CONTEMPORARY USE OF FISH AND WILDLIFE IN EKWOK, KOLIGANEK, AND NEW STUYAHOK, ALASKA

by
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ABSTRACT

This report documents contemporary subsistence patterns of hunting, fishing, and gathering wild resources by residents of Ekwok, Koliganek, and New Stuyahok. These three communities are located along the banks of the Nushagak River, in southwest Alaska and had a combined population of 607 in 1985. Residents are predominantly Yup'ik Eskimos.

The primary method for collecting information was a detailed harvest survey of 111 households (91 percent of community households in Ekwok, 88 percent in Koliganek, and a random sample of 54 percent in New Stuyahok). The survey documented the types of resources harvested, estimates of harvest quantities, and patterns of non-commercial distribution and exchange of wild and renewable resources for the 12 month period from April 1987 through March 1988. The study gathered information on geographic areas used for moose hunting, caribou hunting, and fishing for Ekwok and Koliganek. Information on community demography, employment, monetary income, and involvement in commercial fishing also was collected.

During the 1980s the Nushagak River communities' were supported by a mixed subsistence-market economic system, a type of traditional economy in rural Alaska. Commercial salmon fishing represented the greatest percentage of jobs while employment opportunities in other sectors were fairly limited. During the study year, 57.1 percent of Ekwok's adults were employed for an average of 6.5 months. In Koliganek, 79.5 percent of the adults in the sampled population were employed for an average of 5.1 months. In New Stuyahok, 65.9 percent of the adults were employed for an average of 5.0 months. Most jobs were

part-time and seasonal in nature. After commercial fishing, most jobs were with the local governments or the school district. Some monetary income was earned by trapping and selling furs, particularly from beavers.

All three communities followed a similar round of harvesting activities. Many families migrated to summer fish camps in Nushagak Bay to participate in subsistence and commercial salmon fishing. Relatively extensive harvest areas were used for obtaining eight major resource categories, including salmon, moose, caribou, freshwater fish, furbearers, waterfowl, clams, and plants (including berries). While the areas used were quite extensive and somewhat overlapping, all harvesting took place in the Bristol Bay region. Transportation used for subsistence harvesting was generally skiffs, snowmachines, and all terrain vehicles. Particular areas were used more intensively for moose hunting, caribou hunting, and salmon and freshwater fishing.

Wild resources played a prominent role in the economic, social, and cultural life of the villages. Resource use and harvest levels were high. Over the course of a year, respondents used over 60 different species of fish, wildlife, and plants. In pounds edible weight, the wild resource harvest was 797 pounds per capita in Ekwok, 831 pounds in Koliganek, and 701 pounds in New Stuyahok. These harvest levels are among the highest in the state. Subsistence harvest levels appear to have increased somewhat since 1973 when a similar survey was conducted. When adjusted to represent comparable species, 1987-88 per capita harvest levels were higher by 133 pounds in Ekwok, 48 pounds in Koliganek, and 69 pounds in New Stuyahok.

Together, salmon and land mammals composed approximately 80 percent by weight of each communities' harvest. Salmon was the dominant resource category. In Ekwok, salmon contributed 57.3 percent of the overall edible harvest, in Koliganek 43.6 percent, and in New Stuyahok 58.3 percent. King and sockeye salmon were the primary species. The second major resource category was land mammals, composed primarily of moose and caribou. Large game mammals represented 24.5 percent of the edible harvest in Ekwok, 35.9 percent in Koliganek, and 27.6 percent in New Stuyahok. Other resource categories which contributed notable amounts to the harvest included freshwater fish, furbearers, birds, and plants. Very small quantities of marine mammals and marine invertebrates comprised the remainder. When compared to 1973, salmon, moose, and caribou continued to be the major resources harvested.

Sharing of wild resources was widespread both within each community and with relatives and friends in other communities. Moose, caribou, salmon, beaver, and berries, as well as other resources, were frequently exchanged with friends and relatives. Seal oil was exchanged for inland products over inter-community sharing networks. It was commonly received from people in coastal communities such as Clarks Point, Togiak, and Manokotak. Subsistence foods were considered essential to the celebration of many community holidays, such as birthdays, weddings, name days, and Russian Orthodox Christmas, the latter of which involved repeated feasting over the course of an entire week.

The report concludes that subsistence foods and associated activities continue to be a vital part of the way of life for residents along the Nushagak River. Participation in subsistence activities

provides important nutritional, social, and cultural elements in the lives of people along the Nushagak.

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Many colleagues in the Division of Subsistence have also contributed to this project. Research conducted by former Division employees John Wright and Karen Kraus in the early 1980s was especially helpful. John collected extensive information on annual harvesting patterns and land use areas in all three villages, and compiled detailed data on resource use patterns in New Stuyahok. This work provided an

important starting point for the current endeavor. Much of the information presented in this report concerning the role of subsistence foods during the celebration of the Russian Orthodox Christmas was gathered by Karen Kraus. Once again, our supervisor, Jim Fall, has stood by us throughout the project providing invaluable advise, assistance, and encouragement during all its phases. This report has benefited enormously from his oversight. Cheryl Scott has continued to support us with scrupulously thorough preparation and review of the quantitative data. Bob Wolfe's insightful comments on an earlier draft manuscript greatly enhanced the current version. Gretchen Jennings generated the computer graphics.

The maps were prepared by Carol Barnhill of the Habitat Division.

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CHAPTER 1

INTRODUCTION

BACKGROUND

This report documents contemporary subsistence harvests and uses of fish, wildlife, and plants for three communities along the Nushagak River, specifically, Ekwok, Koliganek, and New Stuyahok (Fig. 1). These predominantly Yup'ik Eskimo communities had a combined population of approximately 607 people in 1985. Portage Creek, along the Nushagak River, is not included in the report because at the time of the study the population had dwindled to only one year-round and several seasonal residents.

This study was undertaken by the Division of Subsistence, Alaska Department of Fish and Game, for two major reasons. First, it was particularly timely because a state land planning effort for the Nushagak and Mulchatna river drainages was underway. Residents of the study communities were concerned that recreational uses of the Nushagak/Mulchatna area would adversely affect their subsistence way of life. Consequently, state agencies cooperatively undertook the Nushagak/Mulchatna Recreation Management Plan (ADNR, ADF&G, and BBCRSAB 1988 and 1990). In order to make meaningful determinations on recreation uses, land and resource managers needed well-documented information on subsistence uses. This study was designed to assemble such information and make it available to planners.

In addition to the immediate planning effort, this study continues to fulfill the Division's ongoing responsibility to collect

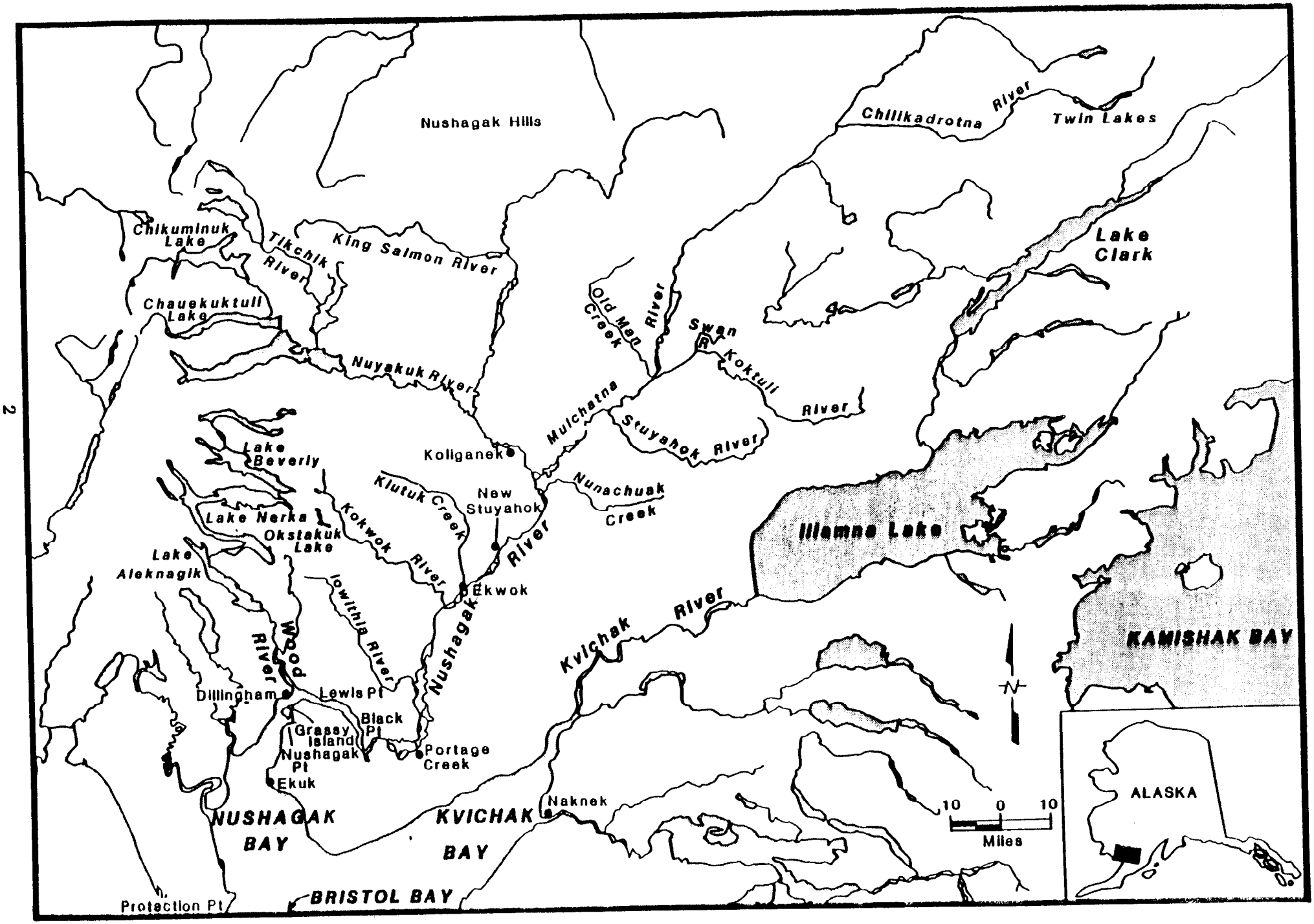


Figure 1. Nushagak Study Area.

community baseline information on all aspects of subsistence uses. Consequently, the research design incorporated a survey which collected data on household harvests and uses of all wild resources for a twelve-month period from April 1987 through March 1988. Relevant demographic and socioeconomic information were also collected to provide a context for interpreting the harvest information.

When the present study began, the Division of Subsistence had already compiled a substantial amount of information on Nushagak River communities. The data were particularly extensive for New Stuyahok where community-wide descriptive information and detailed household information regarding subsistence harvest and use patterns were collected in the winter and spring of 1982-83. Preliminary results were presented in Wolfe et al (1984).

Less extensive information also had been collected for the communities of Ekwok and Koliganek, including species harvested, the timing of subsistence activities, and location of major subsistence activities (ADF&G 1985a; Wright et al 1985; Schroeder et al 1987). In addition, Ekwok and Koliganek were key villages in a study of freshwater fishing patterns in Bristol Bay. Information on species harvested, timing, methods of harvest, uses, methods of preservation, and harvest quantities were collected (Fall, Chythlook, Morris, and Schichnes 1991).

PURPOSE

The primary purpose of this study was to document contemporary patterns of hunting, fishing, and gathering wild renewable resources of the residents of Ekwok, Koliganek, and New Stuyahok. This included the

variety and quantities of wild resources used for a 12 month period in 1987-88; the annual seasonal round of subsistence resource activities; and the ways in which wild resources were used, including methods of harvesting, processing, and preservation. A second purpose was to document intensity of effort in moose, caribou, and freshwater fish harvest areas.

Research objectives included:

1. Estimates of the percentages of households in Ekwok, Koliganek, and New Stuyahok using, attempting to harvest, harvesting, receiving, and sharing each type of wild resource during April 1987 - March 1988;

2. Estimates of harvest quantities of wild resources during a 12 month study period for each village in numbers of animals, birds, or fish (or other suitable units) and in pounds usable weight per household and per capita;

3. Comparison of harvest quantities, involvement in harvesting activities, and mix of resources for 1973 and 1987-88;

4. Maps depicting intensity of effort in areas used for caribou and moose hunting as well as freshwater fishing;

5. An overview of involvement in cash-producing activities in each village.

DATA COLLECTION METHODS

In February 1988, a staff member from the Division of Subsistence traveled to Ekwok, Koliganek, and New Stuyahok to introduce the research project to village leaders. In Ekwok and Koliganek,

meetings were held with the village councils. In New Stuyahok, the researcher explained the proposed study to the vice-mayor who presented it at a subsequent council meeting. The councils reviewed the study design and the proposed questionnaire. Their comments were incorporated in the final design and all three communities agreed to participate.

The principal researchers were two employees of the Division of Subsistence. One (Chythlook) was a life-long resident of Bristol Bay and a fluent Central Yup'ik speaker. The other (Schichnes) had lived in Dillingham for seven years and had made numerous trips to the three communities and the Lewis Point fish camp. In addition, one or two local assistants were hired in each community to assist with the surveys.

The primary instrument for data gathering was a detailed household survey (See Appendix A). The survey was designed to collect standard, largely quantifiable data from all households in Koliganek, Ekwok, and a random sample of half of New Stuyahok's households. It was modeled after forms administered during similar studies in Pilot Point, Dillingham, and Manokotak, with modifications to reflect appropriate species and harvest areas.

The survey questionnaires were administered face to face by the two authors and local assistants. Prior to administering the surveys, all households were identified and mapped. Those heads of households identified as dominant Yup'ik speakers were contacted by a Yup'ik-speaking researcher. Interviews were conducted from the end of March to the beginning of May, 1988. Two households in Ekwok declined to participate and seven households (six in Koliganek and one in Ekwok) could not be found at home. Hunting and mapping data for two Koliganek

households was not completed, as the hunters could not be contacted. As shown in Table 1, the following interviews were completed; 29 of 32 households in Ekwok (90.6 percent); 42 of 48 households in Koliganek (87.5 percent); and 40 randomly chosen households out of 74 in New Stuyahok (54.1 percent).

TABLE 1. SURVEYED HOUSEHOLDS, NUSHAGAK RIVER STUDY COMMUNITIES, APRIL 1987 - MARCH 1988.

Community	Total Number of Households[a]	Number of Households Surveyed	Percent Households Surveyed	Population of Surveyed Households
Ekwok	32	29	90.6%	97
Koliganek	48	42	87.5%	163
New Stuyahok	74	40	54.1%	191
TOTAL	154	111	72.1%	451

[a] The most current listings of households were supplied by community officials. Researchers and key informants updated the lists to reflect year-round residents during the study period.

Besides quantified resource harvest and use data, the survey gathered information which identified the intensity of effort in moose, caribou, and freshwater fish harvest areas. Maps of resource harvest areas used by residents of each community during a 20 year period from 1963 to 1983 had been prepared during an earlier research effort connected with the Bristol Bay Cooperative Management Plan and the southwest Alaska volume of the Department of Fish and Game's Habitat Management Guide (Alaska Department of Fish and Game 1985b; Wright et

al. 1985). Subdivisions of these areas were identified through key informants and the area wildlife biologist. Respondents were asked to indicate the frequency of their use of each area by noting which areas they had ever used, how frequently, and which they used during the study year.

A limited amount of participant observation was conducted in Koliganek during the ice-fishing season in April and salmon fishing season in July. Prior to this study, the principal author had accompanied New Stuyahok hunters on a fall hunting trip, joined in ice fishing, and spent a week at the Lewis Point fish camp. A follow-up visit was made to New Stuyahok in September during the moose season. The principal author also participated in numerous meetings with village representatives in the context of the Nushagak-Mulchatna Rivers Recreation Management Plan.

Other methods of data collection included informal and semi-structured interviews with knowledgeable individuals. Many sources of data were examined. Of particular usefulness was the work of previous Division of Subsistence researchers John Wright and Karen Kraus. Relevant literature and records from the various divisions of the Department of Fish and Game have been reviewed. An important source for historical harvest data was Gasbarro and Utermohle (1974), which reports the results of a resource harvest survey conducted with a sample of households in Ekwok, Koliganek, and New Stuyahok pertaining to 1973.

Survey results were computerized and analyzed by Division of Subsistence data management staff with the Statistical Package for the Social Sciences (SPSS). Resource harvests reported in numbers, buckets, or gallons were converted to pounds edible weight using standard

conversion factors (Appendix B). Spelling of Yup'ik words follows the orthography of Jacobsen (1984).

Drafts of this report were sent to each of the three communities for comments. Public meetings were held with the Ekwok City Council, the Koliganek Village Council, and the New Stuyahok City Council for the purpose of reviewing the document in May, 1991. Subsequently, the report was revised to incorporate additional information gathered at these sessions.

CHAPTER 2

THE COMMUNITIES AND THE AREA

NATURAL ENVIRONMENT

All three of the study communities are situated on the west bank of the Nushagak River in the low, generally flat basin of the river system. Forests of spruce and deciduous trees and tundra are the dominant vegetation types. Forests are best developed on bottom lands along rivers. Tundra covers most of the rolling upland areas in the basin.

Bristol Bay drainages are the most productive salmon breeding grounds in the world. Five species of salmon (chinook, sockeye, pink, chum, and coho) and several other anadromous and freshwater fish species, including whitefish, northern pike, and Arctic grayling are abundant in the Nushagak River system. Rainbow trout, Dolly Varden, and lake trout are also present in the area.

Moose are common in forest and shrub habitats. Caribou of the Mulchatna Herd are abundant in the upper reaches of the Mulchatna drainage and range over much of the tundra east of the Nushagak River (Wright et al. 1985:48). During the 1980s the herd experienced tremendous growth and was estimated at 83,000 animals in 1990 (Van Daele, personal communication, 1990). In the late 1980s, caribou also became more common west of the Nushagak. Brown bear density is high and black bears also reside in the area. A variety of furbearers inhabit the Bristol Bay area, especially beaver which are abundant throughout

the region. Land otter are also common as well as varying populations of lynx, muskrat, fox, wolf, wolverine, and marten. Hare are cyclically abundant and porcupine can be spotted in wooded areas. A variety of waterfowl are present seasonally in the areas coastal and riverine environments, the largest concentrations are evident during the spring and fall migrations. A multitude of birds can be found in the appropriate habitat, seabirds along the coast, ptarmigan in the tundra, and spruce grouse in the woods.

The Nushagak River villages are located in a climatic transition zone with the primary influence being maritime. However, local weather patterns are considerably modified by the interior Arctic. The area is characterized by cloudy skies, mild temperatures, moderately heavy precipitation, and strong surface winds coming off the coast. Average temperatures vary from 30 to 66 degrees in the summer and 4 to 30 degrees during the winter (ADRCR 1982).

TRADITIONAL HISTORY AND SEASONAL ROUND[1]

Prehistory

Little is known about the prehistory of the area although it is generally recognized that the material culture was part of the Bering Sea Eskimo. The Bering Sea culture was not only well adapted to sea mammal hunting and trapping on land, but also to the taking of fish. As people gradually dispersed from the Bering Sea coast, first to the Kuskokwim and later to the Nushagak River, they adapted by emphasizing

[1]Unless otherwise noted, the sources for this section are VanStone (1967 and 1984).

fishing and land mammal hunting. Sea mammal hunting techniques gradually fell into disuse and were abandoned. Salmon fishing provided the basis for economic stability and a repertoire of diverse fishing techniques were used. Active ties were maintained with coastal Eskimos through trading inland resources such as caribou for sea mammal products such as seal oil and walrus ivory.

Two distinct regional groups of Central Yup'ik speaking Eskimos settled the Nushagak River and Nushagak Bay areas. At the time of contact, the Eskimos of the Nushagak River (known as *Kiatagmiut*), inhabited the entire Nushagak River, the lower Mulchatna River, and the area to the north possibly including the Wood River Lakes. To the east, the *Kiatagmiut* occupied the upper Kvichak River and probably the lower end of Iliamna Lake. Nushagak Bay residents belonged to a different subgroup and were called *Aglurmiut*. Their general territory is thought to have included the upper portion of the Alaska Peninsula and slightly beyond the Naknek River to the north. A relatively reliable population estimate of 900 people for the combined *Aglurmiut-Kiatagmiut* groups exists as early as 1829. Population shifts occurred soon after contact with the Europeans and distinctions between the two groups were blurred.

Traditional Seasonal Round

It is difficult to reconstruct the prehistoric subsistence cycle with any certainty since Eskimos were drawn into the fur trade before their aboriginal way of life was recorded and relatively little archaeological work has been done in the region. However, VanStone (1967:122-130) has provided a description of the seasonal round for the

time period between 1880-1910 which is summarized below. The settlement pattern of the Nushagak River region is characterized as Central Based Wandering (VanStone 1970), a pattern which involves seasonal migration from permanent settlements.

Spring was a time of great activity. Winter food supplies were running low, although actual starvation was rare. Trips were made to spring camps along the streams in the mountainous country of the interior beginning in late February or early March. Boats and all household equipment were moved by dog sled. The emphasis was on the taking of furbearers, namely, beaver, otter, red fox, bear, arctic fox, marten, lynx, mink, muskrat, and wolf. Fixed and spring-pole snares were set but beaver were mainly taken by digging them out of their houses. Caribou hunting was also important both for the meat and the skins. Traditionally, bows and arrows or snares were used but by 1880 many Eskimos were mainly using rifles or flintlock muskets. Occasionally a few upriver families would travel down to the coast to hunt seals and stay on to fish for salmon.

By no later than the middle of June, families left their spring camps and returned to the winter villages to prepare for salmon fishing. This included repairing their sinew gillnets and fish traps built of split spruce strips. Spears and dip nets were used as well. Salmon were preserved by splicting and drying; heads were fermented in the ground and eggs were saved in seal oil. Many families traveled to the coast each year at this time even before the fur trade was established; some remained to put up fish while others returned to their permanent villages to conduct their fishing activities. The trip downriver was made in large boats covered with caribou skins or bear hides. Trading

was common. Inland products were exchanged for coastal goods such as ivory and seal oil. Once the fur trade was established, furs were exchanged at the trading post for processed foods and gunpowder. For the return voyage, the large boats were abandoned or traded for small sealskin-covered kayaks.

By early September, most people left their summer fish camps and returned to the winter villages. When the fish runs were nearly over, only the men moved to the interior to pursue caribou and beavers, with the women and children remaining behind to safeguard the fish caches. Before the arrival of the fur traders, skins were used for clothing but subsequently, the Eskimos were persuaded to sell most furs and substitute manufactured materials. Interior hunting and trapping continued until the first snowfall in October at which time the men returned once more to the winter villages.

In the winter, whitefish were taken with traps under the ice and grayling with hooks through holes in the ice. Although some caribou hunting continued, subsistence activities slowed down substantially once the extremely cold weather set in. Winter was primarily a time for dance festivals whose themes were both secular and supernatural. Often, residents of other villages were invited to partake of the celebrations and feasting. As the winter drew to a close, and spring was imminent, people began repairing their nets and traps to commence the annual cycle once again.

Historical Period

In 1778, Captain James Cook was the first European to record a visit to Bristol Bay. In 1818, the Russian-America Company established

its first trading post, Aleksandrovsky Redoubt, at the mouth of the Nushagak River. The Russians were successful in recruiting the local Eskimos into the fur trade, inaugurating them into simple commodity production for sale on world markets. Subsistence activities were altered somewhat to place more emphasis on fur trapping as Eskimos became dependent on particular trade goods. Subsistence food production continued. An unfortunate result of contact was the arrival of previously unknown diseases, including smallpox, measles, and tuberculosis, which decimated some local populations.

The explorers and fur traders were soon followed by missionaries and in 1841 a Russian Orthodox church was established at Aleksandrovsky Redoubt. By the end of the Russian era, Christianity had become the predominant religion for the Eskimos of southwest Alaska. The United States' acquisition of Alaska had no immediate effect on the pattern of cultural contact which had been established by the Russians. Under the ownership of the Alaska Commercial Company, involvement in the fur trade continued and a wider variety of trade goods were introduced. Other Christian denominations, particularly the Moravians, sent missionaries seeking converts but the Russian Orthodox remained dominant along the Nushagak River, as it does today.

Of all the change agents, the development of the commercial salmon fishery by American firms in the 1880s had the greatest impact on Eskimo culture. Eskimos were slowly drawn into the processing sector as cannery workers until, after World War II, all-native cannery crews were common. By the 1960s Natives had made significant inroads into the harvesting sector as well with many acting as fishermen. The fishery affected Eskimos well beyond the Nushagak Bay region and eventually

Eskimos from the most remote villages were drawn to Bristol Bay in the summer months where they came into contact with people from all over the world. Earnings from commercial fishing and cannery work became the major annual source of cash income for many Eskimo families in Bristol Bay and trapping in particular declined as a result. During the 1980s commercial fishing continued to be a major part of the cash sector of Bristol Bay's monetary economy.

EKWOK

Community History

The community of Ekwok is located on the west bank of the Nushagak River, 43 air miles northeast of Dillingham and 17 miles below New Stuyahok (Figure 1). Ekwok (*Iquaq*) is a Yup'ik Eskimo word meaning 'end of the bluff' (Figure 2). According to VanStone (1967:148), the community was probably established in the last decade of the nineteenth century, and is the oldest continuously occupied village on the Nushagak River. Prior to year-round settlement the site was first used in the spring and summer as a fish camp, and in the fall as a base for berry-picking (ADCRA 1982).

By 1923 the village had become the largest settlement along the river. In 1930 a BIA school was established and a post office was opened which served the entire river for a time. Mail service was extremely irregular since residents depended on infrequent deliveries from Dillingham by dogsled. The villagers relocated to higher ground at

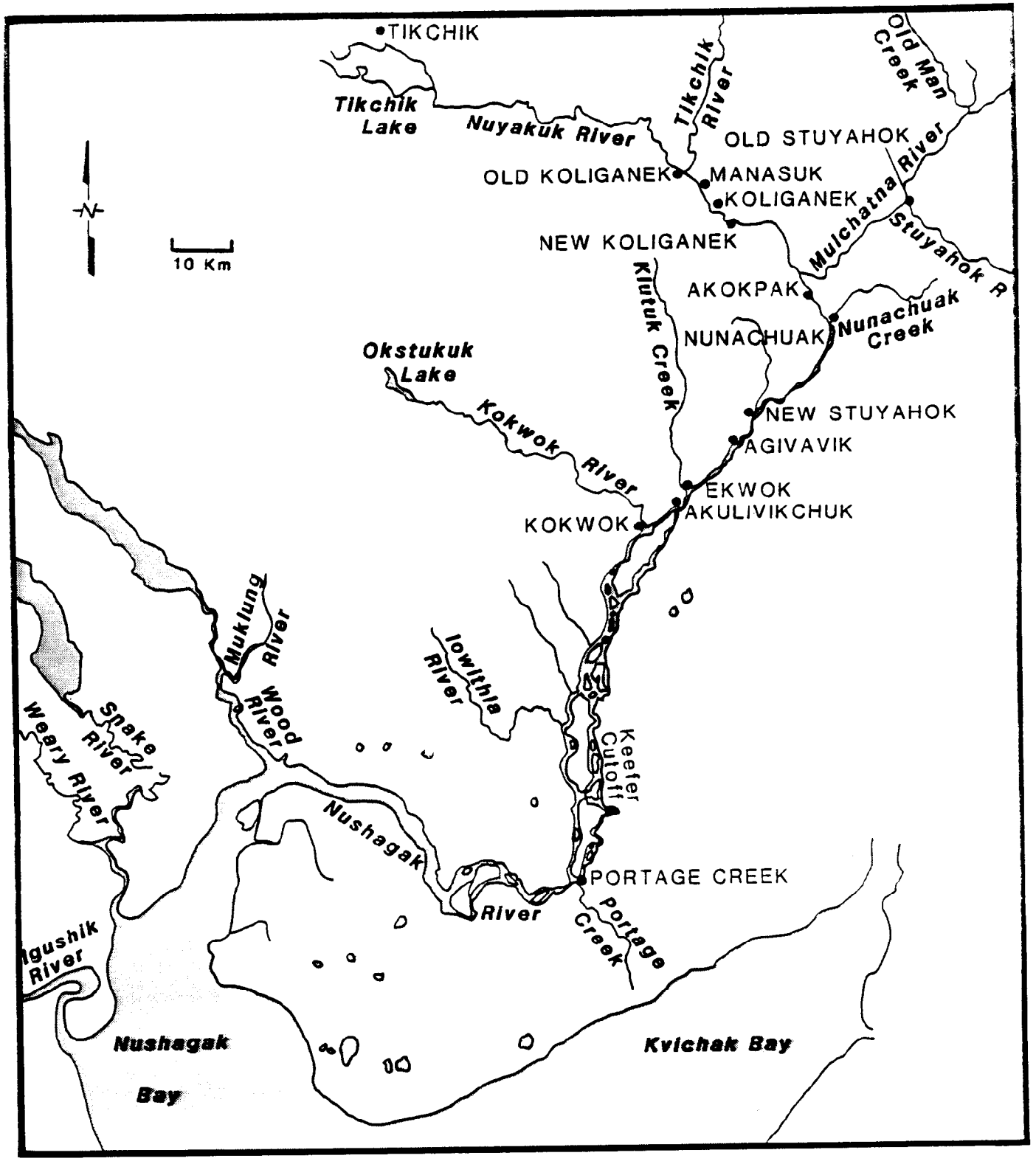


Figure 2. Nushagak River Historical Settlements.
After VanStone 1971.

Ekwok's current location due to severe flooding in the early 1960s (Nebesky et al. 1983:102).

Demography

The first recorded population for Ekwok was 79 inhabitants in 1900 (Table 2). Since that time, its population has fluctuated. By 1930, the population had declined to 40, but increased steadily until 1950 when Ekwok was the largest community on the river with a reported population of 131. In 1985, 107 persons resided in Ekwok.

During the 12 month study period for April 1987 to March 1988, there were 32 occupied houses in Ekwok. Demographic data were obtained for 29 of those households with a combined population of 97 people (Table 3). The average household size was 3.34. A breakdown of the sampled population by sex and age is presented in Figure 3. The sex ratio was slightly skewed towards males, with males comprising 52.6 percent and females only 47.4 percent. Most of the population was distributed fairly evenly between the ages of 0 and 49, except for slightly larger percent in the 0-9 year age group.

Most household heads and spouses (90.2 percent) were of Alaska Native ancestry and had lived in the community for a substantial length of time. The average length of residence for household heads born in the study communities or their antecedent villages was 42.0 years. The majority of household heads and spouses had been born in one of the Nushagak River communities (66.7 percent) or in other Bristol Bay communities (15.7 percent). The remainder had been born in other Alaskan communities (5.9 percent) or outside of Alaska (9.8 percent).

TABLE 2. RECORDED POPULATION OF THE NUSHAGAK RIVER SUBREGION, 1880-1990.

Community	Year												
	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1985	1990
Agivivak	52	30											
Akakpuk		9				20							
Akulwikchuk	72	61											
Ekwok (Ekwak)			79			40	68	131	106	103	77	107	77
Kokwok (Kakuak)	104	45	106										
Koliganek (Kali gnak) (Old Koliganek)	91	114						90	100	142	117	161	181
Molchatna	180												
New Stuyahok (Old Stuyahok)		50-75				90-125		88	145	216	331	339	391
Nunachuak						32	50						
Portage Creek										60	48	35	5
Tikchik	38												
TOTAL	537	309-334				182-217	118	309	351	521	573	642	654

Sources: ADL 1981 and 1987; Rollins 1978; VanStone 1971, Petroff 1884; U.S. Census Bureau 1985.

TABLE 3. DEMOGRAPHIC CHARACTERISTICS OF SAMPLED HOUSEHOLDS, EKWOK, KOLIGANEK, AND NEW STUYAHOK, APRIL 1987 - MARCH 1988

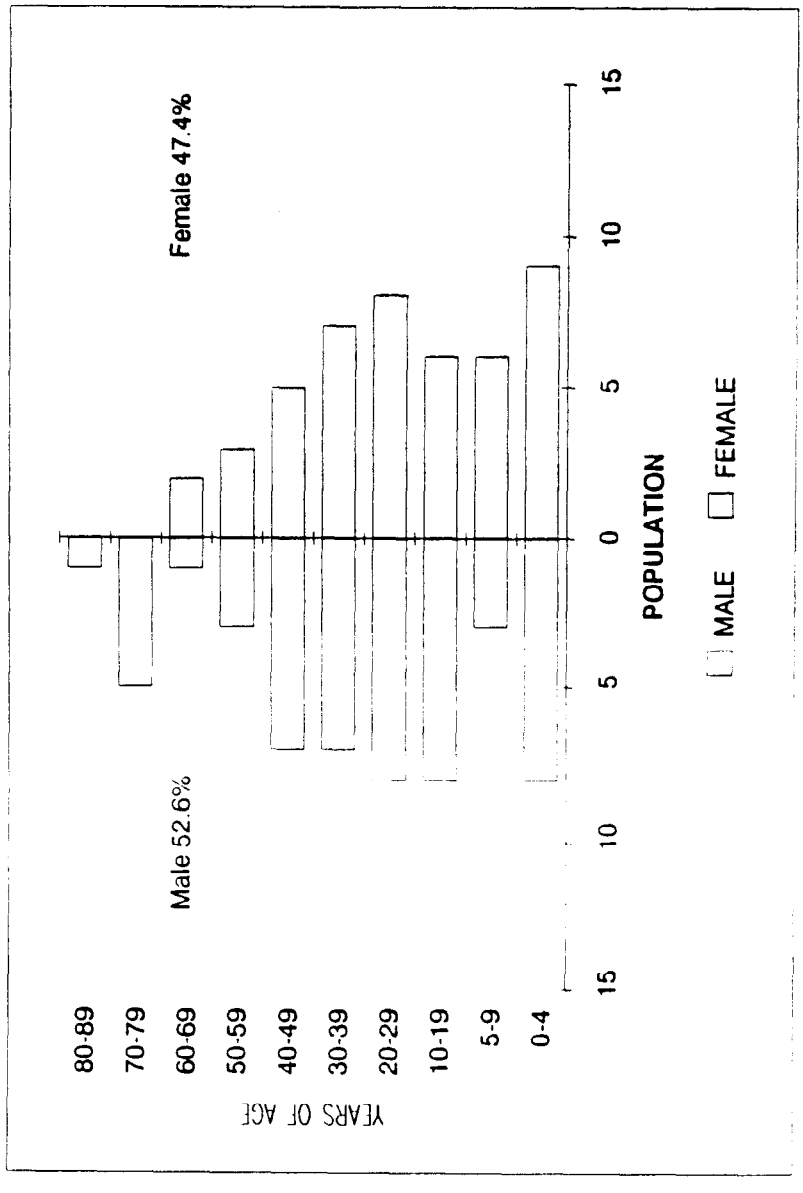
	Ekwok	Koliganek	New Stuyahok
Number of sampled households	29	42	40
% of total households	90.6%	87.5%	54.1%
Average household size	3.34	3.88	4.77
Total sample population	97	163	191
Estimated expanded total population	107	186	353
% male	52.6%	50.9%	58.6%
% female	47.4%	49.1%	41.4%
% of household heads or spouse, AK Native except heads or spouses	90.2%	91.7%	98.6%
% of hh's population AK Native ancestry	96.6%	95.2%	100.0%
Mean length of residence, persons born in study communities or antecedent communities[a]	42.0	31.1	35.1
% of hh heads or spouses[b] born in Nushagak River communities	66.7%	58.3%	68.1%
% of hh heads or spouses[b] born in other Bristol Bay communities	15.7%	18.1%	15.3%
% of hh heads or spouses[b] born in other Alaska communities	5.9%	15.3%	9.7%
% of hh heads or spouses[b] born outside Alaska	9.8%	5.6%	1.4%

[a] Antecedent communities for Koliganek are first or second Old Koliganek. Old Stuyahok is the antecedent community for New Stuyahok.

[b] "Heads or spouses" includes all persons who reported themselves as either male or female heads during interviews.

Source: Division of Subsistence Survey, ADF&G, 1988.

Figure 3. Population Profile, Ekwok, 1987/88



Services and Facilities

Situated in a roadless area, Ekwok is accessible by air, boat, or snowmachine depending on the season. There is a gravel runway and in good weather, frequent service to Dillingham and other villages is provided by several air taxis. Mail is delivered six days a week.

During the study year, there were 32 occupied houses, a council building, a clinic, a post office, and a school. There were two churches in the village. Most households were affiliated with the Russian Orthodox church; but there was also a Baptist church which held occasional services. Neither church had a priest or pastor in residence.

Most houses were of wood frame construction. The majority were heated with wood while the remainder were dependent upon oil as the primary fuel source. All houses had running water supplied by individual wells. In spite of the presence of running water, most residents greatly preferred their steambaths (*maqi*) for washing and socializing in the evenings. A community sewer system was in place. Electricity was generated from Southwest Region Schools during the school year and the city's generator in the summer months. There was no store in the village but a limited amount of goods were available in a private home. Video tapes could be rented in a private home in conjunction with a Dillingham business. A small video arcade was open on a part-time basis.

Ekwok became part of the Southwest Region School District in 1971. During the study year there were both a high school and elementary program staffed by three teachers and an aide. There were

also children of high school age attending school at Mt. Edgecumbe in Sitka, southeast Alaska. The local high school program was suspended for the 1989-90 school year when the four high school-aged students all opted to attend boarding programs. Some college courses were offered through a distance delivery program provided by the University of Alaska's Dillingham branch and a GED program was also available.

Incorporated in 1974 as a second-class city, Ekwok had a 7 member city council. For non-city programs and services Ekwok's Native population was represented by a seven member traditional council. During the study year, the council was actively involved with issues of tribal enrollment in preparation for changing eligibility requirements for federally supported Indian health services. Ekwok's village corporation operated a sport fishing lodge two miles below the village.

The Bristol Bay Area Health corporation provided limited health services in the village through two trained health aides. A public health nurse also made regularly scheduled visits to provide assessments and immunizations. Doctors and a dentist visited the community once or twice each year. For more extensive treatment, residents travelled to the hospitals in Dillingham or Anchorage.

Employment

As part of the resource use survey, information on employment characteristics was also collected and the findings are summarized in Table 4. The types of jobs which were available in each community were fairly similar. To avoid repetition, Table 5 presents a summary of employers and positions which were available in each community during

TABLE 4. EMPLOYMENT CHARACTERISTICS OF THE STUDY COMMUNITIES, APRIL 1987 - MARCH 1988

	EKWOK	KOLIGANEK	NEW STUYAHOK
Number of adults employed during part of study year	36	66	81
Percent of total adults employed during study year[a]	57.1%	79.5%	65.9%
Number of jobs held by employed adults	55	112	130
Average number of jobs held per employed adult	1.5	1.7	1.6
Average number of months during which employed adults were employed[b]	6.5	5.1	5.0
Percent of employed adults that were employed year-round[c]	19.4%	13.6%	12.3%
Average number of months employed, all households heads[d]	4.0	4.3	4.8

[a] Excluding those classed as disabled, homemakers, students, or retired for the entire 12 month period. An adult was defined as any person 18 years of age or older.

[b] Respondents indicated the months during which they were employed. In some cases, they were employed for only portions of these months. The N of cases used in this row reflects the number of employed adults where months worked were known.

[c] Year round is defined as working during 12 months. In some cases, individuals were employed for only portions of these months.

[d] Since number of months employed is missing for 21 of the employed adults: this number must be considered a minimum estimate.

Source: Division of Subsistence, ADF&G, Survey 1988.

TABLE 5. TYPES OF NON-FISHING JOBS AVAILABLE IN EKWOK, KOLIGANEK, AND NEW STUYAHOK, APRIL, 1987 - TO MARCH 1988.

Employer and Position	Ekwok	Koliganek	New Stuyahok
Village or City Council			
Mayor	-	-	1[a]
Administrator	1[a]	1[a]	1[a]
Clerk	1[a]	1[a]	1[a]
Janitor	1[a]	1[a]	1[a]
Water /or Sewer Manager	1[a]	1[a]	1[a]
Oil and Gas Vendor	-	-	1[a]
Electric Meter Reader	-	1[a]	-
Construction	-	[c]	-
Van Driver	-	-	1[a]
Dog Catcher	-	-	1[c]
Village Corporation			
Controller	-	1[c]	-
Fishing Guide	1[d]	-	-
Store Manager	-	-	1[a]
Store Clerk	-	-	3[a]
Store Stocker	-	-	1[a]
Secretary	-		1[a]
Administrator	-		1[a]
Southwest Region Schools			
Teachers and Principal	3[b]	5[b]	12[b]
Counselor	-	-	1[b]
Teachers Aide	1[a]	2[a]	2[a]
Bi-Lingual Instructor	1[a]	1[a]	1[a]
Pre-School teacher aide	-	1[a]	1[a]
Resource Specialist	1[a]	1[a]	1[a]
Cook	1[a]	1[a]	3[a]
Janitor	1[a]	1[a]	2[a]
JOM Activities Supervisor	1[a]	1[a]	2[a]
Substitutes (numerous)	[d]	[d]	[d]
Secretary	-	1[a]	1[a]
State and Federal Government			
U.S. Postmaster	1[a]	1[a]	1[a]
(Alternates)	-	-	2[d]
Mail Hauler	1[a]	1[a]	1[a]
BBAHC* Health Aide	2[a]	2[a]	2[a]
BBAHC* Alternate Health Aide-	-	1[d]	2[d]
PHS* Construction	[d]	-	[d]
BBNA* Elderly Nutrition Coordinator	1[a]	1[a]	1[a]
Village Public Safety Officer	1[e]	1[e]	1[e]
Airport Maintenance	1[d]	1[d]	1[d]
Fee Agent	-	-	1[d]
Adult Education Teacher	1[a]	1[a]	1[a]
BBAHC* Peer Counselor			1[a]

TABLE 5. (Continued) TYPES OF NON-FISHING JOBS AVAILABLE IN EKWOK, KOLIGANEK, AND NEW STUYAHOK, APRIL, 1987 - TO MARCH 1988.

Employer and Position	Ekwok	Koliganek	New Stuyahok
Other Wage Employment			
AVEC* worker	-	-	3[c]
Private Store	2[a]	2[a]	-
Airline Dispatcher	1[a]	1[a]	
Tour Guide	-	1[a]	-
Processing		1[d]	c
Construction	c	c	c
Babysitting (numerous)	-	c	c
Chore assistant			1[c]

a Part-time, less than 37.5 hours per week.
b Full-time, nine month positions. During the study year, two teaching positions in New Stuyahok and two in Koliganek were held by year-round residents.
c Status unknown.
d Irregular or seasonal.
e Full-time, 37.5 hours per week.

*Employers are abbreviated as follows: AVEC, Alaska Village Electric Co-op; BBAHC, Bristol Bay Area Health Corp.; BBNA, Bristol Bay Native Association; PHS, Public Health Service.

the study year. Most positions were seasonal and part-time in nature. For instance, all jobs with the schools, with the exception of the certified administrative and teaching staff were nine-month, part-time positions. In many instances, jobs with the city, village, or stores were shared between two individuals both to distribute the earnings to more families and to allow each person time for subsistence activities and family obligations. Most positions also had an alternate who stepped in as needed.

During the twelve month study period from April 1987 to March 1988, 57.1 percent of Ekwok's adults, excluding retirees, students, the disabled, or homemakers, were employed for an average of 6.5 months (Table 4). The sample held a combined total of 55 jobs or 1.5 jobs per employed adult. Only 19.4 percent of adults were employed year-round. Most jobs were seasonal and part-time in nature. The average non-fishing job was reported at 29 hours per week.

As demonstrated in Table 6, commercial fishing and trapping accounted for the greatest share of all jobs (58.2 percent) when categorized by employer type. However, the proportion of Ekwok's involvement in the commercial fishing sector was noticeably smaller than the other two study communities. Employment opportunities in other sectors were fairly limited. The services sector provided 16.4 percent of the jobs. These were positions funded through the Bristol Bay Health Corporation (health aides and clinic janitor) or Bristol Bay Native Association (village public safety officer and elderly lunch program site manager). The two other employers of note were the local school district which hired a teacher's aide, bilingual aide, activities supervisor, resource center director, cook, and janitor, and the city

TABLE 6. PERCENTAGE OF JOBS BY EMPLOYER TYPE WITHIN THE STUDY COMMUNITIES, APRIL 1987 - MARCH 1988

	EKWOK N=55[a]	KOLIGANEK N=112[a]	NEW STUYAHOK N=130[a]
Agriculture, Fisheries, Forestry,	58.2%	67.9%	73.8%
Construction	1.8%	1.8%	0.0%
Transportation Communications, Utilities	1.8%	0.0%	0.8%
Retail Trade	3.6%	4.5%	2.3%
Services	16.4%	4.5%	9.2%
Federal Government	5.5%	1.8%	0.8%
State Government	1.8%	0.0%	0.8%
Local Government and School District	10.9%	17.9%	11.5%
Self-employed	0.0%	0.9%	0.0%
Missing	0.0%	0.9%	0.0%

[a] Represents number of jobs held by respondents in the study sample; due to job turn-over, some positions were held by more than one/ person during the the study period.

Source: Division of Subsistence, ADF&G, Survey 1988.

government which hired a city clerk, an administrator, and a janitor. A few jobs were available in other sectors as well. One respondent worked as a freight handler/dispatcher for two air taxies, another was self-employed in a small video arcade and snack shop, the post office employed a postmistress and janitor and one respondent worked as a fishing guide for the village-owned lodge. A sole individual had left the village to work seasonally in construction

Table 7 reports the percentage of the jobs held by Ekwok residents during the study year by occupational category. Again, commercial fishing (23.6 percent) and trapping (32.7 percent) accounted for the largest share of the jobs. The services workers, including social service and janitors accounted for the next largest percentage (14.5 percent). The professional, technical, and manager category comprised the third largest (9.1 percent) group with jobs such as health aides and bilingual teachers. Occupations such as clerical and sales (5.5 percent), construction (3.6 percent), motor freight and transportation (3.6 percent), miscellaneous labor (3.6 percent), and recreational-based occupations (3.6 percent) made up the rest.

Monetary Income

Tables 8A and 8B report monetary incomes for Ekwok from several sources. Table 8A compares the average taxable income by income tax return for Ekwok and Anchorage in the late 1970s and early 1980s. The data indicate that Ekwok's earnings have been consistently and substantially less than the mean income in Anchorage. Table 8B indicates that the average earned household income for Ekwok from April

TABLE 7. PERCENTAGE OF JOBS BY OCCUPATIONAL TYPE WITHIN THE STUDY COMMUNITIES, APRIL 1987 - MARCH 1988

	EKWOK N=55 Jobs[a]	KOLIGANEK N=112 Jobs[a]	NEW STUYAHOK N=130 Jobs[a]
Professional, Technical, Manager	9.1%	9.8%	6.2%
Clerical and Sales	5.5%	4.5%	5.4%
Services Worker	14.5%	11.6%	11.5%
Agriculture, Fisheries, Forestry	56.3%	67.9%	73.1%
Commercial Fishing [b]	23.6%	40.2%	43.1%
Trapping [b]	32.7%	25.9%	30.0%
Logging	0.0%	0.9%	0.0%
Fish Processing	0.0%	0.9%	0.0%
Construction	3.6%	2.7%	.8%
Motor Freight and Transportation	3.6%	0.9%	0.0%
Miscellaneous Labor	3.6%	0.9%	3.1%
Recreational-based Occupations	3.6%	0.9%	.8%
Missing	0%	0.9%	0%

[a] N=jobs held by sampled respondents during the study year, due to turn-over in some jobs, this number should not be equated with the number of jobs available in the community.

[b] Commercial Fishing and Trapping are sub-categories of "Agriculture, Fisheries, and Forestry."

Source: Division of Subsistence, ADF&G, Survey 1988.

TABLE 8A. MEAN TAXABLE INCOME PER INCOME TAX RETURN BY YEAR

	EKWOK	KOLIGANEK	NEW STUYAHOK	ANCHORAGE
1978[a]	$ 7,186	$ 8,138	$ 9,948	$18,255
1979[b]	$ 5,931	$ 3,619	$ 5,853	NA
1981[a]	$ 7,602	$10,417	$ 9,436	$23,043
1982[a]	$ 7,837	$ 9,034	$ 5,882	$23,590
1983[a]	$12,057	$ 8,602	$ 8,001	$24,393
1984[a]	$ 9,489	$ 8,036	$ 8,156	$25,406
1985[a]	$10,139	$ 8,310	$10,389	$25,855

NA = Not available.
[a]Average taxable income per return. Source: Community Profile Database, Alaska Department of Fish, 1991; Alaska Department of Revenue, March, 1985.
[b]Mean per capita income; Source: United States Bureau of the Census 1980.

TABLE 8B. MEAN HOUSEHOLD INCOME BY INCOME SOURCE (For all responding households)[a], APRIL 1987 - MARCH 1988

	EKWOK (n = 29)	KOLIGANEK (N = 42)	NEW STUYAHOK (N = 40)
Commercial Fishing	$3,452 (25.7%)	$8,683 (47.6%)	$3,275 (21.6%)
Trapping	347 (2.6%)	694 (3.8%)	368 (2.4%)
Other Earned Income	4,015 (29.9%)	3,676 (20.1%)	3,914 (25.8%)
Permanent Fund Dividends	2,766 (20.6%)	3,209 (17.6%)	3,949 (26.0%)
ANCSA Corp. Dividends	214 (1.6%)	512 (2.8%)	379 (2.5%)
Social Security/Pensions	949 (7.1%)	652 (3.6%)	1,170 (7.7%)
Other Income[b]	1,685 (12.6%)	832 (4.6%)	2,126 (14.0%)
TOTAL	$13,428	$18,258	$15,181

[a] Source: Division of Subsistence Survey, 1988. These represent minimum data; for 22.7 percent of the jobs, the amount of income earned from the job was unknown.
[b] Includes longevity bonus, energy assistence, public assistance, aid to families with dependent children, ANCSA corporation dividends, and unemployment.

1987 to March 1988 was $13,428. Non-fishing jobs accounted for the largest share of the average household's earned income or $4,015. Commercial fishing earnings contributed $3,452 and trapping only $347. Permanent dividend fund payments averaged $2,766 per household and made a sizeable impact on the average household income. Social security and pensions contributed $949. Government transfer payments totaling $1,685 comprised the remainder.

Cost of Living

As part of the information collected from the household surveys, respondents estimated their monthly costs for home heating, transportation fuel, electricity, housing, and food. Table 9 reports the results and indicates that costs were very similar in Ekwok and Koliganek. In Ekwok, average monthly costs broke down as follows: $47 for heating fuel, $72 for transportation fuel, $382 for food, $51 for electricity, $28 for propane, and $78 for phones. One family paid $200 per month for rent which averages to $7 for all households who answered this question.

KOLIGANEK

Community History

Koliganek (*Qalirneq*) is the uppermost community on the Nushagak River. Located 65 miles northeast of Dillingham on the south bank of the river, its name means "last or upper village." The present site of Koliganek has been documented as the third village location (Figure 2).

TABLE 9. AVERAGE ESTIMATED MONTHLY HOUSEHOLD EXPENSES AT EKWOK, KOLIGANEK AND NEW STUYAHOK, APRIL 1987 - MARCH 1988.

