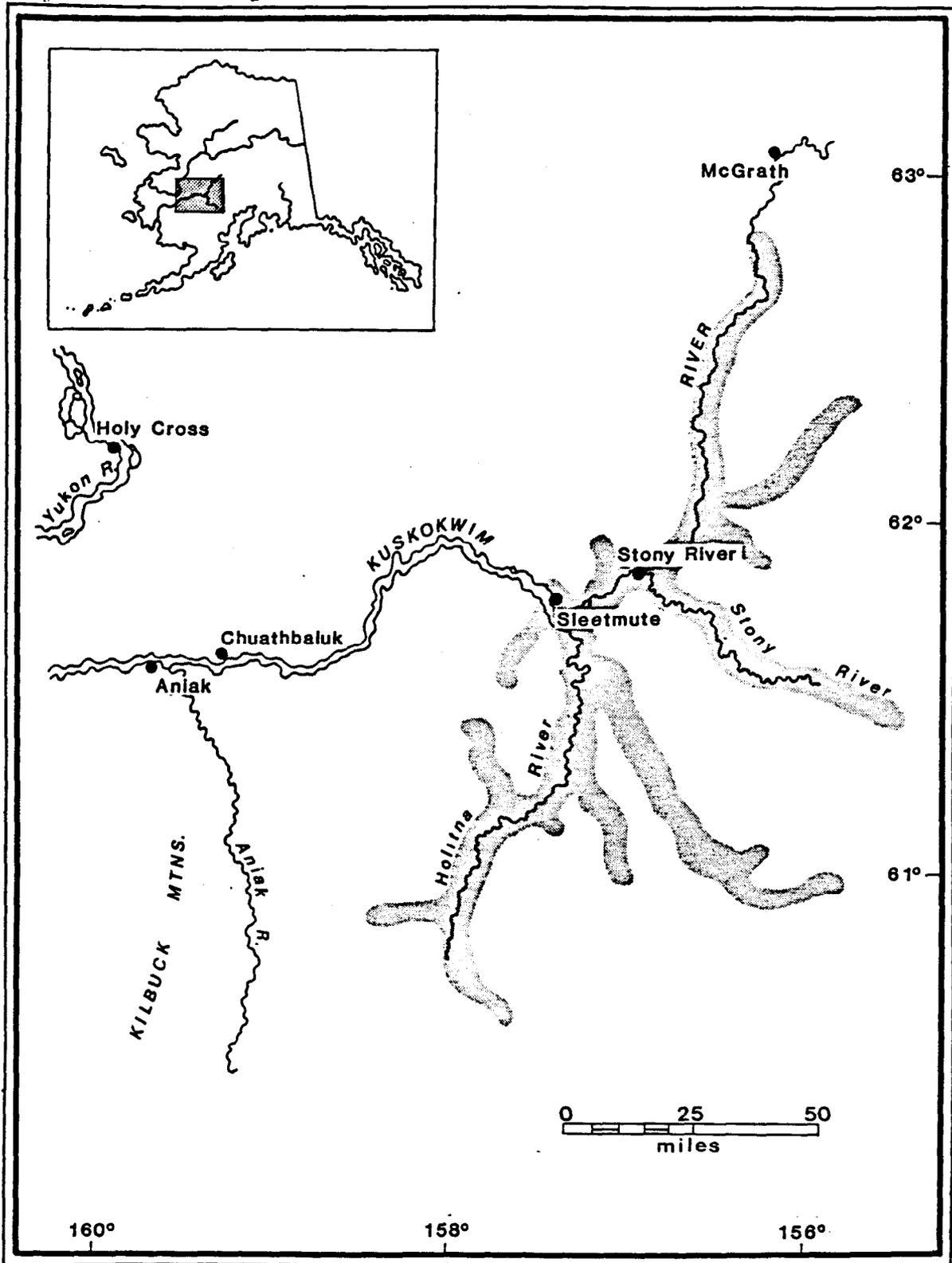


Fig. 6. Areas used by Sleetmute residents for hunting moose prior to 1960.