	Ekwok (N=28)[a]	Koliganek (N=41)[a]	New Stuyahok (N=40)[a]
Expenses			
Heating	$ 47 (27)	$ 30 (33)	$ 83 (39)
Transportation Fuel	$ 72	$ 92 (27)	$ 93 (29)
Water	$ 0	$ 0	$ 23 (38)
Housing	$ 7	$ 0 (40)	$ 66 (33)
Food	$382	$382 (27)	$345 (25)
Electricity	$ 51	$ 39 (31)	$ 70
Propane	$ 28	$ 35 (31)	$ 28 (30)
Phone	$ 78 (16)	$ 66 (34)	$ 78 (37)
Total Expenses	$665	$644	$786

[a] Sample size except where noted.

Source: Division of Subsistence, ADF&G, Survey 1988.

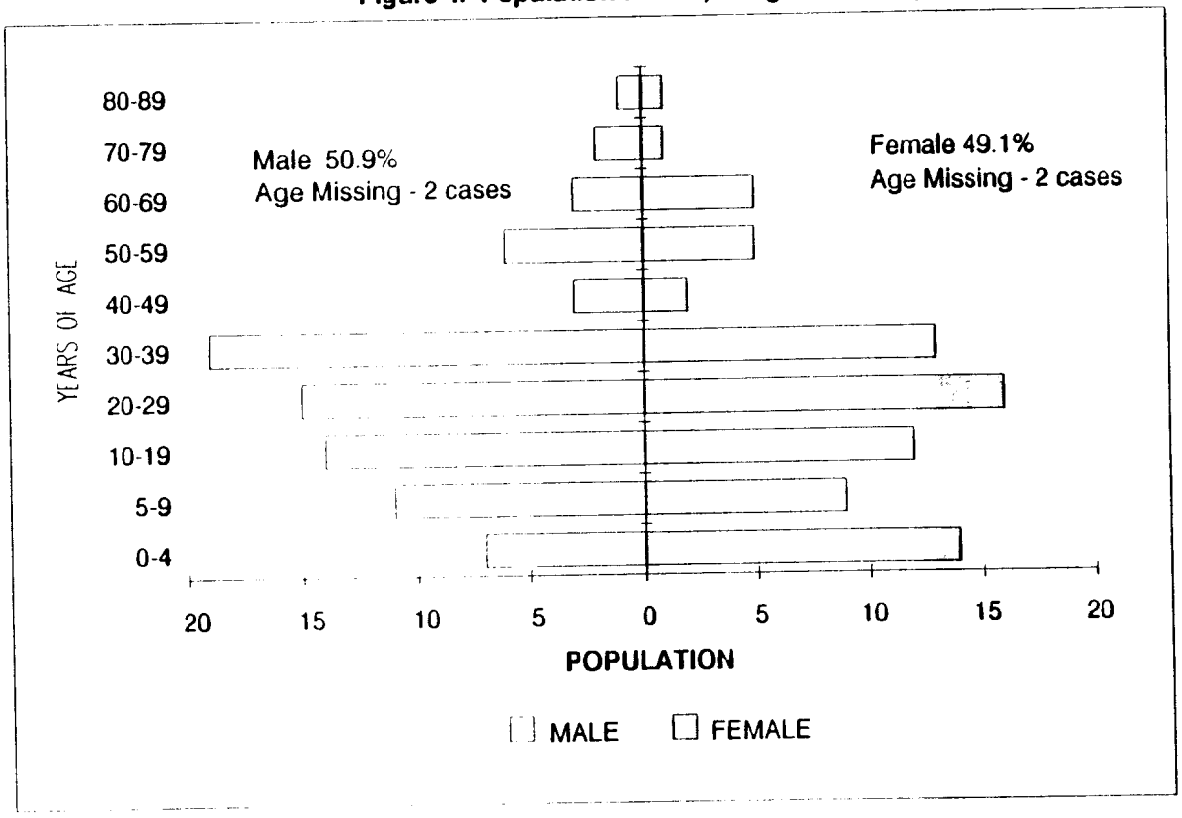
The first move occurred in 1940 because of a shortage of firewood in the original site at the mouth of the Nuyakuk River, and the second in 1964 because of flooding problems in the second location ten miles downstream on the northern bank (Nebesky 1983:117; VanStone 1967:143-145). During the field work period, one researcher was told that the village had actually moved four times and that the first site was abandoned because of too many deaths, a common Yup'ik practice (Chythlook, field notes 1988). Perhaps this last is a reference to *Manasuk*, a sizeable village located halfway between Old Koliganek and Koliganek and abandoned at the turn of century because of an influenza and measles epidemic (VanStone 1971:34).

Demography

Old Koliganek's population was first recorded as 91 in 1880 and 114 ten years later (Table 2). There are no other records until 1950. From that year to 1980, the number of residents fluctuated from a low of 90 in 1950 to a high of 142 in 1970. In 1985, a village census reported 161 inhabitants.

In Koliganek, 42 of the occupied households (87.5 percent) were included in the study sample with a total population of 163 persons (Table 3). The average household size was 3.88. Figure 4 provides a breakdown by age and sex. The sex ratio was fairly even with 50.9 percent male and 49.1 percent female. Koliganek had a young population. 41.1 percent were under 20 years of age. The largest single cohort of the sample (19.7%) were adults in their 30s. Elders comprised the

Figure 4. Population Profile, Koliganek, 1987/88



smallest group, with only 7.9% over 59. The vast majority of household heads and spouses were of Alaska Native ancestry (91.7 percent). The mean length of residence in Koliganek's present location was 24.1 years for household heads but when previous village locations were included, the mean was 31.1 years. Over half the heads and spouses (58.3 percent) were born in Nushagak River communities and an additional 18.1 percent were born in other Bristol Bay communities. Smaller portions were born in other Alaskan communities (15.3 percent) or outside of Alaska (5.6 percent).

Services and Facilities

Like Ekwok, Koliganek is situated in a roadless area accessible by air, boat, or snowmachine depending on the season. During the spring breakup season, its gravel runway is at times too soft to remain open and the village is temporarily cut off from mail, supplies, and air travel. When the runway is in good condition, there is frequent air service from Dillingham air taxis and mail is delivered six days per week.

During the study year, there were 48 occupied houses, a new community hall and post office building, a pump house, a clinic, two stores, a church, and a school. Houses were of wood frame or log construction and stretched out on a bluff along the river bank. The village is divided by a small creek which is crossed by a footbridge. The majority of homes were heated with wood stoves although some homes also have oil burners. Most households had running water but a public water station supplied water for those for households who needed it.

Electricity was sold by the council which bought surplus power from the school district. A new pump house was just completed.

Koliganek had two small general stores, a cooperative store and one which was privately owned. Both were usually stocked with basic canned, fresh, and frozen foods as well as a moderate amount of clothing, stationery, dry goods, and snacks. Video tapes could be rented in a private home through an arrangement with a Dillingham business.

Koliganek is a member of the Southwest Region School District. During the study year, there were 39 students in the elementary and high school. Similar to Ekwok, no high school program was offered for the 1988-89 school year because the small number of students of high school age opted to enroll in larger schools in other locations. A limited pre-school program was also offered. The University of Alaska through its Dillingham branch sponsored an Adult Basic Education Program and offered college course through a distance delivery method.

A health clinic was staffed by a trained health aide funded by the Bristol Bay Area Health Corporation. A public health nurse also made regularly scheduled visits to provide assessments and immunizations. Doctors and a dentist visited the community once or twice each year. For more extensive treatment, residents travelled to hospitals in Dillingham or Anchorage.

Koliganek is an unincorporated community and government is provided by a traditional village council. Historically, the Russian Orthodox domination has been the principal church and this was still true during the study year when an ordained priest resided in the community. More recently, a small number of families began an

affiliation with the Assembly of God church in Dillingham and held regular meetings in private homes until a building was completed in 1990.

Employment

In Koliganek, 69.5 percent of the adults in the sampled population were employed during at least one month between April 1987 and March 1988 (Table 4). Together, these 66 people held a total of 112 jobs. Each employed adult held an average of 1.7 jobs and worked an average of 5.1 months. Only 13.6 percent of them were employed year-round. As in Ekwok, most jobs were of a seasonal and part-time nature. Excluding fishing and trapping jobs, the average number of hours worked per week was 28.

As expected, the category of agriculture, fisheries, and forestry accounted for the greatest proportion of employment (67.9 percent) since this sector included commercial fishing and trapping (Table 6). The local school district and village council were the next largest employers (17.9 percent). Jobs in the retail sector were available in two stores, one family run, and the other a village co-op. Together, they employed two managers and three clerks and accounted for 4.5 percent of the jobs. Other job categories included services (4.5 percent), construction (1.8 percent), and the federal government (1.8 percent). One person was also self-employed as a summer tour boat operator in another Bristol Bay watershed.

By occupational type, agriculture, fisheries, and forestry, again ranked as first representing 67.9 percent of the jobs. The

largest number of those jobs were in commercial fishing (40.2 percent), followed by 25.9 percent in trapping. One individual had worked in a cannery and another as a logger in a different region of the state. Other occupational categories provided fewer numbers of jobs. Service workers characterized the next largest category (11.6 percent). This category included such diverse positions as custodian, electric meter reader, elderly nutrition coordinator, activity supervisor, teacher aide, priest, and water and sewer maintenance. Professional, technical, and managerial positions were responsible for 9.8 percent of the jobs. They included two teaching positions which were held by year-round non-Native residents as well as health aides, and store managers. The clerical and sales category (4.5%) encompassed secretarial and administrative positions for the village council and corporation as well as store clerks. Three persons (2.7 percent) were employed on local construction projects. The remaining categories each reported one job during the study period: a truck driver in motor freight and transportation; a miscellaneous laborer; and a tour boat operator. One person in the sample was collecting unemployment and one entry was missing information on job type.

Monetary Income

Of the three study communities, Koliganek reported the highest average household income, $18,258 (Table 8B) for the study period of April 1987 to March 1988. The greatest portion, 47.6 percent, ($8,683), was derived from commercial fishing. Trapping contributed $694 to the average household income. Earnings from other jobs averaged $3,676.

ANCSA dividends totaled $512 while social security and pensions added $652. Permanent fund dividends were responsible for $3,209 while government transfer payments made up the remaining $832. When average earnings during the late 1970s and early 1980s are compared with Anchorage, Koliganek's taxable income was only one-third to one-half that in Anchorage (Table 8A).

Cost of Living

Survey respondents estimated their total monthly expenses at $644 dollars (Table 9). More than half that sum, $382, was spent on food. Other costs included home heating, $30; transportation fuel, $92; electricity, $39; propane, $35, and $66 for phone service. No households reported rent or mortgage payments. Water and sewer services were available to about half the households and were provided by the village without charge.

New Stuyahok

Community History

New Stuyahok's (*Cetuyaraq* means "to go downriver") present site 52 miles northeast of Dillingham is the village's third location. The original, or "Old Village," was several miles upriver from the present location in 1918. In 1918, villagers moved to "Old Stuyahok" which was located at the confluence of the Mulchatna and Stuyahok rivers, where they herded reindeer for the U.S. Government. The villagers became

dissatisfied with that location for numerous reasons. During the 1920s and 1930s, the village was subjected to flooding; the site was too far inland to receive barge service or for BIA to establish a school; and the reindeer were not thriving. Consequently, in 1942 the community moved to its present location thereby gaining better access to the commercial salmon fishing grounds, improved supply linkages from barge service, and the promise of a BIA school (Nebesky et al 1983:109; Southwest Region Schools 1983).

Demography

VanStone (1971:68) concluded that during the historic era, Yup'ik Eskimos lived along the lower Mulchatna from the late nineteenth century until about 1940. However, there are no firm population statistics for the community of Old Stuyahok. VanStone estimated the population ranged from 50 to 75 in the late nineteenth and early twentieth centuries to a peak of 90 to 125 from 1920 to approximately 1935. New Stuyahok's population was first recorded at 88 in 1950. Its population has continued to grow steadily and since 1960 has always been the largest of the Nushagak River settlements. By 1985, the city enumerated its population at 339 persons. Data provided by the city in 1988 listed 355 residents.

During the study, 54.1 percent of New Stuyahok's occupied households were included in the sample. New Stuyahok's average household size of 4.77 was the largest of the three study communities. As depicted in Figure 5A, the forty households reported a total population of 191 persons with a noticeably imbalanced proportion of

Figure 5A. Sample Population Profile, New Stuyahok, 1987/88

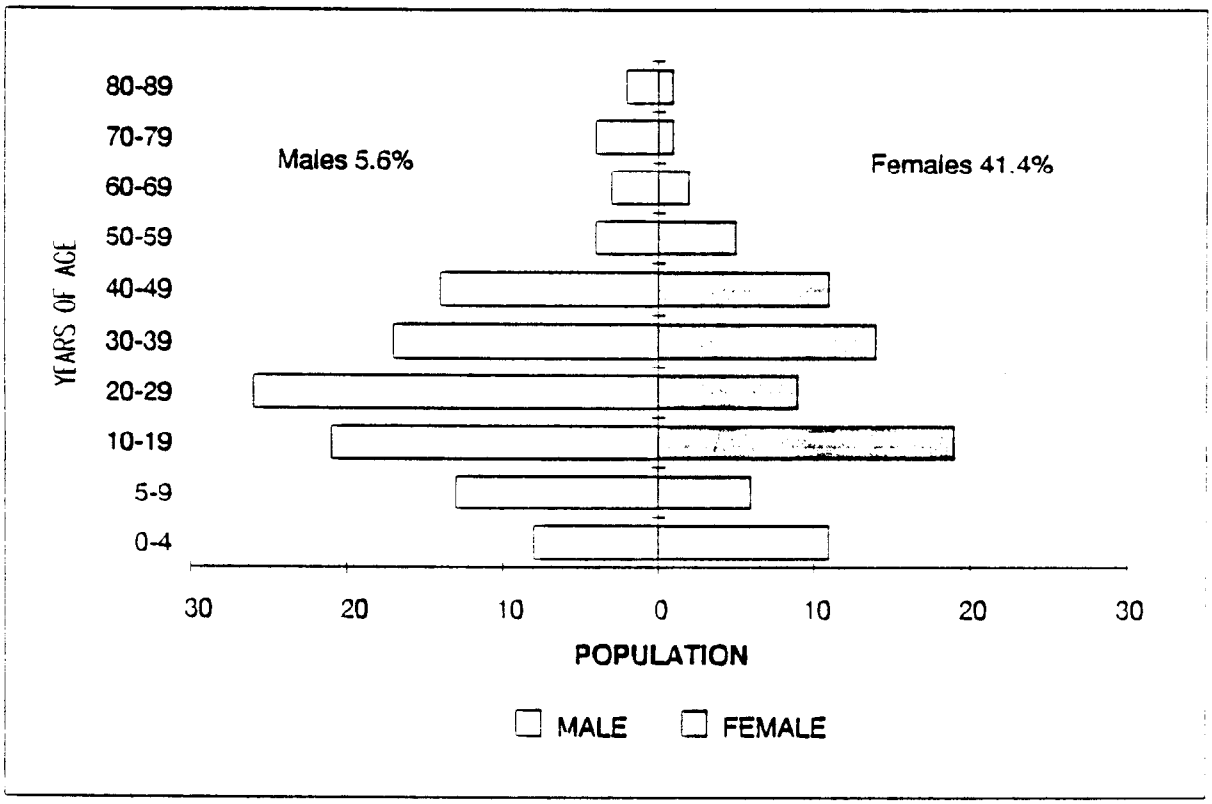
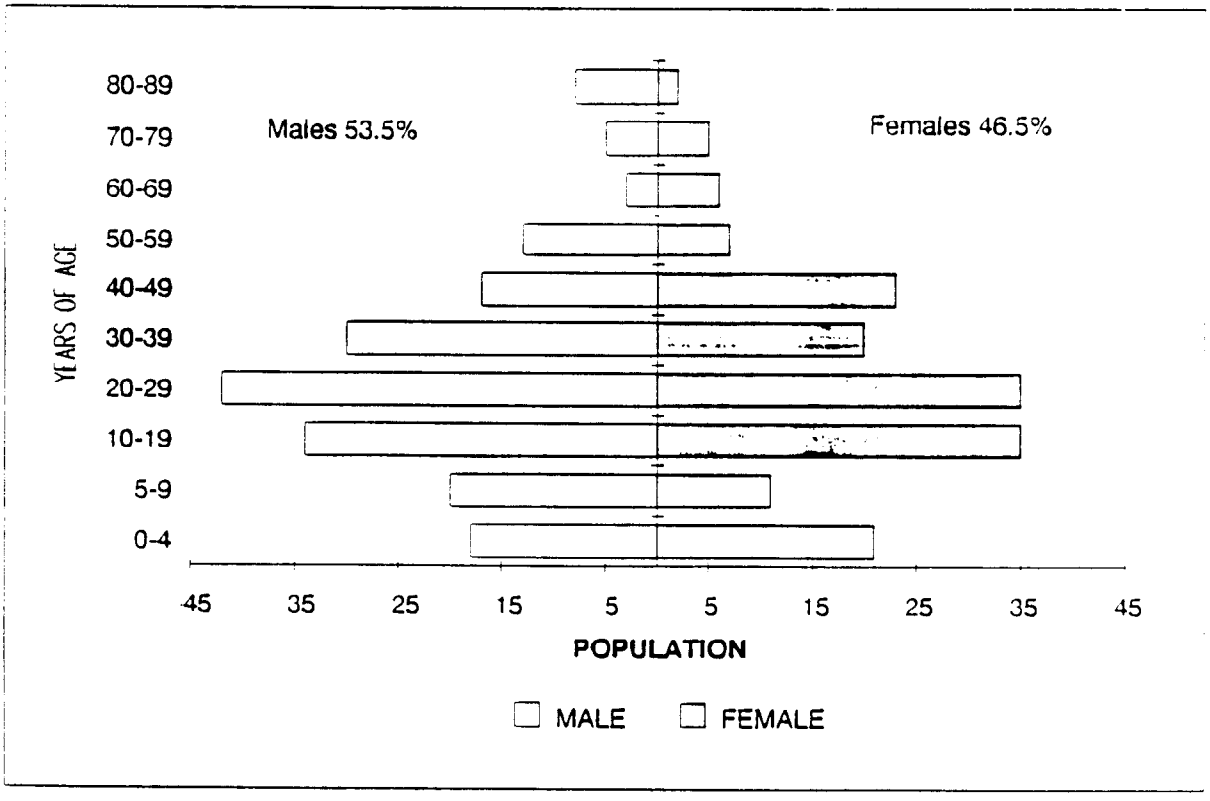


Figure 5B. Community Population Profile, New Stuyahok, 1987/88



males (58.6 percent) and females (41.4 percent). It was particularly noticeable in the 20-29 year old cohort in which there were 26 males and only 9 females. Most of New Stuyahok's sampled population was young clustered between the ages of 10 and 49.

Using a list of 1987-8 residents and their birthdates which was provided by the city council, it was possible to construct a population pyramid for the entire community. Results are depicted in Figure 5B. Males (53.5 percent) still predominated over females (46.4 percent), although not as sharply as in the sample population. The population was young, 61.7 percent is under 30 years of age. An additional 14.1 percent are in their 30s and 11.3 percent are in their 40s. The remaining 13.8 percent range from ages 50 to 89.

Of the three study communities, New Stuyahok reported the highest number of Alaska Native household heads (98.6 percent). The average length of residency in the village's present site was 34.3 years and 35.1 years for either Old Stuyahok or New Stuyahok. As in the other communities, nearly all the household heads or spouses were born in a Nushagak River village (68.1 percent) or another Bristol Bay community (15.3 percent). Of the remainder, 9.7 percent were born in other areas of Alaska or outside the state (1.4 percent).

Services and Facilities

New Stuyahok is the largest of the three villages. During the study year, there were 74 occupied houses. Other buildings included a co-op store, a health clinic, a Russian Orthodox church, city office, a community hall, a post office, a city shop, two youth centers, and a

fire hall. Most homes were of wood-frame construction. In 1985, 30 new homes were constructed by the Alaska State Housing Authority and were distinctive in their size and location. These two to four bedroom homes were located on the hill below the airport and above the rest of the village, laid out in two parallel rows along a road and gave quite a uniform appearance.

Electrical power was provided through the Alaska Village Electric Co-op (AVEC). The primary method of home heating was oil although in some households wood was also burned as a supplement. New Stuyahok has a community water and sewer system. As in the other upriver villages, steambaths (*maqi*) were widely preferred over showers and were a vital part of the community's social life.

The village of New Stuyahok was incorporated as a second class city in 1972. It had a seven-member city council. New Stuyahok's Native population was represented by a traditional council. Although all three communities had a political body which was associated with the local Russian Orthodox Church, similar to a council of elders, in New Stuyahok the role of "chief" had considerable prestige and informal authority in the village. This respect was enhanced by the fact that Chief Ivan Blunka (who died in 1988) was recognized as one the founders of the new village along with Cavelela Andrew and Evan Chunak Sr. (Southwest Region Schools 1984). He was also very instrumental in the establishment of the new school.

Pre-school, elementary, and high school programs were provided through Southwest Region Schools. During the study year, there were 91 students. The University of Alaska's Dillingham branch operates an

Adult Basic Education Program and delivered college-level courses via a distance delivery model.

Employment

Table 5 presents an overview of all the jobs which were available in New Stuyahok during the study period. It should be kept in mind that Tables 4, 6, and 7 represent employment patterns only of persons who were in the study sample (54 percent of the community households). Since the employment patterns of the sample population are generally consistent with the other two communities, they appear quite reliable.

During the study year, 81 (65.9 percent) of the adults in the New Stuyahok sample were employed and held an average of 1.6 jobs each as shown in Table 4. Each adult was employed for an average of 5.0 months. Only 12.3 percent were employed on a year-round basis. Household heads (including those who had no job) were employed for an average of 4.8 months each.

By employer type (Table 6), jobs in natural resources, specifically fisheries and trapping, dominated all the categories (73.8 percent). The employer type which ranked second was local government, including the school district, in which 11.5 percent of the jobs were included. Services provided 9.2 percent of the jobs and retail trade 2.3 percent. The following employer types each provided only one job each to the study sample: transportation, communications, and utilities; the federal government; and state government. Data for two jobs were missing.

When jobs were classified by occupational type (Table 7), the largest percentage was again grouped in the category of agriculture, fisheries, and forestry (73.1 percent) which included the commercial fishing (43.1 percent) and trapping (30.0 percent) jobs. No other category came close to approaching that level. As in the other two study communities, services workers ranked second (11.5 percent). This was followed by professional, technical, and manager (6.2 percent), clerical and sales (5.4 percent), miscellaneous labor (3.1 percent), and construction and recreation-based occupations (0.8 percent each).

Monetary Income

According to the survey results, New Stuyahok's average household income was $15,181 for the twelve month study period (Table 8B). Earnings from wage jobs represented $3,914 while commercial fishing added another $3,275. Trapping brought in $368 to the average household and government transfer payment and pensions contributed an additional $2,126. Social security and pensions totaled $1,170. ANCSA corporation dividends added up to $379. The largest segment of the average household's income, $3,949, derived from permanent fund dividends. As with the other communities, earnings were quite low when compared to Anchorage (Table 8A). In the late 1970s and early 1980s, the average income in New Stuyahok topped $10,000 only once. Anchorarge incomes were double and triple the New Stuyahok amounts each year. The lowest average Anchorage income was about $18,000 during the same period.

Cost of Living

New Stuyahok's average monthly expenses of $786 were the highest of the study communities (Table 9). This was undoubtedly due to the fact that New Stuyahok was the only community which had a substantial number of recently built HUD homes. Ownership of HUD homes required minimum monthly mortgages payments of $95 per month. (The exact amount was determined on a sliding scale according to income.) New Stuyahok was the only one of the study communities in which numerous respondents (21 households) reported housing costs, and those averaged $66 per month. HUD homes were typically much larger in size than the average village house and thus larger heating and electric bills were incurred. Households estimated monthly amounts of $83 for heat and $70 for electricity. New Stuyahok was also the only community to levy a fee for water and sewer services, a monthly charge of $23. Non-housing related expenses were quite similar to the other Nushagak River communities. New Stuyahok respondents reported average monthly expenses of $93 for transportation fuel, $545 for food, $28 for propane, and $78 for phone service.

COMMERCIAL FISHING

Commercial Salmon Fishery

Commercial salmon fishing is the dominant economic force in the Bristol Bay region and particularly significant in the communities of the Nushagak River. For a detailed historical account of the Nushagak

salmon fishery, see VanStone (1967). All three communities conducted most of their commercial salmon fishing in Nushagak Bay. Ekwok fishermen usually lived on their boats while their families stayed in the village to put up subsistence fish for the winter. During the study period, only two sampled households in Ekwok reported setting up fish camps along the coast. In contrast, about half the households in Koliganek and New Stuyahok moved to the bay for the duration of the commercial salmon season. Koliganek families scattered to various locations in the commercial fishing district, particularly to Nushagak and Ekuk. The vast majority of New Stuyahok families had fish camps concentrated at Lewis Point, actually three closely situated but separate locations at the mouth of the Nushagak River outside the commercial fishing district. Although the greatest commercial effort took place within the Nushagak commercial district, much smaller numbers of fishermen also travelled to other Bristol Bay fishing districts including Naknek, Togiak, and Egegik during the study year in hopes of greater financial returns. This is a fairly new phenomenon for Nushagak River fishermen and may be a result of increasing economic pressure as the fishery has become more capital intensive. Commercial fishing crews were most commonly composed of males who were often related but some female kin were also involved in particular families.

Tables 10, 11, and 12 report the number of limited entry salmon permits held by residents of the study communities between 1975 and 1986 as well as the number of permits initially issued. For all three communities, the domirant permit was the Bristol Bay salmon drift permit. Ekwok reported the greatest loss in this arena. Although 17 drift permits were initially issued to Ekwok residents (Table 10), only

TABLE 10. NUMBER OF COMMERCIAL FISHING PERMITS BY TYPE, EKWOK, 1975-1986

Permit Type

Year	Bristol Bay Salmon		Sac Roe Herring Gillnet	Herring Spawn-on-Kelp
	Drift	Set Net		
Initial # Permits Issued	17	1	NA	NA
1975	17	1	0	0
1976	17	1	0	0
1977	18	1	0	0
1978	21	1	3	2
1979	17	0	3	3
1980	12	0	9	4
1981	12	0	6	0
1982	11	0	5	0
1983	8	0	3	1
1984	10	0	3	1
1985	8	0	3	1
1986	8	0	4	2

NA = Not applicable.

Source: Alaska Commercial Fisheries Entry Commission, 1988.

TABLE 11. NUMBER OF COMMERCIAL FISHING PERMITS BY TYPE KOLIGANEK, 1975-1986

Year	Permit Type: Bristol Bay Salmon Drift	Bristol Bay Salmon Set Net	Sac Roe Herring Gillnet	Herring Spawn-on-Kelp	Other
Initial # Permits Issued	19	10	NA[a]	NA[a]	na[b]
1975	19	5	0	0	0
1976	17	4	0	0	0
1977	18	4	0	0	0
1978	22	6	0	1	0
1979	21	10	7	4	0
1980	22	9	8	8	0
1981	21	10	2	1	0
1982	20	8	2	0	0
1983	20	9	2	0	1[c]
1984	18	7	4	1	1[d]
1985	16	9	5	3	1[e]
1986	16	10	4	0	1[e]

[a] Not applicable.
[b] Not available.
[c] One permit for halibut, statewide, longline gear for vessels under 5 net tons and one salmon set net permit for Kodiak. Permit held by seasonal resident.
[d] One permit for halibut, longline, statewide. Permit held by seasonal resident.
[e] One permit for herring, gillnet, Security Cove.

Source: Alaska Commercial Fisheries Entry Commission, 1988.

TABLE 12. NUMBER OF COMMERCIAL FISHING PERMITS BY TYPE NEW STUYAHOK, 1975-1986

Permit Type

Year	Bristol Bay Salmon		Sac Roe Herring Gillnet	Herring Spawn-on-Kelp	Other
	Drift	Set Net			
Initial # Permits Issued	33	3	NA[a]	NA[a]	na[b]
1975	36	3	0	0	0
1976	36	4	0	0	0
1977	39	4	0	0	0
1978	40	3	1	1	0
1979	37	3	2	6	0
1980	38	1	9	13	0
1981	39	1	5	1	0
1982	38	1	7	2	0
1983	38	1	11	4	0
1984	34	1	14	5	0
1985	35	3	14	5	2[c]
1986	38	5	16	6	4[d]

[a] Not applicable.
[b] Not available.
[c] One permit for halibut, statewide, longline gear for vessels under 5 net tons, and one permit for salmon set net, Kodiak. Permit held by seasonal resident.
[d] One permit for halibut, longline, statewide (held by seasonal resident); and one permit for freshwater fish, set or sunken net, statewide; and two permits for salmon, set gill net, Kodiak.

Source: Alaska Commercial Fisheries Entry Commission, 1988.

8 were held by Ekwok residents in 1986. In Koliganek, the loss was less dramatic. Of the 19 initial limited entry drift net permits, 16 still remained within the community in 1986. New Stuyahok was the only one of the three communities which was able to gain ground in the number of permits owned from the 33 initially issued to 38 in 1986. The limited entry system has made it all but impossible for younger fishermen to become permit holders except through inheritance. In 1988, the median sale price for a Bristol Bay drift permit was reported at $170,000 (ACFEC 1989), a sum far out of reach for most local residents.

Table 13 shows the mean earnings per drift permit from 1975 to 1986 for the three study communities. In a given year, earnings are fairly consistent between communities. However, earnings have been erratic between years, emphasizing the unstable nature of the commercial fishing industry. Many factors influence a fisherman's annual profit including market price, run strength, weather, as well as timing and location of the fishing district for which the permit holder registers. The 1982 fishermen's strike hit Nushagak River fishermen particularly hard since most worked for canneries and honored the strike. Two bad seasons in a row can make it impossible for a fisherman to pay off his boat loan and consequently he may be forced to sell his permit.

As Tables 10, 11, and 12 also illustrate, much smaller numbers of fishermen were involved with set net fishing. Only one set net permit was issued to an Ekwok fisherman and no set permits have been held by any Ekwok residents since 1979. From data furnished by the Limited Entry Commission, it does not appear that this single permit was ever fished (Table 13). Koliganek residents, who had the greatest involvement in the set net salmon fishery, were still holding 10

TABLE 13. COMMERCIAL SALMON FISHING EARNINGS FOR STUDY COMMUNITIES, 1975 - 1986.

	Ekwok	Koliganek	New Stuyahok
	Mean Drift Net Earnings Per Permit		
1975	4,933 (9)	5,574 (14)	4,143 (17)
1976	14,775 (11)	20,478 (12)	15,831 (23)
1977	12,885 (12)	15,102 (13)	14,001 (25)
1978	26,727 (11)	30,935 (13)	30,966 (31)
1979	30,017 (12)	35,097 (15)	37,757 (31)
1980	20,895 (9)	27,572 (18)	26,159 (32)
1981	31,369 (9)	49,911 (18)	41,804 (34)
1982	26,064 (9)	18,288 (18)	17,051 (33)
1983	40,228 (7)	39,906 (16)	27,919 (31)
1984	32,636 (8)	24,193 (16)	19,801 (31)
1985	28,665 (8)	28,905 (14)	25,504 (32)
1986	43,901 (6)	45,660 (13)	42,300 (35)
	Mean Set Net Earnings Per Permit		
1975	---	*** (2)	*** (2)
1976	___	4,871 (4)	___
1977	___	*** (3)	___
1978	___	*** (2)	*** (1)
1979	___	13,545 (4)	___
1980	___	*** (3)	___
1981	___	23,783 (4)	___
1982	___	8,828 (4)	___
1983	___	14,159 (5)	___
1984	___	10,204 (4)	___
1985	___	10,105 (4)	*** (2)
1986	___	18,774 (7)	*** (3)

*** Due to confidentiality requirements, income for samples less than four people must of omitted.

Source: Special Data Run prepared by Division of Subsistence from data provided by Alaska Commercial Fish Entry Commission, 1990.

original permits in 1986. New Stuyahok residents have increased the original three set net permits to five. Limited Entry Commission records indicated set net permits were used only four out of the 12 years. Table 13 displays average earnings for set net fishermen in the three communities from 1975-82 and only Koliganek reported consistent earnings. It appears two or three New Stuyahok residents may have begun actively set netting since 1985. As was the case with drift fishing, set net earning also varied widely between years but were substantially lower than drift income.

Other Fisheries

To a much smaller degree, some Nushagak River fishermen have been involved in the Togiak sac roe herring fishery which has developed since the late 1970s. Tables 10, 11, and 12 also report the number of herring permits held by residents of the study communities from 1975-1986. Involvement by the study communities in the herring fishery is generally low because of the distance to the fishing grounds but a number of fishermen do make the trip each year. New Stuyahok fishermen, in particular, showed a marked increase in participation. Study findings are consistent with the trends indicated in these tables. In 1987, 4 Ekwok households, 8 Koliganek households, and 11 New Stuyahok households reported harvesting herring commercially. Smaller numbers were involved in picking herring spawn-on-kelp.

Tables 11 and 12 also reveal that a few Nushagak River fishermen held permits for statewide halibut fishing and salmon fishing in Kodiak. However, no households in the study sample reported involvement in these

fisheries. Upon further inquiry, researchers were told that the permits were held by teachers who did not live in the communities on a year-round basis, and were not included in the study sample.

CHAPTER 3

GENERAL CHARACTERISTICS OF RESOURCE USE

CONTEMPORARY SEASONAL ROUND

During the 1980s, Nushagak River residents utilized a variety of resources (Table 14). Moose, porcupine, snowshoe hare, furbearers, spruce grouse, berries, firewood, and some wild vegetables and herbs were taken in the forests. Caribou, arctic hare, furbearers, berries, and some herbs and vegetables were harvested on the tundra. Waterfowl, salmon, and many other types of freshwater and anadromous fish were plentiful in the nearby rivers and lakes. Ekwok, Koliganek, and New Stuyahok shared a similar round of annual harvesting activities during the 1980s which is depicted in Figure 6.

The annual cycle began in the spring (late March or April) with the break up of the river ice, usually in early to mid-May. At this time, some families set nets in the sloughs for whitefish and pike. The arrival of the first ducks and geese was noted with great excitement and those birds were eagerly sought by subsistence waterfowl hunters. Spring was the only time of the year when geese were readily available for harvesting. Dried meat was also prepared at that time of year, usually from animals killed earlier in the season. It made a convenient food when families were without refrigeration at summer fish camps or on fishing boats. Although both caribou and moose were dried, dried moose was preferred for its texture. Wild greens, such as fiddlehead ferns, wild celery, and wild spinach were also harvested in May and June.

TABLE 14. WILD RESOURCES HARVESTED OR USED IN THE STUDY COMMUNITIES, COMMON, YUP'IK, AND SCIENTIFIC NAMES, APRIL 1987 - MARCH 1988

Common English	Yup'ik	Scientific	Ekwok	Koliganek	New Stuyahok
Salmon					
King (chinook) salmon	*Taryaqvak*	Onchorhynchus tshawytscha	x	x	x
Red (sockeye) salmon	*Sayak*	O. nerka	x	x	x
Chum (dog) salmon	*Kangitneq*	O. keta	x	x	x
Pink (humpy) salmon	*Amaqaayak*	O. gorbuscha	x	x	x
Coho (silver) salmon	*Qakiiyaq*	O. kisutch	x	x	x
Spawning sockeye salmon	*Sayalleq*		x	x	x
Marine Fish					
Smelt	*Iqalluaq*	family Osmeridae	x	x	x
Herring	*Iqalluarpak*	Clupea harengus pallasi	x	x	x
Herring Roe	*Meluk*			x	x
Herring roe-on-kelp	*Melucuaq*		x	x	x
Freshwater Fish					
Round whitefish	*Uraruq*	Prosopium cylindraceum	x	x	x
Pike	*Cuukvak*	Esox lucius	x	x	x
Grayling	*Nakrulugpak*	Thymallus arcticus	x	x	x
Rainbow trout	*Talaariq*	Salmo gairdneri	x	x	x
Lake trout	*Cikignaq*	Salvelinus namaycush	x	x	x
Dolly Varden (includes Arctic char)	*Yugyaq*	Salvelinus spp.	x	x	x
Burbot	*Manignag*	Lota lota	x	x	
Blackfish	*Can'giiq*	Dallia pectoralis	x		
Long-nose Suckers	*Cungartak*	Castostomus castostomus	x	x	x
Starry flounder	*Naternaq*	Platichtys stellatus		x	x
Marine Invertebrates					
Butter clams	*Tavtaaq*	Saxidomus giganteus	x	x	
Razor clams	*Aliruaq*	Siliqua patula		x	x

TABLE 14. (Con't) WILD RESOURCES HARVESTED OR USED IN THE STUDY COMMUNITIES, COMMON, YUP'IK, AND SCIENTIFIC NAMES, APRIL 1987 - MARCH 1988

Common English	Yup'ik	Scientific	Ekwok	Koliganek	New Stuyahok
Marine Mammals					
Harbor seal	*Issuriq*	Phoca vitulina	x	x	x
Bearded seal	*Maklak*	Erignathus barbatus	x		
Walrus	*Asveq*	Odebenus rosmarus		x	
Sea lion	*Uginaq*	Eumatopias jubatus		x	
Belukha	*Cetuaq*	Delphinapterus leucus			x
Bowhead Whale	Arveq	Balaena Mysticetus	x		
Land Mammals					
Brown bear	*Taqukaq*	Ursus arctos		x	
Black bear	*Tan'gerliq*	Ursus americanus	x	x	x
Caribou	*Tuntuq*	Rangifer tarandus	x	x	x
Moose	*Tuntuvak*	Alces alces	x	x	x
Porcupine	*Issaluuq*	Erethizon dorsatum	x	x	x
Snowshoe hare	*Nullutuuyak*	Lepus americus	x	x	x
Arctic hare	*Qayuqegqliq*	Lepus othus	x	x	x
Furbearers					
Beaver	*Paluqtaq*	Castor canadensis	x	x	x
Mink	*Imarmiutaq*	Mustela vison	x	x	x
Red fox	*Kaviaq*	Vulpes vulpes	x	x	x
Wolf	*Kegluneq*	Canis lupus		x	
Wolverine	*Terikaniaq*	Gulo gulo		x	x
Land otter	*Cuignilnguq*	Lutra canadensis	x	x	x
Muskrat	*Kanaqlak*	Ondatra zibethicus	x	x	x
Lynx	*Tertuli*	Felis lynx		x	
Marten	Qavcicuar	Martes americanus	x	x	x

TABLE 14. (Con't) WILD RESOURCES HARVESTED OR USED IN THE STUDY COMMUNITIES, COMMON, YUP'IK, AND SCIENTIFIC NAMES, APRIL 1987 - MARCH 1988

Common	Yup'ik	Scientific	Ekwok	Koliganek	New Stuyahok
Birds					
Spruce grouse	*Egtuk*	Canachites canadensis	x	x	x
Willow Ptarmigan	*Aqesgiq*	Lagopus spp.	x	x	x
Geese	*Neqleq*				
Canada	*Neqlernaq*	Branta canadensis			
Cackler		Branta canadensis minima	x	x	x
Tavener		Branta canadensis taverneri	x	x	x
White-fronted	*Neqlepik*	Anser albifrons	x	x	x
Black Brant	*Neqlernaq*	Branta nigricans		x	x
Emperor	*Nacaullek*	Philacte canagica		x	
Whistling (tundra) swan	*Qugyuk*	Olus columbianus	x	x	x
Sandhill crane	*Qucillgaq*	Grus canadensis		x	x
Duck	*Yaqulek*	sub families Anatinae and Arythyinae			
Mallard	*Uqulkatagpak*	Anas platyrhynchus	x	x	x
Pintail	*Uqulkatak*	Anas acuta	x	x	x
King eider	*Qengallek*	Somateria spectabilis		x	x
Eider	*Metraq*	Somateria mollissima		x	x
Scoters	*Kukumyar*	Melanitta nigra	x	x	
Green-wing teal	Tengesqaar	Anas crecca		x	
Bird eggs	*Kayanguq*				
Seagull eggs	*Naruyaq*			x	
Goose eggs	*Neqleq*			x	
Duck eggs	Yaqulek			x	
Murre eggs	*Alpak*			x	
Plants	Naunraat				
Berries	Atsat		x	x	x
Other Green Plants	Naunraat		x	x	x

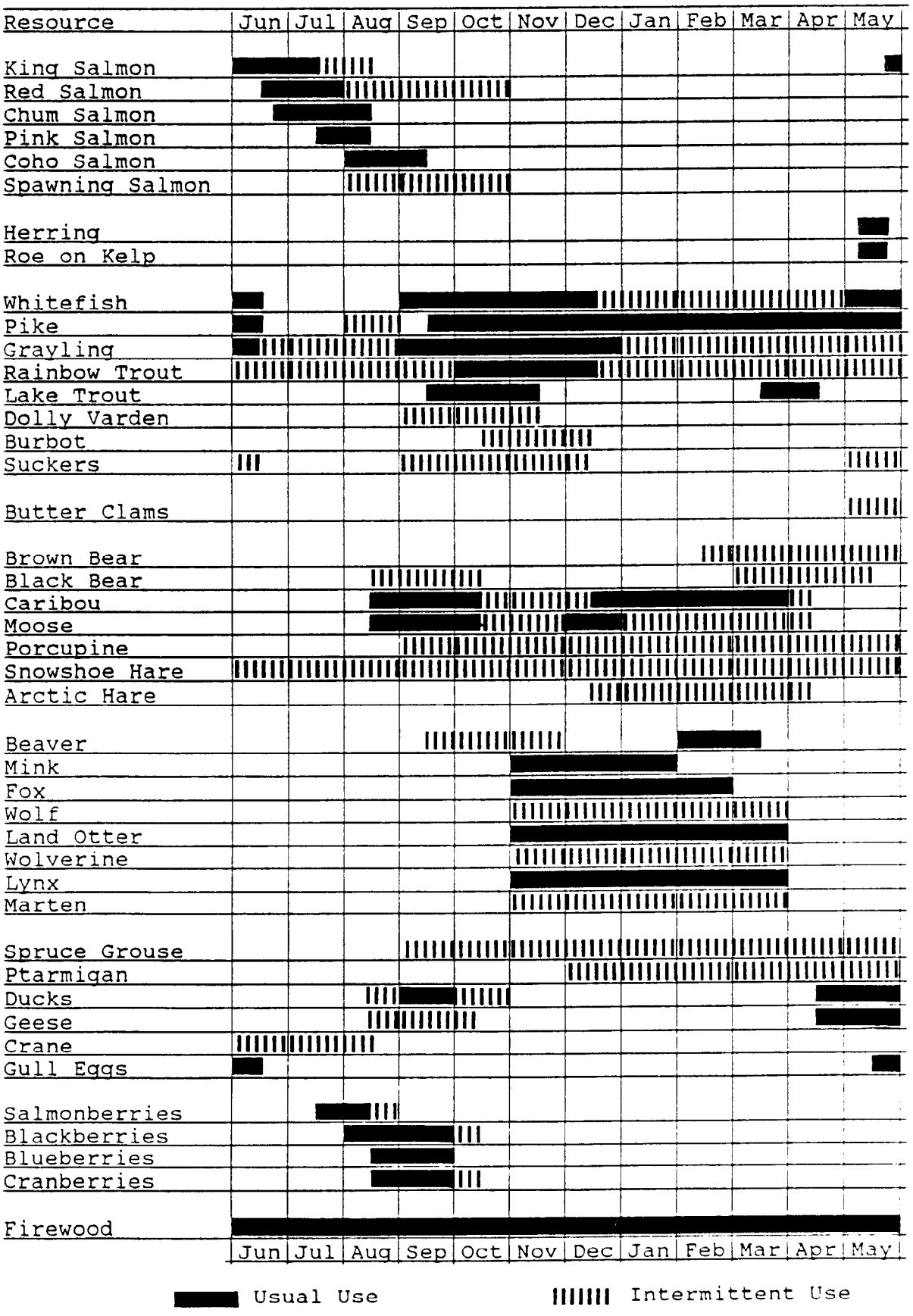


Figure 6. Seasonal Round of Resource Harvests, Ekwok, Koliganek and New Stuyahok.

In recent years, a small but increasing number of fishermen, particularly from New Stuyahok, traveled to Kulukak or Togiak bays to participate in the Togiak commercial herring sac roe fishery in May. They often returned with herring, herring roe-on-kelp, butter clams, or an occasional seal, which were all welcomed by the families at home.

Much of May was spent preparing for the upcoming salmon season, with fishermen working in their home villages or Dillingham to ready their boats and equipment. By the end of May, many families began traveling down the river to their fish camps along Nushagak Bay. Others stayed at the main village. King salmon were the first species to arrive in late May or early June at Nushagak Bay, soon afterward in the Nushagak River. The first kings were usually eaten fresh and widely shared but as they started arriving in larger numbers, they were dried and smoked in great quantities at fish camp and at the home village. King salmon "strips" were considered a prized food. Some kings were also frozen. Red and chum salmon arrived next, usually in mid-June, and were also dried and smoked for winter use. While at fish camps, some families looked for sea gull eggs. Plants and berries were also sought as they became available. Women kept a careful eye on the progress of nearby berry patches and when the salmonberries ripened on the tundra in mid to late July, berry picking began in earnest. Salmonberries, blueberries, blackberries, and cranberries were harvested in succession. Cranberry picking continued into early October with the flavor of the berries improved by the first frost.

By the end of July, with the close of the commercial sockeye fishery, most families returned to the winter villages, where silver salmon were harvested in August and September for the winter. When run

strength and market conditions were favorable, some fishermen remained in the Bay until mid-August for commercial pink or silver fishing. Spawning sockeye were netted in September and October and dried to eat with seal oil. During the summer, some freshwater fishing for pike, grayling, and rainbow trout took place using rod and reel but the bulk of the freshwater species were harvested with nets in the fall (September and October) and spring (March and April) with some families making trips to the Tikchik and Nuyakuk lakes for this purpose.

In August, hunters began travelling along the Nushagak and Mulchatna rivers by skiff in search of moose and caribou. Hunting continued until late September when moose went into rut and the meat was no longer considered edible. Ducks and a few geese were also taken in the fall. After freeze-up and a good snow cover permitted travel by snowmachine, moose and caribou hunting resumed. Moose meat was especially sought for use during the celebration of Russian Orthodox Christmas (*Slavi*) in mid January. Caribou were hunted as long as travelling was safe by snowmachine.

Trapping was another winter-time activity. A few trappers made some early winter sets for land otter, red fox, mink, lynx, and a few other species, but most trapping activity occurred later in the winter during the legal beaver season in January and February. Beaver were the primary furbearer sought for commercial sale. Trappers, often accompanied by their families, usually sold their skins during Dillingham's Beaver Round-up in early March. In addition, almost all of the beaver meat was eaten and widely shared. Some beaver skins were used locally in the manufacture of hats and mittens. March was also the month for local carnivals and New Stuyahok hosted an annual event

featuring dog races and other activities. Some residents traveled to carnivals held in the Iliamna Lake and Kvichak River villages.

Small game was taken year-round. Porcupine were taken opportunistically and relished as a welcome variation in the diet. A few snowshoe hares were snared. Arctic hare were occasionally hunted near the village or taken incidentally while out after other game. Spruce grouse were hunted in the woods near the village, and ptarmigan caught on the tundra in winter or in the brush along river channels in March and April.

Firewood was collected all year using skiffs and snowmachines but spring was a particularly busy time for this endeavor as people took advantage of the long days and good traveling conditions before the trails became too soft for snowmachines. Some homes were heated with wood and others used wood stoves as a back-up source of heat. Wood was burned in trapping and fishing cabins as well. Wood was also greatly in demand for steambaths (*maqi*) which were lit almost every day and considered essential to the village's social life. Dry, standing dead spruce was the preferred wood for steambaths, while cottonwood was sought for smoking fish.

LAND USE PATTERNS

Figure 7 depicts the extensive and often overlapping areas used for resource harvesting by Ekwok, Koliganek, and New Stuyahok residents between 1963 and 1983. The Nushagak and Mulchatna rivers along with their tributaries formed the core of this territory but the uplands were also used intensively when snowmachine travel made overland travel

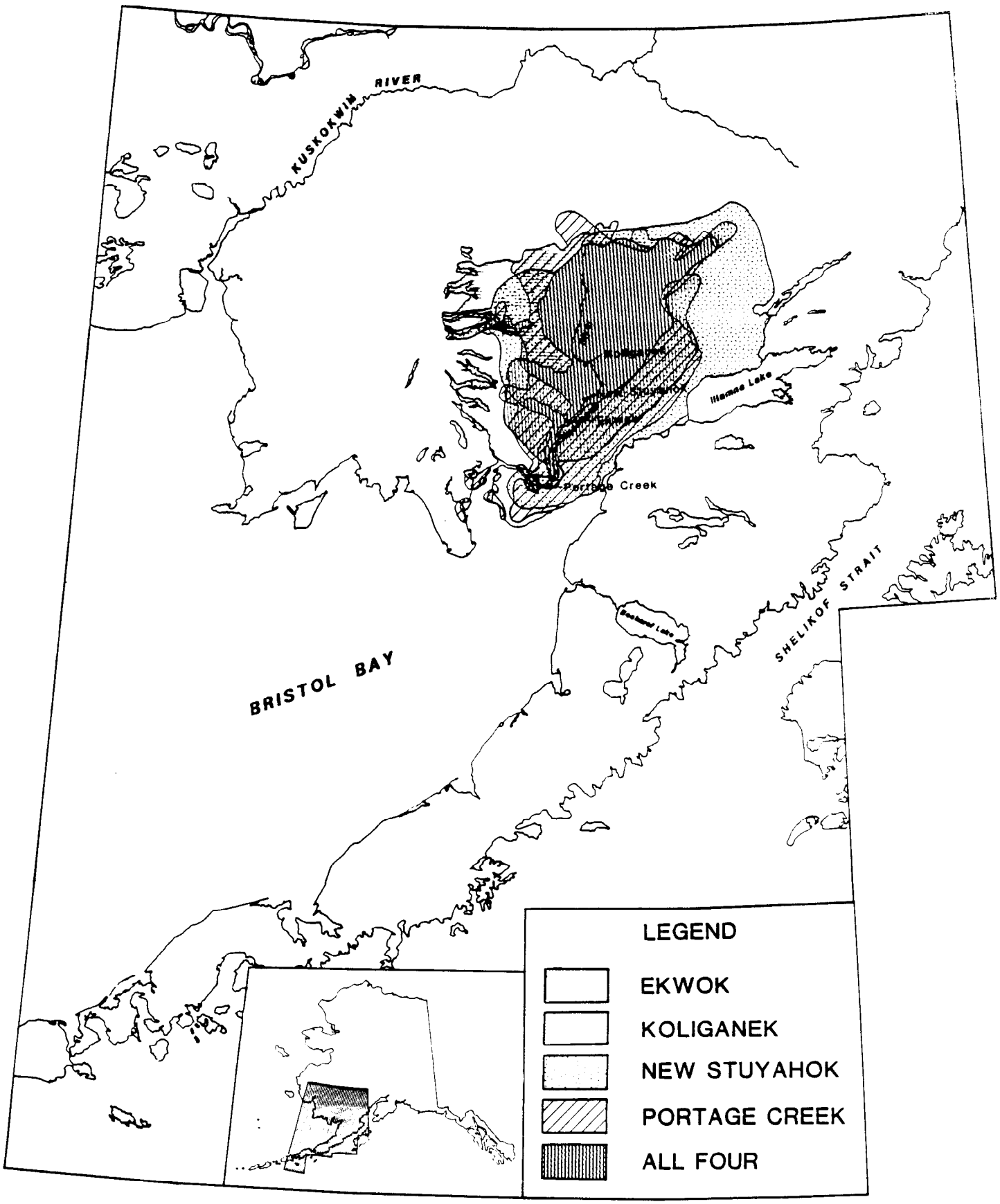


Figure 7. Resource Harvesting Areas, Ekwok, Koliganek and New Stuyahok, 1963-1983.

practical. Subsequent chapters will highlight individual community use patterns for salmon, moose, caribou, and freshwater fish harvesting. These differences reflect long-term traditional ties to respective areas. (For more detailed mapped data on community harvest areas for other resource categories, see Alaska Habitat Management Guide's reference maps [ADF&G 1985b]). The following section will generally describe the land use patterns for the three study communities.

Residents of Ekwok used the Nushagak River and most of its tributaries, such as the Kokwok, Nunachuak, and Iowithla rivers, from Black Point all the way north to the Nushagak Hills. Hunters and trappers also travelled along the Mulchatna River, using the rivers and creeks which emptied into it such as the Koktuli and the Stuyahok as far north as the Chilikadrotna. They also utilized the Nuyakuk River, Nuyakuk Lake, Tikchik Lake, and lower portion Nunachuak, Mulchatna, and Stuyahok rivers.

Koliganek residents also used extensive areas along the Nushagak River and its tributaries from Lewis Point just above the mouth of Nushagak Bay as far north as the Nushagak Hills. The Nuyakuk and Tikchik lakes and river were utilized as well. Trips were sometimes made to Lake Chauekuktuli and Chikuminuk Lake. Although Koliganek residents tended to hunt along the Nushagak River upriver from the village, the Mulchatna and its tributaries including the Stuyahok and the Koktuli Rivers, as far as the Chilikadrotna were used as well. Some Koliganek residents also made use of areas around Nushagak Bay, particularly at Nushagak Point where some families had summer fish camps. Areas near Protection Point and Ekuk Bluff were identified as

clamming locations while some families had harvested plants and berries along portions of the Weary and Snake rivers.

New Stuyahok residents had the largest use area of the three communities. Again the Nushagak and Mulchatna rivers and their tributaries and uplands were widely used for subsistence harvesting activities. New Stuyahok residents were the only one of the three who reported travelling beyond the Chilikadrotna River along the Mulchatna, nearly to Half-Cabin Lake. The Mulchatna river and its tributaries were especially important during the fall hunting season. To the east, waterfowl and caribou were sought as far as the west banks of the Kvichak River. Caribou hunting also took place along the north west shore of Iliamna Lake and the northern shore of the Newhalen River. Trips were also made to Lake Beverly, Lake Nerka, Nuyakuk Lake, Tikchik Lake, and Lake Chauekuktuli. Lewis Point, just above the mouth of Nushagak Bay was the site of many salmon fish camps. Areas around Ekuk, Snake River, and Clarks Point had also been used by residents for berry-picking.

SPECIES USED AND LEVELS OF PARTICIPATION

Respondents in Ekwok, Koliganek, and New Stuyahok reported using a wide variety of wild resources during the 12 month study period between April 1987 and March 1988 and they are summarized in Table 15. Species used were similar between the three communities and included 17 species of fish, two species of marine invertebrates, six species of marine mammals, 16 species of land mammals and furbearers, and 14 species of birds and eggs. At least four species of berries and a

TABLE 15. RESOURCE HARVEST AND USE CHARACTERISTICS OF EKWOK, KOLIGANEK, AND NEW STUYAHOK, APRIL 1987 - MAY 1988.

	EKWOK N=29 HHs	KOLIGANEK N=42 HHs	NEW STUYAHOK N=40 HHs
Mean number of resources used per household	16.5	20.1	17.4
Mean number of resources attempted to harvest per household	13.7	14.5	13.4
Mean number of resources harvested per household	11.7	14.3	13.1
Mean number of resources received	6.8	9.8	8.9
Mean number of resources given away	4.8	7.9	6.0
Mean household harvest in pounds	2,664.4	3,223.0	3,344.5
Community per capita harvest in pounds[a]	797.0	830.7	701.2
Household per capita harvest in pounds[a]	822.0	914.7	660.6
Percent households using any resource	100.0	100.0	100.0
Percent households attempting harvest any resource	100.0	100.0	100.0
Percent households harvesting any resource	96.6	100.0	100.0
Percent household receiving any resource	82.8	95.2	97.5
Percent household giving away any resource	86.2	95.2	87.5

[a] Community per capita harvest equals the total resource harvest by the sample in pounds edible weight divided by the number of people in each sample. Household per capita harvest is computed by dividing each household's harvest by its size, and then averaging across households for each sample.

Source: Division of Subsistence, ADF&G, Survey 1988.

variety of greens were reported. The sample of 29 households in Ekwok used an average of 16.5 different resources and harvested a mean of 11.7 resources. In Koliganek, 42 households used 20.1 different species and harvested a mean of 14.3 resources. Similar to the other communities, New Stuyahok's 40 households reported using an average of 17.4 resources and harvesting an average of 13.1 species.

Table 15 shows that 100 percent of the 111 sampled households used some type of wild resource during the study period. Participation in harvesting activities was also universal. Every sampled household in Ekwok, Koliganek, and New Stuyahok attempted to harvest at least one resource. One hundred percent of the households in Koliganek and New Stuyahok were successful in harvesting at least one resource, while in Ekwok 28 of the 29 households (96.6 percent) were successful harvesters during the study period.

In Ekwok the most commonly used resource categories were land mammals, plants, and salmon, each used by 93.1 percent of the sample (Table 16, Figure 8). In addition, 75.9 percent of the sample used furbearers and 72.4 percent used freshwater fish species. Birds were used by 62.1 percent of the sample, marine fish by 58.6 percent, and marine mammal products by 41.4 percent. The ten most commonly used species, reported in descending order were berries and caribou (93.1 percent each); king salmon (89.7 percent); moose and red salmon (82.8 percent); beaver and coho salmon (75.9 percent); grayling (69.0 percent), and pike and chum salmon (65.5 percent) (Table 16).

By resource category, Ekwok's 29 households reported trying to collect plants or berries most frequently (89.7 percent), followed by land mammals which were sought by 79.3 percent of the households,

TABLE 16. LEVELS OF HOUSEHOLD HARVEST, USE, AND SHARING OF FISH, GAME AND PLANT RESOURCES, EKWOK, APRIL 1987 - MAY 1988. N=29

Resource	% used	% attempt	% success	% received	% gave away	mean hh Harvest, Pounds[a]	total sample harvest, numbers[b]	expanded sample harvest numbers[c]
SALMON	93.1	65.5	65.5	51.7	48.3	1,525.8	---	---
King Salmon	89.7	55.2	55.2	48.3	41.4	596.2	1,252.0	1,381.0
Red Salmon	82.8	51.7	51.7	37.9	27.6	536.1	3,684.0	4,065.0
Chum Salmon	65.5	48.3	48.3	17.2	17.2	195.9	1,271.0	1,403.0
Pink Salmon	13.8	10.3	10.3	3.4	6.9	3.0	38.0	42.0
Coho Salmon	75.9	48.3	48.3	31.0	27.6	178.7	1,129.0	1,246.0
Spawning Sockeye	34.5	20.7	20.7	20.7	6.9	15.9	231.0	255.0
MARINE FISH	58.6	20.7	17.2	51.7	17.2	5.1	---	----
Smelt	51.7	6.9	6.9	48.3	10.3	0.8	4.0g	4.0g
Herring	6.9	0.0	0.0	6.9	0.0	0.0	0.0	0.0
Herring Roe	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Roe on Kelp	31.0	13.8	10.3	24.1	6.9	4.3	25.0g	25.0g
Flounder	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FRESHWATER FISH	72.4	69.0	65.5	41.4	34.5	224.2	---	----
Whitefish	62.1	58.6	55.2	27.6	20.7	43.0	1,247.0	1,376.0
Pike	65.5	55.2	51.7	17.2	24.1	107.8	1,117.0	1,233.0
Arctic Grayling	69.0	62.1	58.6	17.2	20.7	17.4	719.0	793.0
Rainbow Trout	58.6	58.6	51.7	10.3	10.3	9.0	186.0	205.0
Lake Trout	27.6	20.7	17.2	10.3	3.4	0.9	10.0	11.0
Dolly Varden	51.7	48.3	44.8	6.9	3.4	5.0	104.0	115.0
Burbot	13.8	10.3	10.3	6.9	3.4	0.8	22.0	24.0
Blackfish	3.4	0.0	0.0	3.4	0.0	0.0	0.0	0.0
Longnose Suckers	34.5	27.6	27.6	13.8	6.9	40.3	780.0	861.0
MARINE INVERTEBRATES	0.0	0.0	0.0	0.0	0.0	0.0	---	---
Butter Clams	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Razor Clams	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PLANTS	93.1	89.7	89.7	31.0	37.9	63.3	-----	---
Berries	93.1	89.7	89.7	28.6	39.3	61.0	442.0g	488.0
Other Green Plants	31.0	31.0	27.6	7.1	7.1	2.3	67.0qt	74.0
LAND MAMMALS	93.1	79.3	69.0	62.1	48.3	652.9	----	----
Brown Bear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Black Bear	3.4	0.0	0.0	3.4	0.0	0.0	0.0	0.0
Caribou	93.1	72.4	62.1	60.7	39.3	269.0	52.0	57.0
Moose	82.8	75.9	51.7	53.6	34.5	372.4	20.0	22.0
Porcupine	55.2	51.7	41.4	24.1	17.2	8.3	30.0	33.0
Snowshoe Hare	27.6	27.6	20.7	3.6	3.4	1.0	14.0	15.0
Arctic Hare	24.1	24.1	17.2	3.6	3.4	2.3	12.0	13.0

TABLE 16. LEVELS OF HOUSEHOLD HARVEST, USE, AND SHARING OF FISH, GAME AND PLANT RESOURCES, EKWOK, APRIL 1987 - MAY 1988. N=29

Resource	% used	% attempt	% success	% received	% gave away	mean hh Harvest, Pounds[a]	total sample harvest, numbers[b]	expanded sample harvest numbers[c]
MARINE MAMMALS	41.4	0.0	0.0	41.4	6.9	0.0	-----	---
Harbor Seal	41.4	0.0	0.0	41.4	6.9	0.0	0.0	0.0
Bearded Seal	3.4	0.0	0.0	3.4	0.0	0.0	0.0	0.0
Walrus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sea Lion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belukha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bowhead Whale	3.4	0.0	0.0	3.4	0.0	0.0	0.0	0.0
FURBEARERS	75.9	51.7	51.7	34.5	34.5	180.7	-----	---
Beaver	75.9	51.7	51.7	31.0	34.5	180.7	311.0	343.0
Mink	17.2	24.1	17.2	3.4	0.0	NA	8.0	9.0
Fox	24.1	37.9	24.1	3.4	0.0	NA	26.0	29.0
Wolf	0.0	6.9	0.0	0.0	0.0	NA	0.0	0.0
Wolverine	0.0	17.2	0.0	0.0	0.0	NA	0.0	0.0
Land Otter	27.6	27.6	27.6	3.4	6.9	NA	15.0	17.0
Muskrat	3.4	6.9	3.4	0.0	3.4	NA	1.0	1.0
Lynx	0.0	13.8	0.0	0.0	0.0	NA	0.0	0.0
Arctic Ground Squirrel	0.0	3.4	0.0	0.0	0.0	NA	0.0	0.0
Marten	10.3	17.2	6.9	0.0	0.0	NA	9.0	10.0
BIRDS AND EGGS	62.1	55.2	55.2	24.1	20.7	12.2	-----	----
Spruce Grouse	48.3	41.4	41.4	10.3	6.9	3.3	96.0	106.0
Ptarmigan	27.6	27.6	24.1	6.9	0.0	0.8	32.0	35.0
Cacklers	10.3	10.3	6.9	3.4	3.4	0.2	6.0	7.0
Taverner's	10.3	3.4	3.4	6.9	3.4	0.3	4.0	4.0
Whitefront	3.4	6.9	3.4	3.4	3.4	0.5	6.0	7.0
Black Brants	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
Emperors	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
Geese, unknown	3.4	6.9	3.4	3.4	3.4	0.7	12.0	13.0
Swan	3.4	6.9	3.4	0.0	3.4	0.3	1.0	1.0
Sandhill Crane	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
Mallards	44.8	37.9	34.5	10.3	10.3	3.3	96.0	106.0
Pintails	37.9	31.0	24.1	10.3	6.9	1.3	47.0	52.0
Eider	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Black Ducks	10.3	10.3	10.3	3.4	3.4	1.5	44.0	49.0
Gull Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Goose Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Duck Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Swan Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Murre Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALL RESOURCES	100.0	100.0	96.6	82.8	86.2	2,664.4	-----	

[a]Harvests reported in number of fish or animals, except resources marked by "g" (gallons) or "qt" (quarts).

[b]Harvests in pounds for furbearers represent only those animals which were eaten.

c Based on 95% confidence level, see Appendix .

Source: Division of Subsistence Survey, 1988.

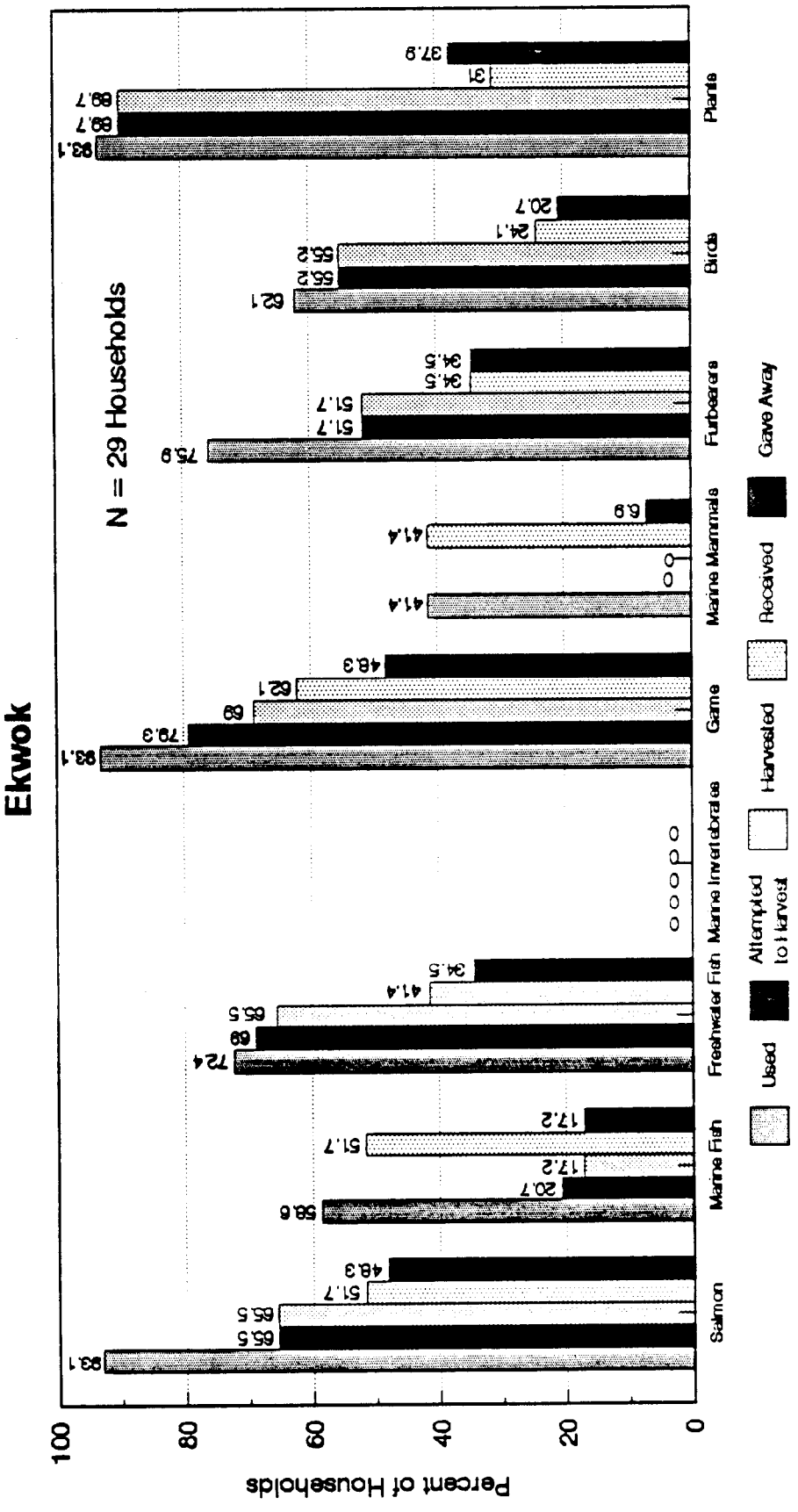


Figure 8. Levels of Harvest, Use, and Sharing of Nine Major Resource Categories, Ekwok, 1987-8

freshwater fish (69.0 percent), and salmon (65.5 percent of the households). In addition, 55.2 percent of the households hunted birds, 51.7 percent trapped or hunted furbearers, and 20.7 percent undertook to harvest marine fish. The eleven most frequently sought species were berries (89.7 percent), moose (75.9 percent), caribou (72.4 percent), grayling (62.1 percent), rainbow trout and whitefish (58.6 percent each), pike and king salmon (55.2 percent), and beaver, red salmon, and porcupine (51.7 percent) (Table 16).

The most commonly harvested resource category in Ekwok was berries which were picked by 89.7 percent of the 29 sampled households during the study period. In addition, at least one species of land mammal was successfully taken by 69.0 percent of the sampled households, salmon and freshwater fish were harvested by 65.5 percent, birds were taken by 55.2 percent, furbearers were trapped by 51.7 percent, and marine fish harvested by 17.2 percent. The most commonly harvested species were berries (89.7 percent), caribou (62.1 percent), king salmon and whitefish (55.2 percent each), followed by moose, beaver, pike, red salmon, and rainbow trout (51.7 percent each) (Table 16).

In Koliganek, resource use was also widespread. The 42 sampled houses reported that the most frequently used resource category for the study period was land mammals which were used by nearly all households (97.6 percent), followed by freshwater fish and plants (92.9 percent), furbearers and birds (90.5 percent), salmon (83.3 percent), marine mammals (71.4 percent), marine fish (52.4 percent), and marine invertebrates (14.3 percent). The eleven most frequently used species were berries and caribou (90.5 percent), pike and beaver (88.1 percent).

moose and whitefish (83.3 percent), king salmon (78.6 percent), grayling, coho salmon, red salmon, and ptarmigan (73.8 percent) (Table 17, Figure 9).

The 42 sample households in Koliganek attempted to harvest resources in nine different categories during the study year. Freshwater fish and plants were sought by the most households (81.0 percent); at least one species of bird was hunted by 78.6 percent of the households; land mammals were hunted by 76.2 percent of the households; 71.4 percent of the households fished for salmon; furbearers were trapped by 66.7 percent of the households; 9.5 percent of the households dug for clams; and 2.4 percent tried to harvest a marine mammal resource. The species which were sought most frequently were berries (81.0 percent), caribou (73.8 percent), pike (71.4 percent), beaver (64.3 percent), grayling (59.5 percent), coho salmon, moose, mallard ducks, and whitefish (57.1 percent each), and ptarmigan (54.8 percent) (Table 17).

Resource categories harvested most successfully by the 42 Koliganek households during the study year were freshwater fish and berries harvested by 81.0 percent of the sample; birds taken by 78.6 percent; land mammals hunted by 76.2 percent; salmon fished by 71.4 percent; furbearers trapped by 66.7 percent; and marine invertebrates collected by 9.5 percent. There were no harvesters of marine mammals (Table 17).

In New Stuyahok, the results of the survey of 40 households revealed that during the study year the most frequently used resource category was land mammals. All households reported having used at least one species during the study period. This was followed by plants and freshwater fish which were used by 97.5 percent of the households. In

TABLE 17. LEVELS OF HOUSEHOLD USE, HARVEST, AND SHARING OF FISH, WILDLIFE AND PLANTS, KOLIGANEK, APRIL 1987 - MARCH 1988. N=42 HH

Resource	% used	% attempt	% success	% received	% gave away	mean hh Harvest, Pounds[a]	total sample harvest, numbers[b]	expanded community harvest, numbers[c]
SALMON	83.3	71.4	71.4	61.9	52.4	1,406.7	----	----
King Salmon	78.6	52.4	52.4	50.0	42.9	288.0	876.0	1,001.0
Red Salmon	73.8	47.6	47.6	42.9	38.1	654.3	6,512.0	7,442.0
Chum Salmon	50.0	40.5	40.5	10.0	2.5	161.3	1,516.0	1,733.0
Pink Salmon	4.8	2.4	2.4	2.4	0.0	0.3	5.0	6.0
Coho Salmon	73.8	57.1	57.1	34.1	19.0	233.5	2,132.0	2,436.0
Spawning Sockeye	42.9	23.8	23.8	31.0	12.2	69.7	1,464.0	1,673.0
MARINE FISH	52.4	14.3	14.3	42.9	11.9	10.7	----	----
Smelt	38.1	7.1	7.1	33.3	9.5	2.6	18.0g	21.0g
Herring	7.1	2.4	2.4	4.8	0.0	3.6	25.0g	30.0g
Herring Roe	9.5	0.0	0.0	9.5	0.0	0.0	0.0g	0.0
Roe on Kelp	23.8	2.4	2.4	21.4	2.4	3.0	25.0g	30.0g
Flounder	9.5	9.5	9.5	2.4	2.4	1.5	65.0	74.0
FRESHWATER FISH	92.9	81.0	81.0	64.3	57.1	357.5	-----	----
Whitefish	83.3	57.1	57.1	45.2	33.3	60.0	2,521.0	2,881.0
Pike	88.1	71.4	71.4	38.1	45.2	160.8	2,412.0	2,757.0
Arctic Grayling	73.8	59.5	57.1	33.3	28.6	33.6	2,017.0	2,305.0
Rainbow Trout	59.5	52.4	52.4	19.0	16.7	12.7	381.0	435.0
Lake Trout	40.5	19.0	16.7	31.0	7.1	6.4	100.0	114.0
Dolly Varden	42.9	33.3	33.3	19.0	16.7	4.3	128.0	146.0
Burbot	21.4	16.7	16.7	14.3	7.1	3.2	134.0	153.0
Blackfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Longnose Sucker	42.9	28.6	28.6	21.4	16.7	76.4	2,140.0	2,446.0
MARINE INVERTEBRATES	14.3	9.5	9.5	4.8	4.8	5.0	-----	----
Butter Clams	11.9	9.5	9.5	2.4	4.8	5.0	70.0g	80.0g
Razor Clams	2.4	0.0	0.0	2.4	0.0	0.0	0.0	0.0
PLANTS	92.9	81.0	81.0	50.0	42.9	80.8	----	----
Berries	90.5	81.0	81.0	47.6	41.5	80.6	846.0g	967.0
Other Green Plants	33.3	28.6	28.6	11.9	11.9	0.2	9.5qt	11.0
LAND MAMMALS	97.6	76.2	76.2	73.8	69.0	1,155.8	----	----
Brown bear	7.1	7.1	7.1	0.0	4.8	11.9	5.0	6.0
Black bear	9.5	9.5	9.5	0.0	9.5	5.5	4.0	5.0
Caribou	90.5	73.8	73.8	63.4	61.0	582.1	163.0	186.0
Moose	83.3	57.1	52.4	61.9	57.5	540.0	42.0	48.0
Porcupine	50.0	35.7	35.7	21.4	17.1	13.7	72.0	82.0
Snowshoe Hare	26.2	19.0	16.7	11.9	4.9	1.1	23.0	26.0
Arctic Hare	19.0	11.9	11.9	7.1	5.0	1.5	11.0	12.0

TABLE 17. LEVELS OF HOUSEHOLD USE, HARVEST, AND SHARING OF FISH, WILDLIFE AND PLANTS, KOLIGANEK, APRIL 1987 - MARCH 1988. N=42 HH

Resource	% used	% attempt	% success	% received	% gave away	mean hh harvest[a] Pounds[a]	total sample harvest[b] numbers[b]	expanded community harvest,[c] numbers[c]
MARINE MAMMALS	71.4	2.4	0.0	71.4	11.9	0.0	-----	----
Harbor Seal	71.4	2.4	0.0	71.4	11.9	0.0	0.0	0.0
Bearded Seal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walrus	2.4	0.0	0.0	2.4	2.4	0.0	0.0	0.0
Sea Lion	2.4	0.0	0.0	2.4	2.4	0.0	0.0	0.0
Belukha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bowhead Whale	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FURBEARERS	90.5	66.7	66.7	45.2	47.6	161.8	-----	----
Beaver	88.1	64.3	64.3	42.9	45.2	161.0	437.0	499.0
Mink	14.3	14.3	14.3	2.4	0.0	NA	23.0	26.0
Fox	23.8	23.8	23.8	2.4	0.0	NA	103.0	118.0
Wolf	11.9	14.3	11.9	0.0	2.4	NA	41.0	47.0
Wolverine	11.9	11.9	11.9	0.0	0.0	NA	10.0	12.0
Land Otter	42.9	42.9	42.9	2.4	0.0	.8	43.0	49.0
Muskrat	9.5	9.5	9.5	0.0	0.0	NA	9.0	10.0
Lynx	2.4	2.4	2.4	0.0	0.0	NA	3.0	3.0
Arctic Ground Squirrel	0.0	0.0	0.0	0.0	0.0	NA	0.0	0.0
Marten	23.8	23.8	23.8	2.4	0.0	NA	47.0	54.0
BIRDS AND EGGS	90.5	78.6	78.6	52.4	64.3	44.7	-----	----
Spruce Grouse	35.7	28.6	28.6	9.5	9.5	2.1	89.0	102.0
Ptarmigan	73.8	54.8	54.8	35.7	40.5	10.2	613.0	701.0
Cackler	31.0	21.4	21.4	11.9	14.3	2.2	77.0	88.0
Taverner's	28.6	23.8	23.8	7.1	19.0	3.4	68.0	78.0
Whitefront	14.3	11.9	11.9	7.1	11.9	1.8	31.0	36.0
Black Brant	4.8	4.8	4.8	0.0	2.4	0.2	7.0	8.0
Emperors	7.1	4.8	4.8	2.4	2.4	1.0	17.0	19.0
Geese, Unknown	4.8	2.4	2.4	2.4	0.0	0.6	15.0	17.0
Swan	28.6	23.8	23.8	4.8	16.7	3.2	17.0	19.0
Sandhill Crane	4.8	2.4	2.4	2.4	0.0	0.1	1.0	1.0
Mallards	66.7	57.1	57.1	26.2	40.5	9.7	409.0	468.0
Pintails	57.1	47.6	47.6	26.2	38.1	7.0	365.0	417.0
Eider	7.1	4.8	4.8	2.4	0.0	0.6	15.0	17.0
Ducks, Unknown	14.3	11.9	11.9	7.1	7.1	1.8	80.0	91.0
Gull Eggs	23.8	16.7	16.7	9.5	4.8	0.6	147.6	168.0
Geese Eggs	2.4	2.4	2.4	0.0	2.4	0.1	12.0	12.0
Duck Eggs	7.1	4.8	4.8	2.4	2.4	0.1	32.4	36.0
Swan Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Murre Eggs	2.4	0.0	0.0	2.4	0.0	0.0	0.0	0.0
ALL RESOURCES	100.0	100.0	100.0	95.2	95.2	3,223.0	---	---

[a] Harvests in pounds for furbearers represent only those animals which were eaten.

[b] Harvests are reported in numbers of fish or animals, except resources marked by g (gallons) or qt (quarts).

[c] Calculated at 95% confidence intervals, see Appendix .

Source: Division of Subsistence Survey, 1988.

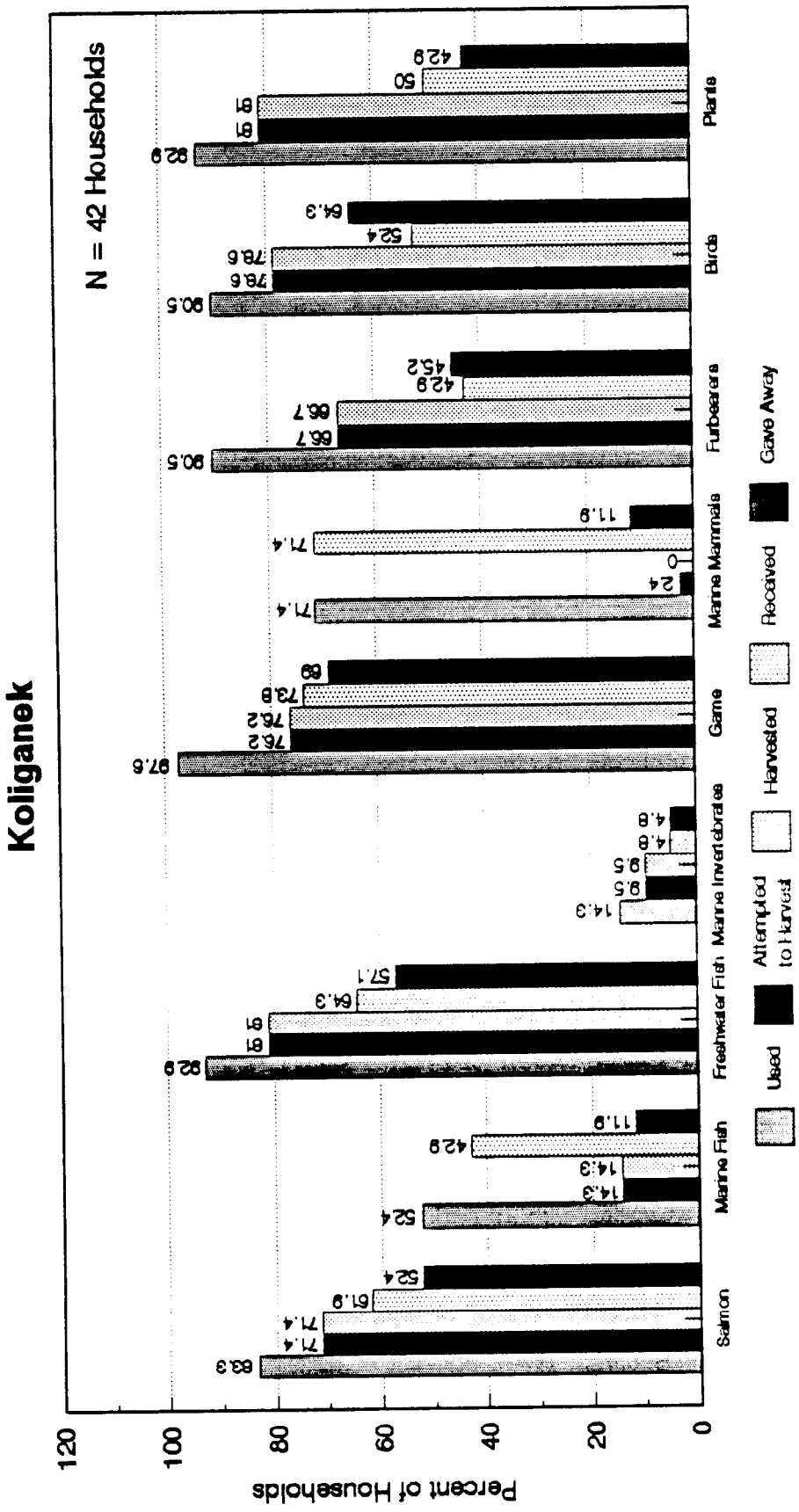


Figure 9. Levels of Harvest, Use, and Sharing of Nine Major Resource Categories, Koliganek, 1987-8

addition, 90 percent of the sampled households reported using salmon, 82.5 percent used birds and furbearers, 77.5 percent used marine mammal products, 65.0 percent used marine fish, and 15 percent used some type of marine invertebrate. The most commonly used resources were: caribou and berries (97.5 percent each); king salmon and pike (87.5 percent each); moose and red salmon (82.5 percent each); beaver (80 percent); and harbor seal, grayling, and whitefish (77.5 percent each) (Table 18, Fig. 10).

As in Ekwok and Koliganek, the resource category pursued most often during the study period by the 40 sampled New Stuyahok households was plants (92.5 percent). In addition, 85 percent of the households tried to catch some species of freshwater fish or hunted for at least one land mammal species. Salmon was sought by 77.5 percent of the households, 72.5 percent searched for birds, 65.0 percent trapped furbearers, 22.5 percent tried to harvest some species of marine fish, 7.5 percent dug for clams, and 5.0 percent pursued some type of marine mammal (Table 18). The species which New Stuyahok households attempted to harvest most often were berries (92.5 percent); caribou (82.5 percent), king salmon and pike (72.5 percent), whitefish and grayling (67.5 percent); red salmon (65.0 percent); moose (63.2 percent); beaver (62.5 percent); and mallard ducks (52.5 percent) (Table 18).

Again, similar to the other study communities, the resource category collected most frequently by the New Stuyahok sample was plants (92.5 percent). This was followed by freshwater fish and land mammals which were harvested by 85.0 percent, salmon fished successfully by 77.5 percent, birds taken by 72.5 percent, furbearers trapped by 65.0 percent, marine fish harvested by 20.0 percent, and marine invertebrates

TABLE 18. LEVELS OF HOUSEHOLD HARVEST, USE, AND SHARING OF FISH, WILDLIFE, AND PLANTS, NEW STUYAHOK, APRIL 1987 - MARCH 1988. (N=40 HH)

Resource	% used	% attempt	% success	% received	% gave away	mean hh Harvest, Pounds[a]	total sample harvest, numbers[b]	expanded community harvest totals[c]
SALMON	90.0	77.5	77.5	65.0	32.5	1,951.3	----	---
King Salmon	87.5	72.5	70.0	61.1	35.3	948.7	2,748.0	5,084.0
Red Salmon	82.5	65.0	65.0	51.4	20.0	695.0	6,588.0	12,188.0
Chum Salmon	62.5	47.5	47.5	36.8	18.9	196.5	1,758.0	3,252.0
Pink Salmon	17.5	15.0	15.0	7.5	5.0	3.1	54.0	100.0
Coho Salmon	52.5	37.5	37.5	25.6	7.9	85.1	742.0	1,373.0
Spawning Sockeye	32.5	25.0	25.0	13.2	2.6	22.8	456.0	844.0
Salmon, unidentified	2.5	0.0	0.0	2.5	0.0	0.0	0.0	0.0
MARINE FISH	65.0	22.5	20.0	57.5	17.5	15.7	---	---
Smelt	60.0	7.5	5.0	57.5	12.5	1.3	9.0g	16.0g
Herring	5.0	10.0	5.0	2.5	5.0	4.5	30.0g	55.0g
Herring Roe	7.5	2.5	2.5	5.0	0.0	3.0	15.0g	30.0g
Roe on Kelp	32.5	12.5	12.5	30.0	7.5	6.9	55.0g	100.0g
Flounder	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0
FRESHWATER FISH	97.5	85.0	85.0	72.5	57.5	156.1	----	---
Whitefish	77.5	67.5	67.5	47.5	40.0	27.2	1,090.0	2,017.0
Pike	87.5	72.5	72.5	45.0	37.5	70.6	1,009.0	1,867.0
Arctic Grayling	77.5	67.5	67.5	30.0	37.5	18.0	1,027.0	1,900.0
Rainbow Trout	37.5	37.5	37.5	15.0	17.5	7.3	210.0	388.0
Lake Trout	22.5	17.5	17.5	15.0	7.5	8.3	123.0	228.0
Dolly Varden	35.0	30.0	27.5	7.5	12.5	4.2	121.0	224.0
Burbot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blackfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Longnose Suckers	47.5	40.0	40.0	15.0	22.5	20.4	544.0	1,006.0
MARINE INVERTEBRATES	15.0	7.5	7.5	10.0	7.5	1.9	----	----
Butter Clams	12.5	7.5	7.5	7.5	7.5	1.9	25.0g	45.0g
Razor Clams	2.5	0.0	0.0	2.5	0.0	0.0	0.0	0.0
PLANTS	97.5	92.5	92.5	37.5	30.0	65.4	---	---
Berries	97.5	92.5	92.5	38.5	28.2	63.9	639.4g	1,183.0g
Other Green Plan	47.5	47.5	47.5	10.0	10.0	1.5	59.0qt	109.0qt.
LAND MAMMALS	100.0	85.0	85.0	65.0	62.5	921.8	----	---
Brown bear	5.0	2.5	0.0	5.0	0.0	0.0	0.0	0.0
Black bear	5.0	2.5	2.5	2.5	2.5	1.4	1.0	2.0
Caribou	97.5	82.5	82.5	61.5	60.5	513.7	137.0	254.0
Moose	82.5	63.2	55.0	59.0	52.6	391.5	29.0	54.0
Porcupine	55.0	47.4	45.0	25.0	21.1	13.0	65.0	120.0
Snowshoe Hare	12.5	12.5	12.5	0.0	5.0	0.6	12.0	22.0
Arctic Hare	7.5	7.5	7.5	0.0	2.5	1.5	11.0	20.0

TABLE 18. LEVELS OF HOUSEHOLD HARVEST, USE, AND SHARING OF FISH, WILDLIFE, AND PLANTS, NEW STUYAHOK, APRIL 1987 - MARCH 1988. (N=40 HH)

Resource	% used	% attempt	% success	% received	% gave away	mean hh Harvest, Pounds[a]	total sample harvest, numbers[b]	expanded comunity harvest numbersc
MARINE MAMMALS	77.5	5.0	2.5	75.0	15.0	2.8	----	---
Harbor Seal	77.5	5.0	2.5	75.0	15.0	2.8	2.0	4.0
Bearded Seal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walrus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sea Lion	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Belukha	5.0	2.5	0.0	5.0	2.5	0.0	0.0	0.0
Bowhead Whale	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FURBEARERS	82.5	65.0	65.0	52.5	42.5	210.8	----	---
Beaver	80.0	62.5	62.5	45.0	40.0	210.8	440.0	814.0
Mink	7.5	7.5	7.5	0.0	0.0	NA	8.0	15.0
Fox	32.5	32.5	32.5	7.5	2.5	NA	22.0	41.0
Wolf	0.0	0.0	0.0	0.0	0.0	NA	0.0	0.0
Wolverine	2.5	2.5	2.5	0.0	0.0	NA	1.0	2.0
Land Otter	22.5	22.5	22.5	5.0	2.5	NA	19.0	36.0
Muskrat	2.5	2.5	2.5	0.0	0.0	NA	10.0	19.0
Lynx	0.0	0.0	0.0	0.0	0.0	NA	0.0	0.0
Arctic Ground Squirrel	0.0	0.0	0.0	0.0	0.0	NA	0.0	0.0
Marten	7.5	7.5	7.5	0.0	0.0	NA	3.0	6.0
BIRDS AND EGGS	82.5	72.5	72.5	32.5	30.0	18.7	----	---
Spruce Grouse	15.0	12.5	12.5	2.5	2.5	1.2	48.0	89.0
Ptarmigan	32.5	27.5	27.5	5.0	10.0	1.3	73.0	135.0
Cacklers	35.0	30.0	30.0	12.5	7.5	1.6	55.0	101.0
Taverner's	17.5	12.5	12.5	12.5	5.0	1.5	28.0	52.0
Whitefront	2.5	0.0	0.0	2.5	0.0	0.0	0.0	0.0
Black Brants	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Emperors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geese, unknown	15.0	15.0	15.0	0.0	2.5	1.2	28.0	52.0
Swan	2.5	2.5	2.5	0.0	0.0	0.2	1.0	2.0
Sandhill Crane	2.5	2.5	2.5	0.0	2.5	0.4	3.0	6.0
Mallards	65.0	52.5	52.5	25.0	15.0	4.0	161.0	297.0
Pintails	42.5	37.5	37.5	15.0	20.0	2.5	126.0	233.0
Eider	5.0	5.0	2.5	2.5	2.5	4.0	100.0	185.0
Ducks, unknown	2.5	2.5	2.5	0.0	0.0	0.1	2.0	4.0
Gull Eggs	7.5	5.0	5.0	5.0	2.5	0.6	156.0	24.0
Goose Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Duck Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Swan Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Murre Eggs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALL RESOURCES	100.0	100.0	100.0	97.5	87.5	3,344.5	---	----

[a] Harvests in pounds for furbearers represent only those animals which were eaten.

[b] Harvests are reported in numbers of fish or animals, except resources marked g" (gallons), or "q" (quarts).

[c] Calculated at 95% confidence interval, see Appendix .

Source: Division of Subsistence, ADF&G Survey, 1988.

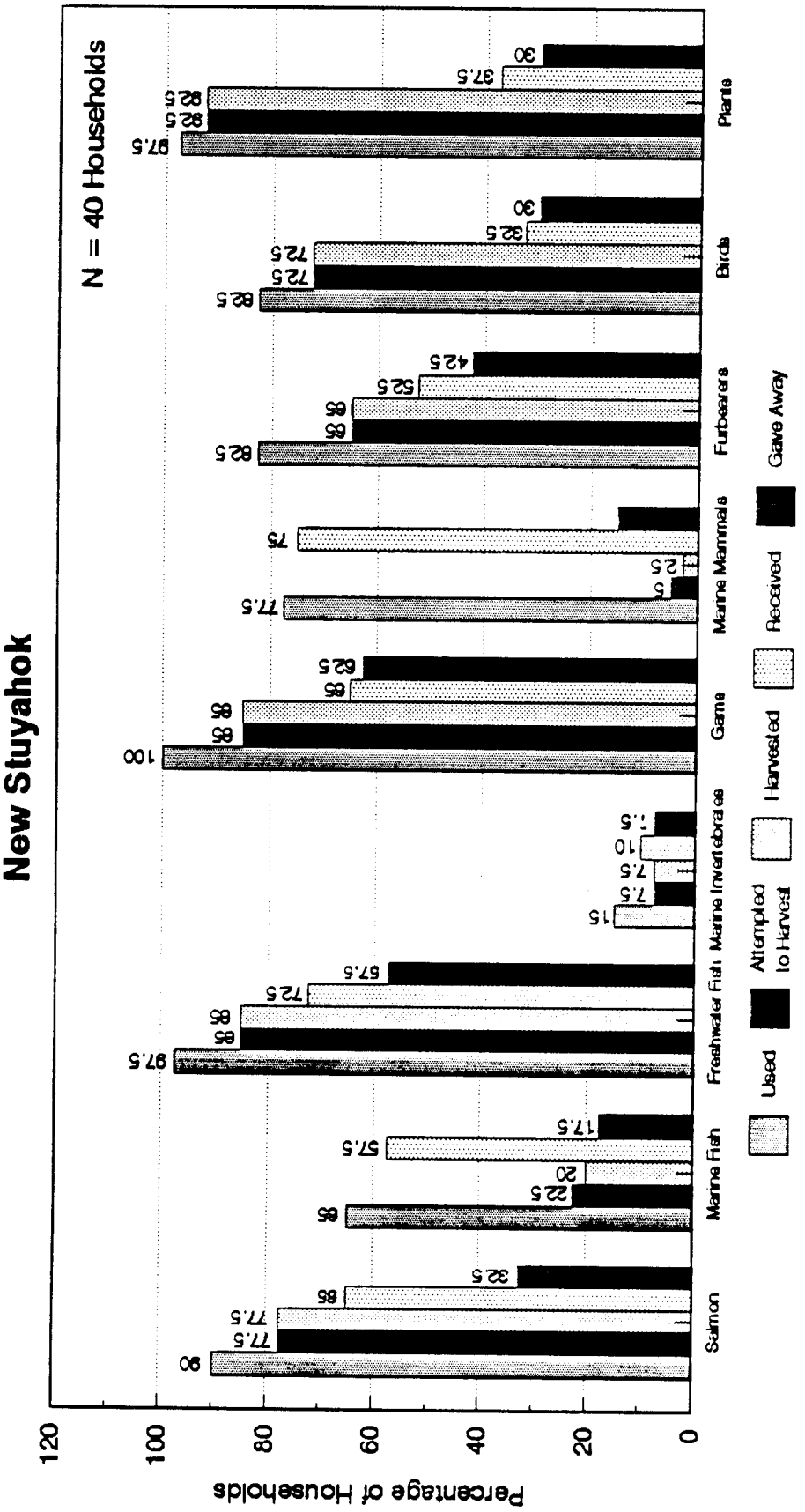


Figure 10. Levels of Harvest, Use, and Sharing of Nine Major Resource Categories, New Stuyahok, 1987-8

collected by 7.5 percent. New Stuyahok was the only community to report a harvest of any marine mammals, with one household (2.5 percent) taking seals. The species harvested most successfully were berries (92.5 percent), caribou (82.5 percent), pike (72.5 percent), king salmon (70.0 percent), grayling and whitefish (67.5 percent), red salmon (65.0 percent), beaver (62.5 percent), moose (55.0 percent), and mallard ducks (52.5 percent) (Table 18).

HARVEST QUANTITIES

Harvest quantities for all three study communities were substantial during the twelve month study period. Ekwok's 29 sampled households had a mean household harvest of 2,664.4 pounds edible weight and a per capita harvest of 797.5 pounds (Table 19). In Koliganek, the sample of 42 households harvested a mean of 3,223.0 pounds edible weight. Koliganek's per capita harvest was the largest of the three communities at 830.7 pounds. The sample of 40 New Stuyahok households harvested a mean of 3,344.5 pounds edible weight and the per capita figure was 701.2 pounds.

In all three study communities, a wide variety of resources were harvested, but salmon and land mammals formed the bulk of the overall resource harvest from April 1987 to March 1988. Salmon contributed the largest portion by weight of all the resources harvested. Second to salmon, land mammals contributed the next largest portion. Together, these two resource categories contributed a minimum of 80.6 percent in pounds edible weight to the overall resource harvest.

TABLE 19. COMPOSITION OF RESOURCE HARVEST IN POUNDS BY CATEGORY, EKWOK, KOLIGANEK AND NEW STUYAHOK, APRIL 1987 - MAY 1988.

	Ekwok 29 households 97 people			Koliganek 42 households 163 people			New Stuyahok 40 households 191 people		
	Mean hh harvest lbs	Per capita harvest lbs	% of total harvest	Mean hh harvest lbs	Per capita harvest lbs	% of total harvest	Mean hh harvest lbs	Per capita harvest lbs	% of total harvest
Salmon	1,525.8	456.8	57.3%	1,406.7	362.5	43.8%	1,951.3	409.1	58.3%
Marine Fish	5.1	1.5	0.2%	10.7	2.7	0.3%	15.7	3.3	0.5%
Freshwater Fish	224.2	67.1	8.4%	357.5	92.1	11.1%	156.1	32.7	4.7%
Marine Invertebrates	0.0	0	0.0%	5.0	1.3	0.1%	1.9	0.4	0.1%
Land Mammals	652.9	195.5	24.5%	1,155.8	297.9	35.9%	921.8	193.3	27.6%
Marine Mammals	0.0	0	0.0%	0.0	0	0.0%	2.8	0.6	0.1%
Furbearers	180.7	54.1	6.8%	161.8	41.7	5.0%	210.8	44.2	6.3%
Birds	12.2	3.6	0.5%	44.7	11.5	1.3%	18.7	3.9	0.6%
Plants	63.3	18.9	2.4%	80.8	20.8	2.5%	65.4	13.7	2.0%
	2,664.4	797.5	100.0%	3,223.0	830.7	100.0%	3,344.5	701.2	100.0%

Source: Division of Subsistence, ADF&G, Survey 1988.

The 29 sampled households in Ekwok harvested an average of 1525.8 pounds of salmon during the study year, or 456.8 per capita (Table 19). Salmon made up 57.3 percent of the community harvest (Figure 11). Land mammals supplied 652.9 pounds (24.5 percent) to the mean household harvest or 195.5 pounds per capita. Other resource categories which made smaller contributions to the overall harvest included freshwater fish at 224.2 pounds per household, or 67.1 per person, represented 8.4 percent of the harvest; furbearers at 180.7 pounds per household, or 54.1 pounds per person, composed 6.8 percent; plants, 63.3 pounds per household or 18.9 pounds per capita composed 2.4 percent; birds added 12.2 pounds per household, 3.6 per capita or 0.5 percent; and marine fish contributed 5.1 pounds per household, or 1.5 pounds per person or 0.2 percent.

Two species of salmon contributed the largest portions to the mean household harvest. These were king salmon, 596.2 pounds, and red salmon, 536.1 pounds. These were followed by moose and caribou. The moose harvest was 372.4 pounds and caribou 269.0 pounds per household. Other species which made notable contributions to the mean household harvest were chum salmon (195.9 pounds), beaver (180.7 pounds), and coho salmon (178.7 pounds). Together these seven species represented 87.4 percent of the mean household harvest as represented by pounds edible weight.