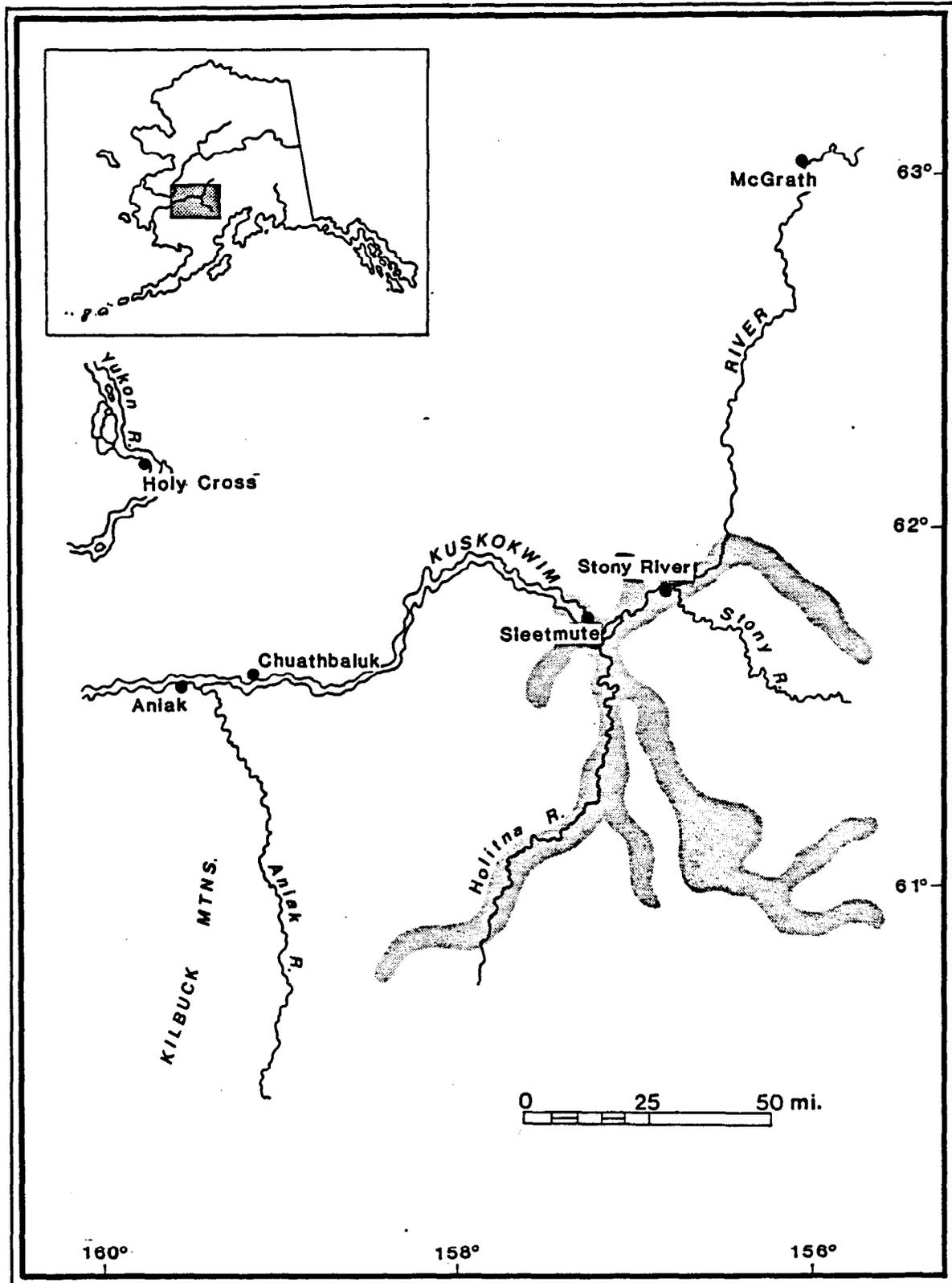


Fig 7. Areas used by Sleetmute residents for hunting moose between 1960 and 1979.

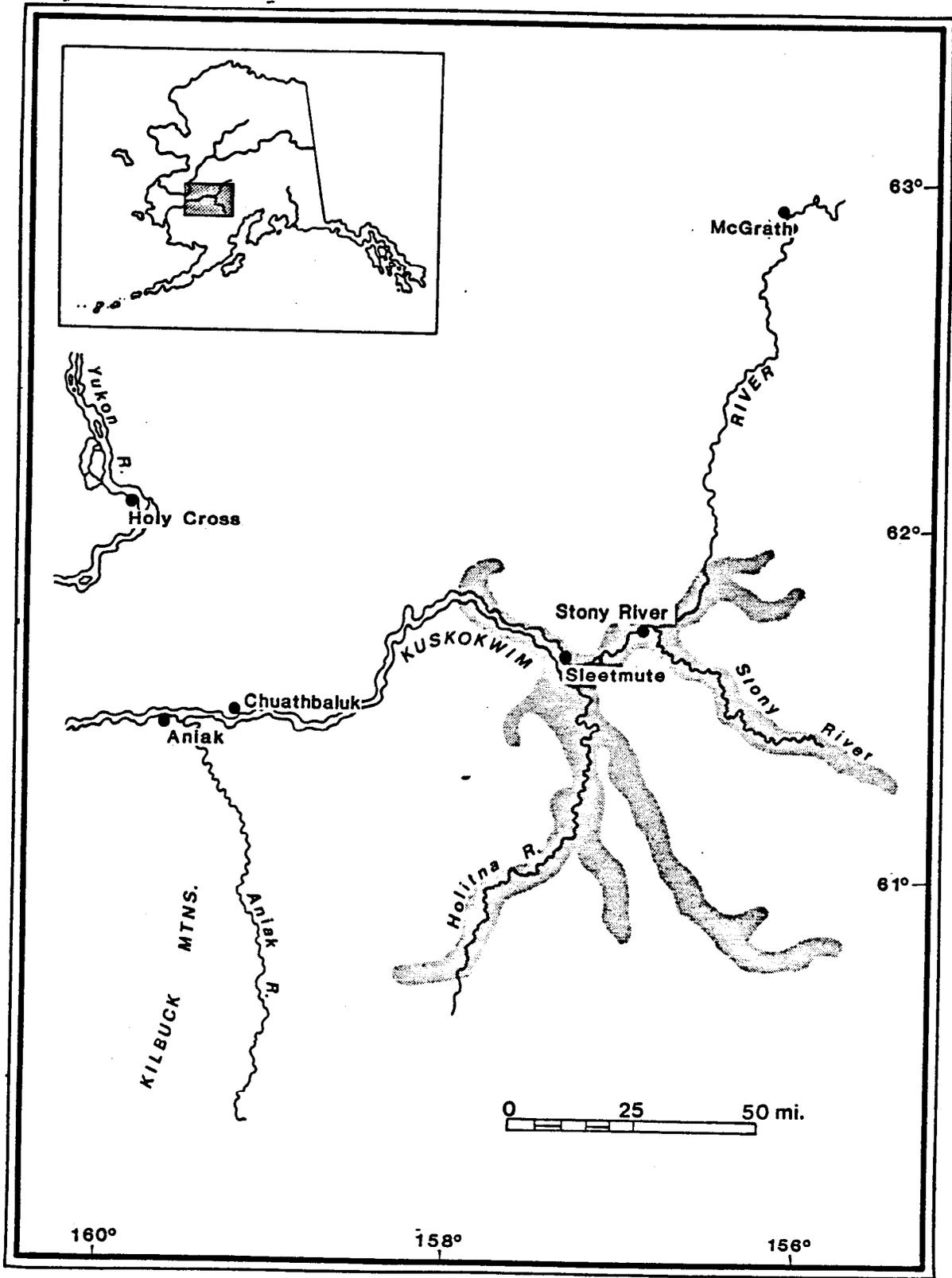


Fig. 8. Areas used by Sleetmute residents for hunting moose between 1979 and 1982.

kinship relationships. Areas utilized tend to be those that were used by individuals during their time of residency in other central Kuskokwim communities prior to moving to Chuathbaluk, which was reestablished as a year-round community in 1954. The lack of a resource-rich tributary in the immediate proximity of the village has probably caused individuals to utilize several of the central Kuskokwim tributaries with which they have historic and kinship ties. Sleetmute residents, most of whom have resided in the village for the majority of their lives and who have immediate access to a tributary of the Kuskokwim in which moose are recognized as being relatively abundant, have concentrated their moose hunting activities within the Holitna and Hoholitna drainages throughout their lifetimes. Hunting areas used by individuals do not appear to have been influenced by the change in mode of transportation from dog teams to snowmachines.

#### PROCESSING AND USE OF MOOSE

##### Preservation

Once a moose is harvested a portion of the meat is set aside to be eaten fresh over the next few days. The remainder may be preserved by a variety of techniques. The primary means of preserving moose meat is by freezing. Most residents of Chuathbaluk and Sleetmute do not own freezers, as electricity was not made available to these villages until September 1982. Many individuals consider freezers to be too great an expense and do not plan on acquiring them. Those households that do own freezers may not have enough room in them to store a large quantity of moose meat, as freezers are already full of fish, berries, birds, and other wild foods. When moose meat is to be stored in a freezer, it is first cut into portions

that fit into one-gallon "zip-lock" bags.

Most villagers depend on the weather to prevent their meat from spoiling. For this reason, hunting seasons that occur during months when temperatures have already fallen below freezing are preferred. Butchered sections of the moose such as hind and front quarters and rump are commonly hung in the salmon smokehouse owned by the household if it is located in the village, or are suspended from a rack approximately ten feet high constructed from birch or spruce timbers. The meat is wrapped with a material such as burlap to prevent damage from birds. Sections of the moose may sometimes be placed in the household's cache. If a household lacks a storage area, it may place the meat in the smokehouse or cache of a close kin relation such as parents. Cold temperatures freeze the meat and preserve it through the winter. During warm months, meat may be placed in garbage bags and submerged underwater in rivers or creeks to be kept cool.

Three additional meat preservation methods are smoking, drying, and jarring. Salting moose meat by placing it in a barrel in layers with rock salt was reported to be a traditional method of preserving meat but is no longer in use. This preservation method predominated during the summer months. A more current practice is to brush a brine solution onto hanging meat to discourage flies from laying eggs.

Smoking is a method of preserving moose meat currently in use during warm weather. The large, butchered parts of the animal such as legs, rump, and ribs are smoked over a fire in the smokehouse to create a hardened outer layer over the meat. The meat is not cured all the way through, but a protective outer layer is formed allowing the inner meat to remain soft and fresh. When pieces are cut for use in eating the smoke causes a

new outer crust to form. This protective layer keeps flies off of the meat.

Dry meat is considered a specialty and appears to be more prevalent as a preservation method in Sleetmute than in Chuathbaluk. Dry meat was traditionally made during spring but also during summer months when freezing was not possible. April and May considered are the best times to make dry meat. Meat with a cross-grain is preferred for drying, usually from the rump, although meat can be taken from any part of the body that lacks tough sinew. The meat is cut into long, thin strips, and either placed on a suspended bed of chickenwire, hung over poles, or suspended from poles on pieces of string. The meat can be dried by the sun in spring before flies hatch out, over a fire in the smokehouse in summer, or indoors over a stove during winter. Meat that has been frozen during the winter can be thawed and dried in spring or summer.

Jarred meat is made through the canning process, utilizing a pressure cooker. Several cases containing twelve one-quart jars may be prepared by a given household.

#### Moose Products

Residents of Chuathbaluk and Sleetmute seek to utilize nearly the entire moose. Wasting meat is considered unethical by most local residents. Often the animal will not be skinned prior to butchering in order to keep the meat clean and fresh. Some households are not concerned with saving the hide. Others give it to their dogs to eat, the texture functioning to clean and deworm their intestines. Some individuals cut the hide into small pieces and use it for trapping bait. Moose leggings are often saved and used in the manufacture of skin boots. Pieces of moose hide

with the hair removed, preferably from the belly, are used in making bottoms for these boots. Babiche (rawhide) was used in making snowshoe webbing but it is no longer being made.

Moose sinew was traditionally made into thread for use in sewing clothing. It was also woven into fishnets, for which pieces of the antler or bone were used as sinkers. The bones of game animals were traditionally thrown in the river to prevent dogs from chewing on them. It was believed that the spirit of the animal would be offended if dogs chewed on its bones, making it difficult or impossible to hunt in the future (Oswalt and VanStone 1967). This practice is reportedly no longer in effect. In the past, bone was used for making awls, fish hooks, and net sinkers (Oswalt and VanStone 1967). Antler was used in the manufacture of net sinkers, arrowheads, wedges, woman's knife (uluaq) handles, side-bladed knife handles, adz heads, and kayak shoes (Oswalt and VanStone 1967). Most of these uses have now been superseded by modern replacements. Antler is still used occasionally for making uluaq (womens' knives) handles. The moose scapula is sometimes saved and used for making moose calls when hunting.

Moose meat is most commonly boiled for eating, although it is sometimes fried, roasted, and barbequed. Moose that has little sinew is sometimes ground into "hamburger." Often the meat is used in soups and stews to make it last longer. The leg bones and hooves are generally used in soups. Marrow from the leg bones is considered a delicacy. Moose head soup is a favorite dish, the nose, tongue, cheek meat, and brains being the most desirable parts. The liver, heart, kidneys, part of the stomach muscle, and one of the four stomachs are all eaten. Other viscera may be fed to the dogs.

Moose fat is a highly valued commodity. Up to 100 pounds of fat may be cleaned out of the stomach area of a fat moose. The fat may be fried, cooled and eaten in small pieces. It is also rendered into oil and used for making akutaq, "Eskimo ice cream", that may have moose meat, fish, crisco, sugar, and berries mixed into it.

### Distribution

The distribution of meat both within and between communities along kinship and friendship lines is a common phenomenon in Chuathbaluk and Sleetmute. Food sharing provides both unsuccessful hunting households and households lacking hunters with wild meat. Moose meat was also observed being distributed to other successful hunting households. A significant amount of distribution occurs when the meat is fresh. If a household is unsuccessful in harvesting moose during a particular season it may be "loaned" meat by a successful hunting household. An equivalent amount of meat will be returned to the lending household following a subsequent season in which the latter household is successful. When an individual kills his first moose, all of the meat is given away to other households. Residents report that this practice ensures the hunter with good luck and prosperity in future hunting endeavors. Some families give small portions of every kill to village elders in order to bring luck in the future, according to local accounts. Village elders stated that when they were young, every game animal harvested by a community member was shared with the entire community. An array of wild game species were harvested and consumed at "potlatches" in which several communities participated. Wild game is currently shared village-wide during Russian Orthodox celebrations of Slavic, weddings, and "40-days feasts."

The distribution of moose meat following the September and November 1982 seasons was documented using questionnaires (Appendices A and B). Ten responses which provided adequate data for analysis revealed complex patterns of distribution, including at times parents, siblings, offspring, and cousins of both the hunter and his wife, nephews and aunts, and non-relatives. Primary distribution only was documented on questionnaires. Secondary distribution, occurring when those who have received meat from one household further distribute it to additional households, was documented through direct observation. The following cases provide examples of the variations that occurred in meat distribution.

#### Case 1

After several unsuccessful hunting forays with his father and various unrelated hunters during the September season, one hunter harvested a moose along the Kuskokwim River in the vicinity of his fishcamp, approximately 20 miles upriver from Chuathbaluk. The hunter's household shares a fishcamp site with his parents. There is another fishcamp across the river presently used by a widow from Aniak, with whom they are friends. All three households cooperate in fishing for and processing salmon during the summer. The moose was shared between these three households (Fig. 9). Initial distribution also took place to the households of the hunter's sister and brother-in-law, and the hunter's mother's brother, all residents of Chuathbaluk who had hunted unsuccessfully during the fall season.