A mean household harvest of 1,406.7 pounds of salmon represents slightly less than half (43.8 percent) of all resources harvested by the 42 Koliganek households during the study year (Fig. 12). The per capita salmon harvest was 362.7 pounds. Land mammal harvests were also

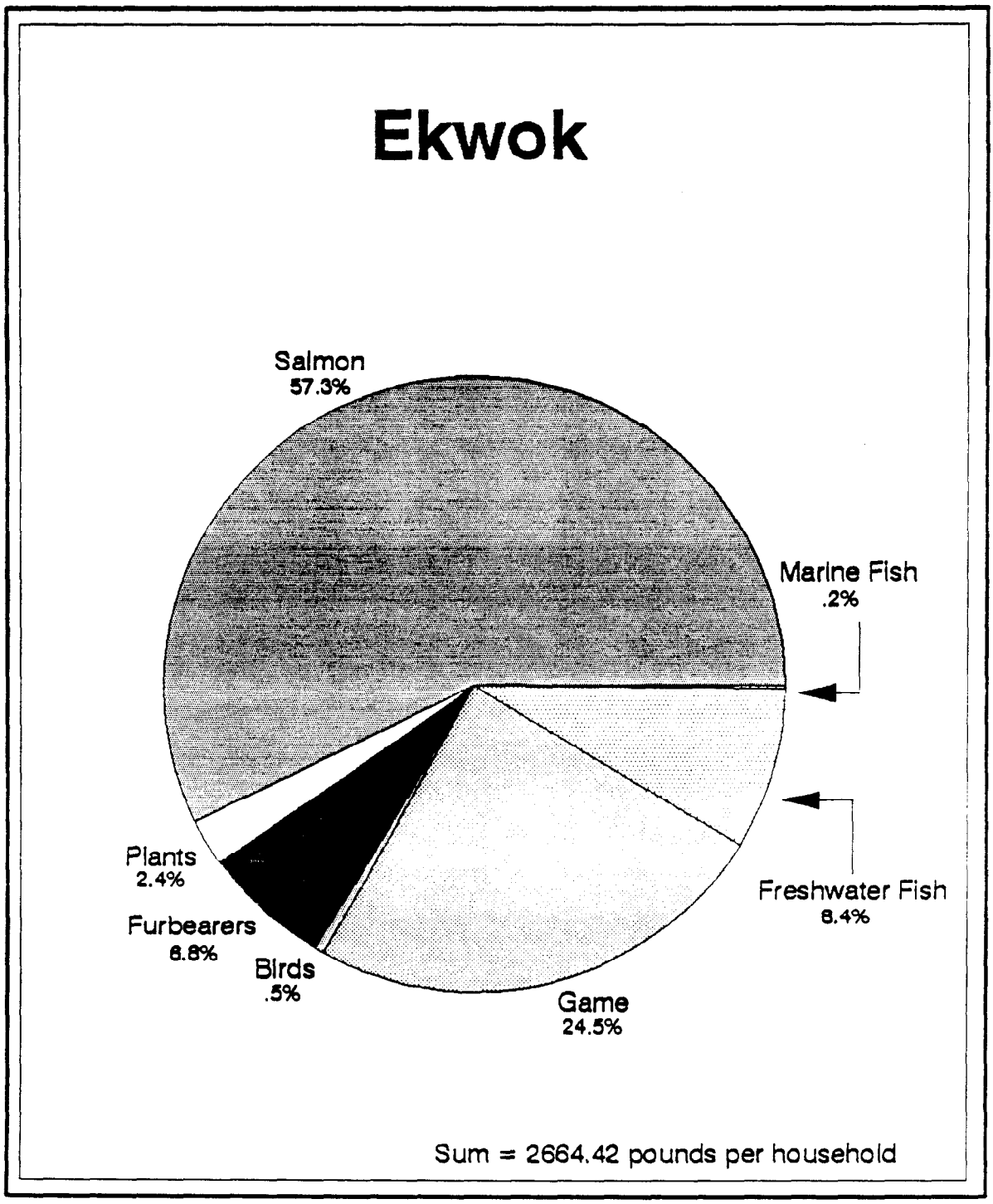


Figure 11. Composition of Wild Resource Harvests by Resource Category, Ekwok, April 1987 - March 1988

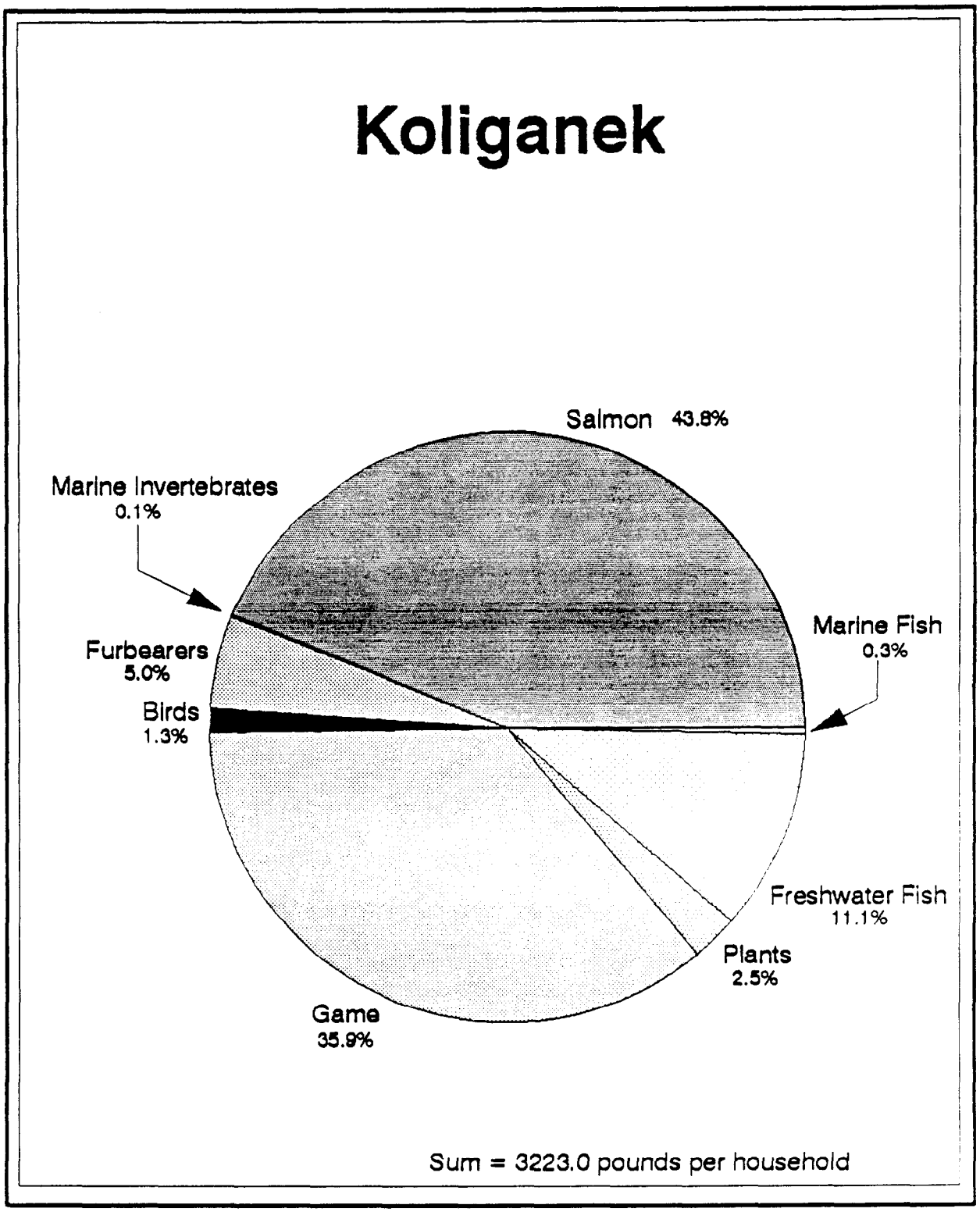


Figure 12. Composition of Wild Resource Harvests by Resource Category, Koliganek, April 1987 - March 1988

significant, 35.9 percent (1,155.8 pounds per household or 297.9 per capita). The remainder of the harvest was 11.1 percent freshwater fish (357.5 pounds per household or 92.1 per capita); 5.0 percent furbearers (161.8 pounds per household or 41.7 per capita); 2.5 percent plants (80.8 pounds per household or 20.8 per capita); 1.3 percent birds (44.7 pounds per household or 11.5 per capita); 0.3 percent marine fish (10.7 pounds per household or 2.7 per capita); and 0.1 percent marine invertebrates (5.0 pounds per household or 1.3 per capita).

Red salmon (644.3 pounds per household) was the largest contributor to the average Koliganek household harvest. This was followed by caribou (582.1 pounds); moose (540.0 pounds); king salmon (288.0 pounds); coho salmon (233.5 pounds); chum salmon (161.3 pounds); beaver (161.0 pounds); and pike (160.8 pounds). Together these resources comprised 77.7 percent of the community harvest during the study year.

In New Stuyahok, the salmon harvest at 1,951.3 pounds per household or 409.1 per capita composed well over half (58.3 percent) of the average household harvest (Fig. 13). Land mammals ranked second, with 27.6 percent or 921.8 pounds per household, 193.3 per capita. Other contributors were 6.3 percent furbearers (210.8 pounds per household or 44.2 per capita); 4.7 percent freshwater fish (156.1 pounds per household, or 32.7 per capita); 2.0 percent plants (65.4 pounds per household or 13.7 per capita); 0.6 percent birds (18.7 pounds per household or 3.9 per capita); 0.5 percent marine fish (15.7 pounds per household or 3.3 per capita); and 0.1 percent each for marine mammals (2.8 pounds per household or 0.6 per capita) and marine

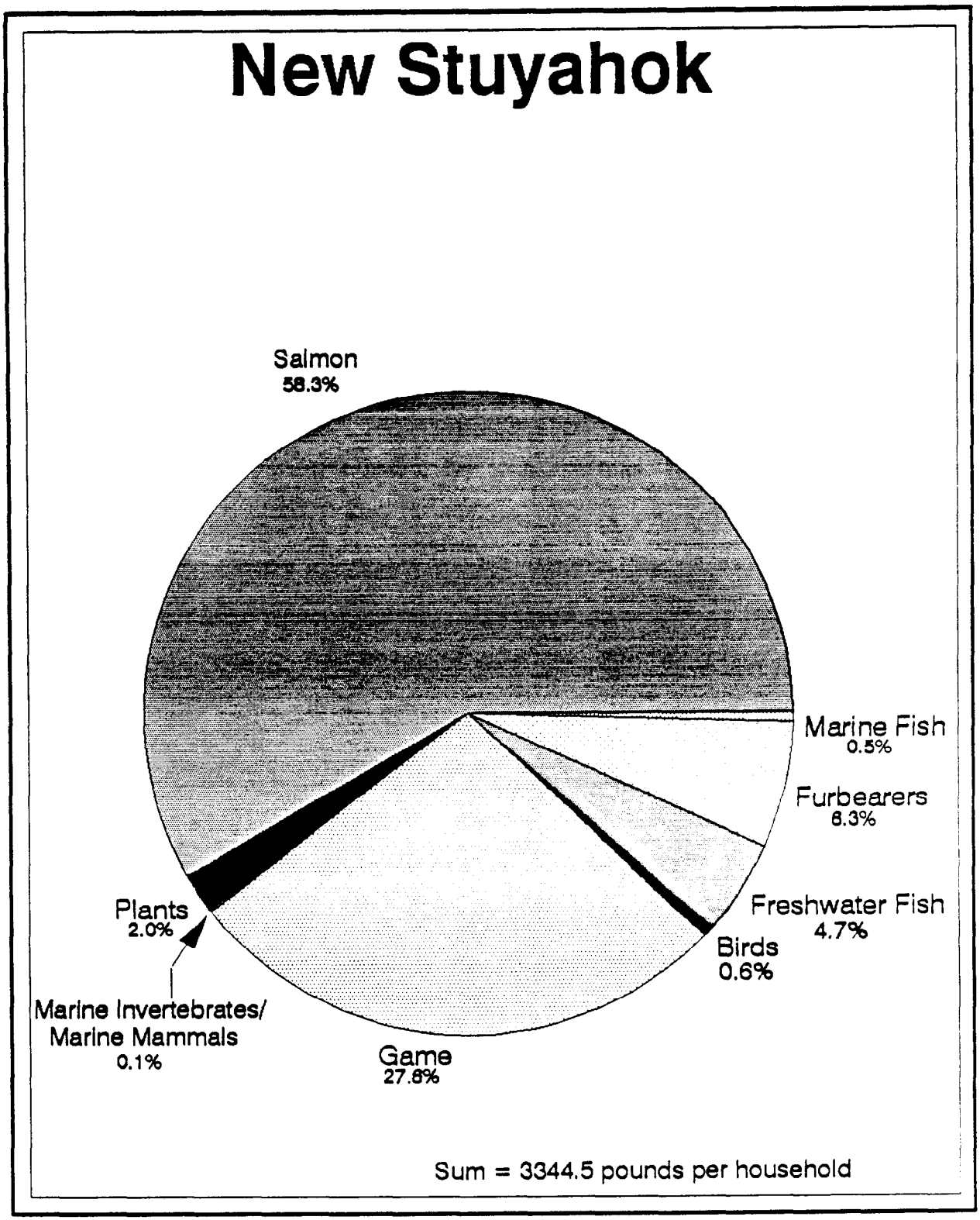


Figure 13. Composition of Wild Resource Harvests by Resource Category, New Stuyahok, April 1987 - March 1988

invertebrates in the form of butter clams (1.9 pounds per household or 0.4 per capita).

SHARING AND RECEIVING

General Patterns

Resource sharing was a common occurrence in the study communities. Researchers frequently witnessed and were themselves the recipients of many acts of sharing. One respondent told them she never worried about running out of meat because "those boys (kin from another household) will keep our freezer full." Several months later, on a subsequent visit to the same household the researcher observed that a leg of moose had been left on its freezer for further butchering. Although the family was not sure who had left it for them, their casual attitude seemed to indicate that such gifts were routine. Several respondents spoke of particular hunters who made sure other households were well supplied. One said of a particular hunter, "He hunts all the time and then gives it out in the village. He hardly keeps any for himself." Several hunters told of making special efforts to secure foods which were particular favorites of the elders. Given the frequency of such gifts, it was difficult for some respondents to recall which resources had been given or received and the figures reported should be considered minimum estimates.

In Ekwok, the sample of 29 houses reported that 86.2 percent had shared at least one resource during the study period; the mean number of resources given away was 4.8 (Table 15). The resources which were

given or shared most frequently were king salmon (41.4 percent, caribou and berries (39.3 percent each), moose and beaver (34.5 percent) (Table 16). Other resources which were also shared frequently included red and coho salmon (27.6 percent); pike (24.1 percent); and grayling and whitefish (20.7 percent). Resources were also received often; 82.8 percent of the sampled households received at least one resource during the study period. The mean number of resources received was 6.8. Well over half the households in the Ekwok sample received caribou (60.7 percent) and moose (53.6 percent) during the study period. Other resources commonly received were king salmon and smelt (48.3 percent); harbor seal (41.4 percent); red salmon (37.9 percent); coho salmon and beaver (31.0 percent); berries (28.6 percent); and whitefish (27.6).

Koliganek's sample of 42 households reported that 95.2 percent of the households had both given away and received at least one resource during the study period. The mean number of resources shared was 7.9 (Table 15). The resources which were most frequently shared were caribou (61.0 percent); moose (57.5 percent); pike and beaver (45.2 percent each), king salmon (42.9 percent); berries (41.5 percent); ptarmigan and mallard ducks (40.5 percent each); and red salmon and pintail ducks (38.1 percent). The mean number of resources received was 9.8. Harbor seal, usually in the form of seal oil, was the most frequently received resource (71.4 percent). This was followed by caribou (63.4 percent), moose (61.9 percent), king salmon (50.0 percent), berries (47.6 percent), whitefish (45.2 percent), beaver and red salmon (42.9 percent each), pike (38.1 percent), and ptarmigan (35.7 percent).

For the 12 month study period, New Stuyahok's 40 sampled houses reported that 87.5 percent had given away at least one resource and the mean number was 6.0. Caribou was the resource most frequently shared and was given away by 60.5 percent of the households. Other resources shared most frequently were moose (52.6 percent), beaver and whitefish (40.0 percent), grayling and pike (37.5 percent); king salmon 35.3 percent); berries (28.2 percent); suckers (22.5 percent), and porcupine (21.1 percent). Nearly every household (97.5 percent) received at least one resource with harbor seal topping the list (75.0 percent). This was followed by caribou (61.5 percent), king salmon (61.1 percent); moose (59.0 percent); smelt (57.5 percent); red salmon (51.4 percent); whitefish (47.5 percent); beaver and pike (45.0 percent); and berries (38.5 percent).

It is interesting that smelt and harbor seal had such a prominent place in the sharing networks. These are products not available in the riverine environment of the Nushagak River villages. Seal oil is considered a staple in many homes and is the favorite condiment for wild foods. Nushagak River villagers have a long history of trading relationships with coastal communities such as Togiak, often trading moose or caribou meat for seal oil (see VanStone 1967:128). One woman reported that she offered money for seal oil but the giver requested cranberries instead. Many families have regular trading partners. Seal oil is often presented as a gift. Hunters from Togiak and Manokotak bring gifts of marine mammal products when they travel to the Nushagak River villages for moose or caribou hunting. In 1983, one instance was observed where coastal hunters was given surplus caribou in exchange for seal and the hunters never even went out (Wolfe et al

1984). It is also interesting to note the number of Nushagak River households who re-distribute the seal oil they have obtain and the very high use level of seal oil in all the communities although only two seals were harvested by the entire sample of 111 households.

Slavi

Prepared foods were often shared through community and religious celebrations such as name days (the day the Russian Orthodox church observes one's sainted namesake), birthdays, and weddings. On these occasions, members of the entire village were often invited to partake in a feast. The most elaborate festivities occurred during the Russian Orthodox Christmas also known as *Slavi* or *Slaviq*. According to Oleksa (1986), the celebrations which accompany *Slavi* in Western Alaska are a synthesis of traditions derived from Russian Orthodox liturgy, Ukrainian folkways, and the ancient Eskimo Bladder Festival. Oleksa speculates that feasting and gift-giving are aspects of the modern Christian holiday which derive from the traditional Bladder Festival. Fienup-Riordan (1990) also stresses that the Christian holiday is strongly perceived as a Yup'ik celebration in which the elaborate feasting is a central aspect with strong spiritual overtones.

Following the Julian calendar, Russian Orthodox Christmas is celebrated on January 7. In the Nushagak River villages Slavi has grown over the years from the traditional 3 days to an entire week with festivities lasting until the Russian Orthodox New Year. Caroling and feasting lasted for the entire seven days when villagers hosted church members who arrived from other Russian Orthodox communities. Traveling

by snowmachines and airplanes, visits were often exchanged with church groups from Aleknagik, Dillingham, Iliamna, Kokhanok, Newhalen, Levelock, Nondalton, and Portage Creek. Each group first visited the church leader's home and carried at least one rotating, multi-pointed star, usually with a picture of the nativity scene. As the ritual carols were sung in Yup'ik, Slavonic, or English, the star was twirled. Each household then made a donation to the star. Since it was the custom to carol and feast at every house regardless of how large the community, some groups carried two stars so they could divide the houses between them. Even so, caroling often lasted well into the night.

When the singing finished, each group was invited to sit and eat. Refreshments ranged from a simple snack of salted fish, pilot crackers, and coffee to a full meal. Some households also held village-wide feasts in addition to meals served to the carolers and many households had overnight guests as well. Over the course of the seven day holiday, huge quantities of food were served and consumed. Upon questioning, respondents stated that any food could be served but "Native" foods were preferred. Candy was always given to the children. Preparations began well in advance of the actual event with the preservation of large quantities of salmon and berries during the summer months. The various combinations of *akutaq*, a dish made from berries, sugar, and vegetable fat, were considered essential to any feast. Winter hunters often went out specifically to harvest a moose or caribou for the *Slavi* table.

In 1984, a division researcher attempted to quantify the amounts and types of foods which were used for Slavi in New Stuyahok. Although it is considered poor manners to keep track of the food provided to

guests, several households did provide their best estimates for the researcher's benefit. In interviews with eight households, moose, caribou, salmon (smoked, dried, frozen, or salted), and berries were the foods most commonly mentioned. Store-bought foods, such as coffee, tea, juice, crackers, and sweets were also used to fill out the menus (Field Notes, Kraus and Wright, 1984).

Case 1 This New Stuyahok household was visited by nine "starring" groups, composed of 10 to 30 people each. All groups were fed. Six people from the Newhalen contingent were overnight guests one evening. The family itself mostly *slavied* in the village. The couple took one trip to Dillingham and the wife also went to Levelock. The family reported using about 18 pounds of moose meat, 10 pounds of caribou meat, over 50 pounds of salted fish, one large king salmon, five gallons of smoked salmon strips, a large box of dried fish, five gallons of blackberries, five gallons of cranberries, and two and a half gallons of salmonberries. The salted fish referred to above was also used by the son's household. Approximately $100 was spent on store-bought foods, including a turkey, fresh vegetables, cake mixes, and pie fillings. About two gallons of *akutaq* were given to the overnight guests. No other gifts were exchanged.

Case 2. Four or five families, about twelve people, stayed with this New Stuyahok household during the week of *Slavi*. The families were from Koliganek, Portage Creek, and Kokhanok. The husband, with his mother, and aunt spent two days in Dillingham and two days in Portage Creek where they stayed with relatives. The husband *slavied* at 44 houses in his own village. When he could afford it, he liked to travel to the Iliamna communities. The household estimated they used

approximately 350 pounds of meat (moose and caribou), two fairly large boxes of dry fish, fifteen gallons of blackberries, and 3 gallons of salmonberries. They chipped in with four other households to purchase about $600 worth of store bought foods.

Case 3. This New Stuyahok household hosted five or six households each night, the guests were mostly relatives. Two of the sons travelled to Dillingham. A married son from another household shot a caribou for his mother to serve during *Slavi*. The entire animal was used during the seven day period. One gallon of king salmon strips and a small amount of dried fish were also served. The mother would have cooked some freshwater fish but her supply was ruined when electrical problems turned off her freezer. Four gallons of blackberries and three quarts of salmonberries were used for *akutaq*. Some of the berries were contributed by her daughter-in-law. This household estimated expenses of $100 for store-bought food.

As the foregoing examples illustrate, subsistence foods and activities were an integral part of the *Slavi* festivities. Although subsistence foods are important for other celebrations throughout the year, only at *Slavi* is there such continual feasting. In some ways, the celebration of *Slavi* also provides continuity with the ancient Eskimos winter festivals of the past.

CHAPTER 4

FISHING AND GATHERING

SALMON

Nushagak Bay and its associated drainages support runs of five salmon species. Beginning in late May, runs of chinook (king) salmon appear and usually peak by the end of June. Known for their large size, firm flesh, and excellent taste, kings are sought by commercial, subsistence, and sport fishermen. The Nushagak district is Bristol Bay's primary king salmon producer but during the late 1980s, fishery managers became increasingly concerned about the health of the stocks. In 1987, an extensive closure of the commercial gill net fishery was necessary to meet the king escapement goal (ADF&G 1988). In 1988, in spite of the adoption of a new management approach which resulted in very little opportunity for commercial king fishing, the Nushagak king escapement was 24 percent less than the desired goal of 75,000 (ADF&G 1989). No directed king fishery for commercial harvest was permitted in 1988, 1989, or 1990. Biologists have been unable to identify the reason for the declining stocks (Skrade, personal communication, 1990) although local fishermen believe high seas interception is the cause of the problem.

Bristol Bay is the world's most prolific producer of sockeye (red) salmon. Sockeye are the most abundant species in all Bristol Bay drainages, including the Nushagak. Sockeye form the basis of both commercial and subsistence harvests. The peak of the Nushagak sockeye run traditionally occurs around July 4. Chum, locally known as dog

salmon, are not a discrete run and begin returning to the Bay in late June along with the sockeye. Typically, the Nushagak District has the largest chum run in Bristol Bay. Chum are usually caught incidentally with the targeted king and sockeye by commercial and subsistence fishers.

The Nushagak district is also Bristol Bay's primary pink salmon producer. Pink salmon return strongly to the Nushagak in even-numbered years in the latter part of July. Due to their soft texture they are not generally targeted by subsistence fishermen, nor are pink salmon a prized commercial species, but they are harvested by some commercial fishers when an acceptable price has been negotiated.

The last salmon to arrive are the coho, or silver salmon, in early August. Until recent years, the Nushagak district produced almost half of Bristol Bay's coho harvest. Similar to king, run strength from 1987 through 1990 has been weak for unexplained reasons (ADF&G 1988:15; ADF&G 1989:19; ADF&G 1990). Coho are valued by all user groups although commercial interest varies depending on market conditions.

Species Used and Harvest Quantities

As previously noted, salmon comprised the largest portion of any single resource category in all three study communities. In Ekwok, salmon represented 57.3 percent of the total resource harvest and a per capita harvest of 456.8 pounds. The situation was very similar in New Stuyahok, where the salmon harvest of 409.1 pounds per capita comprised 58.3 percent of the total resource harvest. In Koliganek, a per capita salmon harvest of 362.5 pounds represented just under half (43.8

percent) of the wild foods harvested. Salmon was harvested in Ekwok by 65.5 percent of the sampled households and used by 93.1 percent. In Koliganek, 71.4 percent harvested at least one species of salmon and 83.3 percent used it. In New Stuyahok, 77.5 percent harvested salmon and 90.0 percent used it.

In all three communities, king and sockeye were the principal species harvested although the proportions varied within the communities. In Ekwok, the two species comprised nearly equal portions of the community's total salmon harvest by weight, with king only slightly higher (39.1 percent) than sockeye (35.1 percent) (Figure 14). Both species were widely used and harvested, with 89.7 percent of the sampled households using and 55.2 percent harvesting king, while sockeye were used by 82.8 percent of the households and harvested by 51.7 percent. Next were chum which formed 12.8 percent of the salmon harvest; 65.5 percent of the households used chum and 48.3 percent harvested them. Chum were closely followed by coho which represented 11.7 percent of the total salmon harvest. Coho were used by 75.9 percent of the households and harvested by 48.3 percent. Although spawning salmon, locally called "spawned-outs, "redfish", or *sayalleq*, composed only a very small portion of the harvest (1.0 percent), it was used by a significant number of households (34.5 percent) and harvested by 20.7 percent. Since there was no significant pink run in 1987, the pink harvest was negligible.

In Koliganek, sockeye dominated the salmon harvest and represented just under half (46.5 percent) of the total salmon harvest by weight (Figure 15). Sockeye were used by 73.8 percent and harvested by 47.6 percent. King, harvested in smaller numbers, were also very

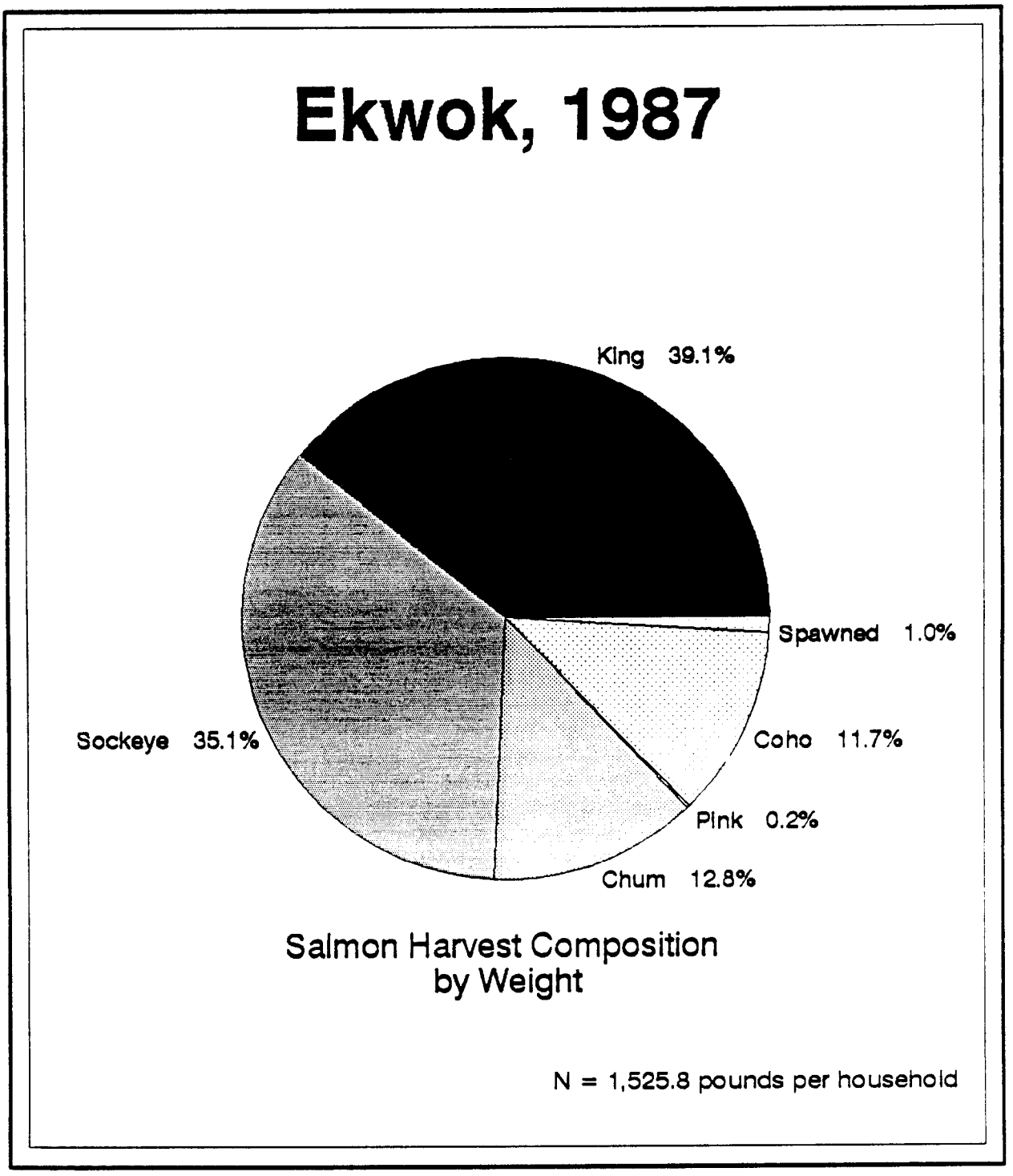


Figure 14. Salmon Harvest Composition by Weight, Ekwok, April 1987 - March 1988.

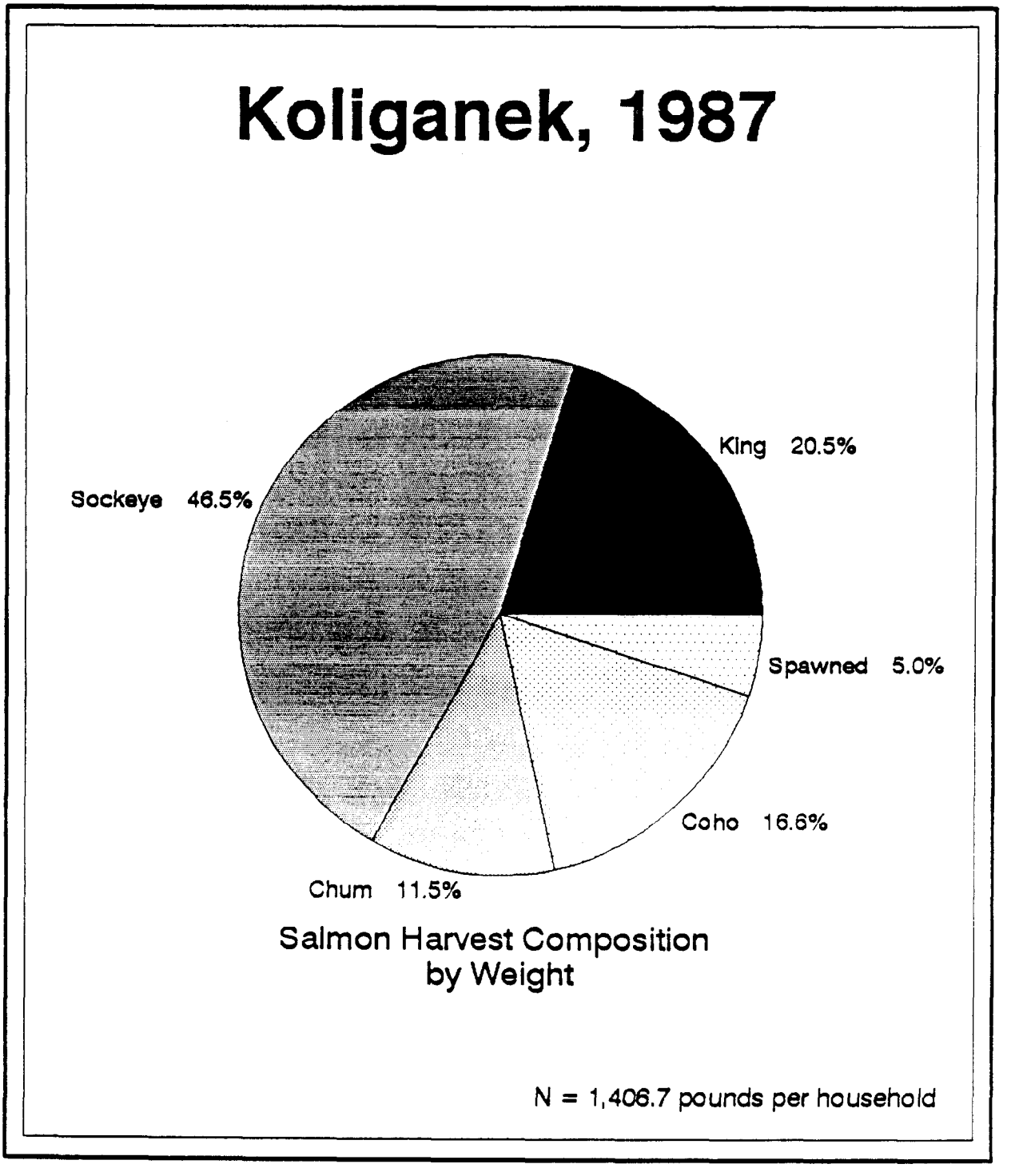


Figure 15. Salmon Harvest Composition by Weight, Koliganek, April 1987 - March 1988.

popular, comprising 20.5 percent of the harvest. Koliganek residents who fished for salmon near the village had less access to king than those who fished downriver, since fewer king reached that far upriver. King were used by 78.6 percent and harvested by slightly more than half the sample (52.2 percent). Coho also represented a substantial portion of the salmon harvest (16.6 percent). Coho were used by 73.8 percent of the sampled households and harvested by 57.1 percent. Chum were also harvested in significant numbers. They represented 11.5 percent of the salmon harvest in Koliganek and were used by 50.0 percent and harvested by 40.5 percent. Spawning salmon were widely used. Although they represented only 5.0 percent of the harvest, 42.9 percent of the households used and 23.8 percent harvested *sayalleq*

New Stuyahok was the only one of the study communities in which king dominated the salmon harvest, composing 48.6 percent by weight (Figure 16). New Stuyahok's numerous fish camps at Lewis Point at the mouth of the Nushagak River provided an excellent location for harvesting king. King were used by 87.5 percent and harvested by 70.0 percent of the sampled households. As in the other communities, sockeye were very important and represented 35.6 percent of the total salmon harvest. Sockeye were used by 82.5 percent and harvested by 65.0 percent. The percentage of the salmon catch composed of chum (10.1) was very similar to the other two communities. Chum were used by 62.5 percent and harvested by 47.5 percent of the New Stuyahok sampled households. Coho made up 4.4 percent of the salmon catch, but were widely used (52.5 percent) and harvested (37.5 percent). Spawned out salmon composed 1.2 percent of the salmon harvest. They were used by

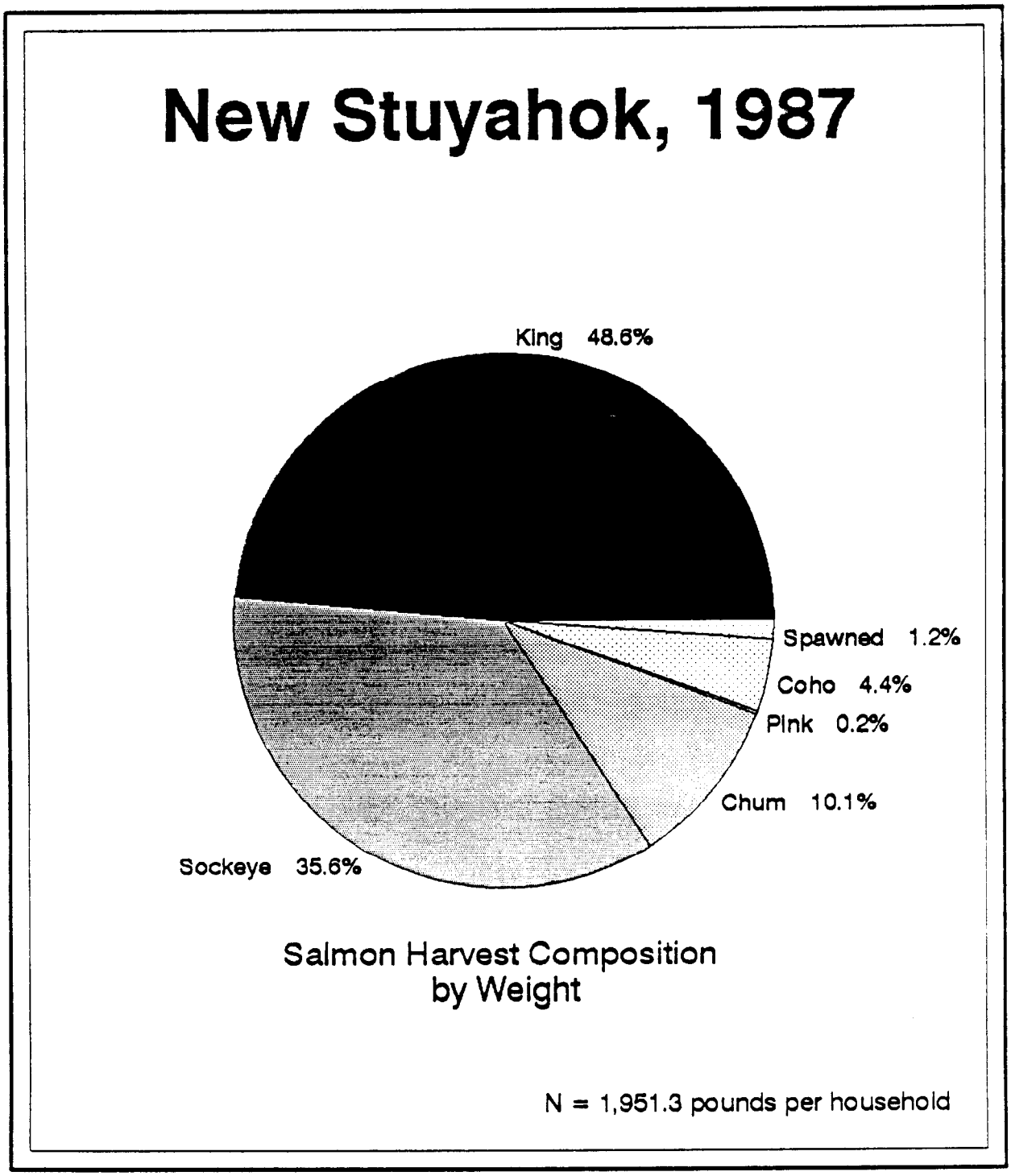


Figure 16. Salmon Harvest Composition by Weight, New Stuyahok, April 1987 - March 1988.

32.5 percent and harvested by 25.0 percent. Again, there was no significant harvest of pink.

Methods of Harvest

Subsistence salmon set nets were the primary method of harvesting salmon in all three study communities. In Ekwok, 44.8 percent of the households obtained salmon in this manner (Table 20). When measured in numbers, 96.3 percent of the salmon catch, and 96.2 percent when measured in pounds, were harvested in subsistence salmon nets (Table 21, Fig. 17). Only 22 fish (all king) were removed from commercial catches. A total of 256 salmon were caught with rod and reel, the majority of which were coho or sockeye. Rods and reels were used especially by younger persons who wanted to catch a small amount of fish for a meal or by men on hunting trips.

In Koliganek, subsistence nets also were responsible for the vast majority of the salmon harvest. Subsistence nets were used by 59.5 percent of the households (Table 22). As shown in Table 23 and Figure 18, 90.5 percent of the salmon in weight and 93.8 percent in numbers was harvested from subsistence nets. Rods and reels contributed 5.3 percent of the catch in pounds, for a total of 477 fish, predominantly coho. Finally, a small number of fish (302) were removed from commercial catches, predominantly king as well as a few sockeye and chum.

In New Stuyahok, subsistence nets were used almost exclusively to obtain salmon for home use during the study year. Of the sampled households, 65.0 percent obtained their salmon in this manner (Table 24). Salmon harvested in subsistence nets represented 99.0 percent (in

TABLE 20. PERCENTAGE OF EKWOK HOUSEHOLDS HARVESTING SALMON, BY GEAR TYPE AND SPECIES, APRIL 1987 - MARCH 1988 (N=29 households)

	Percentage of Households Harvesting			
	Removed from Commercial Catches	Subsistence Net	Rod and Reel	Any Method
Kings	10.3%	41.4%	13.8%	55.2%
Sockeyes	0.0%	41.4%	10.3%	51.7%
Chums	0.0%	44.8%	3.4%	48.3%
Pinks	0.0%	10.3%	0.0%	10.3%
Cohos	0.0%	34.5%	27.6%	48.3%
Spawning	0.0%	17.2%	3.4%	20.7%
ANY SALMON	10.3%	44.8	31.0%	65.5%

Source: Division of Subsistence, ADF&G, Survey 1988.

TABLE 21. SALMON HARVESTS BY GEAR TYPE, EKWOK, APRIL 1987 - MARCH 1988

	Removed from Commercial Catch			Subsistence Net			Rod and Reel			Any Method			
	No.	lbs.	%[a]	No.	lbs.	%[a]	No.	lbs.	%[a]	No.	%[b]	lbs.	%[b]
Kings	22	303.82	1.8%	1,199	16,558.2	24.3%	31	428.1	2.5%	1,252	16.5%	17,290.1	39.1%
Sockeyes	0	0	0.0%	3,634	15,335.5	98.6%	50	211.0	1.4%	3,684	48.4%	15,546.5	35.1%
Chums	0	0	0.0%	1,251	5,592.0	98.4%	20	89.4	1.6%	1,271	16.7%	5,681.4	12.8%
Pinks	0	0	0.0%	38	87.0	100.0%	0	0.0	0.0%	38	0.5%	87.0	0.2%
Cohos	0	0	0.0%	1,004	4,608.4	88.9%	125	573.8	11.1%	1,129	14.8%	5,182.1	11.7%
Spawning	0	0	0.0%	201	402.0	87.0%	30	66.0	13.0%	231	3.0%	462.0	1.1%
TOTAL	22	303.8	0.3%[c]	7,327	42,583.0	96.3%[c]	256	1,362.3	3.4%[c]	7,605	100.0%	44,249.1	100.0%

a Percent of species total taken by gear type
b Percent of total catch made up of each species.
c Percent of total catch of all salmon by gear type.

Source: Division of Subsistence Survey, ADF&G, 1988

Figure 17. Salmon Harvest by Gear Type, Ekwok, 1987

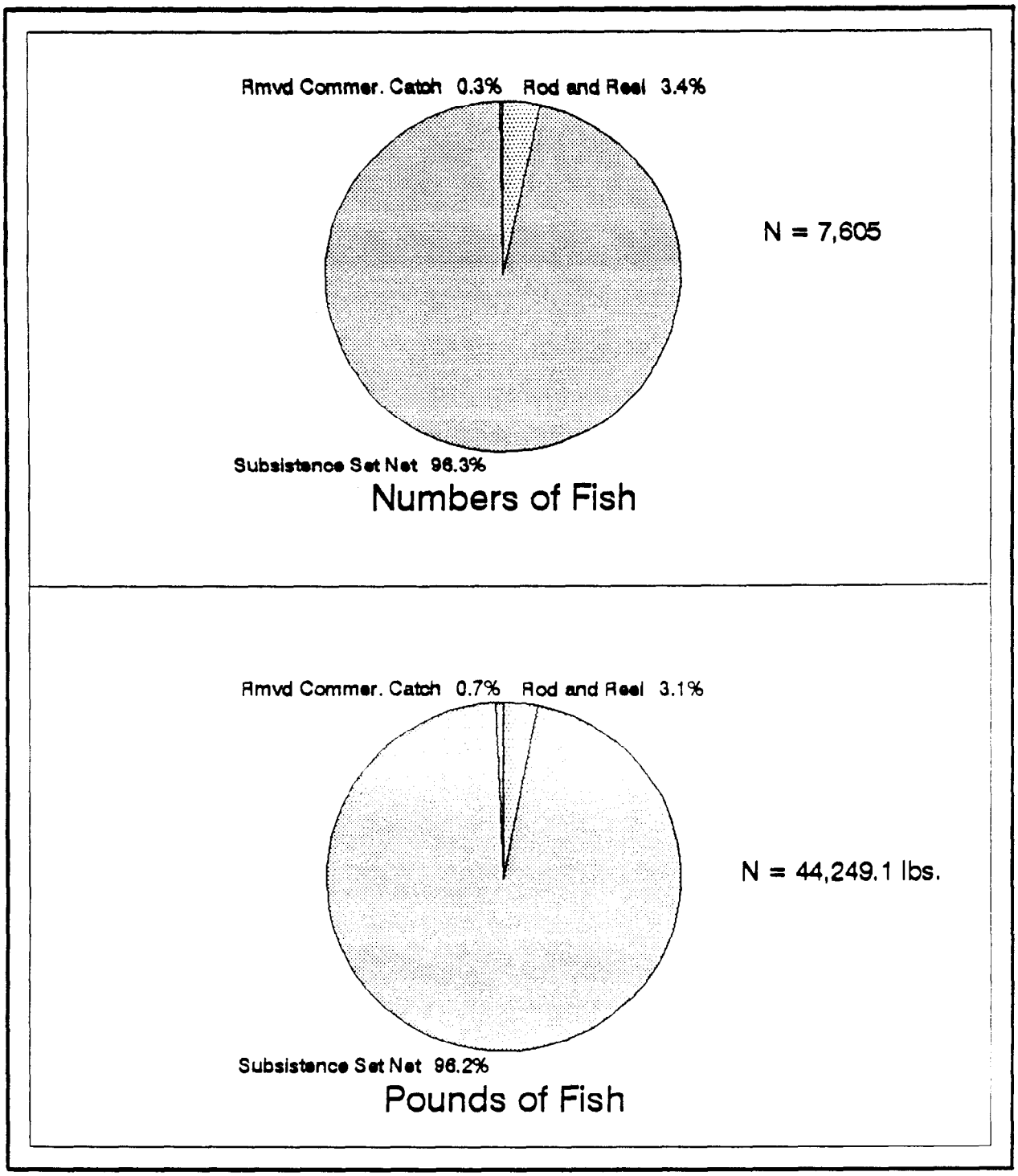


TABLE 22. PERCENTAGE OF KOLIGANEK HOUSEHOLDS HARVESTING SALMON, BY GEAR TYPE AND SPECIES, APRIL 1987 - MARCH 1988 (N=42 households)

	Percentage of Households Harvesting			
	Removed from Commercial Catches	Subsistence Net	Rod and Reel	Any Method
Kings	11.9%	47.6%	4.8%	52.4%
Sockeyes	4.8%	47.6%	4.8%	47.6%
Chums	2.4%	40.5%	0.0%	40.5%
Pinks	0.0%	2.4%	0.0%	2.4%
Cohos	2.4%	31.0%	38.1%	57.1%
Spawning	0.0%	21.4%	4.8%	23.8%
ANY SALMON	11.9%	59.5%	38.1%	71.4%

Source: Division of Subsistence, ADF&G, Survey 1988.

TABLE 23. SALMON HARVESTS BY GEAR TYPE, KOLIGANEK, APRIL 1987 - MARCH 1988

	Removed from Commercial Catch			Subsistence Net			Rod and Reel			Any Method			
	No.	lbs.	%[a]	No.	lbs.	%[a]	No.	lbs.	%[a]	No.	%[b]	lbs.	%[b]
Kings	194	2,679.1	22.1%	647	8,935.1	73.9%	35	483.4	4.0%	876	7.0%	12,097.6	20.5%
Sockeyes	98	413.6	1.5%	6,348	26,788.6	97.5%	66	278.5	1.0%	6,512	52.1%	27,480.6	46.5%
Chums	5	22.4	0.1%	1,511	6,754.2	99.7%	0	0.0	0.0%	1,516	12.1%	6,776.5	11.5%
Pinks	0	0	0.0%	5	11.5	100.0%	0	0.0	0.0%	5	0.0%[c]	11.5	0.0%[c]
Cohos	5	23.0	0.2%	1,760	8,078.4	82.6%	367	1,685.0	17.2%	2,132	17.0%	9,785.9	16.6%
Spawning	0	0	0.0%	1,455	2,910.0	99.4%	9	18.0	.6%	1,464	11.7%	2,928.0	5.0%
TOTAL[d]	302	3,138.0	2.4%[d]	11,726	53,477.7	93.8%[d]	477	2,464.4	3.8%[d]	12,505	100.0%	59,080.1	100.0%

[a] Percent of species total taken by gear type.
[b] Percent of total catch made up of each species.
[c] Equals 0.0001 percent.
[d] Percent of total catch of all salmon by gear type.

Source: Division of Subsistence Survey, ADF&G, 1988

Figure 18. Salmon Harvest by Gear Type, Koliganek, 1987

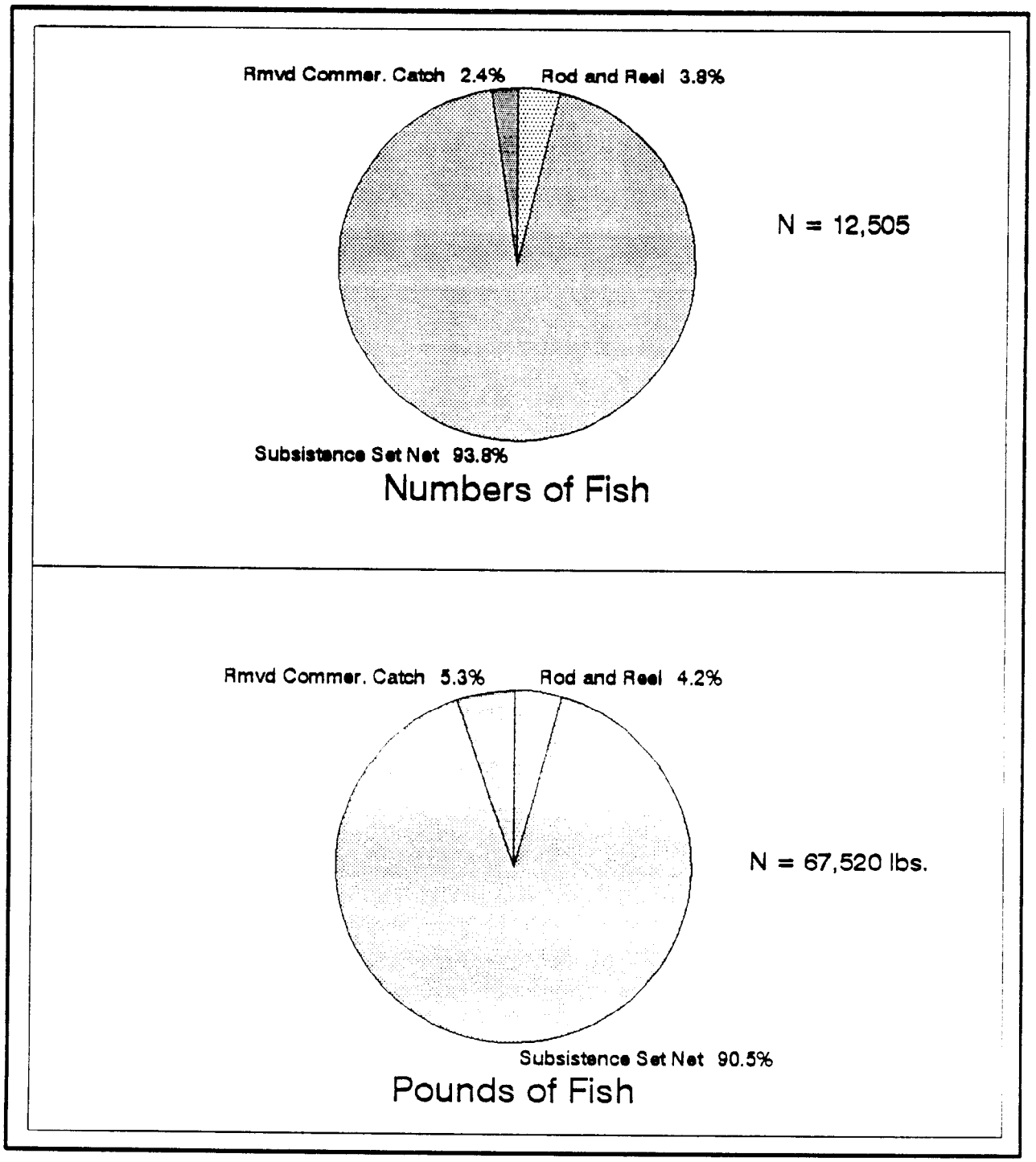


TABLE 24. PERCENTAGE OF NEW STUYAHOK HOUSEHOLDS HARVESTING SALMON, BY GEAR TYPE AND SPECIES, APRIL 1987 - MARCH 1988 (N=40 households)

	Percentage of Households Harvesting			
	Removed from Commercial Catches	Subsistence Net	Rod and Reel	Any Method
Kings	5.0%	62.5%	5.0%	70.0%
Sockeyes	2.5%	62.5%	2.5%	65.0%
Chums	0.0%	45.0%	2.5%	47.5%
Pinks	0.0%	12.5%	2.5%	15.0%
Cohos	0.0%	27.5%	20.0%	37.5%
Spawning	0.0%	20.0%	12.5%	25.0%
ANY SALMON	5.0%	65.0%	25.0%	77.5%

Source: Division of Subsistence, ADF&G, Survey 1988.

numbers and pounds) of the total salmon harvest (Table 25, Fig. 19). A small number of salmon (less than one percent) were also caught using rod and reel. Only 15 fish (all king) were removed from commercial catches.