#### Case 2

Data for this example were gathered through direct observation and participation by the researcher. In the course of travelling on the Kuskokwim between Aniak and Chuathbaluk, a man from Aniak sighted a swimming moose. This person lacked a gun. Shortly thereafter another boat with two brothers from Chuathbaluk approached. One man was carrying a gun. The moose was pointed out by the man from Aniak and was shot on the riverbank upon emerging from the water by the man from Chuathbaluk. There were no kinship ties between these Aniak and Chuathbaluk residents. By this time three other boats with two more Chuathbaluk residents and one Bethel resident maintaining a temporary household in Chuathbaluk had stopped to observe the fallen animal. One of these Chuathbaluk residents was the step-son of the Aniak man's brother. This individual was proficient at butchering and proceeded to do so, with some help from the man who shot the

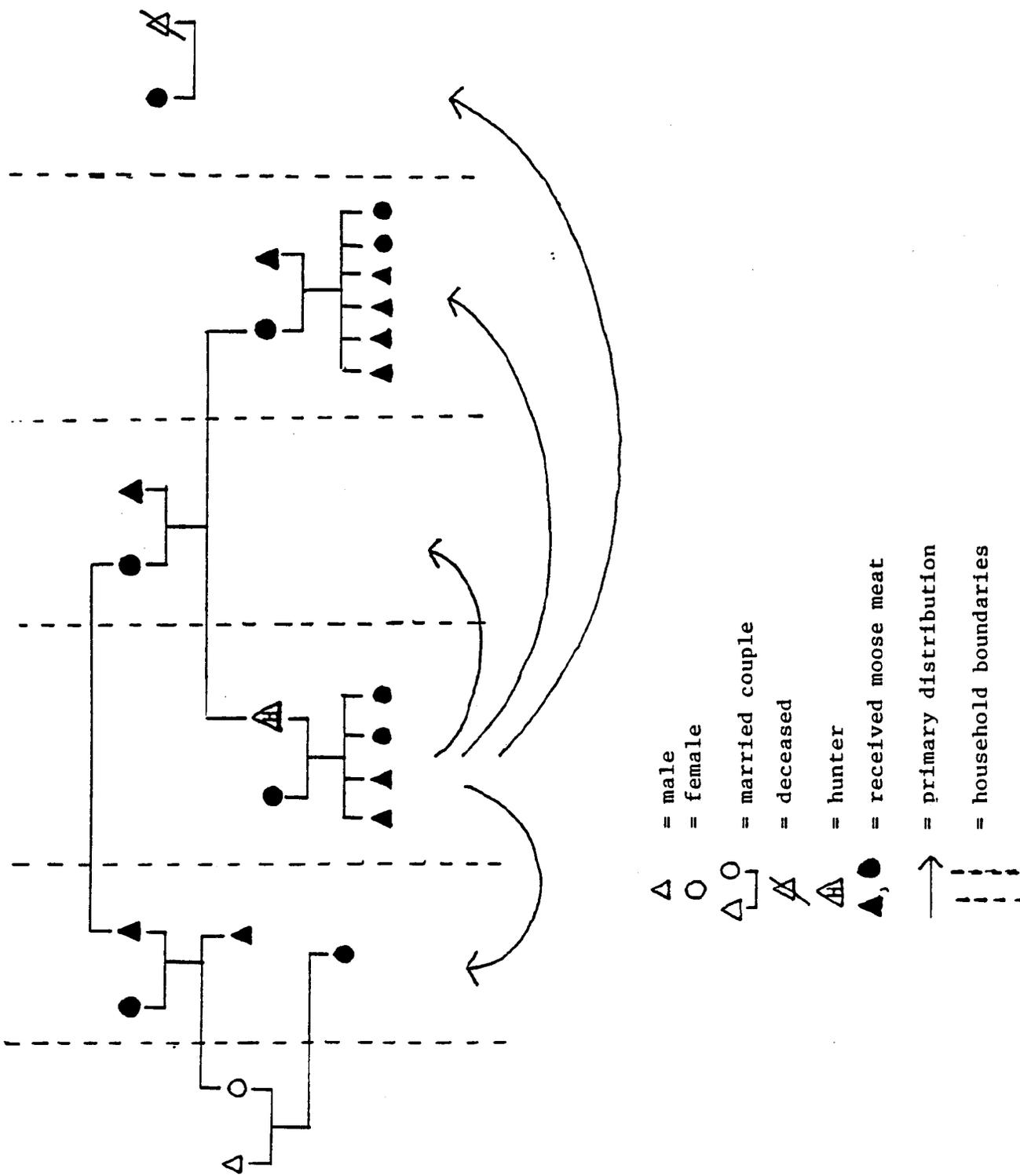


Fig. 9. Distribution of moose meat by a Chuathbaluk hunter.

animal. Following the butchering, everybody present was invited to help themselves to any part of the animal they desired. The Aniak resident who originally spotted the moose and the Chuathbaluk resident who shot the animal were considered the hunters in this case. The hunters insisted that everyone take part in the distribution, and were critical of those who only took small portions of meat. Initial distribution to the households of each individual present at the kill and butchering is shown in Figure 10. Primary distribution further took place by the two hunters. The Aniak resident gave meat to his mother and brother, residents of Chuathbaluk. The Chuathbaluk hunter gave meat to his parent's household which includes the brother travelling with him in the boat and to his father's sister's household, all residents of Chuathbaluk.

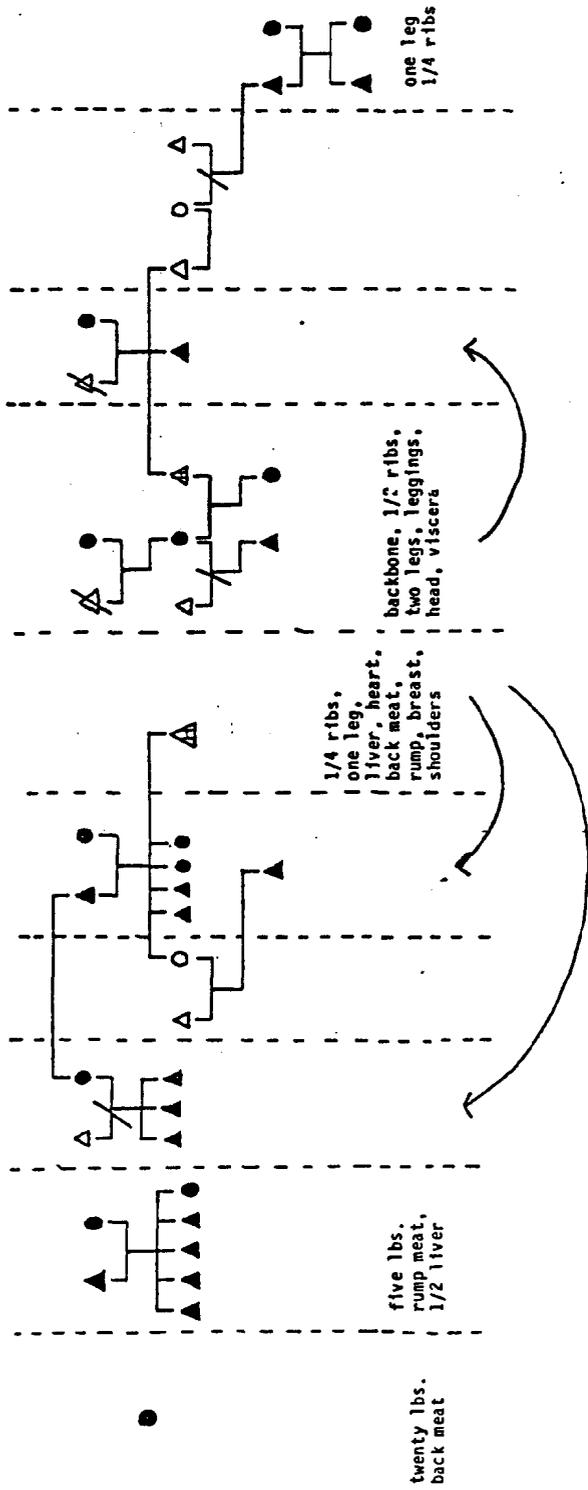
### Case 3

One Sleetmute couple maintaining a household went hunting for three days with the man's brother from Crooked Creek, using the brother's boat. The man is originally from Crooked Creek and the woman is originally from Sleetmute. Two moose were harvested. The brother from Crooked Creek took one moose back to that community and the Sleetmute couple took one to their home in Sleetmute. Meat from this latter animal was shared with the woman's parent's household who were unsuccessful in their hunting endeavors. Figure 11 illustrates this example of distribution.

### Case 4

Data for this example were gathered through direct observation. Two Sleetmute residents, a man (labelled no. 1 in Fig. 12) and his wife's cousin (labelled no. 2 in Fig. 12) went hunting during the February season on the Holitna River. They hunted unsuccessfully for two days and stopped on their return trip to Sleetmute to visit a friend of theirs, also a Sleetmute resident, at his trapping cabin on the Holitna. The friend had already been successful at harvesting a moose and gave the hunters most of his kill, reasoning that he had greater access to moose than they because he over-winters away from the village in an area where he encounters moose frequently. The two returned to Sleetmute and divided the meat. Subsequently, the nephew of one of the men and a member of the same household successfully harvested a moose. Meat from both animals was distributed by this man's household to his sister's household, to two of his sister's sons' households, to his daughter's household in Napakiak, and to the household of a friend in Sleetmute (Fig. 12). The man's wife's cousin was later successful in harvesting a moose with his step-son, a friend from Aniak, and a friend from the Holitna River. Most of this meat went to the man from Aniak who had the greatest need for it. Meat was later given by the household head to the household of his brother and sister.

The case studies provide examples from Chuathbaluk and Sleetmute



- △ = male
- = female
- △ ○ = married couple
- △ ○ = divorced couple
- △ / △ = deceased
- △ = hunter
- △, ○ = received meat
- = distribution to households not present at kill and butchering site
- = household boundaries

Fig. 10. Distribution of moose meat by hunters from Aniak and Chuathbaluk.

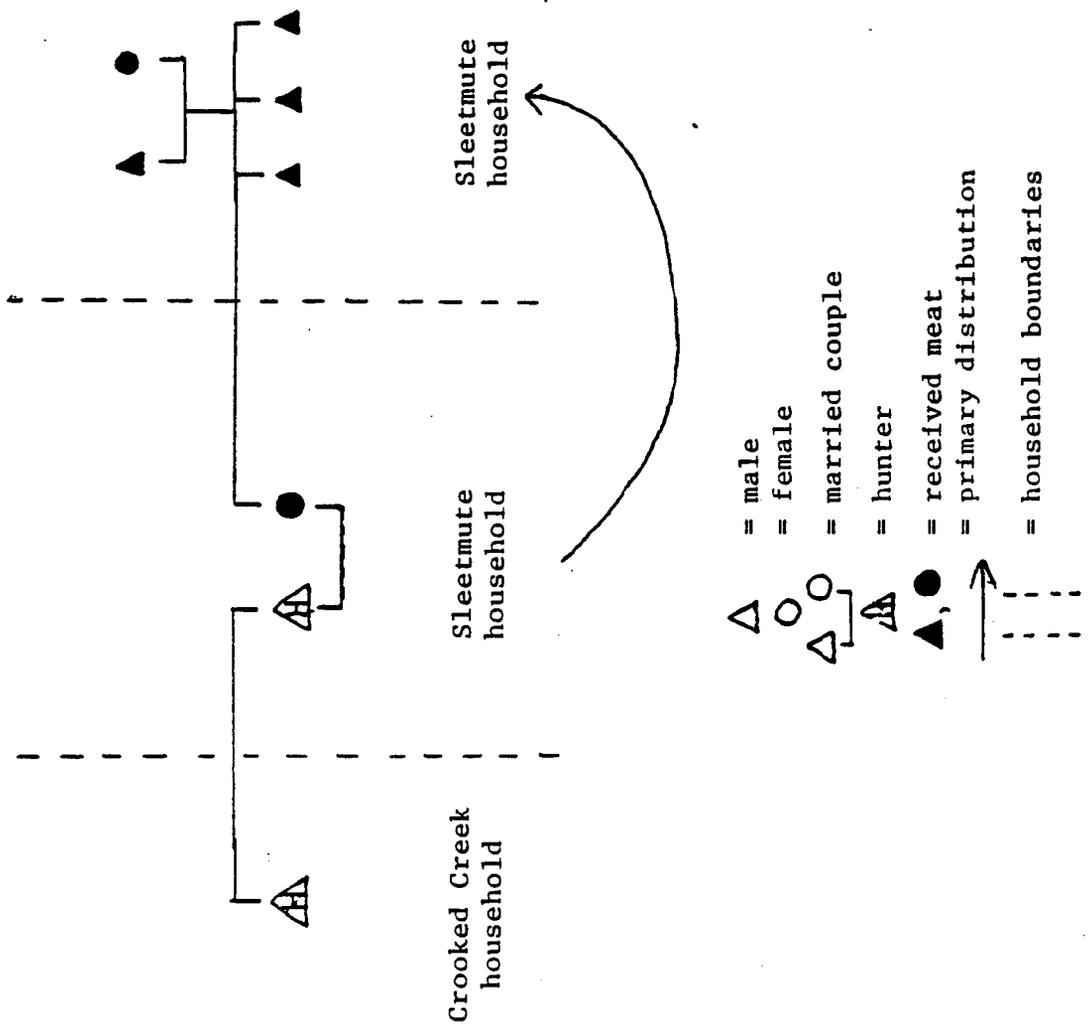


Fig. 11. Distribution of moose meat by a Sleetmute hunter.