Subsistence Fishing Locations

While some families established fish camps along Nushagak Bay to be close to relatives engaged in commercial fishing, others set nets close to the villages (Fig. 20). Generally, people were at their fish camps from early June to late July and caught their king, sockeye, and chum at that location. Only two households in Ekwok reported using fish camps in the summer of 1987. One fished at Ekuk and the other at Lewis Point. Ten Koliganek families had fish camps on Nushagak Bay, all within the commercial fishing district, and included sites at Ekuk, Queen Slough, and Nushagak. One family went to Ekwok to put up fish with relatives there. Almost half the New Stuyahok households reported having fish camps, mostly at Lewis Point. Other fish camps were located at Nunachuak, Wood River, Ekuk, and Nushagak. Figures 21, 22, and 23 show the areas used for salmon fishing for each village over a recent 20 year period.

By the end of July, most families returned to the villages where some continued to harvest silvers. Coho were usually caught in areas close to the villages. "Spawned-outs" were harvested upriver in the Nushagak and Mulchatna rivers, Nunachuak Creek, and in the Tikchik Lake, and Nuyakuk Lake, and Lake Chauekuktuli.

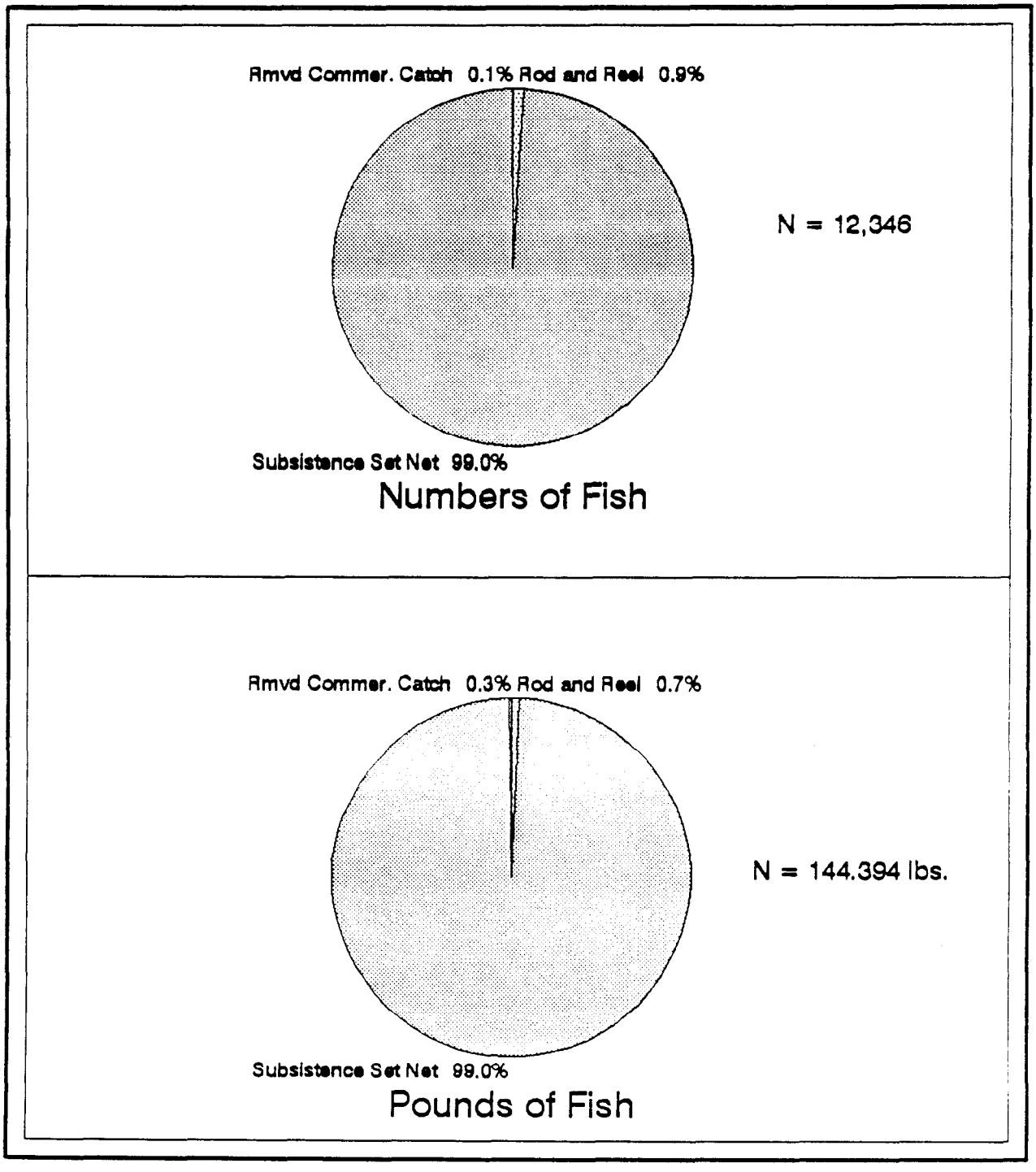
TABLE 25. SALMON HARVESTS BY GEAR TYPE, NEW STUYAHOK, APRIL 1987 - MARCH 1988

	Removed from Commercial Catch			Subsistence Net			Rod and Reel			Any Method			
	No.	lbs.	%[a]	No.	lbs.	%[a]	No.	lbs.	%[a]	No.	%[b]	lbs.	%[b]
Kings	15	207.2	0.5%	2,723	37,604.6	99.1%	10	138.1	0.4%	2748	22.3%	37,949.9	48.6%
Sockeyes	0	0	0.0%	6,566	27,708.5	99.7%	22	92.8	0.3%	6588	53.4%	27,801.4	35.6%
Chums	0	0	0.0%	1,748	7,813.6	99.4%	10	44.7	0.6%	1,758	14.2%	7,858.3	10.1%
Pinks	0	0	0.0%	48	109.9	88.9%	6	13.7	11.1%	54	0.4%	123.7	0.2%
Cohos	0	0	0.0%	686	3,148.7	92.5%	56	257.0	7.5%	742	6.0%	3,405.8	4.4%
Spawning	0	0	0.0%	448	896.0	98.2%	8	16.0	1.8%	456	3.7%	912.0	1.2%
TOTAL	15	207.2	0.1%[c]	12,219	77,281.4	99.0%[c]	112	562.4	0.9%[c]	12,346	100.0%	78,050.9	100.0%

a Percent of species total taken by gear type.
b Percent of total catch made up of each species.
c Percent of total catch of all salmon by gear type.

Source: Division of Subsistence Survey, ADF&G, 1988.

Figure 19. Salmon Harvest by Gear Type, New Stuyahok, 1987



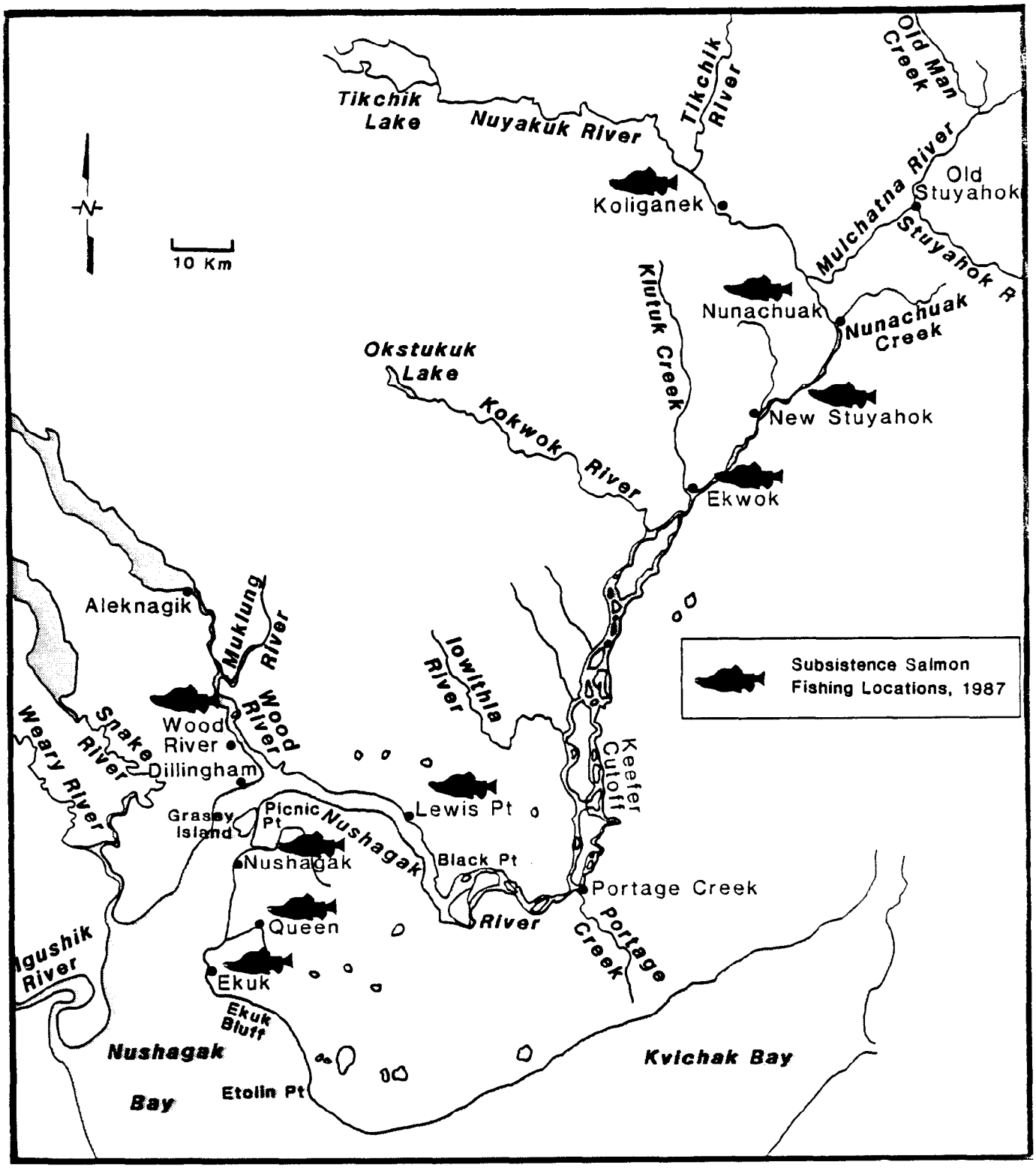


Figure 20. Subsistence Salmon Fishing Locations For Residents Of Ekwok, Koliganek, and New Stuyahok, 1987.

Subsistence Salmon Fishing Regulations

Table 26 outlines the regulations which have governed the subsistence salmon fishery for the Nushagak District from 1960 to 1988. Permits have been required for nearly all subsistence salmon fishing in the Bristol Bay area since statehood. The only exception was subsistence fishing between 1960 and 1964 which took place at least twelve miles upstream of a commercial district. Prior to 1971, applicants were required to show cause for the permits (1960-63) or demonstrate that the use of the fish was compatible with proper utilization of the stocks. After 1971 permits were to be issued upon request and the only additional change occurred in 1980 when it was stated only one permit would be issued per household rather than to each individual.

Gear has been limited to legal commercial gear within the commercial district and to set gill nets in other locations. The number of fathoms allowed for set gill nets has been progressively restricted throughout the years. Until 1974, 50 fathoms were permitted anywhere in the district. In 1974, that portion of the bay encompassing Dillingham (between markers at Bradford Point and Red Bluff) was restricted to use of ten fathoms. In the following year, nets in the remainder of the drainage were limited to 25 fathoms.

From 1963-1979, there were provisions in the regulations to impose quotas through the permitting process. However, no quotas have ever been imposed for the Nushagak District in the subsistence regulations themselves. Over the years a number of other restrictions were added to the regulations, all of which have stayed in place. In

EKWOK
Subsistence Use Areas

MOOSE

SALMON

SOURCES

John Wright and Steve Behnke, field research, 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

Data were collected from four local resource experts. Draft maps were reviewed and corrected at a public meeting attended by about 12 residents and copies of draft maps were left on display in Ekwok prior to final drafting. Data represent contemporary resource use areas,defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

SCALE
5 0 5 10 15 20 Miles

Alaska

Produced by the State of Alaska, Department of Fish and Game, Division of Subsistence, May 1989

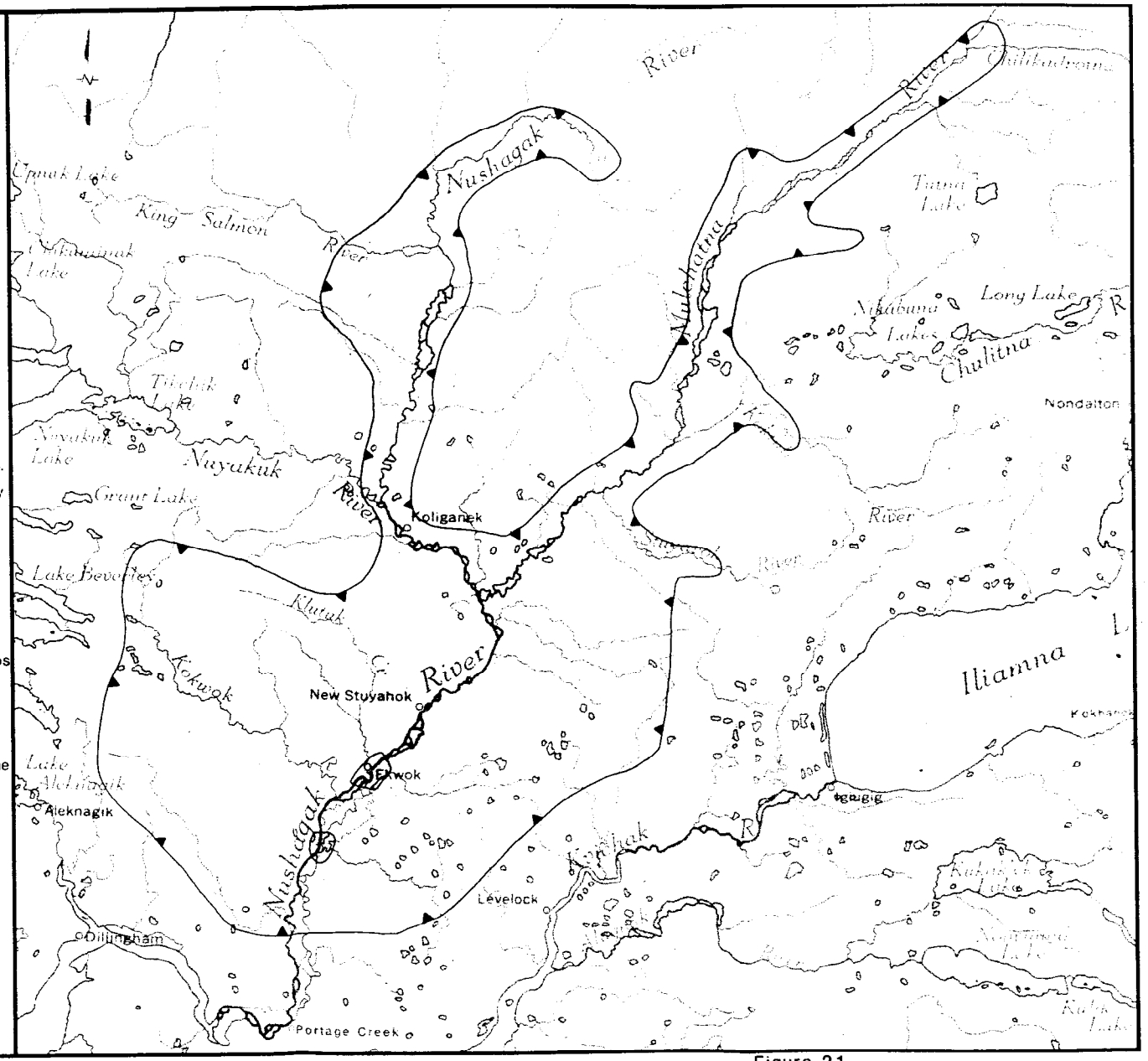
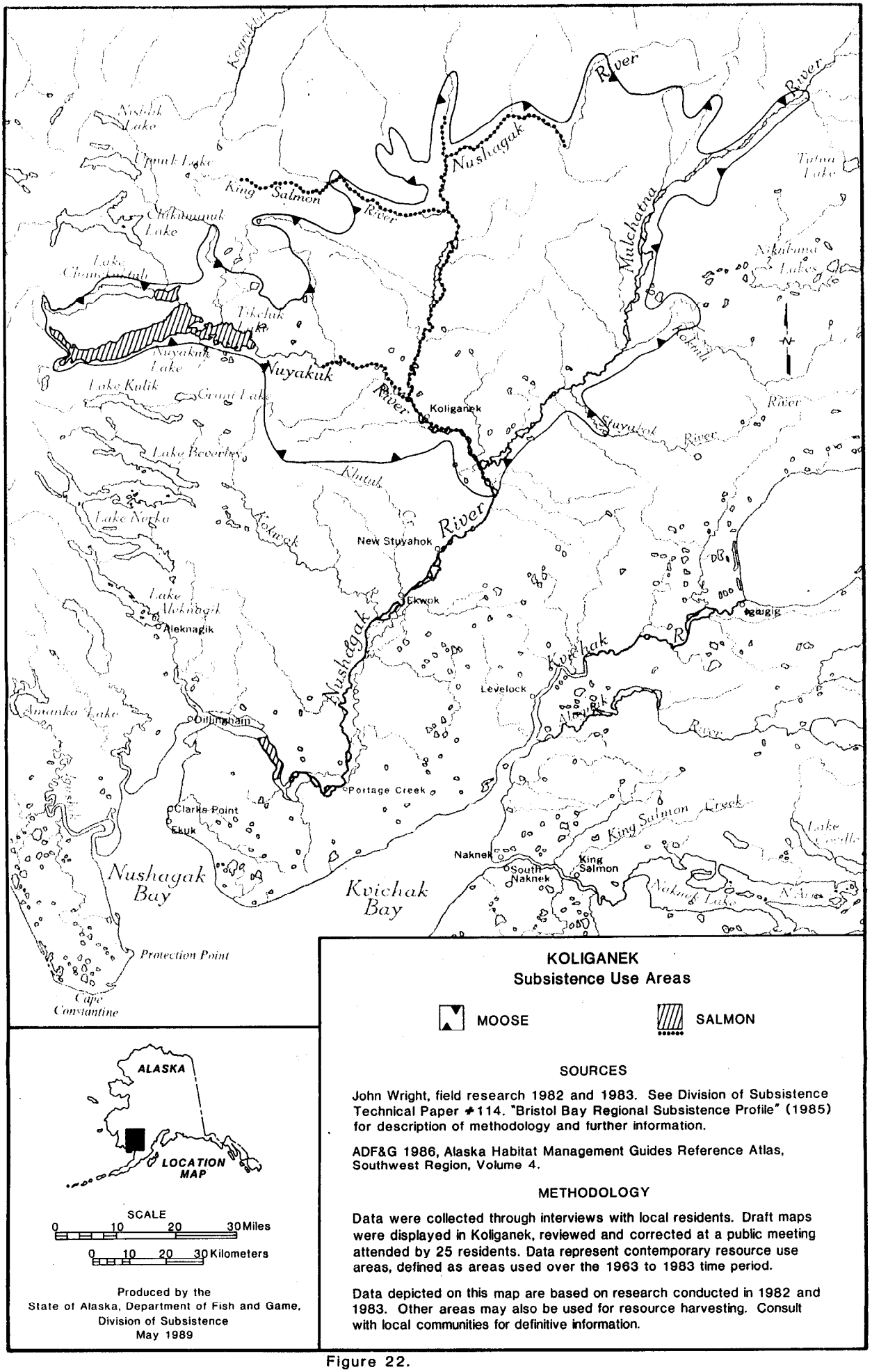


Figure 21.



Produced by the
State of Alaska, Department of Fish and Game,
Division of Subsistence
May 1989

KOLIGANEK
Subsistence Use Areas

MOOSE

SALMON

SOURCES

John Wright, field research 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

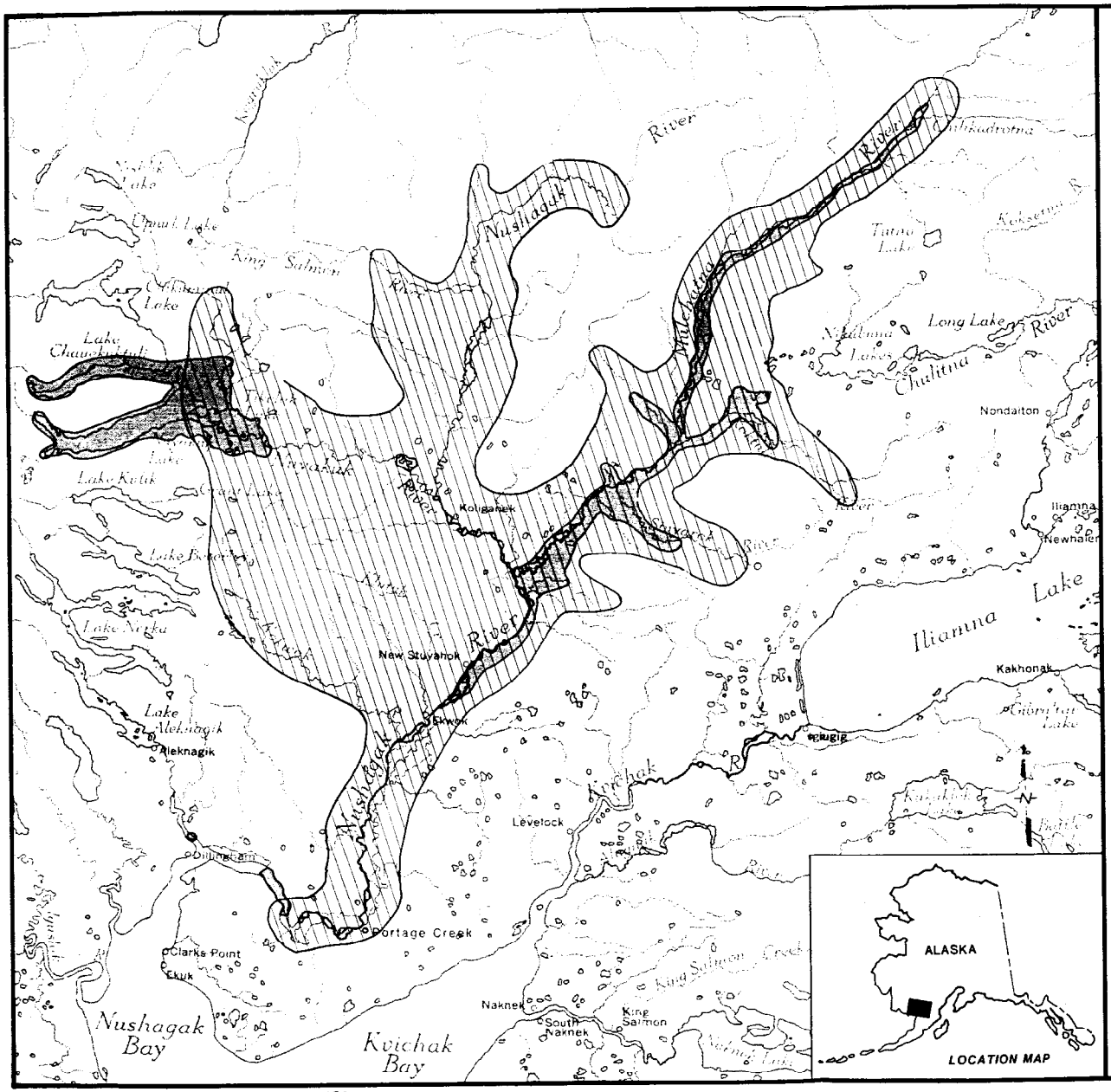
ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

Data were collected through interviews with local residents. Draft maps were displayed in Koliganek, reviewed and corrected at a public meeting attended by 25 residents. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

Figure 22.



NEW STUYAHOK

Subsistence Use Areas

MOOSE

SALMON

SOURCES

John Wright and Steve Behnke, field research, 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

Data were collected at a public meeting in New Stuyahok attended by about 20 residents. Draft maps were reviewed and corrected by about ten people prior to final drafting. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

SCALE 1:1,000,000

0 10 20 30 40 MILES

0 10 20 30 40 KILOMETERS

Produced by the State of Alaska, Department of Fish and Game, Division of Subsistence, May 1989

Figure 23.

TABLE 26. SUBSISTENCE SALMON REGULATIONS NUSHAGAK DISTRICT, 1960-1988.

Year	Permit Required	Gear	Restrictions
1960 to 1962	Permit Required to take fish less than 12 miles upstream from waters open to commercial fishing and within a defined commercial district by those not licensed as commercial fishermen. Must show cause for permit to ADF&G.	Set gill nets not to exceed 50 fathoms or legal commercial gear in a commercial district.	With legal commercial gear in commercial districts during open fishing periods.
1963	Same	Same	Number of salmon may be limited under the terms of the permit. In places where a subsistence fishery may have injurious effects on inadequate number of spawners, fishery may be further restricted by field announcement.
1964	Permit required to take fish less than 12 miles upstream from waters open to commercial fishing and within a defined commercial district by a licensed commercial fishermen. No need to show cause for permit; permit shall be issued by representative of ADF&G if compatible with proper utilization of salmon stocks.	Same	Same

TABLE 26. (Continued) SUBSISTENCE SALMON REGULATIONS NUSHAGAK DISTRICT, 1960-1988.

Year	Permit Required	Gear	Restrictions
1965 to 1970	Permits required for all subsistence fishermen in the drainage.	Same	Same, plus: waters within 300' of any stream mouth utilized by salmon are closed to all subsistence fishing. No nets may obstruct more than 1/2 the width of a stream. Minimum distance between nets in a stream shall be 300'.
1971 to 1973	Salmon for subsistence purposed may be taken under a permit from ADF&G.	Same	Same, plus: minimum units between gear are 300' from another gill net.
1974	Same	Outside the defined commercial district, salmon set gill nets may not exceed 50 fathoms except between the markers (2 mile below Red Bluff on the west side of Wood River) where only 10 fathoms of gear is allowed. All set nets must be staked and buoyed.	Same, plus: during the period June 16-July 17, between the markers at Bradford Pt. and Red Bluff, subsistence fishing will be permitted only during the following times: 9 am Mon. - 9 am Tues. 9 am Wed. - 9 am Thurs. 9 am Fri. - 9 am Sat.

TABLE 26. (Continued) SUBSISTENCE SALMON REGULATIONS NUSHAGAK DISTRICT, 1960-1988

Year	Permit Requirements	Gear	Restrictions
1975 to 1977	Same	Outside the defined commercial fishing districts, salmon for subsistence purposes may be taken only with set gill nets not to exceed 25 fathoms in length; except between markers at Red Bluff - Bradford Pt., nets shall not exceed 10 fathoms.	Same, plus: salmon for subsistence may be taken at any time from Jan. 1 - Dec. 31 in waters closed to commercial fishing.
1978 to 1979	Same	Same	Same, plus: no person may operate or assist in subsistence salmon net gear while operating or assisting in commercial gear.
1980 to 1986	Same, plus: only one permit may be issued per household.	Same	Same
1986 to 1987	Same	Same	Subsistence fishing limited to customary and traditional uses by rural residents.

TABLE 26. (Continued) SUBSISTENCE SALMON REGULATIONS NUSHAGAK DISTRICT, 1960-1988.

Year	Permit	Gear	Restrictions
1988	Same	Same	Limited to Ak. residents domiciled in Nushagak drainage.
	Except		Same, plus "Within the waters of a District open during the Commercial salmon fishing season, salmon may only be taken during open commercial fishing periods. In the open waters of the Nushagak District, the department shall provide for subsistence salmon fishing by emergency order whenever there are commercial salmon closures of from five or more days: and 1) Set gill nets may not be more than 10 fathoms in length; 2) No set gill net may be set or operated within 450' of another set gill net, and 3) Catches during the emergency order openings must be reported to the Dillingham ADF&G office within 24 hours after the closure".

Source: 1960-1978 Alaska Commercial Finfish Regulations.
1979-1988 Alaska Subsistence Fishing Regulations.

sum, these changes closed to subsistence fishing all waters within 300 feet of any stream utilized by salmon (1965); forbade nets to obstruct more than one-half the width of a stream (1965); and established the minimum distance between nets in a stream at 300 feet (1965). In 1971, this regulation was modified to establish 300 feet as the minimum distance nets in any location (1971). In 1974, the area between the markers at Bradford Point and Red Bluff was put on a three day per week fishing period for one month during the peak of the king and sockeye runs. The following year, the distance between subsistence nets set between Red Bluff and Bradford Point was reduced to 100 feet apart. The final restriction occurred in 1978 when no person was allowed to operate or assist in operating commercial and subsistence gear simultaneously.

During the study year (1987) only rural residents from communities with customary and traditional uses of salmon were allowed to obtain salmon for subsistence purposes in the Nushagak District. In 1988 the Board of Fisheries defined customary and traditional uses as occurring in communities of the Nushagak District and its freshwater drainages. Persons domiciled in those communities were required to obtain a permit which was provided without charge from the Alaska Department of Fish and Game. Permits were available from local vendors or at the Dillingham ADF&G offices. Only one permit was issued per household and each permit holder was required to report their daily harvests on a harvest calendar at the end of the season. In the Nushagak District, no harvest limits were imposed on any species.

Until 1988, salmon could only be taken during open weekly commercial salmon fishing periods or by regulated openings during the emergency order period within the commercial district. The area in the

Nushagak River above the marker was open to subsistence fishing seven days per week throughout the year. In 1988, the Board of Fisheries authorized the Department of Fish and Game to allow a limited amount of subsistence fishing within the commercial district by emergency order only. Such openings were to be provided whenever there were commercial salmon closures of five days or more. In those circumstances, gill nets were to be no more than 10 fathoms apart and operated at least 450 feet from another set net. Finally, catches were to be reported to the Dillingham ADF&G office within 24 hours after a closure by VHF, phone, or through a local volunteer monitor.

There was a third section of the Nushagak District, primarily the Dillingham area, which was regulated on a three day per week schedule during the emergency order period, June 16-July 17. Although this section was not generally used by residents of the study communities, there were two fish camps in Dillingham located along Wood River. Net lengths were limited to ten fathoms.

Within the sections of the Nushagak District used by residents of the study communities, subsistence salmon could only be taken by drift or set gill nets. Up to 25 fathoms of set gill net was allowed with at least 300 feet required between sites. Outside the commercial district, set gill nets were the only permissible subsistence gear for salmon. Nets were required to be staked and buoyed and no net was permitted to obstruct more than one half the width of a stream. No person was permitted to operate subsistence gear and commercial gear simultaneously.

Subsistence Salmon Historical Permit Returns

The following section discusses the subsistence salmon harvests for the villages of Ekwok and New Stuyahok from 1965 to 1988, and for Koliganek from 1975 to 1988 based on ADF&G permit returns and the household surveys conducted in 1988. In the early 1960s Bristol Bay fishery managers became concerned about low salmon returns in some river systems. Consequently, the Alaska Department of Fish and Game began a concerted effort to detail salmon catches for subsistence use in the Bristol Bay area and a permit system was gradually introduced throughout the region.

Table 27 reports subsistence salmon harvests for the village of Ekwok from 1965 - 88. During those years, the mean number of permits issued was 11. The return rate for permits has generally been high, 92 percent on average and 100 percent during the last four years of 1985-1988. Harvest numbers averaged 4,453 sockeye, 989 king, 1,803 chum, 97 pinks, 343 cohos, for a total of 7,926 fish or 832 salmon per permit. During the last ten years, the average number of fish per permit has declined to 612.

Permit data for Koliganek has been collected systematically since 1975. During that time, the average number of salmon permit holders was 13, with a substantial return rate of 84% (Table 28). For the 14 year period of 1975 - 1988, Koliganek permit holders reported a mean harvest of 4,921 sockeye, 836 king, 1,746 chum, 101 pink, and 165 coho for a total of 8,556 salmon or 825 per permit. When only the last

TABLE 27. SUBSISTENCE SALMON HARVESTS, EKWOK 1965 - 1988.

Village	Years	Percent Returned	Permits Issued	Sockeyes	Kings	Chums	Pinks	Cohos	Actual Totals	Fish per Permit
Ekwok	1965	88%	8	3,272	419	1,472	5	527	5,695	814
	66	90%	10	2,340	528	2,220	1,162	209	6,459	718
	67	63%	8	3,560	498	4,995	3	130	9,186	1,837
	68	89%	9	6,363	826	2,453	507	3	10,152	1,269
	69	67%	9	5,421	1,817	2,790	1	550	10,579	1,763
	1970	91%	11	6,001	1,863	2,704	28	77	10,673	1,067
	71	100%	9	7,478	799	1,032	2	81	9,392	1,044
	72	88%	8	2,372	829	1,482	48	0	4,731	676
	73	88%	8	3,251	764	1,950	4	121	6,090	870
	74	92%	12	5,434	1,035	2,575	362	269	9,675	880
	1975	100%	12	4,325	1,165	1,149	24	181	6,844	570
	76	100%	15	5,750	938	1,827	358	121	8,994	600
	77	75%	12	3,873	432	1,278	-0-	339	5,922	658
	78	86%	14	6,484	951	3,035	2,402	35	12,907	1,076
	79	100%	13	3,698	980	2,149	16	364	7,207	554
	1980	100%	12	6,525	1,263	1,621	734	239	10,382	865
	81	100%	13	4,825	1,399	1,273	150	1,105	8,752	673
	82	93%	14	3,549	884	1,321	493	725	6,972	536
	83	100%	9	3,170	1,214	1,191	0	209	5,784	643
	84	90%	10	3,750	783	1,040	367	509	6,449	717
	1985	100%	12	4,566	1,122	461	284	575	7,008	584
	86	100%	11	4,959	891	1,057	259	618	7,784	708
	87	100%	15	3,344	1,201	884	38	876	6,343	423
	88	100%	15	2,525	1,106	1,281	620	602	6,134	409
24 year average		92%	11	4,450	988	1,802	128	353	7,920	831
10 year average		98%	12	4,087	1,084	1,228	296	582	7,277	611

Source: Division of Subsistence office files.

TABLE 28. SUBSISTENCE SALMON HARVESTS, KOLIGANEK 1975 - 1988.

Village	Year	Percent Returned	Permits Issued	Sockeyes	Kings	Chums	Pinks	Cohos	Actual Totals	Fish Per Permit
Koliganek	1975	83%	12	5,619	521	620	0	65	6,825	683
	76	80%	15	2,770	452	828	258	0	4,308	359
	77	93%	13	3,750	604	1,263	0	63	5,680	473
	78	82%	11	3,267	466	2,689	269	152	6,843	760
	79	92%	12	4,684	1,452	1,330	0	25	7,491	681
	1980	75%	20	11,608	1,041	1,997	604	384	15,634	1,042
	81	85%	13	6,201	1,102	1,543	0	773	9,619	874
	82	80%	10	6,892	798	3,425	40	293	11,448	1,431
	83	80%	15	6,575	1,566	2,412	0	69	10,622	885
	84	92%	13	9,611	1,518	4,397	164	119	15,809	1,317
	1985	67%	9	3,704	381	421	0	20	4,526	754
	86	100%	8	6,433	478	1,213	76	6	8,206	1,026
	87	80%	15	3,939	449	746	0	338	5,472	456
	88	90%	10	3,846	882	1,569	0	0	7,297	811
14 Yr Average		84%	13	4,921	836	1,746	101	165	8,556	825
10 Yr Average		84%	13	6,349	967	1,905	88	203	9,612	928

Source: Division of Subsistence, office files.

ten years are considered, this figure increases to 928 salmon per permit.

New Stuyahok, the largest of the study communities, has had significantly more permit holders than either Ekwok or Koliganek. For the years 1965- 1988, an average of 25 permits have been issued on an annual basis with a relatively low return rate of only 57% (Table 29). Harvest totals averaged 597 fish per permit. The total community harvest of 9,042 salmon breaks down as follows: 5,045 sockeye, 1,644 king, 1,464 chum, 469 pink, and 328 coho. During the past ten years (1979 - 1988), both the number of permits issued and the return rates have risen sharply, with an average of 77 percent of the 37 permits returned.

Processing and Preservation Methods

A variety of methods were used for processing and preserving salmon. The first king of the year were widely shared and eaten fresh as everyone looked forward to the taste of fresh king salmon. Subsequent catches were cut in strips, brined, dried, and smoked. "Strips" were stored in bags in a freezer or cache, often in the household of the oldest female in an extended family. Having a good supply of "strips" on hand for the winter was considered essential. The heads, stomach, and flesh were commonly boiled in soups. Heads and sometimes bellies were salted (*sulunaq*); heads and backbones were also commonly dried for dog food. Some heads were fermented in the ground and referred to as "stinky heads" or *tepa*. Some king salmon were frozen

TABLE 29 SUBSISTENCE SALMON HARVESTS, NEW STUYAHOK 1965 - 1988.

Village	Years	Percent Returned	Permits Issued	Sockeyes	Kings	Chums	Pinks	Cohos	Actual Totals	Fish Per Permit
New Stuyahok	1965	33%	3	1,347	18	297	0	0	1,662	1,662
	66	67%	6	360	210	120	150	0	840	840
	67	100%	1	980	20	-0-	0	0	1,000	1,000
	68	100%	2	520	154	135	180	0	989	495
	69	100%	5	310	170	235	30	90	835	167
	1970	100%	6	1,554	617	666	116	1	2,954	492
	71	67%	6	3,302	337	68	1	0	3,708	927
	72	40%	15	1,710	284	651	137	57	2,839	473
	73	84%	19	3,654	786	1,124	16	34	5,614	351
	74	36%	22	2,105	541	797	210	99	3,752	469
	1975	72%	32	9,275	2,211	793	767	703	13,749	598
	76	86%	36	4,868	2,162	,949	439	48	9,466	305
	77	75%	36	11,589	1,626	2,147	0	238	15,600	578
	78	47%	38	5,852	2,293	4,708	1,102	213	14,168	787
	79	70%	36	7,383	2,527	1,310	270	446	11,936	477
	1980	81%	26	8,976	3,121	3,071	987	65	16,220	772
	81	81%	36	8,532	3,833	4,406	1,431	840	19,042	657
	82	57%	42	5,257	3,133	2,086	1,302	1,130	12,908	538
	83	71%	41	7,770	2,336	2,531	151	413	13,201	455
	84	78%	37	7,737	1,741	1,860	937	681	12,956	447
	1985	76%	37	7,500	1,778	875	57	788	10,998	393
	86	92%	36	12,417	4,050	3,016	2,911	1,827	24,221	734
	87	76%	38	4,369	2,462	1,080	33	12	7,956	274
	88	90%	38	3,710	3,046	2,470	686	475	10,387	433
24 Year Average		57%	25	5,045	1,644	1,464	469	328	9,042	597
10 Year Average		77%	37	7,365	2,803	2,271	877	278	13,983	518

Source: Division of Subsistence, office files.

specifically for the Russian Orthodox lent when eating meat was discouraged.

Sockeye were most frequently dried and smoked and formed a staple for winter consumption. Chum were spit and dried, and saved for dogs. Silvers were usually frozen for the winter, but also eaten fresh, smoked, or salted as fillets. Because of their low oil content, spawning salmon were favored for drying and eaten with seal oil, particularly by older residents. They were also boiled or used for dog food. Some people saved fish eggs to feed dogs. Salmon were also fermented, pickled, or canned in smaller quantities.

MARINE FISH

The study communities' inland locations provided limited opportunities for harvesting marine fish and this category comprised less than one percent of the total resources harvested during the study period in Ekwok, Koliganek, and New Stuyahok. However, many families welcomed smelt, herring, flounder, and herring roe-on-kelp (*melucuaq*) as a change of diet as is shown in Tables 16, 17, and 18. Most of these fish were received as gifts or trade items from people in coastal communities. Smelt was frequently exchanged for freshwater fish or caribou. Herring and *melucuaq* were brought home by herring fishermen.

In Ekwok, more than half the sampled households (58.6 percent) used at least one species of marine fish because of gifts from other locations. Over half the households (51.7 percent) received either smelt, herring, or herring roe-on-kelp. Although a relatively small amount of smelt was harvested, two households made excursions to the

coast to net or jig for two gallons of smelt (Table 30). During the fieldwork period, one household traveled to Levelock for smelt. Before freeze-up, smelt could be netted downriver from the mouth of the Nushagak to Portage Creek. During the winter months, Lewis Point and Black Point were favorite smelt fishing locations for jigging through the ice. Smelt were widely used (51.7 percent) and were received by 48.3 percent of the households.

Herring roe-on kelp was the other marine resource which was received frequently by Ekwok residents with nearly one-quarter of the households (24.1 percent) receiving *melucuaq*. Three households picked five buckets of herring roe-on-kelp.

Smelt were also widely used in Koliganek where over one-third (38.1 percent) of the sample used smelt and 18 gallons were harvested by four households (Table 31). One household reported they had obtained their smelt by ice-fishing at Red Bluff (on Wood River) when they were visiting friends in Dillingham. Because of the distance, trips are not made solely for harvesting smelt but occasionally the activity was combined with visiting. One third (33.3 percent) of the Koliganek families received smelt in the study period. Roe-on-kelp also was considered a delicacy by Koliganek residents as one newcomer to the community learned when he returned from the fishing grounds without any roe-on-kelp. He promised his disappointed neighbors to bring some the following season now that he knew people "had a taste" for it. A few buckets of herring were also harvested and received. A small amount of flounder (65 fish) were removed from subsistence or commercial salmon nets and retained for home use.

TABLE 30. MARINE FISH HARVEST BY GEAR TYPE, EKWOK, APRIL 1987 - MARCH 1988.

	Subsistence Net		Ice Fishing		Commercial Catch		Other Method		TOTAL
	Number	%	Number	%	Number	%	Number	%	HARVEST
Species									
Smelt	1g[a]	25.0%	3g	75.0%	NA		0	0.0%	4g
Herring	0	0.0%	NA		0	0.0%	0	0.0%	0
Herring Roe	0	0.0%	NA		0	0.0%	0	0.0%	0
Roe on Kelp	NA		NA		0	0.0%	25g[b]	100.0%	25g
Flounder	0	0.0%	NA		0	0.0%	0	0.0%	0

[a] (g) indicates gallons.
[b] picked by hand.
NA = not applicable.
Source: Division of Subsistence Survey, ADF&G, 1988.

TABLE 31. MARINE FISH HARVEST BY GEAR TYPE, KOLIGANEK, APRIL 1987 - MARCH 1988.

	Subsistence Net		Ice Fishing		Commercial Catch		Other Method		TOTAL
	Number	%	Number	%	Number	%	Number	%	HARVEST
Species									
Smelt	15g[a]	86.3%	3g	13.6%	NA		0	0.0%	18g
Herring	25g	100.0%	NA		0	0.0%	0	0.0%	25g
Herring Roe	0g	0.0%	NA		0	0.0%	0	0.0%	0g
Roe on Kelp	NA		NA		0	0.0%	25g[b]	100.0%	25g
Flounder	45	69.2%	NA		20[c]	30.7%	0	0.0%	65

[a] (g) indicates gallons.
[b] picked by hand.
[c] incidental catch.
NA = not applicable.
Source: Division of Subsistence Survey, ADF&G, 1988.

During the study year, three families in New Stuyahok attempted to harvest smelt but only two were successful. As in the other communities, sharing smelt was commonplace and 23 households (57.5 percent) received gifts of smelt. Several families also removed small quantities of roe-on-kelp from their commercial catches or picked roe-on-kelp for subsistence (Table 32). *Melucuaq* was also enjoyed in New Stuyahok. Several respondents who awaited the return of herring fisherman, expressed anticipation for the *melucuaq* they would bring with them.

FRESHWATER FISH

Regulations

According to regulations, the harvesting of char and other trout with nets required a freshwater subsistence permit. Fishermen were required to report their daily catch but no limits were imposed. However, the local ADF&G offices have not put a high priority on issuance of these permits and, consequently, few Bristol Bay residents are even aware of these requirements. In the Bristol Bay area, fishing through the ice with jigging gear was recognized as a subsistence activity by regulation. No permits or licenses were required for jigging and no limits were imposed. By regulation, all rod and reel fishing required a sport fishing license and compliance with the appropriate sport seasons and limits for individual species. Rainbow trout could only be taken legally under sport fish regulations. That is, by regulation, rainbow trout taken by any other means than rod and reel had to be returned to the water. As will be described below, all

TABLE 32. MARINE FISH HARVEST BY GEAR TYPE, NEW STUYAHOK, APRIL 1987 - MARCH 1988.

	Subsistence Net		Ice Fishing		Commercial Catch		Other Method		TOTAL HARVEST
	Number	%	Number	%	Number	%	Number	%	
Species									
Smelt	4g[a]	44.4%	5g	66.6%	NA		0	0.0%	9g
Herring	0	0.0%	NA		0g	0.0%	0	0.0%	0g
Herring Roe	15g	100.0%	NA		0	0.0%	0	0.0%	15g
Roe on Kelp	NA		NA		40g	72.7%	15g[b]	27.3%	55g
Flounder	0	0.0%	NA		0	0.0%	0	0.0%	0

[a] (g) indicates gallons.
[b] picked by hand.
NA = not applicable.
Source: Division of Subsistence Survey, ADF&G, 1988.

traditional freshwater fishing practices were not being provided for by regulation during the study period.

Harvest and Use Patterns

Freshwater fish were an important food source to residents in all three study communities in 1987-8. They were relatively easy to harvest, seasonally abundant, and provided variety in the diet. Annual effort and harvest levels vary depending on water, ice, and weather conditions. (For more detailed information on freshwater fishing patterns in each community, refer to Fall et al nd.) Nets for whitefish, pike, and long-nosed suckers were set in *qamaneqs* (places lacking water current or wind) in the spring and fall. In addition, lengthy trips were made to Tikchik Lake, Lake Nerka, and other upper lakes in the Wood-Tikchik system to harvest whitefish and lake trout, using pink salmon nets A few families set nets under the ice during the winter. Whitefish and pike were primarily dried or frozen and were an important food when families were without refrigeration during the commercial salmon season. Pike heads and stomachs were boiled and eaten. Whitefish also were eaten cooked or frozen with seal oil. The heads and flesh of long-nosed suckers were dried or boiled by some, especially older residents. Other people used suckers for dog food. Before freeze-up grayling and rainbow trout were commonly taken with rod and reel for food, frequently while hunting for moose and caribou by skiff along the Mulchatna River or by children and teens fishing near the village. In Ekwok and New Stuyahok, most rainbow trout were taken in nets.

Burbot were caught in whitefish nets or taken in small numbers with baited lines set near the communities as the ice was moving in the river. The burbot were considered good eating but reportedly not sought as frequently as they once were. The livers were reportedly as "rich as butter." In Ekwok, respondents explained that burbot used to school up at a sandbar in front of the village. When it was destroyed by the 1964 earthquake, there was no longer a concentrated harvesting location. Some older residents recalled that their fathers trapped for burbot and blackfish but fish trapping is no longer practiced.

After freeze-up and into the spring, many people enjoyed ice-fishing for grayling and pike. Smaller quantities of Dolly Varden, lake trout, and rainbow trout also were taken. The long sunny days in March and April are preferred for ice fishing. In the spring of 1988, Koliganek fishers seemed somewhat surprised to find whitefish biting small hooks. Even older residents said it was the first time they had caught whitefish in this manner.

In all three study communities, freshwater fish were harvested in notable quantities. In Ekwok, freshwater species represented 224.2 pounds (8.4 percent) of the mean household harvest. At least one species of freshwater fish was harvested by 65.5 percent of the households and used by 72.4 percent. Freshwater fish were commonly shared with 41.4 percent receiving and 34.5 percent giving. Whitefish, pike, grayling, and suckers were the species harvested in the greatest numbers (Table 33) Whitefish, pike, grayling, rainbow trout, and Dolly Varden were used by over half the sampled households and were also the species most commonly shared. Table 33 also presents Ekwok's freshwater

TABLE 33. FRESHWATER FISH HARVEST BY GEAR TYPE, EKWOK, APRIL 1987 - MAY 1988.

Species	Subsistence Net		Ice Fishing		Rod and Reel		TOTAL HARVEST
	No.	%	No.	%	No.	%	No.
Whitefish	1,227	98.4%	0	0.0%	20	1.6%	1,247
Pike	1,028	92.0%	78	7.0%	11	1.0%	1,117
Grayling	180	25.0%	120	16.7%	419	58.3%	719
Rainbow Trout	107	57.5%	10	5.4%	69	37.1%	186
Lake Trout	6	60.0%	0	0.0%	4	40.0%	10
Dolly Varden	33	31.7%	5	4.8%	66	63.5%	104
Burbot	22	100.0%	0	0.0%	0	0.0%	22
Suckers	780	100.0%	0	0.0%	0	0.0%	780

Source: Division of Subsistence Survey, ADF&G, 1988.

fish harvest by gear type. Pike and whitefish caught in nets formed the greatest part of the harvest.

Nearly all the sampled households (92.9 percent) in Koliganek used freshwater fish species. That resource category represented 11.4 percent of the mean household harvest of 357.5 pounds. At least one freshwater species was harvested by 81.0 percent of the sample. Well over half the sample shared (57.1 percent) or received (64.3 percent) freshwater fish. As shown in Table 34, whitefish, pike, grayling, and suckers were the most numerous species harvested. Most of the whitefish were harvested in nets. Nets were also significant in producing the pike and grayling catch as well but an even larger number were harvested by jigging through the ice. Species harvested in smaller numbers included rainbow trout, lake trout, Dolly Varden, and burbot. Whitefish, pike, and grayling, were also shared by at least one quarter of the sample.

In New Stuyahok, the use of freshwater fish was almost universal with 97.5 percent of the households using at least one species. Freshwater fish contributed 4.7 percent to the mean household harvest or 156.1 pounds. Harvesting was widespread with 85.0 percent of the households participating. Nearly three-quarters of the sample (72.5 percent) received freshwater fish and well over half (57.5 percent) gave some away. As in the other communities, whitefish, pike, and grayling formed the bulk of the harvest (Table 35). Smaller quantities of rainbow trout, lake trout, Dolly Varden, and suckers also were taken. Whitefish were harvested primarily in set nets. The majority of pike and grayling were taken with nets while significant numbers were the result of ice fishing.

TABLE 34. FRESHWATER FISH HARVEST BY GEAR TYPE, KOLIGANEK, APRIL 1987 - MAY 1988.