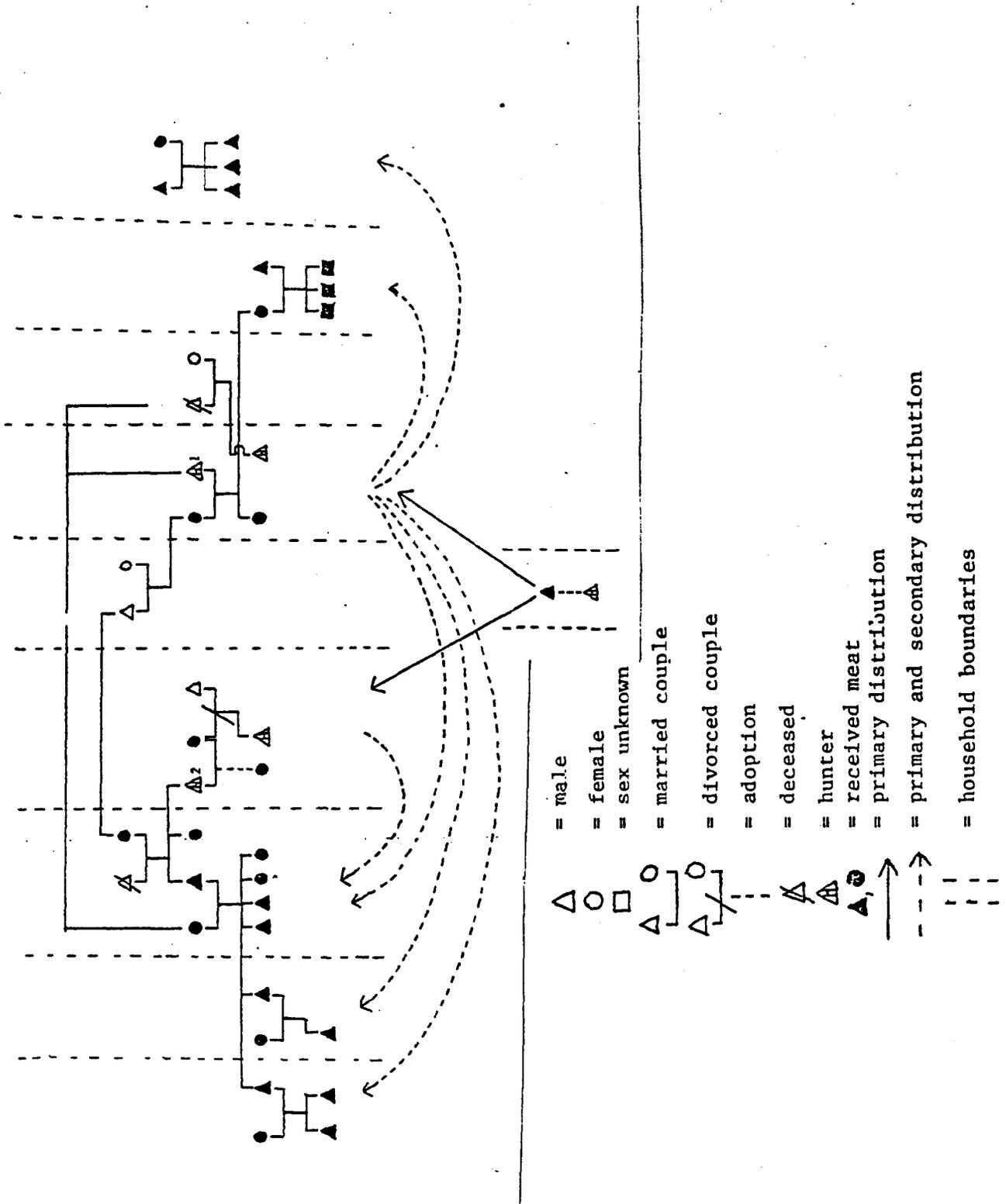


Fig. 12. Distribution of moose meat by Sleetmute hunters.

which illustrate the extent to which meat distribution occurs and examples of the relationships of kinship and friendship that exist between individuals sharing meat. Additional primary, secondary, and tertiary distribution may have taken place by the individuals described in these examples following the time at which the questionnaires were administered and the observations were made.

## THE 1982-1983 MOOSE SEASONS

### Harvest Results

Chuathbaluk and Sleetmute residents who participated in moose hunting following the September and November seasons were formally interviewed to collect comparative data on harvest efforts and hunter success (Appendices A and B). Similar data were collected in interview sessions without the use of a questionnaire following the February season. Each hunter who was active during the seasons was interviewed, except for a few Sleetmute residents who were unable to be contacted. Tables 1 and 2 present the results of these interviews compiled for each village. The total number of moose harvested during the three 1982-1983 open seasons represent minimum harvest levels for each community. It should be noted that the data from Sleetmute were collected from village residents only and do not include harvests of people who reside year-round along the Holitna and Hoholitna rivers.

Table 1 shows that overall, Sleetmute hunters harvested a greater number of moose and a greater number of moose per village household than Chuathbaluk hunters. Better success can be attributed to the September season in which Sleetmute hunters harvested twice as many moose as

TABLE 1  
SEASONAL MOOSE HARVESTS AND EFFORT

Season	September		November		February		Totals	
	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute
Village								
Number of moose harvested	6 bulls	12 bulls	3 cows	1 cow	3 cows 2 bulls 2 unsp.	6 cows	16	19
Number of moose harvested per village household	.21	.43	.10	.04	.24	.21	.55	.68
Number of hunting person-days	411	118	96	1	66	61	573	180
Number of hunting person-days per moose harvested	68.5	9.8	32.0	1.0	9.4	10.2	35.8	9.5

Chuathbaluk hunters. Chuathbaluk hunters spent a significantly greater number of hunting person days harvesting moose, overall, than Sleetmute hunters. These data indicate that Sleetmute residents are able to harvest more moose with less effort than Chuathbaluk residents. A variety of reasons may account for these differences, as will be discussed later. These include ecological variables, competition for the moose resource, and seasonal settlement patterns.

Table 2 shows that a greater number of individuals and households from Chuathbaluk participated in moose hunting as compared with Sleetmute. The September season had the most participants. Bad weather and poor travel conditions during the November season account for the lack of participation in this season by Sleetmute hunters. The 25-day September season probably allowed more hunters to participate than the 10-day November and February seasons. The lower percent of village households that were hunting households during the November and February seasons may reflect the fact that some hunters had already obtained the one moose bag limit. The percent of successful hunting households was consistently high among Sleetmute households. Few hunting households from Chuathbaluk were successful during September and November. Increased success during the February season may be related to good weather, travel, and snow conditions that prevailed during this season, along with a lack of competition from non-unit residents. The findings from Tables 1 and 2 will be discussed in light of the seasonal conditions which are described, as follows.

The September 1982 season was one of abnormally high rainfall. It rained virtually every day of the season. The first frosts occurred in early September, but temperatures did not fall below freezing until the

TABLE 2

PARTICIPATION IN MOOSE HUNTING

Season	September		November		February	
Village	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute	Chuathbaluk	Sleetmute
Number of hunters	41	28	18	1	16	17
Number of hunting households	21	16	15	1	12	11
Percent of village households that were hunting households	72.4	57.1	51.7	3.6	41.4	39.3
Percent of successful hunting households	33.3	75.0	20.0	100	75.0	63.6

end of September. Waters in the Kuskokwim and its tributaries were extremely high. Weather conditions did not prevent hunters from going out but they limited the amount of time some individuals were willing to spend camping. Many local people, particularly Sleetmute residents, do not hunt until the latter half of the September season. This allows cooler weather to set in which causes flies to die off and minimizes chances of meat spoilage for those who lack freezers. Leaf fall progresses throughout September and favors hunting conditions later in the month. Local hunters reported persistent foul weather, numerous small aircraft, an abundance of hunters who were non-residents of units 19A and 19B, and a predominance of cow moose with bulls being scarce. Heavy rains cause moose to travel less and keep them away from riverbeds where high waters flood their feeding habitat. Further, a lack of cold weather during September prevents moose from concentrating on river floodplains during the open season. These factors combined to cause low harvest levels during the September season.

The November 1982 season was a poor one for moose hunting. In Sleetmute the season coincided with freeze-up. The Kuskokwim was mostly frozen over but the ice was only an inch thick, making travel unsafe. Only those villagers who were situated at their trapping cabins on the Holitna River, which had frozen late in October, had suitable conditions for hunting. During the first five days of the November season the weather warmed to above freezing temperatures, bringing rain. Ice and snowmelt made travel overland and on rivers difficult and unsafe. Temperatures dropped to between -20 and -40 degrees Fahrenheit during the last five days of the season. Travel conditions were icy and noisy, with overland hunting nearly impossible due to a lack of snow which enabled

moose to run easily and curtailed snowmachine travel. Extreme cold weather prevented individuals from staying out for prolonged periods of time.

Favorable hunting and travel conditions prevailed during the February 1983 season. Temperatures were near 20 degrees Fahrenheit with mostly cloudy weather and occasional light snowfall. Overflow and open water were a problem for some Chuathbaluk hunters along the Aniak and Kolmakof rivers due to seasonably warm temperatures. Deep snow in the Holitna drainage caused moose to be numerous along the main river, making them accessible to Sleetmute hunters.

Harvest results show that during the 1982-1983 seasons Chuathbaluk residents invested more time with fewer moose harvested as compared with Sleetmute hunters (Table 1). The following variables influence hunting success for both communities but do not fully explain why Sleetmute hunters were more successful than Chuathbaluk hunters. Low harvest success during the September season can be partially attributed to the unfavorable weather conditions that occurred during that time, negatively influencing hunting conditions. The same situation occurred during the November season when a thaw set in and there was little snow, a problem for Sleetmute residents, in particular, who were unable to travel due to freeze-up conditions. The abundance of non-local hunters in September may be a factor influencing harvest success, but because hunting pressure exerted by these individuals is extreme both within the Holitna and Hoholitna drainages and along the Kuskokwim between Aniak and Sleetmute and its tributaries, both communities are likely to be impacted. Alternate resources accessible to both communities are fairly comparable. Sleetmute hunters may have easier access to caribou than Chuathbaluk hunters, but

this species is rather scarce in both areas. Chuathbaluk residents process and store a larger quantity of salmon per household than Sleetmute residents (Charnley, field notes, Aug. and Sept. 1982), and do have better access to higher quality and greater numbers of salmon species than Sleetmute residents. This factor may decrease their requirement for moose.

Discrepancies in harvest success may be primarily attributable to ecological variables. Local observations by hunters indicate that moose are present in higher densities within the Holitna and Hoholitna drainages where Sleetmute residents hunt than within those drainages commonly hunted by Chuathbaluk residents such as the Aniak, Kolmakof, Holokuk, and Oskawalik rivers, as well as along the Kuskokwim between these drainages. Travel conditions are typically more favorable on the Holitna and Hoholitna rivers during open seasons than within the latter drainages because deeper water in September makes it more accessible by boat than the latter, limiting the hunting areas that are penetrable by Chuathbaluk hunters. The Holitna and Hoholitna rivers have a lesser tendency to overflow and to contain open water following freeze-up as compared with the Aniak, Kolmakof, Holokuk, and Oskawalik rivers, making them more accessible during the November and February seasons as well. There is typically a greater amount of snowfall in the Holitna and Hoholitna drainages as compared with other central Kuskokwim tributaries, making travel easier during the November and February seasons and causing moose to concentrate along the rivers where they are more accessible to Sleetmute hunters.

Sleetmute residents may experience less local competition for the moose resource during open seasons than Chuathbaluk residents. Chuathbaluk residents are hunting in areas that overlap somewhat with the hunting

areas of Aniak and Crooked Creek residents, the former in particular. Aniak is a community having a population of over 400 residents in 1982 (John Hale, pers. comm., Nov. 1982). Local competition may make it more difficult for Chuathbaluk residents to obtain moose. Sleetmute residents, on the other hand, maintain their own range which is locally shared with the year-round residents of the Holitna and Hoholitna rivers. Fewer people distributed throughout a drainage that is larger than the Aniak River make local competition less of a problem for Sleetmute residents. Because 30 percent of the Sleetmute households reside at trapping cabins on the Holitna and Hoholitna rivers between September and May, they have easier access to moose which are present in greater abundance near their cabins than they are in the vicinity of the village itself. Frequent encounters with these animals make seasonal harvest easier. With little exception, Chuathbaluk residents remain in the village throughout the winter, decreasing their likelihood of encountering moose and reducing their harvest levels.

Moose are therefore, in general, a more reliable resource for Sleetmute residents than for Chuathbaluk residents, as most Sleetmute households can rely on harvesting at least one animal during the year. This, in turn, influences the orientation that individuals from both communities have toward other resources. Ecological factors including accessible habitat, moose population density, and climatic conditions combine with social and cultural factors including local competition and seasonal settlement patterns to make Sleetmute hunters more successful than Chuathbaluk hunters in harvesting moose.

#### Importance of Moose

It is apparent that moose is a staple in the central Kuskokwim

diet. Both the 1979 and 1981 food surveys performed by the Division of Subsistence (Jonrowe 1979; Stickney 1981) found that moose and salmon were the two major protein sources in the diets of central Kuskokwim villagers. During the 1982-1983 field studies, Chuathbaluk and Sleetmute residents were asked in questionnaires (Appendix A) to estimate the number of moose they had harvested during the open seasons over the past 5 years and the number of moose they felt their households needed to harvest annually in order to have what they consider "enough" moose meat for the year (Table 3).