	Subsistence Net		Ice Fishing		Rod and Reel		Method Unknown		TOTAL HARVEST
Species	No.	%	No.	%	No.	%	No.	%	No.
Whitefish	2,065	81.9%	451	17.9%	5	0.2%	0	0.0%	2,521
Pike	995	41.3%	1,317	54.6%	50	2.1%	50	2.1%	2,412
Grayling	50	2.5%	1,867	92.6%	100	5.0%	0	0.0%	2,017
Rainbow Trout	74	19.4%	72	18.9%	235	61.7%	0	0.0%	381
Lake Trout	89	89.0%	1	1.0%	10	10.0%	0	0.0%	100
Dolly Varden	44	34.4%	37	28.9%	47	36.7%	0	0.0%	128
Burbot	123	91.8%	0	0.0%	0	0.0%	11	8.2%	134
Suckers	2,140	100.0%	0	0.0%	0	0.0%	0	0.0%	2,140

Source: Division of Subsistence Survey, ADF&G, 1988.

TABLE 35. FRESHWATER FISH HARVEST BY GEAR TYPE, NEW STUYAHOK, APRIL 1987 - MAY 1988.

	Subsistence Net		Ice Fishing		Rod and Reel		TOTAL HARVEST
Species	No.	%	No.	%	No.	%	
Whitefish	1,080	99.1%	0	0.0%	10	0.9%	1,090
Pike	594	58.9%	415	41.1%	0	0.0%	1,009
Grayling	583	56.8%	394	38.4%	50	4.9%	1,027
Rainbow Trout	110	52.4%	17	8.1%	83	39.5%	210
Lake Trout	53	43.1%	70	56.9%	0	0.0%	123
Dolly Varden	35	28.9%	86	71.1%	0	0.0%	121
Burbot	0	0.0%	0	0.0%	0	0.0%	0
Suckers	526	96.7%	0	0.0%	18	3.3%	544

Source: Division of Subsistence Survey, ADF&G, 1988.

Harvest Locations

Figures 24, 25, and 26 depict the areas used by each community for freshwater fishing between the years 1963 and 1983. As part of the 1987-8 resource use survey, respondents answered questions about the areas used for harvesting freshwater fish. The researchers asked each respondent to assess the frequency of their use of ten areas within the overall range of harvest areas used by the study communities. Interviewers gathered this information only from active fishing households. The results are reported in Tables 36 and 37 and Figures 27 and 28. Although each community had its own use pattern, the areas harvested most intensively in all the communities were those closest to the villages. In Ekwok, 87.0 percent of the fishing households had utilized that portion of the Nushagak closest to Ekwok, as well as the Kokwok River. The upper Nushagak below the Chickitnok was also used by more than one-fourth of the fishing households (30.4 percent). Other notable use areas were the lower Mulchatna (21.7 percent), the upper Mulchatna, and the lower Nushagak and Iowithla rivers (17.4 percent). Areas used by smaller numbers of households included Nunachuak drainage (8.7 percent), the Wood River Lakes, Tikchik Lake and Nuyakuk River, and Lake Clark/Iliamna/Kvichak drainages (4.3 percent each).

Two areas which were of special importance to Koliganek freshwater fishers were the upper Nushagak below the Chickitnok (used by 80.0 percent) and the Nuyakok River/Tikchik Lake system (used by 63.3 percent). The Nunachuak drainage (13.3 percent), the upper Nushagak above the Chickitnok (20.0 percent), and the lower Mulchatna River (16.7

TABLE 36. HOUSEHOLD FREQUENCY OF USE OF AREAS FOR HARVESTING FRESHWATER FISH, APRIL 1987 - MARCH 1988, EKWOK.

	% Ever Use?	% Regularly Use?	% Seldom Use?	% Use in 1987-8?
A. Wood River and Lakes	4.3%	0.0%	4.3%	0.0%
B. Tikchik Lake and Nuyakok River	4.3%	0.0%	4.3%	0.0%
C. Middle Nushagak and Kokwok River	87.0%	65.2%	21.7%	87.0%
D. Upper Nushagak below Chickitnok	30.4%	17.4%	13.0%	30.4%
E. Nushagak, including Chickitnok	13.0%	4.3%	8.7%	13.0%
F. Nunachuak Drainage	8.7%	4.3%	4.3%	8.7%
G. Lower Mulchatna	21.7%	8.7%	13.0%	17.4%
H. Upper Mulchatna	17.4%	4.3%	13.0%	17.4%
I. Lake Clark/Iliamna/ Kvichak	4.3%	0.0%	4.3%	4.3%
J. Lower Nushagak and Iowithla	17.4%	4.3%	13.0%	13.0%

[a] N = 23 respondent households who had at least one member actively harvesting freshwater fish during the study year and participated in mapping (79.3 percent of the sample of 29 households). Data represent partial estimates since not all harvesters were included.
Source: Division of Subsistence Survey, ADF&G, 1988.

EKWOK
Subsistence Use Areas

FRESHWATER FISH

WATERFOWL

CARIBOU

SOURCES

John Wright and Steve Behnke, field research, 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

Data were collected from four local resource experts. Draft maps were reviewed and corrected at a public meeting attended by about 12 residents and copies of draft maps were left on display in Ekwok prior to final drafting. Data represent contemporary resource use areas,defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

SCALE
5 0 5 10 15 20 Miles

Alaska

Produced by the State of Alaska, Department of Fish and Game, Division of Subsistence, May 1989

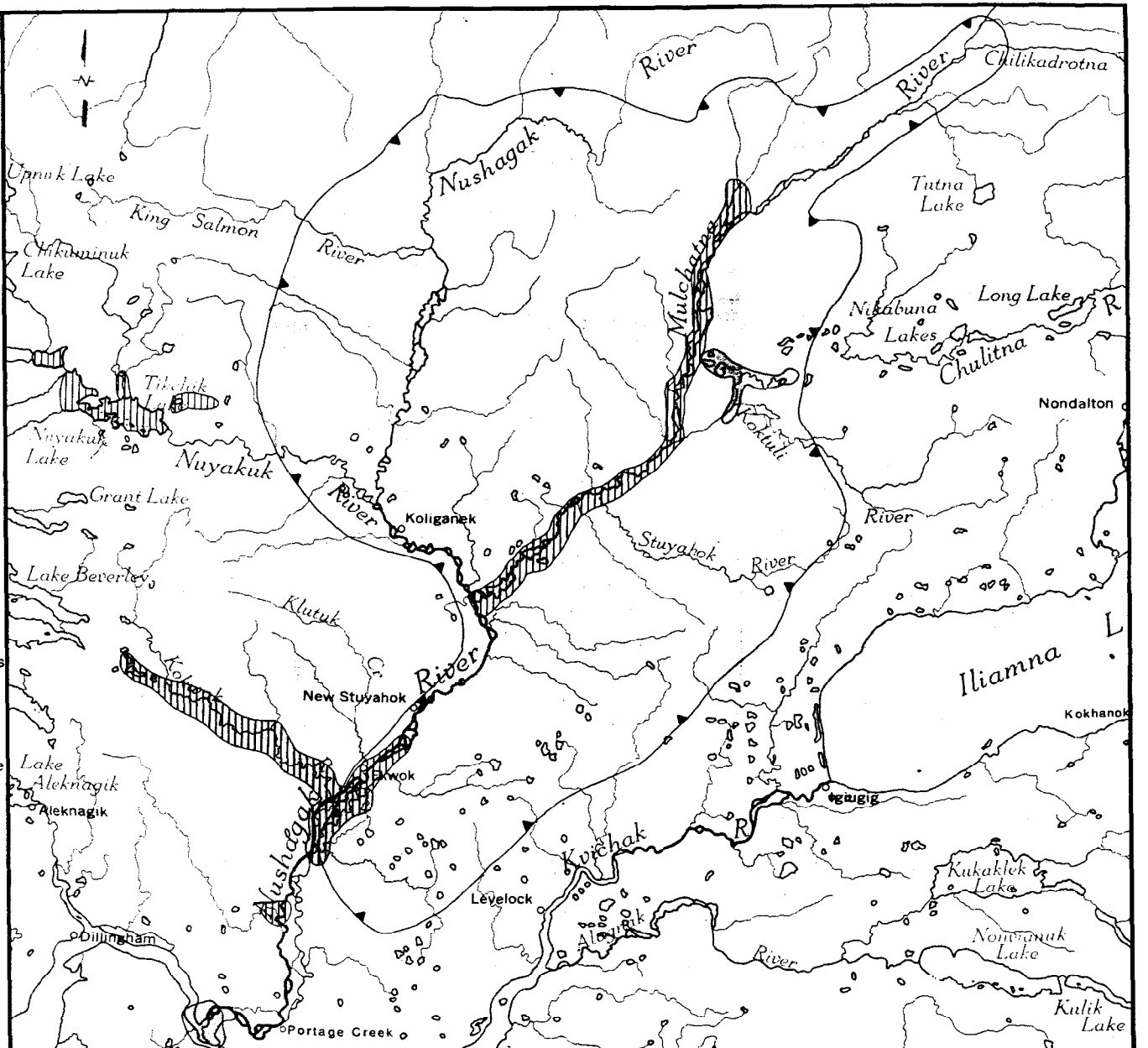
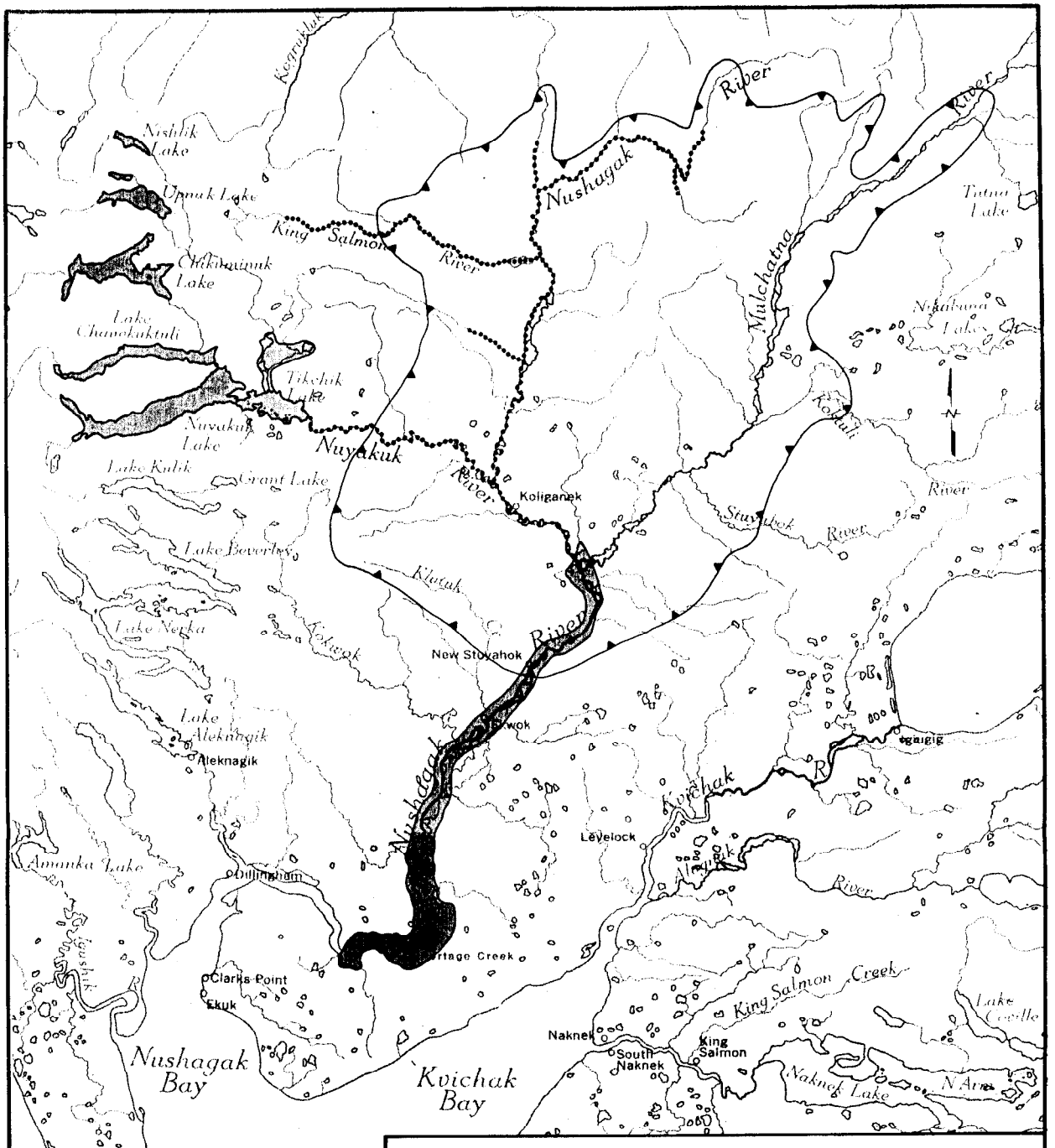


Figure 24.



KOLIGANEK
Subsistence Use Areas

CARIBOU

FRESHWATER FISH

SOURCES

John Wright, field research 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

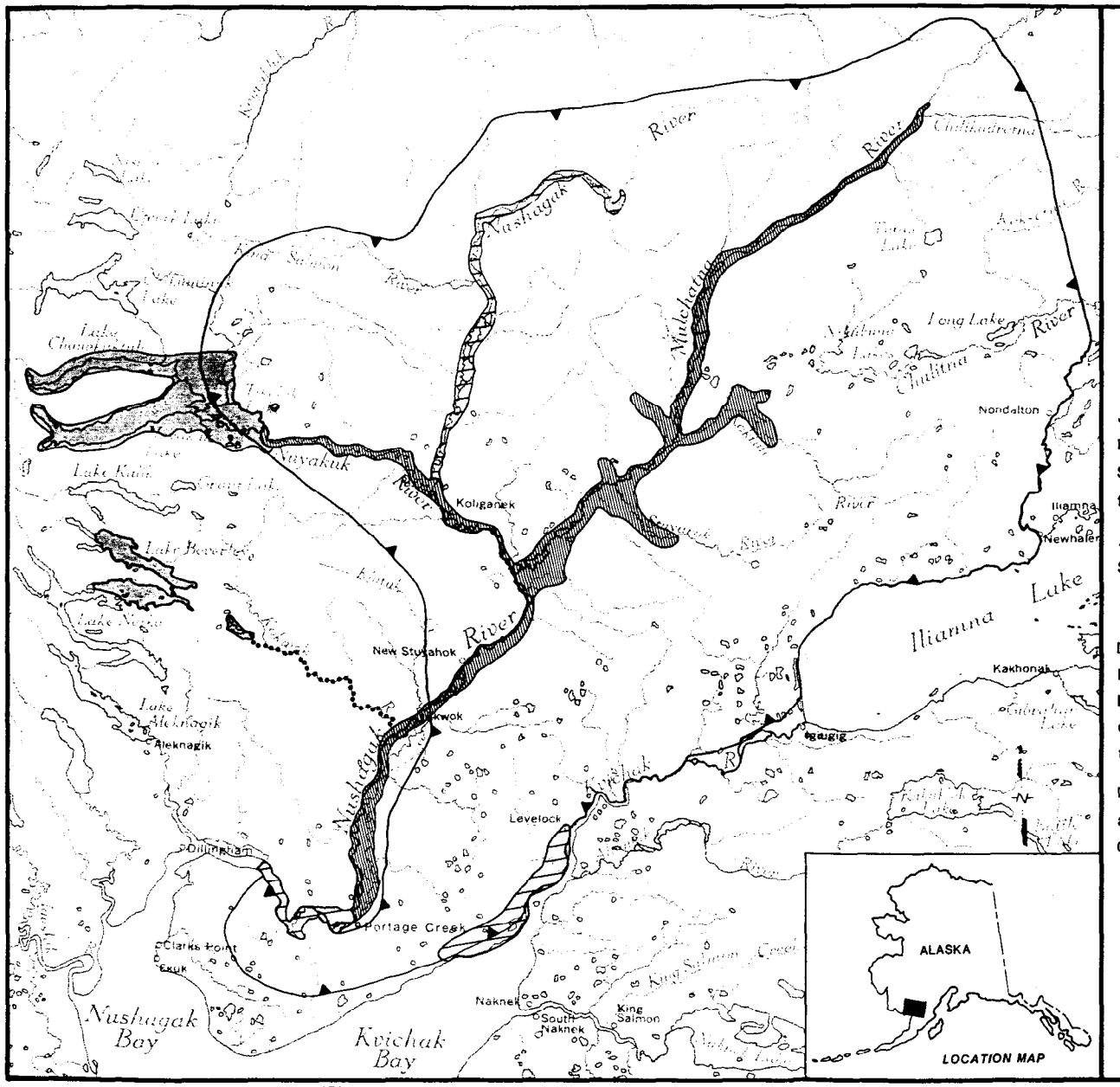
Data were collected through interviews with local residents. Draft maps were displayed in Koliganek, reviewed and corrected at a public meeting attended by 25 residents. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

SCALE
0 10 20 30 Miles
0 10 20 30 Kilometers

Produced by the
State of Alaska, Department of Fish and Game,
Division of Subsistence
May 1989

Figure 25.



NEW STUYAHOK

Subsistence Use Areas

- CARIBOU
- WATERFOWL ONLY
- WATERFOWL AND FRESHWATER FISH
- FRESHWATER FISH ONLY

SOURCES

John Wright and Steve Behnke, field research, 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

Data were collected at a public meeting in New Stuyahok attended by about 20 residents. Draft maps were reviewed and corrected by about ten people prior to final drafting. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

SCALE 1:1,000,000

0 10 20 30 40 MILES

0 10 20 30 40 KILOMETERS

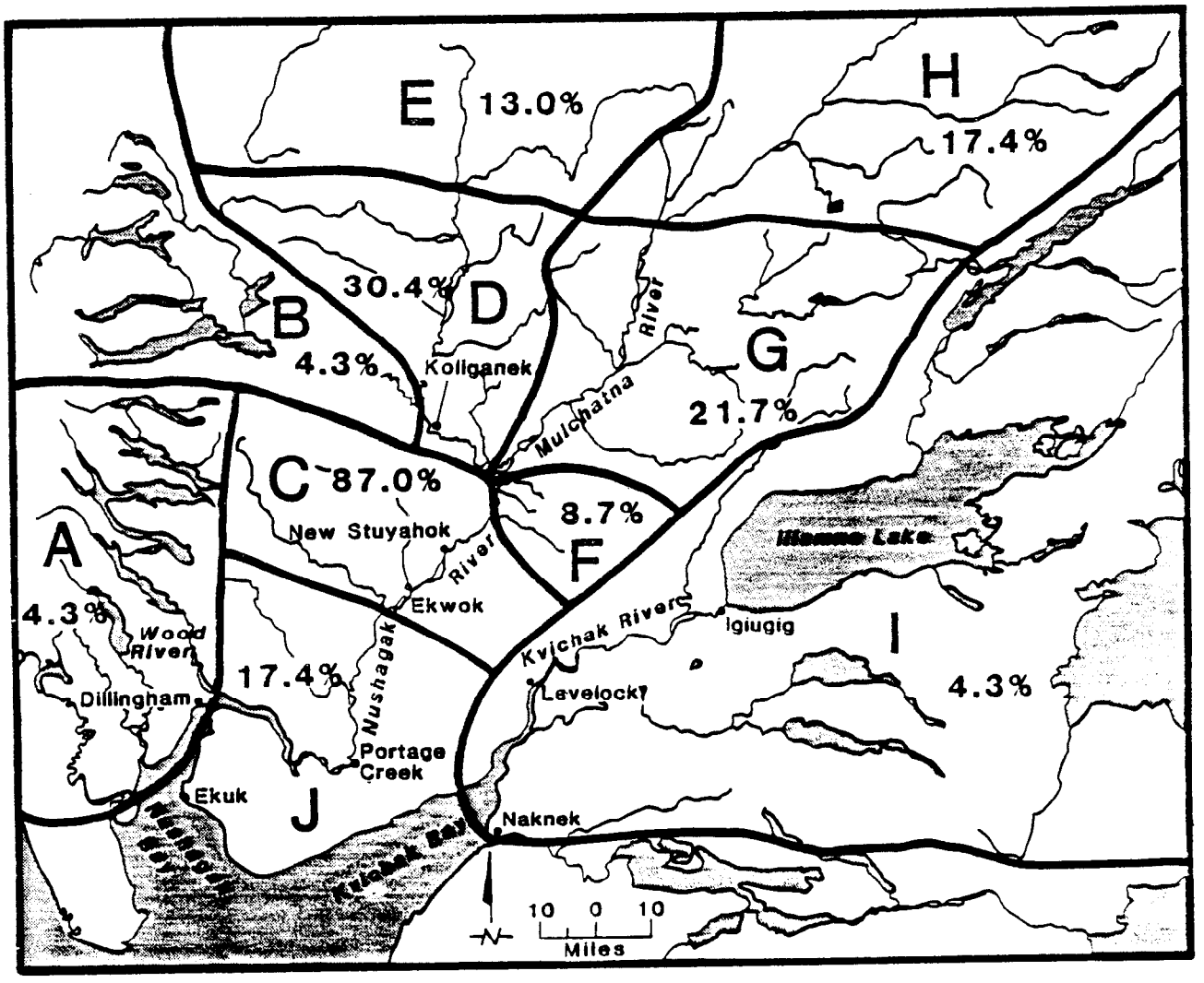
Produced by the State of Alaska, Department of Fish and Game, Division of Subsistence, May 1989

Figure 26.

TABLE 37. HOUSEHOLD FREQUENCY OF USE OF AREAS FOR HARVESTING FRESHWATER FISH, APRIL 1987 - MARCH 1988, KOLIGANEK.

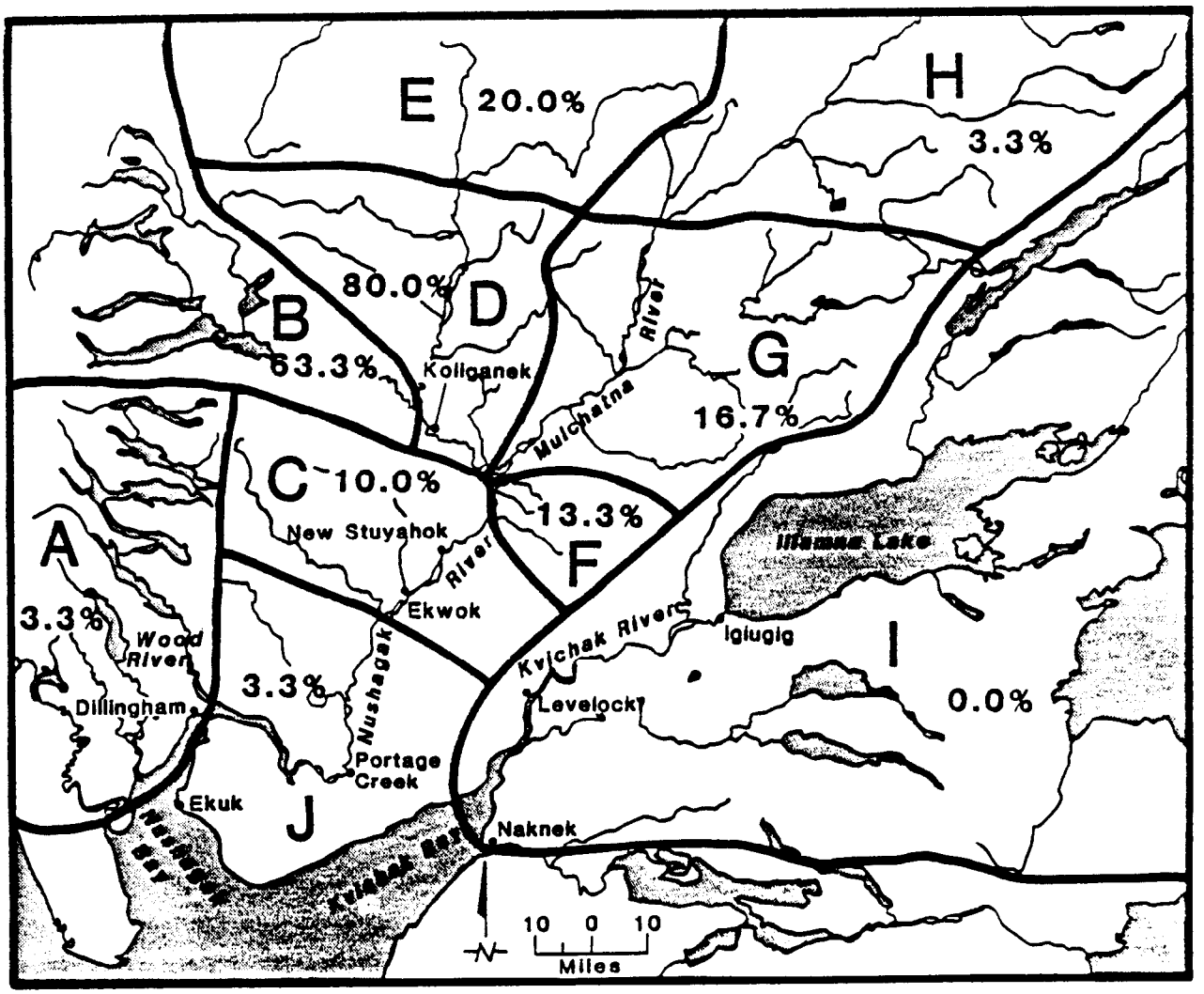
	% Ever Use?	% Regularly Use?	% Seldom Use?	% Use in 1987-8?
A. Wood River and Lakes	3.3%	3.3%	0.0%	3.3%
B. Tikchik Lake and Nuyakok River	63.3%	56.7%	6.7	60.0%
C. Middle Nushagak and Kokwok River	10.0%	3.3%	6.7%	6.7%
D. Upper Nushagak below Chickitnok	80.0%	76.7%	3.3%	80.0%
E. Nushagak, including Chickitnok	20.0%	16.7%	0.0%	16.7%
F. Nunachuak Drainage	13.3%	6.7%	6.7%	13.3%
G. Lower Mulchatna	16.7%	13.3%	3.3%	13.3%
H. Upper Mulchatna	3.3%	3.3%	0.0%	3.3%
I. Lake Clark/Iliamna/ Kvichak	0.0%	0.0%	0.0%	0.0%
J. Lower Nushagak and% Iowithla	3.3%	3.3%	0.0%	3.3%

a
N = 30 respondent households who had at least one member actively fishing for freshwater species during the study year and participated in mapping (71.4 percent of the sample of 42 households). Data represent partial estimates since not all harvesters were included.
Source: Division of Subsistence Survey, ADF&G, 1988.



A. Wood River and Lakes
B. Tikchik Lake and Nuyakuk River
C. Middle Nushagak and the Kokwok
D. Nushagak below Chickitnok
E. Nushagak, Chickitnok and above
F. Nunachuak Drainage
G. Lower Mulchatna
H. Upper Mulchatna, Mosquito Creek and above
I. Lake Clark/Iliamna/Kvichak
J. Lower Nushagak and Iowithla

Figure .
Percent of Ekwok Households (N=23) Which Harvested Freshwater Fish By Area, April 1987-March 1988.



A. Wood River and Lakes
B. Tikchik Lake and Nuyakuk River
C. Middle Nushagak and the Kokwok
D. Nushagak below Chickitnok
E. Nushagak, Chickitnok and above
F. Nunachuak Drainage
G. Lower Mulchatna
H. Upper Mulchatna, Mosquito Creek and above
I. Lake Clark/Iliamna/Kvichak
J. Lower Nushagak and lowithla

Figure .
Percent of Koliganek Households (N=30) Which Harvested Freshwater Fish, April 1987-March 1988.

percent) were also significant for a smaller proportion of the sample. The Wood River and Lakes, the Upper Mulchatna, and the lower Nushagak and Iowithla were each used by one household.

During the study, information on use areas was also collected from New Stuyahok residents but during the coding process, it was recognized that the mapping questions were not administered consistently. When the data were analyzed, the use patterns did not match other information on geographic use patterns collected during the study. Subsequently, the maps were shown to a group of experts during a community report review. They concluded that, in general, the information did not accurately reflect the community's use patterns. Therefore, the data are not included in this report. Residents did confirm that much of the freshwater fishing in the spring and the fall took place within a few miles of the village where nets could be checked conveniently. They also explained that when families made the trip down river to summer fish camps or upriver for fall hunting, fresh fish was usually sought along the way for immediate consumption.

MARINE INVERTEBRATES

Marine invertebrates played a very minor role in the overall resource harvest of the study communities, comprising less than one percent of any community's total harvest. This is because the villages were situated far from the coast. No Ekwok households used or harvested any marine invertebrates during the study period. In Koliganek, four households harvested 14 gallons of butter clams and two New Stuyahok households collected five gallons as well. Clams were harvested in

Kulukak Bay during the herring season. Resource maps which identified harvest areas used by Koliganek residents between 1963 and 1983 also recognized areas near Protection Point and Ekuk bluff as clam harvest areas during the commercial fishing season (Fig. 29). Razor clams were received by two households, one in Koliganek and the other in New Stuyahok.

PLANTS

Berries

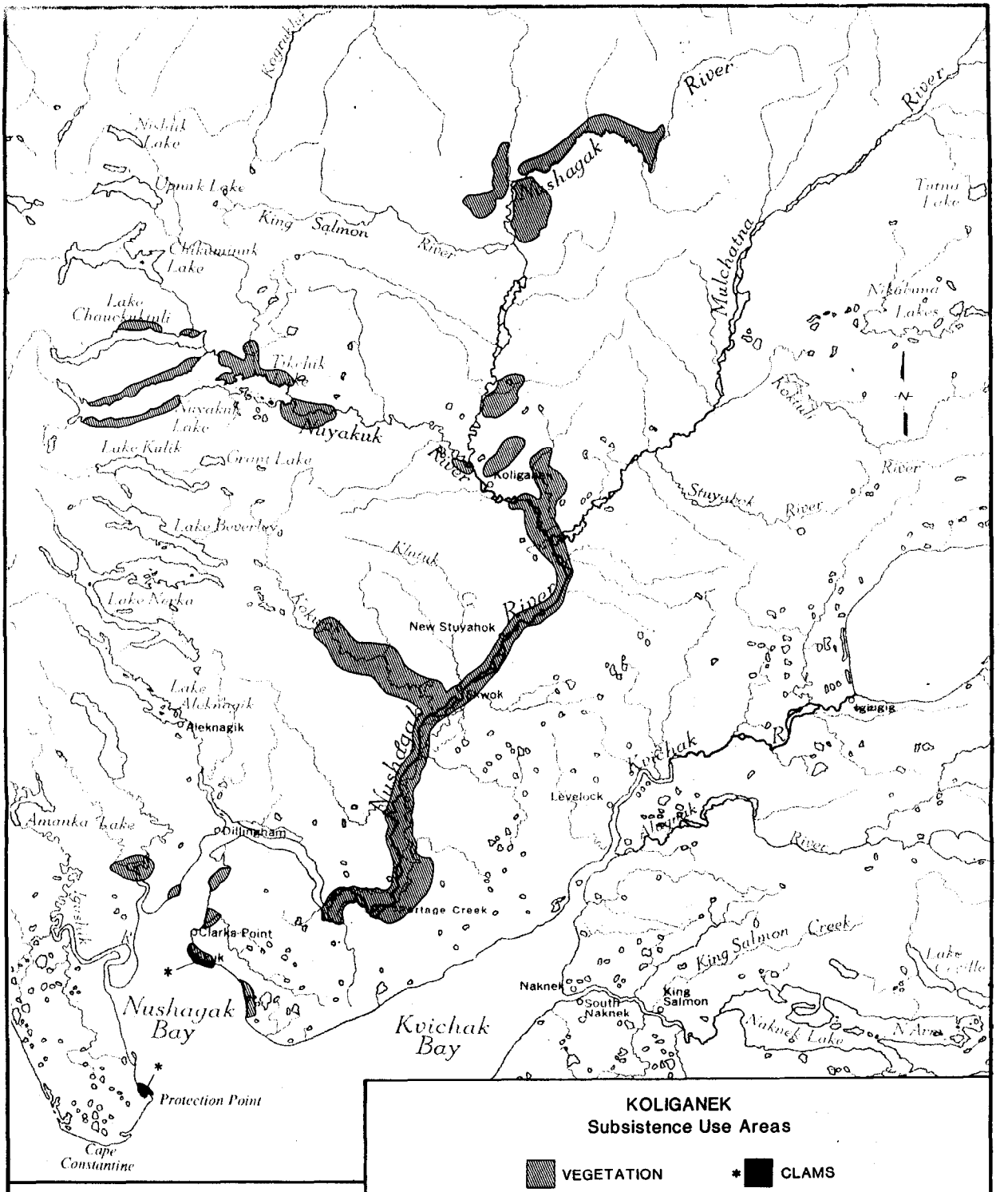
Berries were an extremely important resource in all three communities during the study period, widely harvested and gathered in large quantities when abundant. Figures 29, 30, and 31 illustrate berry picking locations in Bristol Bay which were used between 1960 and 1982. Berries-picking areas were located along the Nushagak and Mulchatna Rivers and their tributaries. Berries also were collected on the tundra a short distance from each village. The particular areas used each year varied depending on the abundance and location of each species in a particular year.

Salmonberries were picked beginning in mid-July at fish camps or in areas near the villages. When salmonberries were plentiful along the Snake River, some families made skiff trips to harvest them before returning home after the fishing season. Blueberries and blackberries were subsequently harvested and cranberries were picked after the first frost and into October. Most families considered it essential to have a good store of berries on hand for the winter, especially blackberries

and salmonberries. If unfavorable growing conditions resulted in a poor berry crop, people grumbled about the lack of berries throughout the winter because the berries were sorely missed. Sometimes, long trips were made to pick berries where they were known to be plentiful. Other families combined berry picking with visiting relatives or friends in distant communities. Some other communities where berries were picked during the study period included Tuntatuliak, Kwethluk, Manokotak, Dillingham, Iliamna, Platinum, and Aleknagik. In 1987, blueberries were especially abundant in Ekwok, and many women from New Stuyahok picked there.

Although women were primarily responsible for berry picking, it was not uncommon to see whole families involved. Occasionally, men might even be seen out alone. Berries were most commonly served in *akutaq*, a mixture of berries, sugar, and shortening. Cranberries were frequently made into *atsiraq*, a type of sauce. Smaller amounts of berries were eaten fresh, made into jams, or used in cooking.

Berries contributed 61.0 pounds to the mean household harvest in Ekwok. Berries were used by a greater percentage of the sample (93.1 percent) than any other resource category. Most households picked berries as well (89.7 percent). The community's berry harvest totaled 442 gallons during the study period. Harvest quantities in Koliganek were also substantial. During the summer and fall of 1987, 34 households (81.0 percent) gathered 846 gallons of berries. Berries were used by almost every household (90.5 percent) in Koliganek, more than any other single resource. New Stuyahok's pattern was similar. Berries were used by all but one household (97.5 percent) and along with caribou were reported as the most frequently used resource. They also were the



KOLIGANEK
Subsistence Use Areas

VEGETATION * CLAMS

SCALE
0 10 20 30 Miles
0 10 20 30 Kilometers

Produced by the
State of Alaska, Department of Fish and Game,
Division of Subsistence
May 1989

SOURCES

John Wright, field research 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

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Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

Figure 29.

EKWOK
Subsistence Use Areas

TRAPPING

VEGETATION

SOURCES

John Wright and Steve Behnke, field research, 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

Data were collected from four local resource experts. Draft maps were reviewed and corrected at a public meeting attended by about 12 residents and copies of draft maps were left on display in Ekwok prior to final drafting. Data represent contemporary resource use areas,defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

SCALE
5 0 5 10 15 20 Miles

Alaska

Produced by the State of Alaska, Department of Fish and Game, Division of Subsistence, May 1989

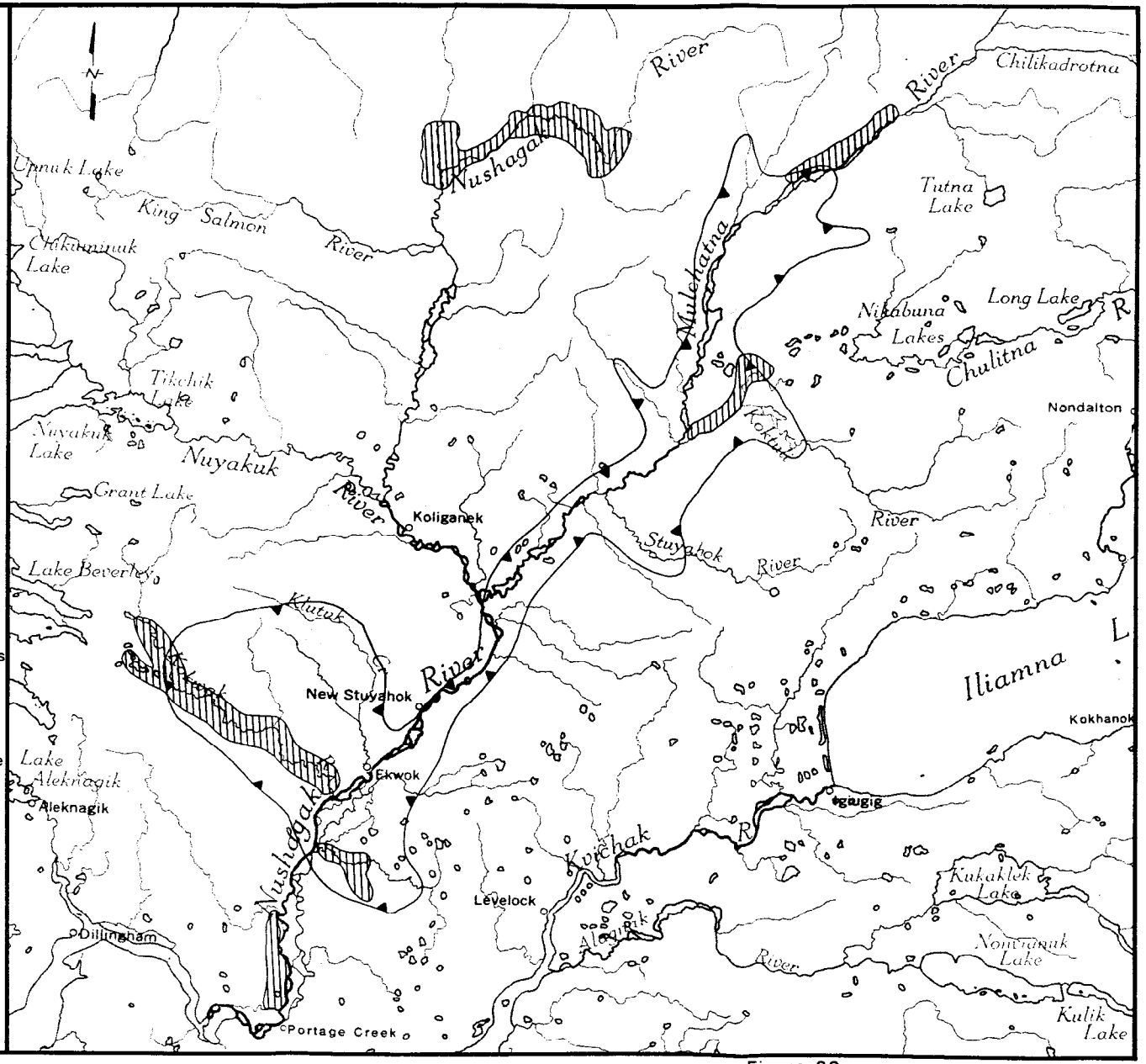
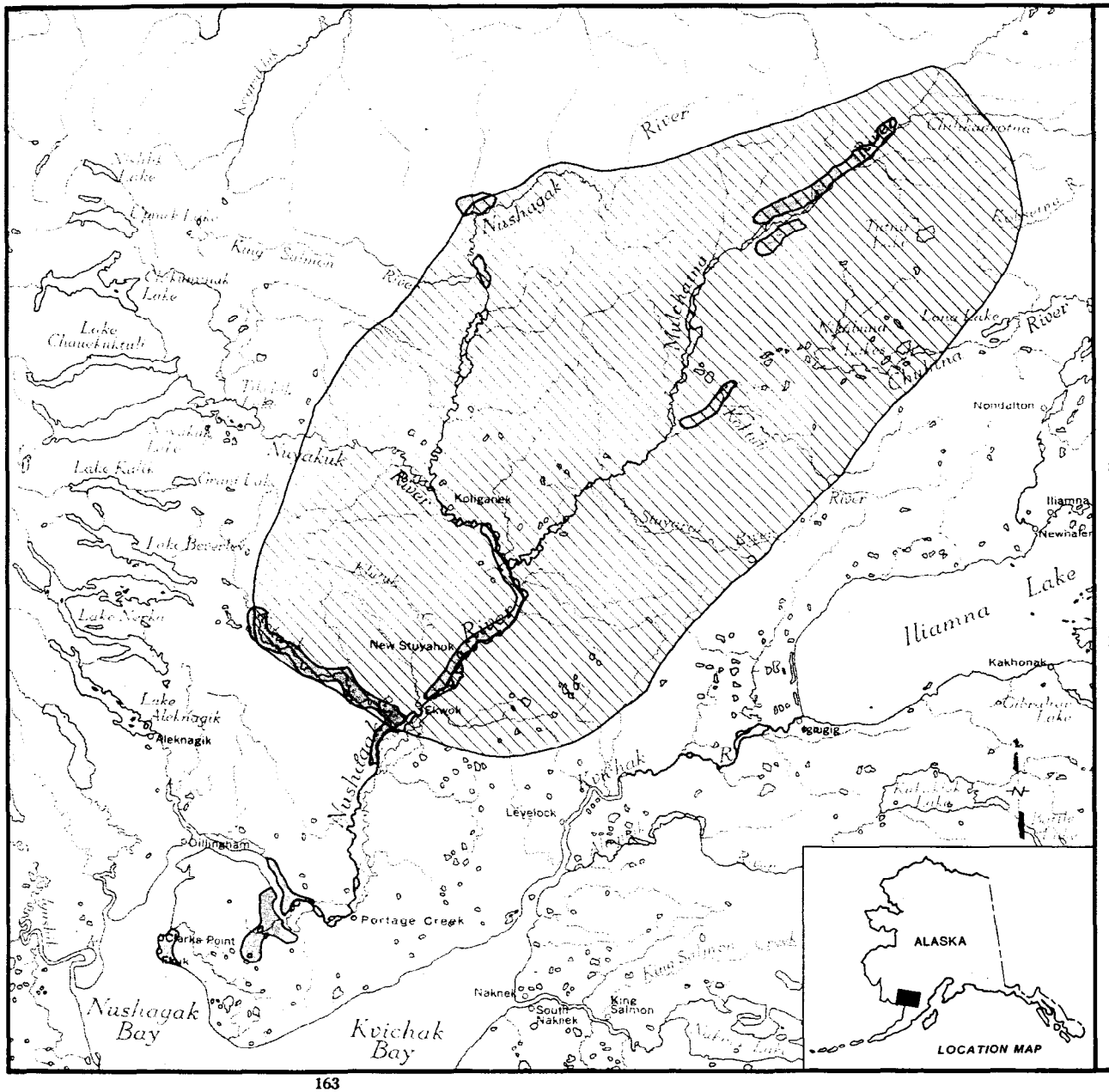


Figure 30.



NEW STUYAHOK

Subsistence Use Areas

TRAPPING

VEGETATION

SOURCES

John Wright and Steve Behnke, field research, 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

Data were collected at a public meeting in New Stuyahok attended by about 20 residents. Draft maps were reviewed and corrected by about ten people prior to final drafting. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

SCALE 1:1,000,000

0 10 20 30 40 MILES

0 10 20 30 40 KILOMETERS

Produced by the State of Alaska, Department of Fish and Game, Division of Subsistence, May 1989

Figure 31.

most frequently harvested (92.5 percent) resource. For the sampled New Stuyahok households, the total berries harvest was reported as 639.4 gallons. The expanded community harvest was 1,183 gallons.

Other Plants

Although not collected in large quantities, green plants were used and harvested in all three study communities Greens were served in *akutaq*, eaten fresh in salads, cooked, made into teas, or used therapeutically. No systematic effort was made to identify plant species harvested during the study year but some species which were known to be gathered by women in the study communities included sourdock (*quagciq*), fiddlehead ferns (*ceturqaaq*), willow greens (*enrilnguaq*), wild celery (*ikiituk*), labrador tea (*ayuq*), stinkweed (*naunerrluk*), and chamomile (*atsaruaq*). On the tundra, women dug up "mouse food" (*utngungssaq*) the roots of tundra grasses and plants which had been cached by mice.

Quantifying the amount of green plants collected was problematic for respondents. Most species are not usually collected in large quantities and many are consumed immediately. However, respondents attempted to estimate their harvest volume. Green plants totaling 67 quarts were collected by nine Ekwok housesholds (31.0 percent). Less plants were harvested by the Koliganek sample where twelve households harvested 9.5 quarts. Finally, nineteen New Stuyahok households gathered a combined sum of 59 quarts of greens.

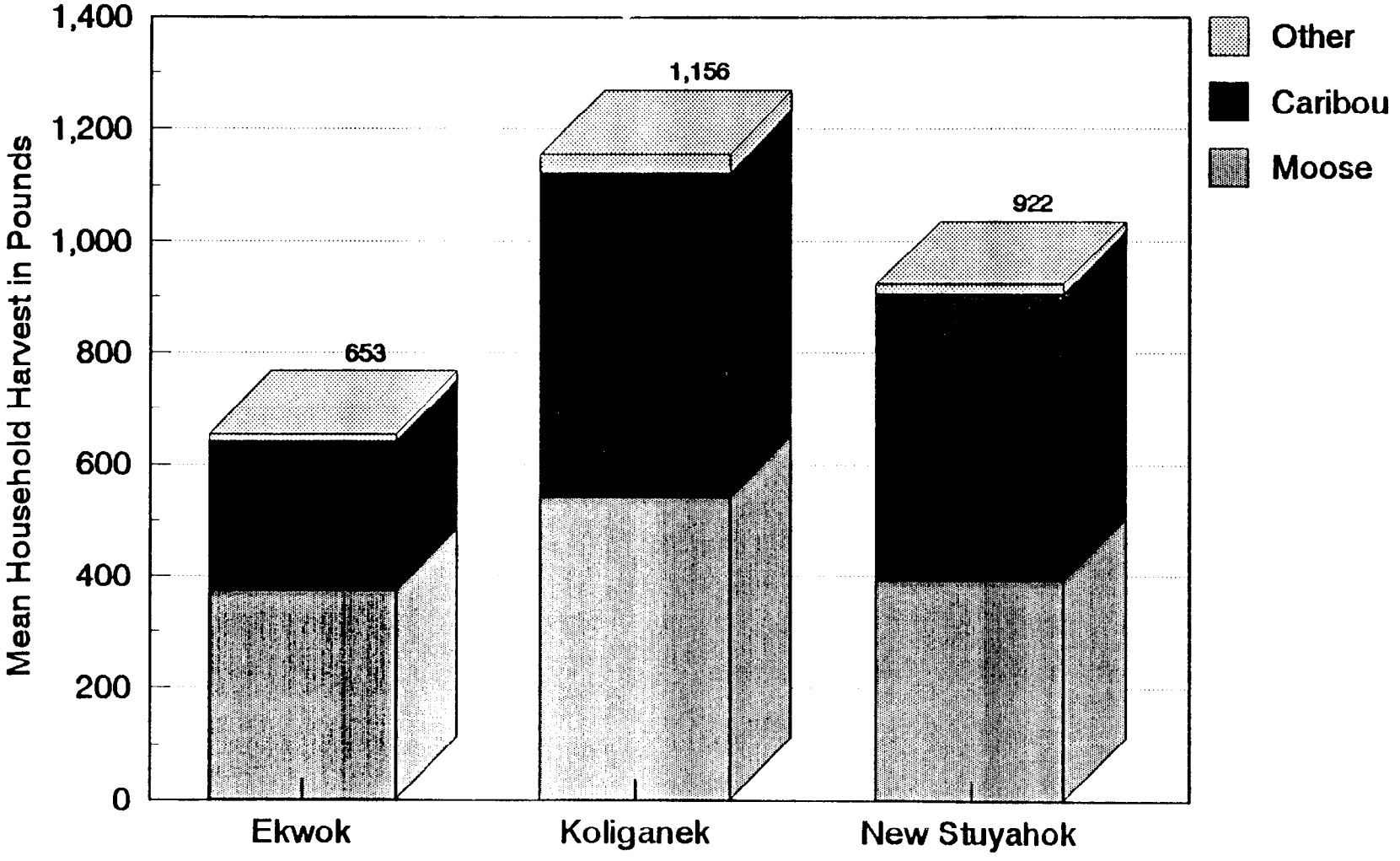
CHAPTER 5

HUNTING AND TRAPPING

LAND MAMMALS

Land mammals, primarily moose and caribou, were a critical resource category in Ekwok, New Stuyahok, and Koliganek during the study year. Next to salmon, they consistently comprised the second largest portion of the total community harvests. In all communities, land mammals were at least 24.5 percent of the mean household harvest (652.9 pounds in Ekwok, 1,155.8 pounds in Koliganek, and 921.9 pounds in New Stuyahok). Figure 32 illustrates the composition of the land mammal harvest by species for each of the study communities. With the exception of three households in the total sample, every household used at least one species of land mammal during the study period. Land mammals were widely harvested by 69.0 percent of the households in Ekwok, 76.2 percent in Koliganek, and 65.0 percent in New Stuyahok. Land mammals were the most frequently received resource category by households in both Ekwok (62.1 percent) and Koliganek (73.8 percent). In New Stuyahok, land mammals were received by 65.0 percent of households. Land mammals were commonly shared as well with 48.3 percent of the Ekwok households, 69.0 percent in Koliganek, and 62.5 percent in New Stuyahok distributing meat to other households.

Figure 32. Composition of Land Mammal Harvest Nushagak River, 1987-88



Moose

Nushagak River hunters take moose in GMU 17B and 17C. Historically, moose have never been abundant in Unit 17A because of the limited amount of moose habitat. Much of the unit is open tundra with forested areas occurring only along the riparian portions of major drainages (Morgan 1990a).

There is little information on moose population levels in Subunit 17B prior to the 1970s. The population within the Kvichak-Mulchatna drainages was estimated at 1,500 moose in 1970. By 1986, the population was estimated at 2,500 to 3,000 moose in GMU 17B. The trend in GMU 17C is similar but densities are lower. In 1976, the moose population in 17C was estimated at only 300 moose while more recent surveys (1988) indicate a population of 1,400 to 1,700 moose. The growth of the moose population can be attributed to several factors, including mild winters from the mid-1970s to 1987, closure of major wintering areas to late season hunting, and increased local use of the expanding Mulchatna caribou herd (Morgan 1990a).

Since the 1930s when moose began expanding into the area, they have become a prized source of red meat. Today, moose meat is regarded as a staple in most Nushagak River households. From late August through September hunters travelled river corridors by skiff in search of moose. Some tracking was done in the early morning or late evening when hunters investigated promising sites for signs of moose. Hunting activity ceased in late September when the animals went into rut and the meat was no longer palatable. In fall, bulls were preferred because of the layer

of fat accumulated over the summer. During periods of good snow cover between December to April, moose were hunted by snowmachine when several hunters worked in concert to flush moose from wooded areas (Wolfe et al. 1984:339).

Most parts of the animal were eaten. The meat was eaten fresh, frozen, or dried in the spring. Moose was the preferred meat for drying since it maintained a pliant texture. The raw stomach was often cleaned and eaten on the spot. Other organs commonly consumed were the heart and liver. The head was usually left in the field but some regarded the nose or the tongue as a delicacy. The bone marrow was commonly eaten cooked or raw. Although in the past the hide was used for skin sewing, this practice seems to have disappeared today.

During the study year, moose was a significant resource for residents of the study communities and the mean household harvests were substantial: 372.4 pounds in Ekwok, 540.0 pounds in Koliganek, and 391.5 pounds in New Stuyahok. Moose was used by a similar percentage of households in each community, 82.8 percent of the sample in Ekwok, 83.3 percent in Koliganek, and 82.5 percent in New Stuyahok. Somewhat more than half the households harvested moose in each community: 51.7 percent in Ekwok, 52.4 percent in Koliganek, and 55.0 percent in New Stuyahok. Moose meat was widely shared, and was one of the top four resources given away in each community. Households reported that they frequently received moose, with well over half the households in each sample reporting gifts of moose meat.

Regulations

Moose hunting by the study communities took place within the boundaries of GMU 17. A history of state moose hunting regulations from 1961 to 1988 appears in Table 38. The annual bag limit of one bull has not changed during that period but the time allowed for harvesting the limit has been shortened considerably. Until 1975, moose hunting was allowed for approximately four continuous months in the fall and early winter. But in 1976, the season was divided into separate fall and winter seasons and shortened to only 41 days. Through the late 1970s and early 1980s, the season was shortened still further by cutting approximately ten days off each of the two seasons. In addition, certain portions of the unit became recognized as winter moose sanctuaries and off limits to any winter hunting. Beginning in 1981, all moose hunting in Unit 17A was prohibited.

In the early 1980s, several changes occurred which had the effect of liberalizing regulations for local hunters. In 1983, an early season (August 20 to September 4) permit registration hunt was established in addition to the other fall season. Although all state residents were eligible, permits were only available at the Dillingham ADF&G office and in local villages. As a consequence of this registration requirement, most permittees tended to be local residents. The upper portion of Unit 17B has been generally regulated as a recreational hunting area utilized by nonlocal hunters (that is, hunters from outside the region) and was not included in the early permit hunt. Another significant event occurred in 1986 when a new state subsistence

TABLE 38. MOOSE HUNTING REGULATIONS, GMU 17, 1961-1988

Year	Subunit	Season	Bag Limit	Restrictions
1961 to 1974	17	Aug. 20 - Dec. 31	1 Bull	
1975	17	Sept. 1 - Dec. 31	1 Bull	
1976 to 1978	17	Sept. 1 - 20 Dec. 10 - 31	1 Bull	
1979 to 1980	17A & B	Sept. 10 - 20 Dec. 10 - 31	1 Bull	
	17C, that portion including Iowithla drainage and Sunshine Valley.	Sept. 10 - 20	1 Bull	
	Remainder 17C	Sept. 10 - 20 Dec. 10 - 31	1 Bull	
1981	17A	No open season		
1982 to	17B	Sept. 5 - 15 Dec. 10 - 31	1 Bull	
	17C, that portion including Iowithla drainage and Sunshine Valley.	Sept. 5 - 15	1 Bull	
	Remainder of 17C	Sept. 5 - 15 Dec. 10 - 31	1 Bull	

TABLE 38 (Continued). MOOSE HUNTING REGULATIONS, GMU 17, 1961-1988

Year	Subunit	Season	Bag Limit	Restrictions
1983	17A	No open season		
	17B, except that portion which includes all drainages of the Mulchatna River upstream from, and including the Chilchitna River.	Aug. 20 - Sept. 4 (Season subject to closure by emergency order)	1 Bull	During the period Aug. 20 - Sept. 4, moose may be taken by registation permit only.
	Remainder 17B	Sept. 5 - 15 Dec. 10 - 15	1 Bull	Same as above.
	17C, that portion including Iowithla drainage and Sunshine Valley.	Aug. 20 - Sept. 4 Sept. 5 - 15	1 Bull	Same as above.
	Remainder 17C	Aug. 20 - Sept. 4 Sept. 5 - 15 Dec. 10 - 31	1 Bull	Same as above.
1984	17A	No open season		
	17B, that portion which includes all drainages of the Mulchatna River upstream from, and including the Chilchitna River drainage.	Sept. 5 - 15	1 Bull	
	Remainder of 17B	Aug. 20 - Sept. 4 Sept. 5 - 15 Dec. 10 - 31	1 Bull	During the period Aug. 20 to Sept. 4, moose may be taken by registration permit only.

TABLE 38 (Continued). MOOSE HUNTING REGULATIONS, GMU 17, 1961-1988

Year	Subunit	Season	Bag Limit	Restrictions
1984	17C, that portion including Iowithla drainage and Sunshine Valley.	Aug. 20 - Sept. 4 Sept. 5 - 15	1 Bull	Same as above.
	Remainder of 17C	Aug. 20 - Sept. 4 Sept. 5 - 15 Dec. 10 - 31	1 Bull	Same as above.
1985	Subsistence Regulations			
	17A	No open season		All state residents were eligible for subsistence hunting.
	17B, the Mulchatna River upstream from, and including the Chilchitna River drainage.	Sept. 1 - 20	1 Bull	
	Remainder of Unit 17(B) and Unit 17(C)	Aug. 20 - Sept. 15 Dec. 10 - 31	1 Bull	During the period Sept. 4, moose may be taken by registration permit only.
	17C, that portion including Iowithla drainage and Sunshine Valley.	Aug. 20 - Sept. 15	1 Bull	Same as above.
	Remainder of 17C	Aug. 20 - Sept. 15 Dec. 10 - 31	1 Bull	Same as above.
1985	General Regulations (non-Alaskan residents) same as subsistence regulations, except: Remainder of 17(B) and 17(C), Sept. 5 - Sept. 15 and no December hunt.			

TABLE 38 (Continued). MOOSE HUNTING REGULATIONS, GMU 17, 1961-1988

Year	Subunit	Season	Bag Limit	Restrictions
1986	Subsistence Regulations			
to	17A	No open season		Eligibility for subsistence
1988	17B, the Mulchatna River upstream from, and including the Chilchitna River drainage.	Sept. 1 - 20	1 Bull	hunt limited to customary and traditional users as defined by the Board of Game
	Remainder of Unit 17(B) and Unit 17(C)	Aug. 20 - Sept. 15 Dec. 10 - 31	1 Bull	
	17C, that portion including Iowithla drainage and Sunshine Valley.	Aug. 20 - Sept. 15	1 Bull	
	Remainder of 17C	Aug. 20 - Sept. 15 Dec. 10 - 31	1 Bull	Same as above.

1986 General Regulations - Regulations for Alaskan residents same as subsistence regulations. Regulations for non-Alaskan residents same except remainder of 17(B) and 17(C) open Sept. 5 - Sept. 15; no December hunt.

1987 and 1988 General Hunting Regulations - same as for subsistence except no December hunt. Remainder of 17(B) and 17(C) open from Sept. 1 - Sept. 15 for Alaska residents and Sept. 5 - Sept. 15 for non residents.

Source: Alaska Game Regulations, 1961 - 1988.

law required separate regulations for subsistence hunting, which was defined as customary and traditional uses by residents of rural areas.

During the study period, April 1987 to March 1988, state subsistence hunting regulations allowed fall (August 20 to September 15) and winter (December 10 to December 31) hunting seasons for moose in portions of GMU 17B and GMU 17C. A hunting license was required. In designated areas, hunting was allowed by registration permit only from August 20 to September 4. Hunting for the remainder of the season required that the hunter obtain a harvest ticket. Permits and harvest tickets were issued in the study communities by ADF&G staff and at the Dillingham ADF&G office. In all seasons, only bulls could be taken, and each hunter was limited to an annual limit of one bull.

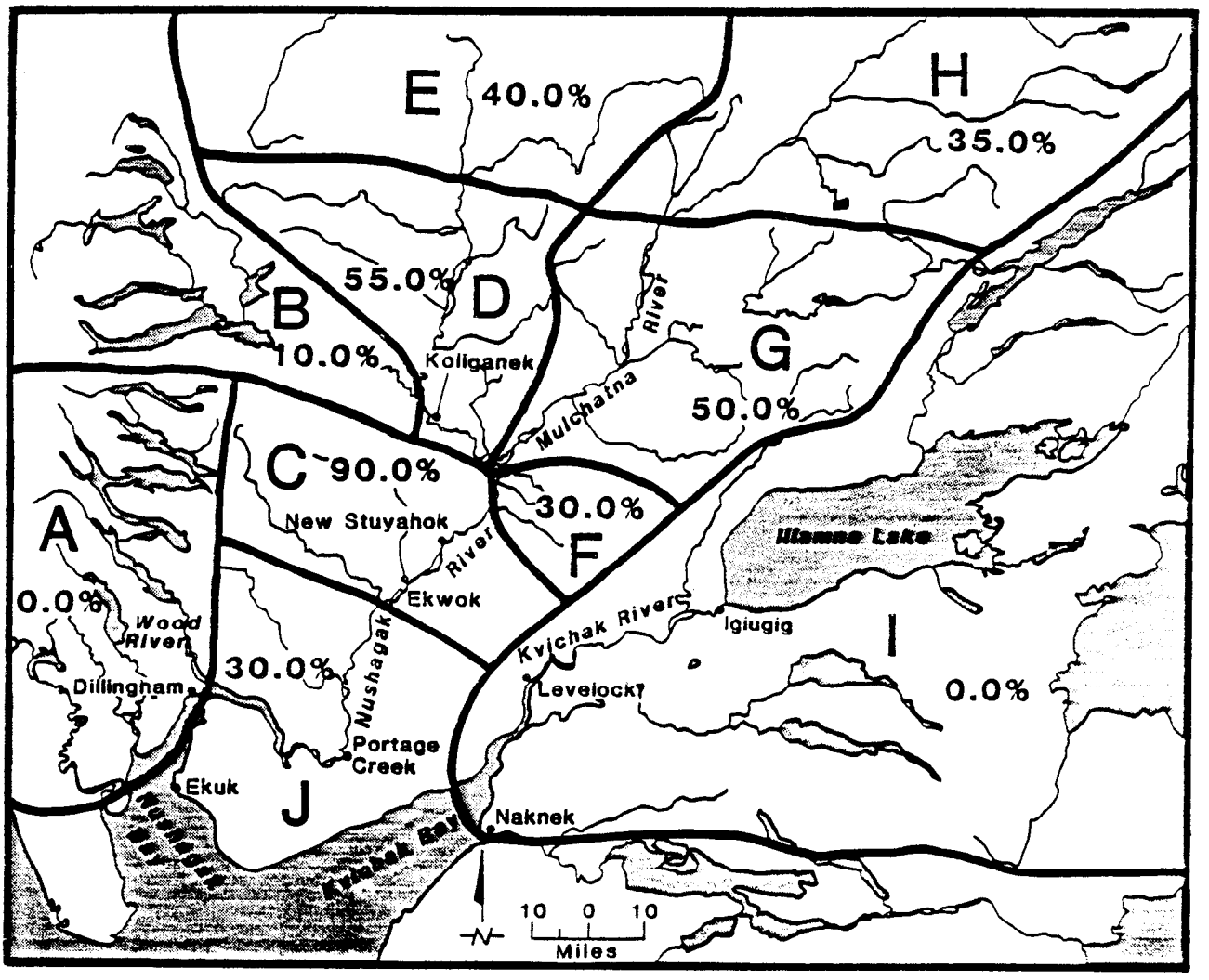
Harvest Areas

Surveyed households were asked to identify the intensity of use for moose hunting areas. Only active moose hunting households were asked to complete this portion of the questionnaire. Since some hunters were unavailable, the results may underreport use levels. In New Stuyahok in particular, there was some misunderstanding in the administration of these questions and the results most accurately report the patterns of active hunters during 1987-88, but not their historical use patterns. Results are discussed below. Although each community favored different areas, the figures indicate that there was some overlap (Fig. 21, 22, and 23). Current use patterns are the result of long-term ties with different areas which have been historically important to villagers. Fall hunting was conducted along the river

corridors of the Nushagak and Mulchatna drainages. In winter, hunters covered a much wider expanse of territory as they traveled overland with snowmachines. Ekwok hunters concentrated on the middle portion of the Nushagak River while those from New Stuyahok frequently headed upriver along the Mulchatna River. Koliganek hunters tended to use the upper Nushagak, locally known as "Main River."

Ekwok hunters covered a large region in their search for moose. Several areas emerged as particularly important to Ekwok moose hunters (Fig. 33). Those areas nearest the community, the middle Nushagak and the Kokwok river drainages were understandably hunted most intensively, by 90.0 percent of the active hunters (Table 39). Other significant areas included the upper Nushagak below the Chickitnok (55.0 percent); the lower Mulchatna River (50.0 percent); the upper Nushagak above the Chickitnok (40.0 percent); the upper Mulchatna (35.0 percent); and the lower Nushagak/Iowithla and Nunachuak drainages (30.0 percent each). In addition, 10.0 percent of the active hunters had utilized the Tikchik Lake and Nuyakok River areas.

As shown in Table 40, Koliganek hunters also concentrated the most effort in those areas closest to home, especially the Nushagak River drainage from the mouth of the Mulchatna to the cut-off of the Chickitnok River (Fig. 34). Moose were sought in this area by 80.0 percent of the active hunters. However, like Ekwok, many other areas were also well utilized. Among them were the upper Nushagak above the Chickitnok (60.0 percent), the Tikchik Lake and Nuyakok River (52.0 percent), and the lower Mulchatna River drainage (32.0 percent). Other areas mentioned included the middle Nushagak and Kokwok river drainages



A. Wood River and Lakes
B. Tikchik Lake and Nuyakuk River
C. Middle Nushagak and the Kokwok
D. Nushagak below Chickitnok
E. Nushagak, Chickitnok and above
F. Nunachuak Drainage
G. Lower Mulchatna
H. Upper Mulchatna, Mosquito Creek and above
I. Lake Clark/Iliamna/Kvichak
J. Lower Nushagak and Iowithla

Figure .
Percent of Ekwok Households (N=20) Which Ever Used Resource Areas For Moose Hunting.

TABLE 39. HOUSEHOLD FREQUENCY OF USE OF AREAS FOR MOOSE HUNTING, APRIL 1987 - MARCH 1988, EKWOK.

	% Ever Use?	% Regularly Use?	% Seldom Use?	% Use in 1987-8?
A. Wood River and Lakes	0.0%	0.0%	0.0%	0.0%
B. Tikchik Lake and Nuyakok River	10.0%	5.0%	5.0%	5.0%
C. Middle Nushagak and Kokwok River	90.0%	55.0%	35.0%	85.0%
D. Nushagak below Chickitnok	55.0%	25.0%	25.0%	45.0%
E. Nushagak, including Chickitnok	40.0%	20.0%	20.0%	35.0%
F. Nunachuak Drainage	30.0%	15.0%	15.0%	25.0%
G. Lower Mulchatna	50.0%	15.0%	35.0%	40.0%
H. Upper Mulchatna	35.0%	5.0%	25.0%	25.0%
I. Lake Clark/Iliamna/ Kvichak	0.0%	0.0%	0.0%	0.0%
J. Lower Nushagak and Iowithla	30.0%	0.0%	25.0%	20.0%

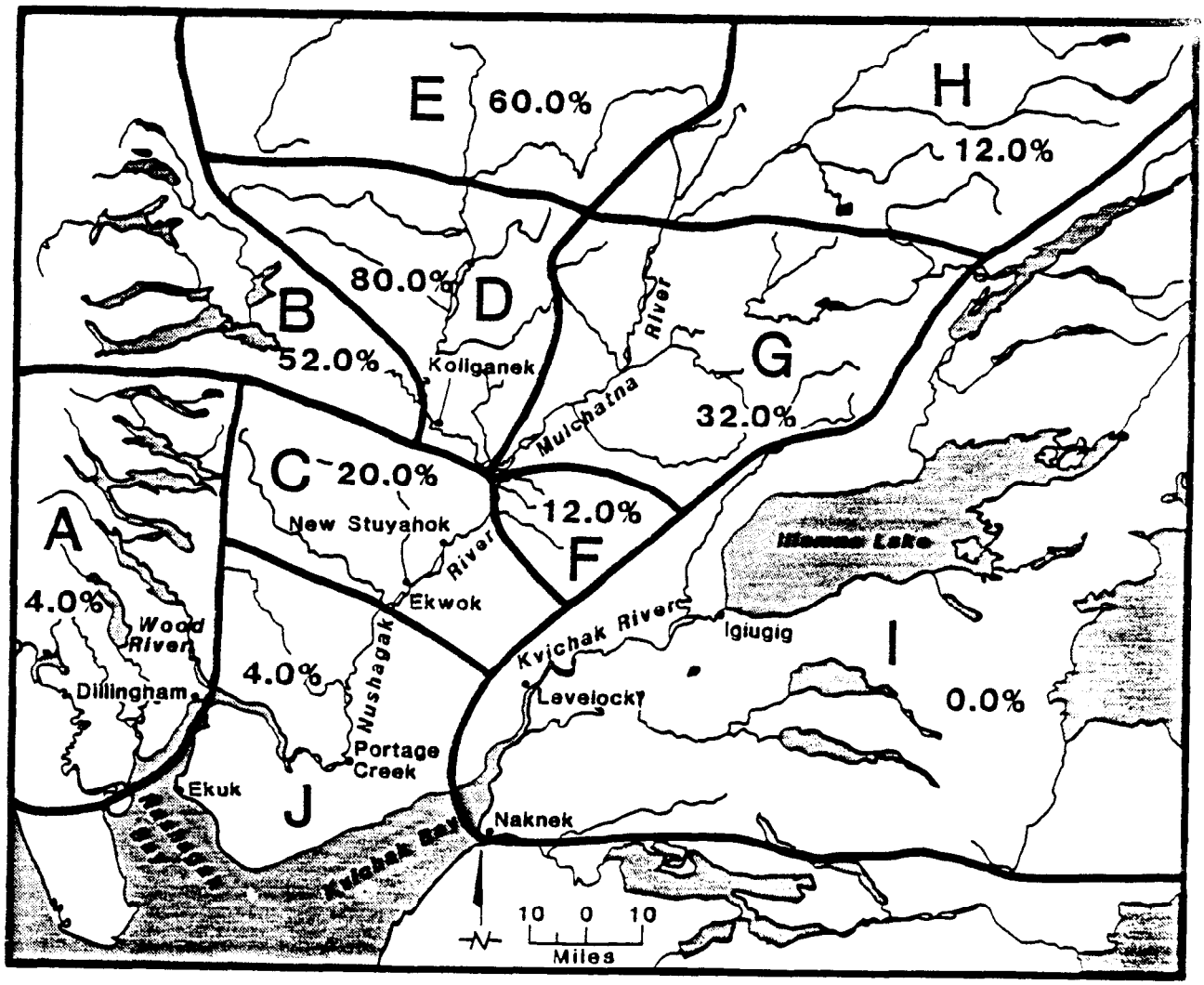
[a] N = 20 respondent households who had at least one member actively hunting moose during the study year and participated in mapping (representing 69 percent of the sample of 20 households). Data represent partial estimates since not all hunters were included.

Source: Division of Subsistence Survey, ADF&G, 1988.

TABLE 40. HOUSEHOLD FREQUENCY OF USE OF AREAS FOR MOOSE HUNTING, APRIL 1987 - MARCH 1988, KOLIGANEK.

	% Ever Use?	% Regularly Use?	% Seldom Use?	% Use in 1987-8?
A. Wood River and Lakes	4.0%	0.0%	4.0%	0.0%
B. Tikchik Lake and Nuyakok River	52.0%	48.0%	4.0%	44.0%
C. Middle Nushagak and Kokwok River	20.0%	16.0%	4.0%	12.0%
D. Nushagak below Chickitnok	80.0%	80.0%	0.0%	76.0%
E. Nushagak, including Chickitnok	60.0%	56.0%	4.0%	56.0%
F. Nunachuak Drainage	12.0%	8.0%	4.0%	8.0%
G. Lower Mulchatna	32.0%	24.0%	8.0%	24.0%
H. Upper Mulchatna	12.0%	12.0%	0.0%	8.0%
I. Lake Clark/Iliamna/ Kvichak	0.0%	0.0%	0.0%	0.0%
J. Lower Nushagak and Iowithla	4.0%	4.0%	0.0%	4.0%

[a] N = 25 respondent households who had at least one member actively hunting moose during the study year and participated in mapping (59.5 percent of the sample of 42 households). Data represent partial estimates since not all hunters participated.
Source: Division of Subsistence Survey, ADF&G, 1988.



A. Wood River and Lakes
B. Tikchik Lake and Nuyakuk River
C. Middle Nushagak and the Kokwok
D. Nushagak below Chickitnok
E. Nushagak, Chickitnok and above
F. Nunachuak Drainage
G. Lower Mulchatna
H. Upper Mulchatna, Mosquito Creek and above
I. Lake Clark/Iliamna/Kvichak
J. Lower Nushagak and lowithla

Figure .
Percent of Koliganek Households (N=25) Which Hunted Moose, April 1987-March 1988.

(20.0 percent), the Nunachuak and the Upper Mulchatna (12.0 percent each), and the lower Nushagak and the Iowithla drainages (4.0 percent).

For reasons previously discussed (see Freshwater Fish), this report cannot present equivalent information on land use patterns of New Stuyahok moose hunters.

Caribou

Hunters in the study communities took caribou solely from the Mulchatna herd which roams the areas west of the Alaska Range and north of Iliamna Lake, as far north as the Taylor Mountains and the Stony River (ADF&G 1985c: 117). The size of the Mulchatna herd has fluctuated in the past, and historical data on the herd are limited. Since 1981, population growth of this herd has been exceptionally rapid, estimated at 20 percent per year (Townsend 1987:3-4). Surveys flown in 1990 indicated a population close to 83,000 animals (Van Daele, pers comm, 1990). Many residents confirmed that the caribou had never been so numerous in their lifetimes and some, particularly elders, were afraid that a population crash may occur.

Caribou was an important source of food for residents in the study communities. Caribou were hunted during August and September and during winter from December through April. During fall, caribou were taken in conjunction with long, multi-purpose hunting trips by skiff. On these fall hunts, most effort was concentrated on moose. On fall multi-purpose hunting trips, families often accompanied the hunters. Most hunting specifically for caribou took place in the winter and early

spring (December through March). Winter and spring trips by snowmachine usually were day trips when the animals were close to the community. When herds were more distant, spring trips commonly lasted one to three days and overnight camping was often done at cabins located on Native allotments (Wolfe et al. 1984:424-427).

Caribou meat was eaten throughout the year and usually eaten fresh or preserved by freezing. Some caribou meat was dried (*kinengyak*) throughout the year as weather permitted but especially in the spring. As with moose, most parts were eaten, including the meat, the liver, stomach, and heart. Cooked and raw bone marrow was consumed and referred to as *pateq*. Some caribou leg skins were used in sewing such items as skin boots (*kameksak*) and other crafts.

Every household in the entire sample, with the exception of four, used caribou during the study period. Along with berries, caribou was one of the top two resources used most frequently in all communities, by over ninety percent of the sampled households. It was also widely harvested by 62.1 percent of the households in Ekwok, 73.8 percent in Koliganek, and 82.5 percent in New Stuyahok. The mean household harvest of caribou was 269.0 pounds in Ekwok, 582.1 pounds in Koliganek, and 513.8 pounds in New Stuyahok. With caribou so abundant and harvested in great quantities, it is no surprise that caribou was also widely shared. Caribou was both given and received by over 60 percent of the households in Koliganek and New Stuyahok. In Ekwok, 39.3 percent of the households distributed caribou to other households and 60.7 percent received some caribou meat.

Regulations

Most caribou hunting effort took place within the boundaries of GMU 17. Table 41 displays the history of caribou regulations in GMU 17 since statehood. The traditional legal season was generally from late August to the end of March, but from 1973 to 1975 there was no closed season. From 1978 through 1984, the season was closed in early September and reopened for winter hunting in December. However, in 1985, the season was again established from mid-August to the end of March. Bag limits have ranged from a low of two in the late 1970s to three throughout the 1980s. Not more than one caribou could be harvested during the early part of the season. This is because until 1985 the Board of Game made no distinction in the regulations between sport and subsistence hunters. Instead, adjustment in seasons, bag limits, or transportation were made to accommodate local hunting needs. The one caribou limit imposed in the fall was designed to minimize pressure from sport hunters. In 1987, residents of communities recognized by the Board of Game as having customary and traditional use of caribou in GMU 17 were eligible to hunt under subsistence regulations. All the study communities were so identified.

Subsistence regulations in 1987-88 closed hunting areas west of the Nushagak River to caribou hunting in an effort to encourage the spread of the herd westward. The season in GMU 17B and 17C was from August 10 to March 31. The limit was three caribou, not more than one which could be taken before November 1.

TABLE 41. CARIBOU HUNTING REGULATIONS, GMU 17, 1961-1988

Year	Unit	Season	Bag Limit
1961 to 1962	17	Aug. 20 - Dec. 31	3
1963	17	Aug. 20 - March 31	3
1964	17	Aug. 10 - March 31	3
1965 to 1971	17	Aug. 10 - March 31	3
1972	17	Aug. 10 - March 31	3
1973 to 1975	17	July 1 - June 30	3
1976	17	Aug. 10 - March 31	2 caribou, provided that not more than one caribou may be taken per day nor may more than one be taken from Aug. 10 - Oct. 31.
1977	17	Aug. 10 - March 31	2 caribou provided that not more than one be taken per day, nor more than one be taken from Aug. 10 - Oct. 31.
1978	17	Aug. 10 - Sept. 10 Jan. 1 - Feb. 28	2 caribou, provided that not more than one may be taken per day, nor may more than one be taken from Aug. 10 - Sept. 10.

TABLE 41 (Continued). CARIBOU HUNTING REGULATIONS, GMU 17, 1961-1988

Year	Unit	Season	Bag Limit
1979 to 1980	17	Aug. 10 - Sept. 10 Dec. 1 - Feb. 28	2 caribou, provided that not more than one may be taken per day, nor more than one caribou be taken from Aug. 10 - Sept. 10.
1981 to 1982	17	Aug. 10 - Sept. 5 Dec. 1 - Feb. 28	2 caribou, provided that no more than one may be taken per day, nor may more than one caribou be taken from Aug. 10 - Sept. 5.
1982 to 1983	17	Aug. 10 - Sept. 5 Dec. 1 - March 31	3 caribou, however, not more than one may be taken per day, nor may more than one caribou be taken from Aug. 10 - Sept. 5.
1983 to 1984	17	Aug. 10 - Sept. 4 Sept. 16 - Sept. 30 Dec. 1 - March 31	3 caribou, however, not more than one may be transported from this unit per regulatory year, nor may more than one caribou be taken from Aug. 10 - Sept. 4.
1984 to 1985	17	Aug. 10 - March 31	3 caribou, however, not more than one caribou may be taken before Nov. 1.

TABLE 41 (Continued). CARIBOU HUNTING REGULATIONS, GMU 17, 1961-1988

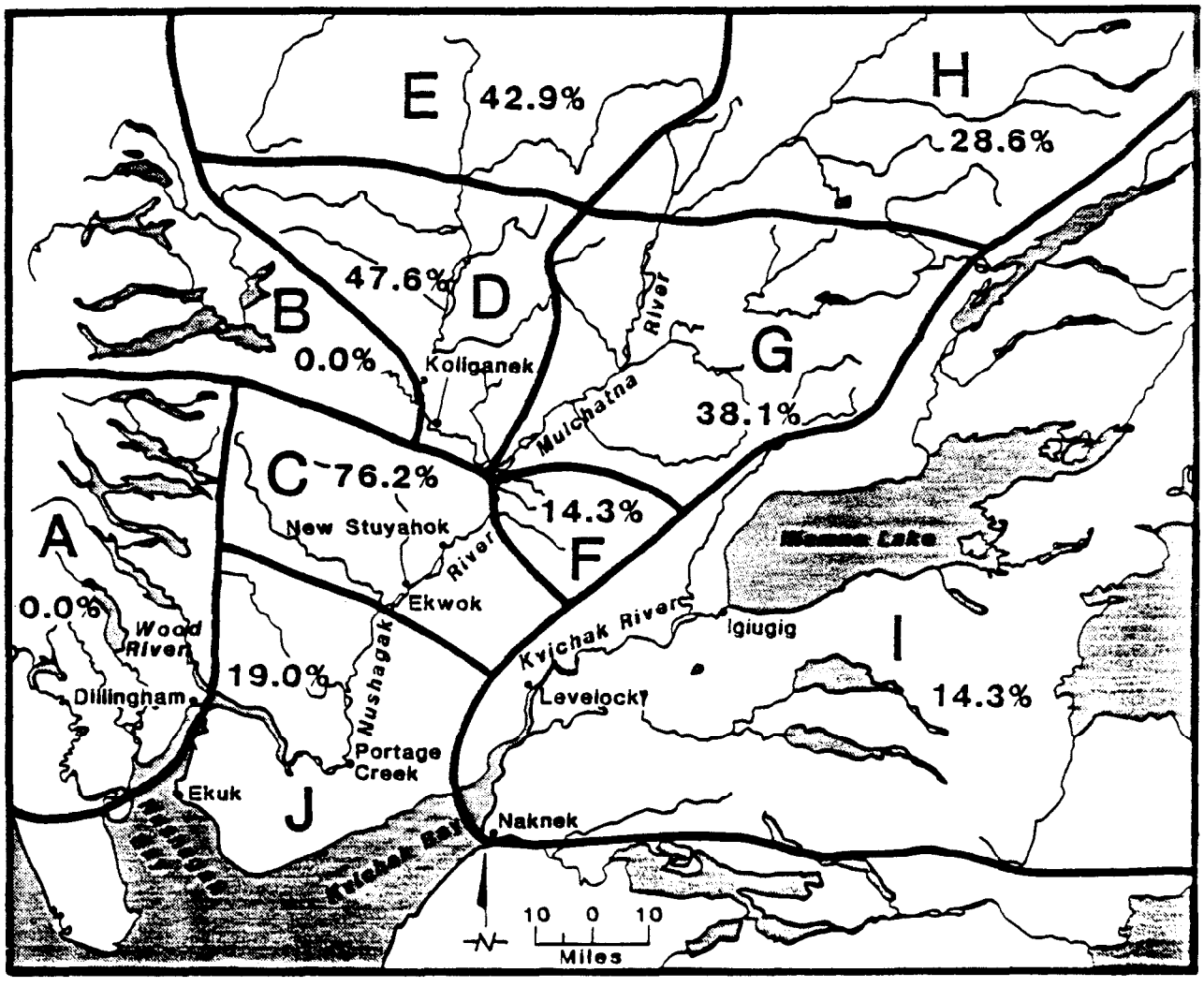
Year	Unit	Season	Bag Limit
	Subsistence Regulations		
1985 to 1986	17	Aug. 10 - March 31	3 caribou, however, not more than one may be taken before Nov. 1
	General Regulations		
	17	Aug. 10 - Oct. 31	1 caribou
	Subsistence and Resident Regulations		
1986 to 1987	17	Aug. 10 - March 31	3 caribou, however, not more than one may be taken before Nov. 1
	General Regulations		
	17	Aug. 10 - Oct. 31	1 caribou
	Subsistence and Regulations		
1987 to 1988	17A and that portion of Unit 17C, west of the Nushagak	No Open Season	
	Remainder of 17	Aug 10 - March 31	same as above, participation limited to customary and traditional users as defined by the Board of Game
	Resident Regulations - season and bag limit same as subsistence		
	General Regulations		
1987 to 1988	17A and that portion of Unit 17C, west of the Nushagak	No Open Season	
	Remainder of 17	Aug. 10 - Oct. 31	1 caribou

Source: Alaska Game Regulations 1960-1988.

Harvest Areas

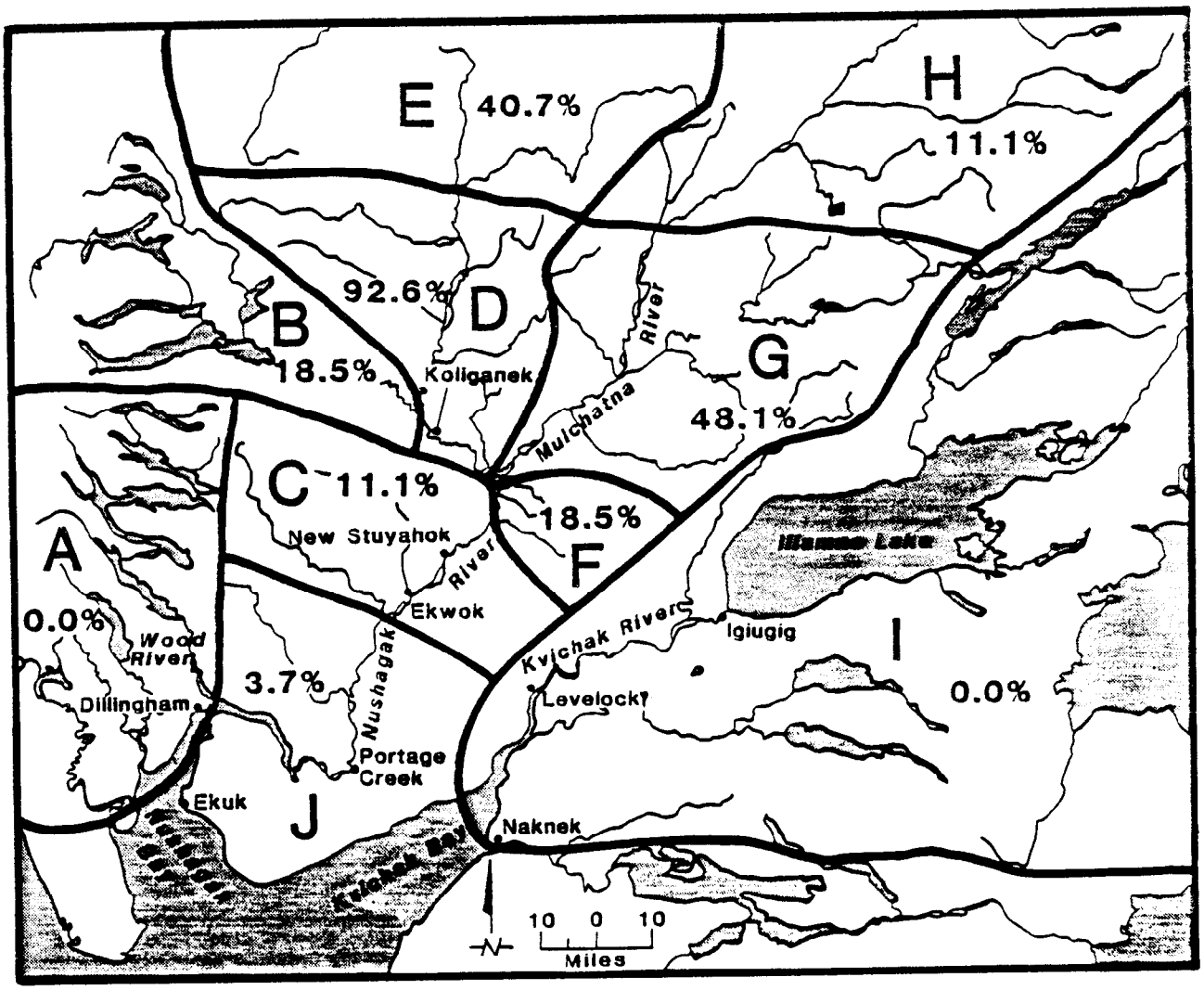
As migratory animals, caribou cover extensive amounts of territory and Nushagak River hunters followed them. This is illustrated by maps (Figures 24, 25 and 26) which depict areas used for caribou hunting over a recent twenty year period. Residents of each community traveled widely. Although the territories were overlapping, as with other species, each community favored different areas. Figures 35 and 36 and Tables 42 and 43, identify areas frequently used for caribou hunting by residents of Ekwok and Koliganek. These data are the result of the survey which asked active caribou hunting households to identify areas which they had ever used for caribou hunting, the frequency, and which areas were used in 1987-8. The results should be regarded as partial estimates since not all hunters participated. In New Stuyahok, there were problems in the administration of the surveys in that some interviewers thought information was only wanted for the study period. For New Stuyahok, geographic information is not available. As was evident with moose hunting, each community's land use pattern was distinct but there was also some overlapping use.

Ekwok hunters most intensively used the middle Nushagak and Kokwok river drainages and associated uplands (76.2 percent), but over 40 percent of the hunters also utilized the Nushagak drainage north to the Chickitnok and a similar number (38.1 percent) harvested in the lower Mulchatna drainage. The upper Mulchatna was used by over one-quarter of the sample (28.6 percent). Several households also reported caribou hunting in the lower Nushagak and Iowithla drainages (19.0 percent) as well as the Nunachuak and Lake Clark-Iliamna-Kvichak



A. Wood River and Lakes
B. Tikchik Lake and Nuyakuk River
C. Middle Nushagak and the Kokwok
D. Nushagak below Chickitnok
E. Nushagak, Chickitnok and above
F. Nunachuak Drainage
G. Lower Mulchatna
H. Upper Mulchatna, Mosquito Creek and above
I. Lake Clark/Iliamna/Kvichak
J. Lower Nushagak and Iowithla

Figure .
Percent of Ekwok Households (N=21) Which Ever Used Resource Areas For Caribou Hunting.



A. Wood River and Lakes
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G. Lower Mulchatna
H. Upper Mulchatna, Mosquito Creek and above
I. Lake Clark/Iliamna/Kvichak
J. Lower Nushagak and Iowithla

Figure .
Percent of Koliganek Households (N=2) Which Hunted Caribou, April 1987-March 1988.

TABLE 42. HOUSEHOLD FREQUENCY OF USE OF AREAS FOR CARIBOU HUNTING, APRIL 1987 - MARCH 1988, EKWOK.

	% Ever Use?	% Regularly Use?	% Seldom Use?	% Use in 1987-8?
A. Wood River and Lakes	0.0%	0.0%	0.0%	0.0%
B. Tikchik Lake and Nuyakok River	0.0%	0.0%	0.0%	0.0%
C. Middle Nushagak and Kokwok River	76.2%	38.1%	38.1%	57.1%
D. Nushagak below Chickitnok	47.6%	19.0%	28.6%	38.1%
E. Nushagak, including Chickitnok	42.9%	19.0%	23.8%	28.6%
F. Nunachuak Drainage	14.3%	0.0%	14.3%	4.8%
G. Lower Mulchatna	38.1%	19.0%	19.0%	23.8%
H. Upper Mulchatna	28.6%	4.8%	23.8%	14.3%
I. Lake Clark/Iliamna/ Kvichak	14.3%	14.3%	0.0%	9.5%
J. Lower Nushagak and Iowithla	19.0%	4.8%	14.3%	19.0%

[a] N = 21 respondent households who had at least one member actively hunting caribou during the study year and participated in mapping (72.4 percent of the sample of 29 households). Data represent minimun estimates since not all hunters were included.
Source: Division of Subsistence Survey, ADF&G, 1988.

TABLE 43. HOUSEHOLD FREQUENCY OF USE OF AREAS FOR CARIBOU HUNTING, APRIL 1987 - MARCH 1988, KOLIGANEK.

	% Ever Use?	% Regularly Use?	% Seldom Use?	% Use in 1987-8?
A. Wood River and Lakes	0.0%	.00%	0.0%	0.0%
B. Tikchik Lake and Nuyakok River	18.5%	14.8%	3.7%	14.8%
C. Middle Nushagak and Kokwok River	11.1%	7.4%	3.7%	3.7%
D. Nushagak below Chickitnok	92.6%	85.2%	7.4%	88.9%
E. Nushagak, including Chickitnok	40.7%	25.9%	11.1%	37.0%
F. Nunachuak Drainage	18.5%	11.1%	7.4%	14.8%
G. Lower Mulchatna	48.1%	37.0%	7.4%	37.0%
H. Upper Mulchatna	11.1%	11.1%	0.0%	3.7%
I. Lake Clark/Iliamna/ Kvichak	0.0%	0.0%	0.0%	0.0%
J. Lower Nushagak and Iowithla	3.7%	3.7%	0.0%	3.7%

[a] N = 27 respondent households who had at least one member actively hunting caribou during the study year and participated in mapping (64.3 percent of the sample of 42 households). Data represent minimum estimates since not all hunters were included.
Source: Division of Subsistence Survey, ADF&G, 1988.

drainages (14.3 percent). On a follow-up visit, when the researcher shared the results of the survey with community residents, they clarified several points. They particularly emphasized that it has only been in the past few years that the caribou herd has been growing on the west side of the river. Therefore most of the historic effort has been directed to the eastern portion of the Middle Nushagak-Kokwok Unit (Unit C). They also emphasized the dynamic nature of subsistence land use patterns. As the herd grows and moves, they will adapt their hunting accordingly.

The areas used most intensively by Koliganek caribou hunters was the portion of the Nushagak drainage from the mouth of the Mulchatna to the Chickitnok (92.6 percent). Other significant areas included the lower Mulchatna River (48.1 percent) and the upper Nushagak River to the Chilakadrotna (40.7 percent). Other drainages which had been used at some point in time by smaller portions of Koliganek caribou hunters were Tikchik Lake and Nuyakuk River and Nunachuak drainages (18.5 percent each) and the middle Nushagak and Kokwok rivers and the Upper Mulchatna River (11.1 percent each). One household had also sought caribou in the lower Nushagak and Iowithla drainage.

Bear

Bears, especially brown bears, were considered dangerous and treated with great respect. One researcher was told that people do not like to use the word *taqukaq* (brown bear) when talking about bears but used the terms *carayak* (ghost) so bears would not be offended by hearing their name mentioned (Chythlook, Field Notes, 1988 and 1990; see also

Loon and Georgette 1990). Brown and black bears were hunted by some younger and middle aged men in the study sample, particularly in the spring when the hides were in good condition and the meat tender and mild tasting. Fall meat was considered tasty as long as the bear had started to eat berries which imparted a sweet flavor to the meat. If bears were feeding on salmon or garbage, they were considered inedible. The meat was then sometimes dried for dogs. For human consumption, black bear meat was preferred over brown bear. One retired bear hunter recalled that "villagers were happy whenever black bear was harvested" and such a kill was "big news."

In the past spring bear hunts were conducted with dog teams which were used to help to track the bears. When the hunters were close to the bear, they tied up the dogs and continued on foot to avoid scaring the dogs. Fall hunts were conducted with kayaks made from moose and bear hides. Today snowmachines and skiffs are used for transportation.

Brown bears are found throughout the mainland portion of Unit 17 and population density is generally considered high (Townsend 1986: 32). Many local residents regard brown bear populations as too high and cite problems from bears preying on moose, robbing the fish racks, or pulling their salmon nets. No sampled households in Ekwok reported using or harvesting brown bear during the study period; however, they are taken other years. Five brown bears were taken by three Koliganek households and two households reported giving a portion of their harvest to households in other communities. All five Koliganek households used some portion of the bear meat for food, and four also utilized the skins. One household in the New Stuyahok sample hunted brown bear

unsuccessfully. Two households were recipients of brown bear meat. In 1983, research by the Division of Subsistence (Wolfe et al. 1984:341) established that there were about five active New Stuyahok bear hunters.

Black bear occur in low densities along the forested drainages of the lower Nushagak and Wood Rivers. Densities are slightly higher along the upper Nushagak and King Salmon Rivers than in other parts of GMU 17 (Morgan 1990b). No population estimates are available (Van Daele, pers. comm. 1990). Respondents reported that black bears could only be reached by traveling long distances into mountainous country at the head of the Nushagak.

In the fall, black bear were hunted by skiff in conjunction with moose hunting. At least one Koliganek respondent reported that he made an annual spring trip by snowmachine specifically for black bear with two or three other hunters. Once they reached the mountains, they searched for bear tracks. Spring bear hunting is a rigorous activity pursued mostly by younger men because of the steep mountains to be negotiated by snowmachine and the tracking on foot. This respondent learned to hunt bears by accompanying his grandfather.

Once the bear was shot, it was divided in the field between the members of the hunting party and distributed again to relatives and elders as well. The hide belonged to the man who did the actual shooting. The legs, hind quarters and ribs were considered the choicest portions of the animal. Bear meat was always cooked for human consumption because of the danger of trichinosis. It was pot roasted, fried, or half-dried and then cooked. Although bear fat was used in the past and reportedly makes the "best pie crust", it was not used during the study period.

Although no black bears were harvested by the Ekwok sample, one household received black bear meat. Four Koliganek households harvested four black bears and all four gave some of the meat to other households. In New Stuyahok, one household took a black bear which was used by two households. Black bear meat as well as the skin was shared with other households.

According to state regulations, a hunting license was required to hunt bear. For brown bear, a $25 bear tag was required as well. There was no closed season on black bears in GMU 17 and the limit was three per year. Brown bears could be hunted in GMU 17 from May 10 to May 25 and from September 10 to October 10. Under 1987/8 subsistence hunting regulations, one brown bear could be taken every four years.

Small Game

The two most important small game species taken in the study communities were porcupine and hares. Porcupine was a periodic source of food and relished as a welcome change in diet from dried fish and other staples. They were looked for in conjunction with other activities, such as gathering wood, trapping, and hunting. Porcupine were taken from September through March and were not considered good eating in the summer. Snowshoe hares were snared by young boys and women but have not been an important source of food for many years. Tundra hares were occasionally shot while hunters were out doing other things or by young men out specifically for hares and ptarmigan (Wolfe et al 1984:340).

In Ekwok, 30 porcupines were harvested by 12 households. Over half (55.2 percent) of the Ekwok sample used porcupine. Ekwok households took a total of 14 snowshoe and 12 arctic hares. Koliganek households harvested 72 porcupines and they were used by exactly half the sample. Twenty-three snowshoe and 11 arctic hares were also harvested. In New Stuyahok, 65 porcupines were taken and used by more than half the sample (55.0 percent). Twelve snowshoe hares and 11 arctic hares were harvested as well.

FURBEARERS

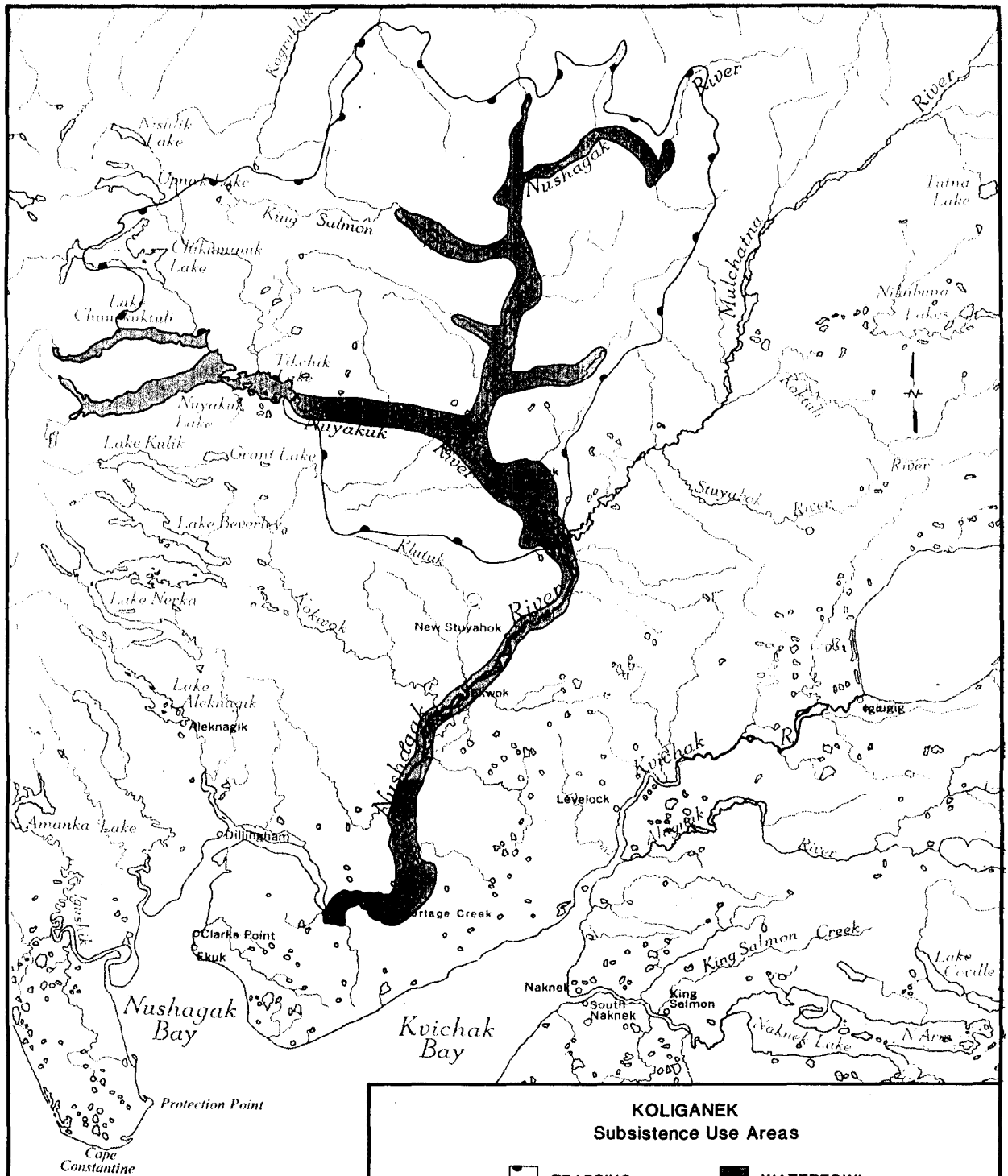
Trapping was an important activity in the study communities. Figures 30, 31, and 37, display the areas used for trapping activities by the study communities from 1960 to 1982. Both the amount of effort and the species targeted usually reflected monetary conditions in the fur market; however, beaver was an important source of red meat and trapped for its food value as well. Most trapping effort in the study communities was directed at beavers which were the primary furbearer sought for commercial sale. The beaver population in GMU 17 was depressed prior to 1970 and the population has rebounded in the 1970s and 1980s (ADFG 1985c:90). Most beavers were taken in February and March during the legal trapping season but a few were shot in mid-August to late September for camp meat (Wolfe et al 1984). Beaver meat was commonly shared between trapping and non-trapping households. Almost all of the meat was eaten, either fresh, frozen, or partially dried and smoked. Partially dried beaver meat was eaten during late spring and early summer when other sources of red meat were not readily available.

The tail was considered especially tasty by some. Beaver was considered the third most important red meat after moose and caribou. Some beaver skins were used locally in the manufacture of hats or mittens.

Another species commonly harvested for sale was land otter. Land otter were not generally eaten but it was explained to the researchers that while land otter is not a preferred food when other species are abundant, it is eaten by a few and might be eaten by more people in times of scarcity. Some trapping effort was directed at red fox, wolverine, mink, wolf, wolverine, muskrat, lynx, and marten. Some furs were retained for use in skin sewing. Respondents indicated that Arctic ground squirrels, locally called "parky squirrels," were located nearby and had been hunted in the past but they were not sought during the study period.

Table 44 summarizes trapping regulations for these species. Seasons were timed to coincide with pelt primeness. Although no systematic data were collected on means of harvest, the vast majority of furbearers taken by the sample were trapped. The exception is wolves, which were most commonly tracked and shot. One hunter practiced land and shoot hunting of wolves. It should be noted that during the study year, fur prices were quite low, and several households said that trapping did not produce enough money to cover trapping-related gasoline costs.