In Chuathbaluk 30 individuals representing 26 households were interviewed and in Sleetmute 11 individuals representing 11 households were interviewed. The sample size in Sleetmute was considerably smaller than that in Chuathbaluk due to the difficulty in contacting households who had moved to trapping cabins prior to the time at which the survey was conducted. The households surveyed in Chuathbaluk had an average household size of 4.7 persons. Those surveyed in Sleetmute had an average household size of 4.4 persons. Households from both communities reported that they needed an average of two moose per year to have what they considered enough meat for the year. Table 2 shows that the actual in-season harvest levels are considerably lower than this. Based on harvest estimates during the open seasons over the past five years, .60 moose per household interviewed were harvested in Chuathbaluk while .82 moose per household interviewed were harvested in Sleetmute. In comparison with the harvest results given in Table 1 for the 1982-1983 open seasons, indicating that Chuathbaluk residents harvested .55 moose per household and Sleetmute residents harvested .68 moose per household, the 1982-1983 averages were similar to the estimated 5-year averages, although Sleetmute

TABLE 3

ANNUAL MOOSE HARVEST LEVELS PER HOUSEHOLD INTERVIEWED  
PAST FIVE YEARS

Villages	Chuathbaluk	Sleetmute
Number of individuals interviewed	30	11
Percent village households interviewed	90	39
Number of moose harvested, past 5 years	72	45
Average number of moose harvested annually	.60	.82
Average size of households interviewed	4.7	4.4
Number of moose desired by average household per year	2	2

harvests were somewhat lower during the 1982-1983 season. There is an apparent trend for Sleetmute residents to harvest a greater number of moose per household than Chuathbaluk residents. It is clear from these data that villagers are not harvesting what they consider to be enough moose meat.

## CONCLUSIONS

Information on moose harvest and use was gathered in Chuathbaluk and Sleetmute between September 1982 and February 1983 through participant observation, formal and informal interview techniques, questionnaire surveys, mapping sessions, and literature review. Moose entered the central Kuskokwim in the early 1900s and populations have increased in size and distribution throughout the region since that time. The moose population in Game Management Units 19A and 19B is presently considered to be in healthy and stable condition by both managers and area residents. There is concern among local hunters, however, that bull moose are declining in number. From the time of Statehood, hunting regulations in units 19A and 19B have reflected the population status of moose and harvest demands over time. Open seasons in 1982-1983 occurred from September 1 to 25, November 20 to 30, and February 1 to 10.

The ecological framework within which moose hunting occurs influences observed hunting patterns. The seasonal distribution and behavior of moose along with climatic conditions influence hunting strategies. Hunting methods vary seasonally, with two general patterns occurring-- one in September when transportation for hunts takes place on open water by boat, and one occurring during November and February when ice and snow

conditions prevail and travel is by snowmachine. The size and composition of production units also vary seasonally.

Areas within which moose were harvested by hunters from Chuathbaluk and Sleetmute during three selected historic periods reflect different trends for each village. Sleetmute hunters have used basically the same moose hunting areas throughout their lifetimes, while areas used by Chuathbaluk hunters have expanded over time. Place of residence, kinship relationships, quality of available moose habitat, customary laws of land tenure, and traditionally used hunting areas combine to influence where moose hunting has taken place, both in the past and presently.

Moose meat is primarily preserved by outdoor freezing, drying, smoking, jarring, and underwater cooling. A variety of moose products are used, including the meat, viscera, hide, leggings, scapula, and antlers. Hide, bone, antler, and sinew were traditionally used to manufacture a variety of implements that are no longer being made. The distribution of moose meat within and between central Kuskokwim communities occurs along lines of kinship and friendship. This can be demonstrated using kinship diagrams which illustrate household distribution.

Harvest estimates based on questionnaire-survey findings during the 1982-1983 moose hunting seasons show that village-wide moose harvests for Chuathbaluk and Sleetmute were 16 and 19, respectively. Overall, a greater number of person-days were required to harvest each moose in Chuathbaluk than in Sleetmute. The number of moose harvested per village household during the 1982-1983 seasons was .55 for Chuathbaluk households and .68 for Sleetmute households. Climatic conditions affecting moose behavior and travel conditions during the open seasons influenced hunting success. Additional variables which influence harvest levels include the

level of competition experienced by local hunters with both unit and non-unit residents, the availability of alternative resources, moose population densities, and place of seasonal residence. Moose appear to be a more reliable resource for Sleetmute residents than for Chuathbaluk residents.

Moose are a staple in the central Kuskokwim diet. The average household in Chuathbaluk and Sleetmute had 4.7 and 4.4 persons, respectively, and reported a need of two moose annually per household to have what they considered enough meat. This figure is considerably higher than the figures representing actual in-season harvest levels during 1982-1983 and over the past five years for households interviewed.

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APPENDIX A

Household/Person Interviewing:

Moose Hunting

1. How many days did you spend hunting moose this season (Sept.)?
2. Who did you go hunting with?
3. Where did you hunt? (general area)
4. How much money would you say you spent on gas, etc. in order to moose hunt?
5. Did you get a moose?
6. If yes, did you give some of the meat to any other household?
7. To whom?
8. Do you think that this was a good season?
9. Do you plan to hunt moose during the Nov. or Feb. seasons?

Moose, Caribou and Bear Hunting

1. Did you get any bear or caribou yet this year?
2. If so, did you go out specifically to hunt bear/caribou, or did you get it while out doing something else?

3. Did anyone give you bear or caribou this year?
4. If so, whom?
5. About how many bear, caribou, and moose has your household harvested over the past 5 years?
6. How many bear, caribou and moose do you feel your household needs in order to have enough meat for the year, each year?
7. If you aren't getting enough meat, why? Regulations? Not enough animals around? You don't have enough time, money, equipment to hunt?
8. Do you think there are lots of moose, caribou and bear around, or not many?
9. What makes you think this?

Salmon Fishing

1. Did you put up salmon this summer?
2. If so, did you, or will you probably, give some of it away to anybody outside of your household?
3. If so, who?
4. If you didn't put up salmon, did you receive dry fish from anyone else?
5. Who?

## Regulations

1. What is your opinion of the hunting and trapping regulations with regard to season?
2. What is your opinion of the hunting and trapping regulations with regards to bag limit?
3. What is your opinion of the hunting and trapping regulations with regards to sex of the animal that can be taken?
4. What is your opinion of the hunting and trapping regulations with regards to methods that can be used?
5. How would you change these regulations if you dislike them?
6. What do you think of downriver hunters?

APPENDIX B

November Moose Hunting Questionnaire

Household/Person Interviewing:

1. How many days did you spend hunting moose this season? (Nov.)
2. Who did you go hunting with?
3. Where did you hunt? (general area)
4. How much money did you spend on gas, etc. in order to hunt?
5. Did you get a moose? If so, was it a cow or a bull?
6. If yes, did you give some of the meat to any other household?
7. To whom?
8. If you didn't get a moose, did you receive meat from any other household?
9. From whom?
10. Do you have a freezer?