During the study period, slightly over half (51.1 percent) of the sampled Ekwok households included 18 active trappers. Furbearers, almost exclusively beaver, contributed 180.7 pounds to the mean household harvest. Fifteen households harvested six types of furbearers. The sample took 311 beavers, 26 foxes, 15 land otters, nine



KOLIGANEK
Subsistence Use Areas

TRAPPING

WATERFOWL

SCALE
0 10 20 30 Miles
0 10 20 30 Kilometers

Produced by the
State of Alaska, Department of Fish and Game,
Division of Subsistence
May 1989

SOURCES

John Wright, field research 1982 and 1983. See Division of Subsistence Technical Paper #114. "Bristol Bay Regional Subsistence Profile" (1985) for description of methodology and further information.

ADF&G 1986, Alaska Habitat Management Guides Reference Atlas, Southwest Region, Volume 4.

METHODOLOGY

Data were collected through interviews with local residents. Draft maps were displayed in Koliganek, reviewed and corrected at a public meeting attended by 25 residents. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

Figure 37.

TABLE 44. FURBEARER TRAPPING REGULATIONS, GMU 17, 1987-1988.

Species	Units	Open Seasons	Bag Limits
Beaver*	17A 17B, 17C	Jan. 1 - Jan. 31 Jan. 15 - March 15	20
Arctic Fox	17A, B, C	Nov. 10 - Feb. 15	No limit
Fox, Red	17A, B, C	Nov. 10 - Feb. 15	No limit
Lynx*	17A, B, C	Nov. 10 - March 31	No limit
Marten*	17A, B, C	Nov. 10 - Feb. 28	No limit
Mink and Weasel	17A, B, C	Nov. 10 - Jan. 31	No limit
Muskrat	17A, B, C	Nov. 10 - June 10	No limit
Otter, Land*	17A, B, C	Nov. 10 - March 31	No limit
Squirrel	17A, B, C	No closed season	No limit
Wolf*	17A, B, C	Nov. 10 - March 31	No limit
Wolverine*	17A, B, C	Nov. 10 - March 31	No limit

* Sealing required.

Source: ADF&G 1987.

marten, eight mink and one muskrat. The estimated gross value of this fur catch was $560 per trapper.

Two-thirds (66.7 percent) of the sampled Koliganek households trapped furbearers. Beavers were harvested in the largest numbers (437) and by the greatest (64.3) percentage of trappers. A notable number of foxes (103) were also taken by ten households. Eighteen households harvested land otters for a total catch of 43 animals and 41 wolves were taken by five households. Most of the wolves were shot. In addition, 47 marten were taken by ten households. Other species taken in smaller numbers included 23 mink, ten wolverines, nine muskrats, and three lynx. The mean value of the furs was $1,005 each for Koliganek's 29 active trappers in the 1987/8 season.

In New Stuyahok, beaver was sought and harvested by 62.5 percent of the sample who harvested a total of 440 animals. Other species were pursued by much smaller proportions of the sample and taken in fewer numbers. Specifically, the furbearer harvest broke down as follows: 22 foxes taken by 13 households; 19 land otter by nine households; 10 muskrats by one household; eight mink by three households; three marten by two households; and one wolverine by one household. In New Stuyahok there were 39 active trappers during the study period. The mean value of the fur was $377 per trapper.

MARINE MAMMALS

Due to their riverine orientation, residents of the Nushagak River communities have never been sea mammal hunters. With the exception of two harbor seals harvested by a single household in New Stuyahok, and one Koliganek household who sought harbor seal without success, no other hunting effort was directed toward marine mammal species during the study period. Nevertheless, seal oil played a prominent role in the diet of the Nushagak River population. Seal oil was used by 41.4 percent of Ekwok households, 71.4 percent of Koliganek households, and 77.5 percent of New Stuyahok households. Seal oil was obtained in a number of common ways, particularly through gifts or trading with coastal communities, especially Togiak, Twin Hills, Goodnews Bay, and Clarks Point. During the study period, seal oil also was reported as sent from relatives in Anchorage and the Yukon area. Less commonly, some families purchased seal oil, for about $20 per gallon. However, one woman told the researchers that whenever she offered to pay for seal oil, it was given as a gift or the donor requested some type of wild food in exchange. The exchanged products commonly were sent via commercial air taxis or brought in person on visits. Seal meat and blubber were sometimes brought back from Kulukak Bay by herring fishermen.

A few gifts of other marine mammals were reported during the study period. These included bearded seal, bowhead whale, sea lion, and walrus, each received by one family. Two households in New Stuyahok were recipients of belukha whale.

BIRDS

By weight, birds comprised a small proportion of the communities' total resource harvests, no more than 1.3 percent. Although birds were not hunted in large numbers, their use and harvest was fairly prevalent in all three communities. In Ekwok, at least one species of bird was harvested by 55.2 percent of the sampled households and used by 62.1 percent. In Koliganek, use was even more widespread with 90.5 percent of households using and 78.6 percent harvesting birds. The pattern was similar in New Stuyahok with 72.5 percent harvesting and 82.5 percent using some type of bird during the study period. Birds supplied 12.2 pounds to the household harvest in Ekwok, 44.7 pounds in Koliganek, and 18.7 pounds in New Stuyahok.

By regulation, a hunting license was required for hunting ptarmigan, grouse, or waterfowl. In addition, a federal and a state duck stamp were needed to harvest waterfowl. Table 45 summarizes hunting regulations for these species during the study year.

Spruce Grouse and Ptarmigan

Residents of the study communities harvested a variety of birds. From mid-August to mid-April spruce grouse were hunted in the woods near the villages. Ptarmigan were shot on the tundra in winter or in the brush along river channels in late winter (Wright et al. 1985:52) but several residents reported that ptarmigan were no longer as plentiful as they had once been. One elder in Ekwok recalled that some people used

TABLE 45. HUNTING REGULATIONS FOR SELECTED SPECIES OF BIRDS, GMU 17, 1987 - 1988.

Species	Open Season	Daily Bag Limits	Possession Limits
Ducks (except sea ducks)	Sept. 1 - Dec. 16	10[a]	30
Sea Ducks[b]	Sept. 1 - Dec. 16	15	30
Brant	Sept. 1 - Dec. 16	2	4
Canada Geese	Sept. 1 - Dec. 16	4[c]	8[c]
Cackling Canada Geese	no open season		
Emperor Geese	no open season		
Snow Geese	Sept. 1 - Dec. 16	6[c]	12[c]
White-Fronted Geese	Sept. 1 - Dec. 16	2[c]	4[c]
Cranes	Sept. 1 - Dec. 16	2	4
Grouse	Aug. 10 - April 30	15	30
Ptarmigan	Aug. 10 - April 30	20	40
Snipe	Sept. 1 - Dec. 16	8	16

[a]Provided that not more than 3 per day, or 9 in possession, may be pintail ducks.
[b]Eiders, scoters, old squaws, harlequins, and mergansers.
[c]No more than 4 a day or 8 in possession may be any combination of Canada or white-fronted geese. The combined bag limit of Canada, white-fronted, and snow geese is 6 a day, 12 in possession.

Source: Alaska Game Regulations No. 28, 1987 pp. 42-44.

to capture ptarmigan by improvising a fence with salmon netting. Ptarmigan walked or flew into the net. In that manner, he reported it was possible to harvest two sacks a ptarmigan a day. The researcher observed this technique in Koliganek when the ptarmigan population rebounded in 1991. When the ptarmigan walked or flew into the net, it was caught. In that manner, he reported it was possible to harvest two sacks of ptarmigan a day. Another technique was to build a fence of willow sticks with snares placed along openings.

Harvests of spruce grouse and ptarmigan were reported in all three communities. Spruce grouse was used more widely than ptarmigan in both Ekwok and New Stuyahok. The total harvests for the Ekwok sample were 96 spruce grouse taken by 12 households and 32 ptarmigan harvested by seven households. A total of 48 spruce grouse was taken by five New Stuyahok households and 73 ptarmigan by 11 households. The opposite was true in Koliganek, where hunters from twelve households brought home 89 spruce grouse while 23 households were successful in securing 613 ptarmigan.

Waterfowl

Waterfowl hunting was an important activity in the spring when people looked forward to fresh ducks and geese. There was some hunting effort in the fall as well. Because of migration routes, geese were mainly available in the spring. Geese species passing through the area included Canada geese (Taverner's and cacklers); whitefront (locally called yellow-legs); black brant, and emperor. The most abundant duck populations in the study area were mallards and pintails. According to

respondents, other ducks appeared in much smaller numbers, including black ducks, green-winged teal, buffleheads, shovelers, wigeons, harlequin, old squaw, mergansers, and goldeneyes. Eiders were taken in Nushagak Bay by a few hunters. Whistling swans and sandhill cranes nested in the Nushagak River area, the former on small tundra lakes and the latter on lowland tundra. Figures 24, 26, and 37 depict the waterfowl hunting areas for each community.

Tables 46, 47, and 48 present harvest totals for migratory waterfowl, broken out by season for Ekwok and Koliganek. The vast majority of the waterfowl were taken in the spring. As described above, spring was the season when ducks and geese were targeted. When ducks were taken in the fall, it was in conjunction with other activities and hunters may not have recalled those opportunistic takes as clearly. In terms of ducks, respondents could generally estimate their spring take of mallards and pintails fairly easily but other species were more difficult to remember. The harvest estimates in all likelihood represent minimum harvests, particularly for the fall.

In Ekwok, a total of 28 geese were taken, 67.8 percent of which were taken in the sprirg and included six cacklers, four Taverners, six whitefront, and 12 unidentified geese. Of the 216 ducks harvested by Ekwok hunters, 152 (71.1 percent) were shot in the spring. Mallards were harvested in the greatest number (96 ducks), followed by 47 pintails and 44 black ducks. One swan was taken in the fall.

Koliganek hunters took all but two of the 215 total geese harvested in the spring. Geese harvested included 77 cacklers, 68 Taverners, 31 whitefront, seven black brant, 17 emperor, and 15 unidentified geese. Nearly all ducks were taken in spring by Koliganek

TABLE 46. MIGRATORY BIRD HARVESTS BY SEASON, EKWOK, APRIL 1987 - MARCH 1988.
(N = 29 Households)

	SPRING				FALL				CUMULATIVE	
Species	% HH Harv	# HH Harv	# Birds (sample)	% Annual Total	% HH Harv	# HH Harv	# Birds Harv (sample)	% Annual Total	Total Sample	Total Expanded Harvest
GEESE										
Cackler	3.4	1	1	16.7	3.4	1	5	83.3	6	7
Taverner's	3.4	1	2	50.0	3.4	1	2	50.0	4	4
Whitefront	3.4	1	6	100.0	0	0	0	0.0	6	7
Black Brant	0	0	0	0.0	0	0	0	0.0	0	0
Emperor	0	0	0	0.0	0	0	0	0.0	0	0
Geese. Unk.	3.4	1	10	83.3	3.4	1	2	16.7	12	13
SWAN	0	0	0	0.0	3.4	1	1	100.0	1	1
CRANE	0	0	0	0.0	0	0	0	0.0	0	0
DUCKS										
Mallard	27.6	8	64	66.7	6.8	2	32	33.3	96	106
Pintail	20.7	6	35	74.5	3.4	1	12	25.5	47	52
Black	10.3	3	34	77.3	3.4	3	10	22.7	44	49
TOTAL	34.5	10	152	70.4	17.2	5	64	29.6	216	239

Source: Division of Subsistence Survey, ADF&G, 1988.

TABLE 47. MIGRATORY BIRD HARVESTS BY SEASON, KOLIGANEK, APRIL 1987 - MARCH 1988.
(N = 42 Households)

	SPRING				FALL					
Species	% HH Harv	# HH Harv	# Birds Harv (Sample)	% Annual Total	% HH Harv	# HH Harv	# Birds Harv (Sample)	% Annual Total	Total Sample Harvest	Total Expanded Harvest
GEESE										
Cackler	21.4	9	77	100.0	0	0	0	0.0	77	88
Taverner's	23.8	10	68	100.0	0	0	0	0.0	68	28
Whitefront	11.9	5	29	93.5	2.4	1	2	6.5	31	36
Black Brant	4.8	2	7	100.0	0	0	0	0.0	7	8
Emperor	4.8	2	17	100.0	0	0	0	0.0	17	19
Geese. Unk.	2.4	1	15	100.0	0	0	0	0.0	15	17
SWAN	21.4	9	15	88.2	4.8	2	2	11.8	17	19
CRANE	2.4	1	1	100.0	0	0	0	0.0	1	1
DUCKS										
Mallard	50.0	21	371	90.7	7.2	3	38	9.3	409	468
Pintail	47.6	20	365	100.0	0	0	0	0.0	365	417
Eider	4.9	2	15	100.0	0	0	0	0.0	15	17
Unknown*	11.9	5	80	100.0	0	0	0	0.0	80	91
	59.5	25	1060	96.1	14.3	6	42	0.0	1,102	1,209

* Includes black ducks, mallards and green-winged teal.

Source: Division of Subsistence Survey, ADF&G, 1988.

TABLE 48. MIGRATORY BIRD* HARVESTS , NEW STUYAHOK APRIL 1987 - MARCH 1988.
(N = 40 Households)

Species	% HH Harv	# HH Harv	# Birds Harv (Sample)	Total Expanded Harvest
GEESE				
Cackler	30.0	12	55	101
Taverner's	12.5	5	28	52
Whitefront	0	0	0	0
Black Brant	0	0	0	0
Emperor	0	0	0	0
Geese. Unk.	15.0	6	28	52
SWAN	2.5	1	1	2
CRANE	2.5	1	3	6
DUCKS				
Mallard	52.5	21	161	297
Pintail	37.5	15	126	233
Eider	2.5	1	100	4
Unknown	2.5	1	2	185
	68.0	28	504	932

* Harvest by season not available.
Source: Division of Subsistence Survey, ADF&G, 1988.

hunters, 816 out of a total harvest of 854. The harvest was comprised of 409 mallards, 365 pintails, and 80 unidentified ducks at least some of which were black ducks and green-winged teal. The sampled households harvested 17 swans and one crane.

In New Stuyahok, harvest by season were not specified, but it is presumed that the proportion would be similar to the patterns at Ekwok and Koliganek given the fact that the communities exhibit a fairly consistent harvest pattern for other species, and based on prior research in New Stuyahok (Wolfe et al 1984). New Stuyahok households reported a total take of 111 geese, comprised of 55 cacklers, 28 Taveners, and 28 geese which were unidentified. The total duck harvest was 289 birds, of which 161 were mallards, 126 pintails, and two of unknown species. One hunter harvested 100 eiders. One swan and three cranes were taken.

Bird Eggs

Several families in the study sample searched for eggs in the vicinity of Nushagak Bay. Most effort was directed at gull eggs (probably glaucous gulls). No Ekwok households used or harvested any type of birds eggs during the study period. Seven households in Koliganek collected a total of 12.3 dozen gull eggs. A very few geese and duck eggs were taken. One household received some murre eggs from the wife's mother in Goodnews Bay. Two New Stuyahok households harvested 13 dozen gull eggs.

CHAPTER 6

DISCUSSIONS AND CONCLUSIONS

COMPARISONS OF THE STUDY COMMUNITIES

As the foregoing chapters have illustrated, Ekwok, Koliganek, and New Stuyahok displayed remarkably similar patterns in the use and harvest of wild resources during the study period of April 1987 to March 1988. This is understandable since the communities are located in the same ecological niche, share the same cultural heritage, and have experienced similar histories. Their historical involvement with the cash economy followed the same course, with important change agents being the Russian and American fur trade, Christian missionaries, western educators, and most profoundly, the commercial salmon fishing industry (VanStone 1967). Throughout the twentieth century, Bristol Bay's economy has been dominated by the vagaries of the commercial salmon trade. All three Nushagak River villages have depended on salmon fishing for their major source of cash income. However, the data show that Ekwok has already lost over half of its limited entry salmon drift permits and this may result in decreasing participation in the future. Non-fishing jobs tend to be insecure, seasonal, and part-time in nature, with the local school district and government entities providing the most employment opportunities.

In all three communities, wild resources played a key component in the mixed cash and subsistence economy. The three communities shared a similar seasonal round of harvesting activities. During the summer months, intensive effort was expended in the subsistence and commercial

harvests of salmon. During the fall, caribou and moose were hunted and nets were set for whitefish and pike. The winter months were busy with trapping, ice fishing, and hunting. In the spring, nets were again set for freshwater species and waterfowl were hunted. Spring was a time to prepare boats, equipment, and fish camps for the upcoming fishing season.

Resource use was high in all three communities. The mean number of resources used in the three communities was very similar, 16.5 different resources in Ekwok, 20.1 in Koliganek, and 17.4 in New Stuyahok. The mean number of resources harvested also showed a marked similarity. The sampled households in Ekwok reported harvesting 11.7 different resources; in Koliganek, 14.3 resources; and in New Stuyahok, 13.1.

Further, harvest levels were relatively high for all three communities and fell within a similar range. The per capita food harvest for the 12 month study period were 797.0 pounds in Ekwok, 830.7 pounds in Koliganek, and 701.2 pounds in New Stuyahok. These quantities are well above the 222 pounds per person of domestic fish, meat, and poultry purchased annually within the average American household (U.S. Department of Agriculture 1983), indicating the vital role which local resources played in the diet of Nushagak River residents. Table 49 compares Ekwok, Koliganek, and New Stuyahok's harvests with other Alaska communities and Table 50 compares them specifically with other communities in Bristol Bay. On a statewide basis, these harvests are among the highest in the state, higher than most other rural communities, and much greater than urban communities such as Kenai or Homer whose per capita harvests were recorded as 38.2 and 98.1 pounds

TABLE 49. HARVEST QUANTITIES FROM SELECTED ALASKA COMMUNITIES.

Community	Region*	Pop.	Mean HH Harvest in Lbs.	HH Size	Per Capita Harvest in Lbs.	Study Year
Tanana	Int	373	5,827.7	2.9	2,157.2	1987
Nondalton	S.W.	224	6,097.7	5.7	1,174.8	1983
Minto	Int	179	3,971.2	3.7	1,015.4	1984
Pedro Bay	S.W.	60	2,544.4	3.0	865.1	1982
Karluk	Kod.	102	3,409.4	4.0	863.2	1982
KOLIGANEK	S.W	175	3,223.0	3.9	830.7	1987
EKWOK	S.W.	107	2,664.4	3.3	797.0	1987
Quinhagak	Y-K	427	3,711.6	4.8	767.9	1982
Newhalen	S.W.	124	3,696.0	4.8	767.1	1983
Beaver	Int	78	1,841.4	2.5	731.9	1985
NEW STUYAHOK	S.W.	367	3,344.5	4.8	701.2	1987
Kokhanok	S.W.	123	3,704.7	5.3	696.6	1983
Igiugig	S.W.	32	3,911.6	3.7	617.6	1983
Akhiok	Kod	103	1,978.9	3.8	519.5	1982
Old Harbor	Kod	355	1,861.1	3.8	491.1	1982
Ivanof Bay	S.W.	40	1,670.5	3.7	445.6	1984
Iliamna	S.W.	129	1,622.5	3.9	416.0	1983
Larsen Bay	Kod.	180	1,677.1	4.2	403.5	1982
Perryville	S.W.	111	1,662.4	4.3	391.2	1984
Egegik	S.W.	75	891.7	2.3	384.3	1984
Manokotak	S.W.	309	2,005.7	5.2	384.0	1985
Ouzinkie	Kod.	233	1,234.2	3.3	369.1	1982
Lake Clark-Port Alsworth	S.W.	NA	1,305.5	3.7	361.0	1983
Nabesna Road	C.B.	50	1,223.9	4.1	279.8	1982
Port Lions	Kod.	291	910.6	3.3	279.8	1982
Chignik Lake	S.W.	138	1,407.0	5.0	278.9	1984
Tyonek	S.C.	273	964.0	3.5	272.0	1983
South Naknek	S.W .	136	752.6	2.8	267.9	1983
Russian Mission	Y-K		1,118.6		232.2	1985
Chickaloon	M.V.	69	521.6	2.3	223.6	1982
King Salmon	S.W.	374	666.1	3.0	220.3	1983
Chiknik Lagoon	S.W.	48	738.5	3.4	220.2	1984
Gakona	C.B.	87	640.1	3.1	201.7	1982
Chitina	C.B.	42	340.3	1.8	190.8	1982
Naknek	S.W.	369	586.3	3.0	188.2	1983
Chignik Bay	S.W.	178	811.1	4.3	187.9	1984
Kodiak City	Kod.	8,247	494.8	3.3	147.2	1982
Mentasta	C.B.	59	386.8	3.4	125.4	1987
Copper Center	C.B.	213	384.0	3.4	113.9	1982
Cantwell	C.B.	136	324.3	2.5	111.6	1982
Gulkana	C.B.	104	314.5	2.8	111.0	1982
Homer City	K.P.	2,588	293.8	2.8	93.8	1982
Homer Area	K.P.	2,069	293.8	3.3	93.8	1982
Ninilchik	K.P.	341	256.1	3.0	85.4	1982
Glennallen	C.B.	511	228.0	3.4	67.2	1982
Seldovia	K.P.	505	176.3	3.5	50.6	1982
Kenai	K.P.	4,558	125.1	3.2	37.9	1982

TABLE 49. HARVEST QUANTITIES FROM SELECTED ALASKA COMMUNITIES. (Continued).

*Regions abbreviated as noted: Y-K=Yukon Kuskokwim; S.W.=Southwest; Kod.=Kodiak; S.C.=Southcentral; C.B.=Copper Basin; M.V.=Matanuska Valley; Int=Interior; K.P.=Kenai Penisula.

Source: Alaska Department of Fish and Game, 1991.

TABLE 50. COMPARISON OF PER CAPITA WILD RESOURCE HARVESTS AND THE COMPOSITION OF WILD RESOURCE HARVESTS BY RESOURCE CATEGORY, EKWOK, KOLIGANEK, AND NEW STUYAHOK WITH OTHER BRISTOL BAY COMMUNITIES.

	Per Capita Harvest lbs[a]	Composition of harvest (percent)						
		Salmon	Other Fish	Marine Invert.	Land Mammals[b]	Marine Mammals	Birds and Eggs	Plants
Ekwok	797	57.3	8.6	0.0	31.3	0.0	.5	2.4
Koliganek	831	43.6	10.9	0.0	40.9	0.0	1.3	2.5
New Stuyahok	701	58.3	5.2	c	33.9	c	.6	2.0
Igiugig	618	71.5	13.1	0.0	10.1	0.4	1.1	3.8
Iliamna	416	79.6	7.4	c	8.0	0.5	0.6	3.9
Kokhanok	697	72.7	14.3	NA	9.8	0.0	0.8	2.4
Lake Clark	361	65.0	4.6	0.3	26.8	0.0	1.2	2.1
Newhalen	767	88.1	4.0	0.0	5.1	0.7	0.7	1.3
Nondalton	1,175	65.3	15.0	0.0	17.0	0.0	0.7	2.0
Pedro Bay	865	82.8	8.6	0.4	6.3	0.0	0.5	1.4
Manokotak	384	35.2	22.3	1.2	24.8	8.5	4.4	3.7
Dillingham	242	58.4	7.2	0.5	27.2	1.2	2.2	3.3
Egegik	384	24.4	4.1	3.5	63.8	0.0	4.2	NA
King Salmon	220	46.6	7.3	NA	46.1	0.0	NA	NA
Naknek	188	54.4	9.9	NA	35.6	0.1	NA	NA
Pilot Point	384	24.7	4.1	1.6	62.5	1.2	4.4	1.5
Port Heiden	408	20.8	2.9	4.3	61.5	3.7	3.3	3.4
South Naknek	268	31.2	6.4	NA	62.2	0.0	NA	NA
Ugashik	814	39.3	4.5	0.0	50.6	0.0	3.1	2.3
Chignik	188	74.4	10.5	3.8	7.3	2.7	1.4	NA
Chignik Lagoon	220	55.3	8.2	6.5	25.9	1.0	3.2	NA
Chignik Lake	279	52.1	5.1	1.2	38.8	1.2	1.7	NA
Ivanoff Bay	446	61.6	3.4	5.9	21.6	4.8	2.7	NA
Perryville	391	58.5	10.8	2.8	21.7	4.6	1.6	NA

[a] The harvest year for Ekwok, Koliganek, and New Stuyahok was April 1987 to March 1988. The harvest year for the Iliamna Lake Lake communities was 1983 (Morris 1986). The harvest year for Manokotak was 1985 (Schichnes and Chythlook 1988). Harvest for Dillingham was 1984 (Fall et al. 1986). Pilot Point, Port Heiden, and Ugashik was June 1986 - May 1987 (Fall and Morris 1987). Harvests for Egegik, Chignik, Chignik Lagoon, Chignik Lake, Ivanof Bay, and Perryville, pertain to 1984 (Morris 1987). For King Salmon, Naknek, and South Naknek, the harvest year was 1983 (Morris 1985).

[b] Includes edible furbearers.

[c] Less than .1 percent.

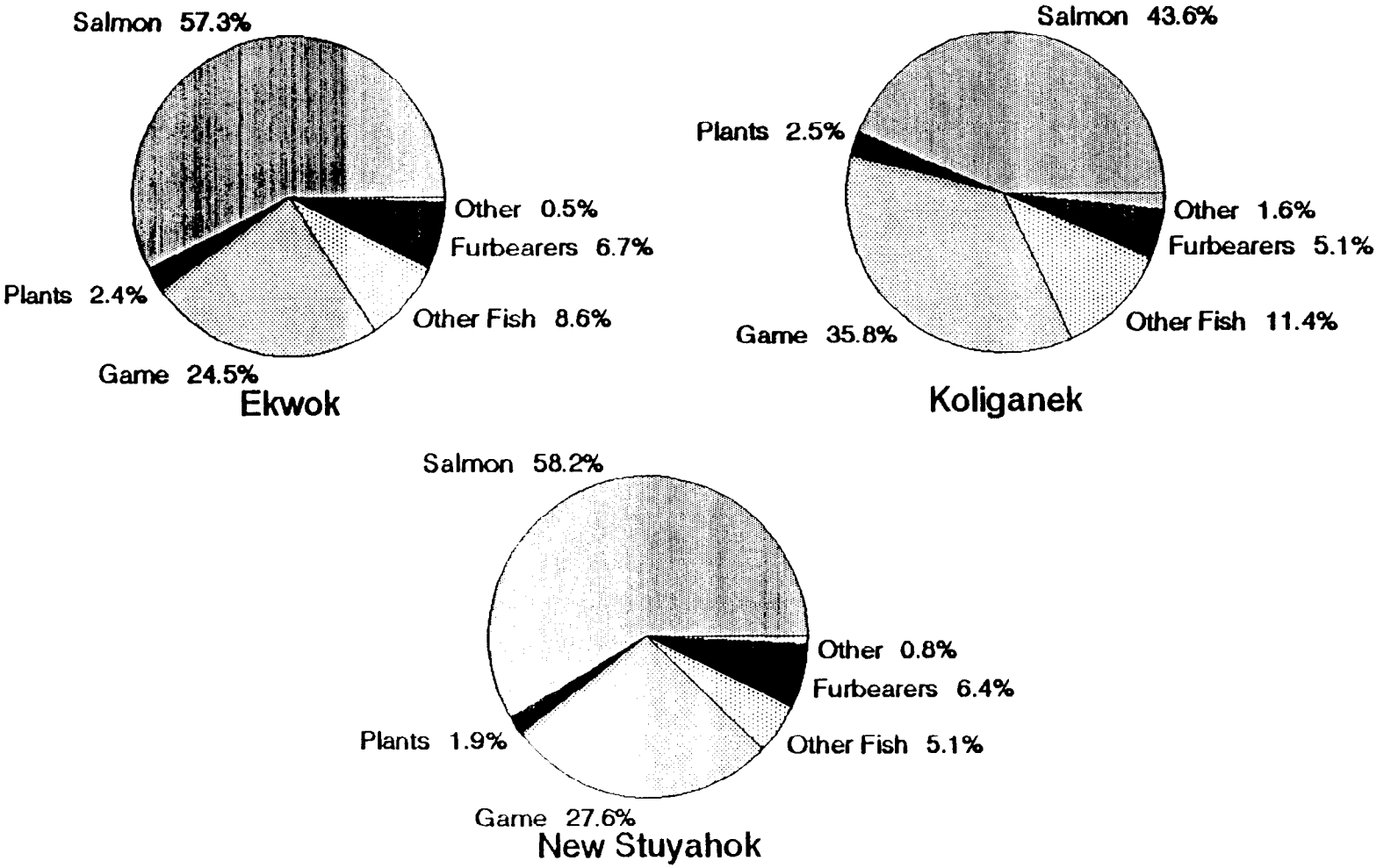
respectively. In Bristol Bay, harvests were comparable to several communities in the Iliamna Lake region, and to Ugashik on the Alaskan Peninsula.

The harvest composition in all three communities relied heavily on salmon and land mammals, especially red salmon, king salmon, moose and caribou. Figure 38 indicates that over 80 percent of each community's harvest was composed of salmon and land mammals. Freshwater fish made up from 4.7 percent of the harvest in New Stuyahok to 11.1 percent in Koliganek with Ekwok's harvest of 8.4 percent falling in between. Much smaller quantities of plants, birds and eggs, and marine species comprised the remainder of the harvests.

The sharing of wild resources was widespread in the three study communities, with households receiving from seven to ten resources on average and giving away an average of five to eight. At least 82.8 percent of the households in each community received some type of wild food during the study period and at least 86 percent gave some away. Notably, seal oil was an important food in all three communities but not harvested by community residents. Rather, marine mammal products were obtained through long-established sharing and trade relationships with friends and relatives in coastal communities.

These results show that wild resource harvests played a similar and central role in the economy and social life of Ekwok, Koliganek, and New Stuyahok in the 1980s. Subsistence patterns within the three communities display such similarities that they can be examined as a unit. The following section compares the patterns of the Nushagak River communities in the past and with other Alaskan communities today.

Figure 38. Comparison: Resource Harvest Categories, Nushagak River, 1987-88



CHANGES IN HARVEST PATTERNS: 1973-4 AND 1987-88

Tables 51, 52, and 53 report the results of a resource harvest survey conducted in 1974 with a sample of households in Ekwok, Koliganek, and New Stuyahok (Gasbarro and Utermohle 1974). The data refer to 1973-4 harvests. (Results of a harvest survey conducted with 19 New Stuyahok households in 1982 indicated a per capita harvest of 948 and are included as Appendix C.) Table 54 compares the 1973-4 data regarding participation in harvest and harvest levels with the results of the Division of Subsistence survey in 1988. These comparisons indicate a striking continuity between 1973-4 and 1987-88. In all three communities, harvests quantities of wild foods remain substantial and have, in fact, surpassed their 1973-4 harvests. As shown in Figure 39, the per capita harvest for Ekwok's sample rose most sharply from 645 pounds in 1973-4 to 778 pounds in 1987-88 (deleting plants for which the 1973-4 data were unavailable). The 1973-4 harvest in Ekwok was composed of 55.8 percent salmon, compared to 57.3 percent in 1987-88. Land mammals comprised 29.3 percent in 1973-4 and 24.5 percent in 1987-8. The percentage of freshwater fish in the harvest totals were nearly identical, with 9.0 percent in 1973-4 and 8.4 percent in 1987-88. There was a slight increase in furbearers, basically beaver, from 4.3 percent in 1973-4 to 6.8 percent in 1987-88, possibly attributable to the recovery of the beaver population.

For Koliganek, the per capita harvest went from 778 pounds in 1973-4 and to 810 pounds per person in 1987-88 (deleting plants). Like Ekwok, the harvest composition remained stable. Salmon comprised 48.5 percent in 1973-4 and 43.8 percent in 1987-8 also similar to Ekwok, land

TABLE 51. WILD RESOURCE HARVESTS EKWOK, 1973-4.

Resource[a]	Percentage Harvesting	Mean Household Harvest, Pounds[b]	Per Capita Harvest, Pounds	Total Sample Harvest Numbers
SALMON[c]	58.8	1,756.8	359.8	5,328
King salmon	NA	653.4	133.8	793
Red salmon	NA	789.4	161.6	3,356
Chum salmon	NA	235.7	48.2	911
Pink salmon	0	.0	0.0	0
Silver salmon	NA	78.4	16.0	268
OTHER FISH	76.5	298.3	61.1	5,019
Whitefish	64.7	152.6	31.2	2,595
Pike	41.2	88.8	18.1	539
Char, Dolly Varden	53.0	1.8	.3	22
Grayling	52.9	30.3	6.2	735
Rainbow Trout	53.0	8.8	1.8	108
Lake Trout	0	0.0	0.0	0
Smelt	6.0	14.7	3.0	1,000
Herring	0	0.00	0.0	0
Flounder	5.9	1.2	.2	20
Suckers	0.0	0.0	0.0	0
MARINE INVERTEBRATES[d]	0	0	0.0	0
MARINE MAMMALS	0	0	0.0	0
LAND MAMMALS	58.8	922.3	188.7	
Moose	52.9	476.5	97.5	15
Caribou	35.3	432.4	88.5	49
Brown Bear	0	0	0.0	0
Black Bear	0	0	0.0	0
Hare	11.8	2.6	.5	22
Porcupine	23.5	10.8	2.2	23
BIRDS -	70.6	35.6	7.0	---
Waterfowl	58.8	28.3	5.8	208
Ducks[e]	52.9	11.1	2.2	135
Geese[e]	53.0	17.2	3.5	73
Swans	0	0	0	0
Ptarmigan	35.3	3.6	.7	88
Grouse	23.5	2.7	.5	65

N = 17 households with 83 people = 81 percent of village households 21 HH total.
Source: Original data collected by Gasbarro and Utermohle (1974).

TABLE 51. (Continued) WILD RESOURCE HARVESTS, EKWOK, 1973-4.

Resourcea	Percentage Harvesting	Mean Household Harvest, Poundsb	Per Capita Harvest, Pounds	Total Sample Harvest Numbers
FURBEARERS	64.7	136.5	27.9	161
Beaver	64.7	136.5	27.9	116
Fox	47.1	0.0	0.0	27
Land Otter	35.3	0.0	0.0	14
Mink	11.8	0.0	0.0	4
Lynx	0.0	0.0	0.0	0
Wolf	0.0	0.0	0.0	0
Wolverine	0.0	0.0	0.0	0
Squirrel	0.0	0.0	0.0	0
PLANTS[f]	82.4	NA	NA	NA
ALL RESOURCES--	94.1	3,148.7	644.8	

a. Only those resources for which data were collected during the survey are listed.
b. Factors used to convert numbers of animals or fish into pounds edible weight are included in Appendix D.
c. Reported as "salmon". Catch broken down by species proportional to the reported 1973 subsistence catch for the Nushagak district; sockeye (red) salmon, 63%; chinook (king) salmon, 14.9%; chum (dog) salmon, 17.1%; pink salmon, 0%; coho (silver) salmon, 5% (Wright et al. 1985: 95).
d. Reported as "clams".
e. Harvest by species not reported.
f. Berries only.

TABLE 52. WILD RESOURCE HARVESTS, KOLIGANEK, 1973-4.

Resource[a]	Percentage Harvesting	Mean Household Harvest, Pounds[b]	Per Capita Harvest, Pounds	Total Sample Harvest, Numbers
SALMON[c]	80.0	2,093.9	369.5	5,600
King salmon	NA	778.9	137.4	834
Red salmon	NA	940.8	166.0	3,528
Chum salmon	NA	280.8	49.5	958
Pink salmon	NA	0.0	0.0	0
Silver salmon	NA	93.5	16.4	280
OTHER FISH	60.0	291.3	51.4	3,375
Whitefish	60.0	76.3	13.4	1,145
Pike	60.0	120.4	21.2	645
Char, Dolly Varden	33.3	10.3	1.8	110
Grayling	60.0	56.5	9.9	1,210
Rainbow Trout	53.3	12.2	2.1	131
Lake Trout	20.0	5.0	.8	28
Smelt	0	0.0	0.0	0
Herring	0	0.0	0.0	0
Suckers	6.7	10.6	1.8	106
Flounder	0	0.0	0	0
MARINE INVERTEBRATES[d]	NA	0	0.0	0
MARINE MAMMALS	NA	0	0.0	0
LAND MAMMALS	66.7	1,693.3	299.5	176
Moose	60.0	828.0	146.1	23
Caribou	60.0	810.0	142.9	81
Brown Bear	20.0	20.0	3.5	3
Black Bear	6.7	3.9	1.6	1
Hare	13.3	1.7	.3	13
Porcupine	66.7	29.9	5.1	55
BIRDS	80.0	63.7	12.2	-
Waterfowl	80.0	50.3	8.8	400
Ducks[e]	80.0	30.3	5.3	325
Geese[e]	60.0	20.0	3.5	75
Swans	0.0	0.0	0.0	0
Cranes	0.0	0.0		
Ptarmigan	60.0	18.9	2.3	284
Grouse	0.0	0.0	0.0	0

N = 15 households with 85 people = 75 percent of village households (Total HH = 20)

Source: Original data collected by Gasbarros and Utermohle (1974).

TABLE 52. (Continued) WILD RESOURCE HARVESTS, KOLIGANEK, 1973-4.

Resource[a]	Percentage Harvesting	Mean Household Harvest, Pounds[b]	Per Capita Harvest, Pounds	Total Sample Harvest, Numbers
FURBEARERS	53.0	174.7	30.8	227
Beaver	53.3	174.7	30.8	131
Fox	46.7	0.0	0.0	34
Land Otter	33.3	0.0	0.0	19
Lynx	6.7	0.0	0.0	1
Mink	13.3	0.0	0.0	32
Wolf	13.3	0.0	0.0	4
Wolverine	20.0	0.0	0.0	6
Squirrel	0.0	0.0	0.0	0
PLANTS[f]	60.0	NA	NA	NA
ALL RESOURCES--	100.0	4,316.4	761.7	

a. Only those resources for which data were collected during the survey are listed.
b. Factors used to convert numbers of animals or fish into pounds are included in Appendix D.
c. Reported as "salmon". Catch broken down by species proportional to the reported 1973 subsistence catch for the Nushagak district; sockeye (red) salmon, 63%; chinook (king) salmon, 14.9%; chum (dog) salmon, 17.1%; pink salmon, 0%; coho (silver) salmon, 5% (Wright et al. 1985: 95).
d. Reported as "clams."
e. Harvest by species not reported.
f. Berries only.

TABLE 53. WILD RESOURCE HARVESTS, NEW STUYAHOK, 1973-4.

Resource[a]	Percentage Harvesting	Mean Household Harvest, Pounds[b]	Per Capita Harvest Pounds,	Total Sample Harvest, Numbers
SALMON[c]	80.8	1,097.6	175.0	5,093
King Salmon	NA	408.3	65.1	762
Red salmon	NA	493.2	78.6	3,207
Chum salmon	NA	147.2	23.4	869
Pink salmon	0.0	0.0	0.0	0
Silver salmon	NA	48.9	7.8	255
OTHER FISH	84.6	485.7	77.4	8,548
Whitefish	73.1	47.9	7.6	1,245
Pike	76.9	249.6	39.8	2,318
Char, Dolly Varden	46.2	13.9	2.2	257
Grayling	65.4	99.9	15.9	3,710
Rainbow trout	38.5	29.6	4.7	550
Lake trout	11.5	44.5	7.0	428
Smelt	3.8	0.5	0.1	40
Herring	0.0	0.0	0.0	0
Suckers	0.0	0.0	0.0	0
Flounder	0.0	0.0	0.0	0
MARINE INVERTEBRATES[d]	0	0.0	0.0	0
MARINE MAMMALS	0	0	0.0	0
LAND MAMMALS	73.1	2,031.3	323.8	406
Moose	69.2	1,183.8	188.8	57
Caribou	53.8	796.2	126.9	138
Brown Bear	0.0	0	0.0	0
Black Bear	0.0	0	0.0	0
Hare	11.5	4.5	0.7	59
Porcupine	73.1	46.8	7.4	152
BIRDS	84.6	70.8	10.6	
Waterfowl	80.8	57.8	9.2	687
Ducks[e]	80.8	25.8	4.1	479
Geese[e]	57.7	32.0	5.1	208
Swans	0.0	0	0.0	0
Ptarmigan	57.7	13.0	2.1	273
Grouse	3.8		.2	66

N = 26 households with 163 people = 84 percent of village households (Total HH = 31).

Source: Original data collected by Gasbarro and Utermohle (1974).

TABLE 53. (Continued) WILD RESOURCE HARVESTS, NEW STUYAHOK, 1973-4.

Resource[a]	Percentage Harvesting	Mean Household Harvest, Pounds[b]	Per Capita Harvest Pounds,	Total Sample Harvest, Numbers
FURBEARERS	69.2	188.5	30.0	448
Beaver	69.2	188.5	30.0	245
Fox	57.7	---	---	86
Land Otter	34.6	---	---	31
Lynx	23.1	---	---	16
Mink	34.6	---	---	37
Muskrat	7.7	---	---	28
Wolf	0	---	---	0
Wolverine	3.8	---	---	1
Squirrel	7.7	---	---	4
PLANTS[f]	92.3	NA	NA	NA
ALL RESOURCES--	100.0	3,870.2	617.3	

a. Only those resources for which data were collected during the survey are listed.
b. Factors used to convert numbers of animals or fish into pounds edible weight are included in Appendix D.
c. Reported as "salmon". Catch broken down by species proportional to the reported 1973 subsistence catch for the Nushagak district; sockey (red) salmon, 63%; chinook (king) salmon, 14.9%; chum (dog) salmon, 17.1%; pink salmon, 0%; coho (silver) salmon, 5% (Wright et al. 1985: 95).
d. Reported as "clams."
e. Harvest by species not reported.
f. Berries only.

TABLE 54. COMPARISONS OF 1973-74 AND 1987-88 FISH AND WILDLIFE HARVESTS, EKWOK, KOLIGANEK, AND NEW STUYAHOK.

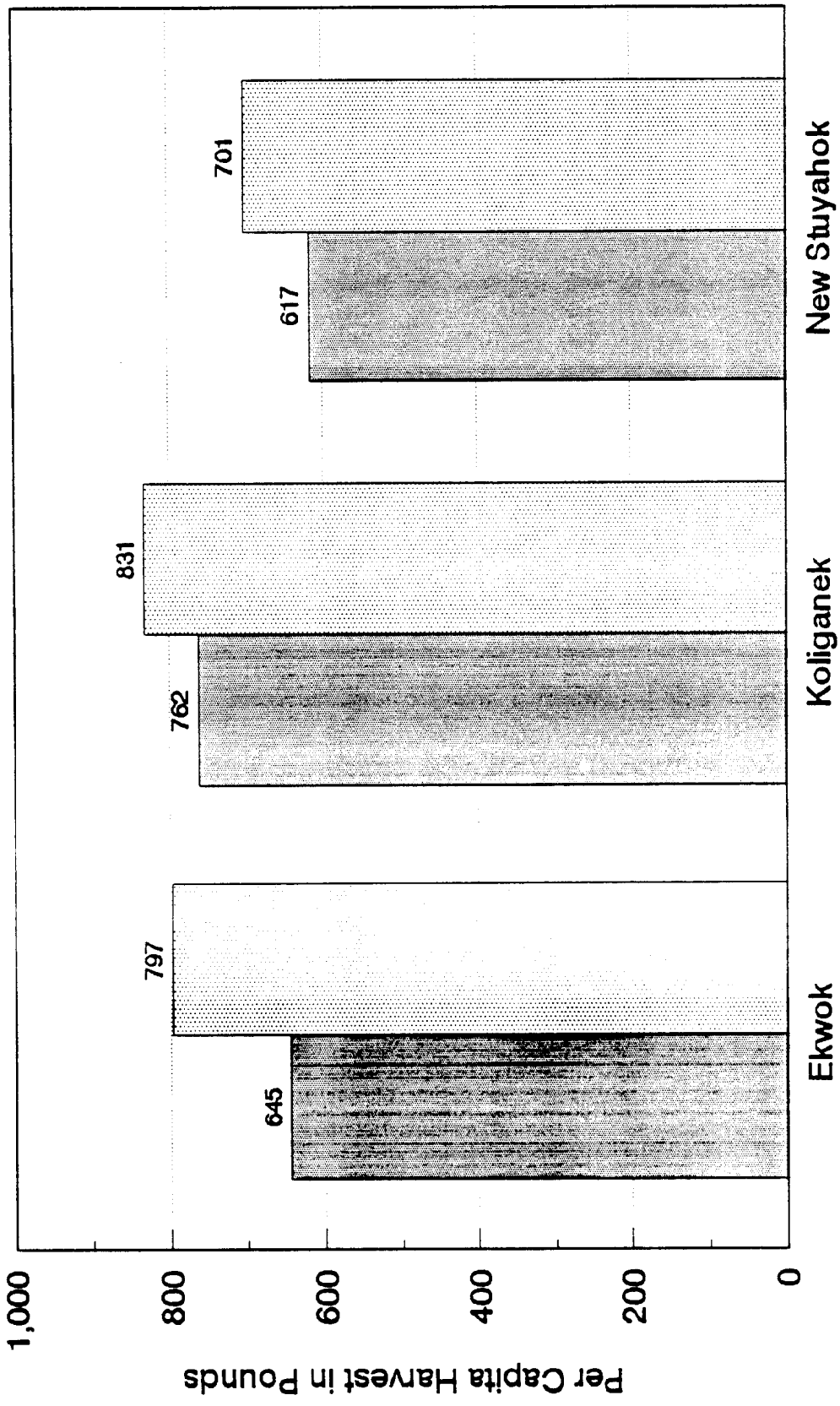
	Ekwok				Koliganek				New Stuyahaok			
	% HHs harvesting		% of total harvest		% HHs harvesting		% of total harvest		% HHs harvesting		% of total harvest	
	1973-74	1987-88	1973-74	1987-88	1973-74	1987-88	1973-74	1987-88	1973-74	1987-88	1973-74	1987-88
Salmon	58.8	65.5	55.8	57.3	80.0	71.4	48.5	43.8	80.8	77.5	28.4	58.3
Birds	70.6	55.2	1.1	0.5	80.0	78.6	1.5	1.3	84.6	72.5	1.8	0.6
Land Mammals	58.8	69.0	29.3	24.5	66.7	76.2	39.2	35.9	73.1	85.0	52.5	27.6
Moose	52.9	51.7	15.1	13.9	60.0	52.4	19.2	15.8	69.2	55.0	30.6	11.7
Caribou	35.3	62.1	13.7	10.0	60.0	73.8	18.8	17.0	53.8	82.5	20.6	15.4
Furbearers	64.7	51.7	4.3	6.8	53.0	66.7	4.0	5.0	69.2	65.0	4.9	6.3
Freshwater Fish	76.5	65.5	9.0	8.4	60.0	81.0	6.7	11.1	84.6	85.0	12.5	4.7
Plants	82.4	89.7	na	2.4	60.0	81.0	na	2.5	92.3	92.5	na	2.0
Marine Invertebrates	0.0	0.0	0.0	0.0	0.0	9.5	0.0	0.1	0.0	7.5	0.0	*
Marine Mammals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	*
Marine Fish	6.0	17.2	0.5	0.2	0.0	14.3	0.0	0.3	3.8	20.0	*	0.5
ALL RESOURCES	94.1	96.6	---	---	100.0	100.0	---	---	100.0	100.0	---	---

na=not available

* less than .1 percent.

Source: Division of Subsistence Survey, ADF&G, 1988.

Figure 39. Comparison Per Capita Harvests
1973 and 1987/88



mammals harvest declined slightly from 39.2 percent in 1973-4 to 35.9 percent in 1987-88. However, the per capita harvests were identical -- 298 pounds in both study years. This is somewhat surprising given the rate of growth of the Mulchatna caribou herd and the much greater availability of caribou in 1987-88. One might have speculated that land mammal harvests, particularly caribou, would have increased substantially. The fact that salmon continued to be harvested in the same proportions demonstrates residents preferences and traditional tastes. Freshwater fish increased from 6.7 percent of the resource composition in 1973-7 to 11.1 percent in the current study. No differences emerged for other major resource categories.

New Stuyahok also demonstrates a noticeable increase in per capita harvest levels, up from 617 pounds per person in 1973-4 to 688 pounds per person in 1987-88 (with plants deleted). Alone of the three communities, New Stuyahok displays a significant departure in the orientation of the resource harvest composition. In 1973-4, salmon represented only 28.4 percent of the harvest, ranking second after land mammals which comprised 52.5 percent. In the 1987-88 data, New Stuyahok followed a similar pattern to Ekwok and Koliganek, namely, salmon ranked first and represented 58.3 percent of the harvest and land mammals were 27.6 percent. These differences are not readily explainable.

The percentage of households harvesting resources was high both years. Every household except one in Ekwok and every household in Koliganek and New Stuyahok harvested at least one resource during each study year. Over half the households in each sample harvested resources from the categories of salmon, birds, moose, furbearers, freshwater

fish, and plants in both study years. In all three communities there was a substantial rise in the percentage of households that harvested caribou. This change is most likely due to the greater abundance and availability of caribou in the study area in the mid-1980s.

Overall, comparisons of on fish and wildlife harvest for 1973-4 with 1987-88 suggest considerable continuity in harvesting patterns. Per capita harvest levels are similar but have increased somewhat in all three communities. Resource composition has remained fairly stable, with the exception of New Stuyahok where proportionally salmon harvests increased and game harvests decreased from 1973-4 to 1987-8. Levels of participation in harvesting have remained high and there has been a noticeable rise in hunting effort directed at caribou.

RESIDENTS' CONCERNS RELATED TO SUBSISTENCE

Increasing Recreational Use in Traditional Hunting Areas

Throughout the 1980s, residents of the Nushagak River villages reported that their traditional fall hunting patterns were being disrupted by increasing numbers of recreational users. Data supplied by ADF&G confirm the continuing, rapid increase in sport moose hunting pressure in the Nushagak/Mulchatna drainage, especially from non-Alaskan residents. The average reported number of hunters per year between 1983 and 1986 was 512, a 340 percent increase over the previous decade's average of 150. During the same period, reported moose harvests per year averaged 141, a 220 percent increase over the previous decade's

average of 64. Despite the increase in moose harvests, the average hunter success rate fell from 43 percent in the previous decade to 28 percent between 1983 and 1986 (ADNR, ADF&G, and BBCRAB 1988).

During the course of a comprehensive land use planning effort for Bristol Bay (ADNR, ADF&G, and BBCRAB 1984), local residents testified to increasing conflicts between traditional subsistence hunters and the more recent recreational hunters. In response, a second coordinated planning effort entitled the Nushagak and Mulchatna Rivers Recreation Management Plan was undertaken in 1987 to identify appropriate levels of recreational uses on state lands (see ADNR, ADF&G, and BBSRAB 1988 and 1990).

During a three year planning period, Nushagak River residents repeatedly voiced a number of concerns. Problems included displacement of subsistence hunters from traditional camping sites and harvest areas, trespass on Native allotments and corporation lands, and disturbance of animal populations due to increased activity. The most intense conflicts centered on the use of traditional hunting territories by non-local recreational hunters during the fall moose hunting season. As one example, the village of New Stuyahok was previously located at the mouth of the Stuyahok River and several Native allotments are located nearby. Many New Stuyahok residents have a strong attachment to this area and it has been a regular site for Stuyahok hunters to stop to warm up, camp, or track moose. But increasingly local hunters found many unfamiliar people already camped there and consequently often passed the site by.

State land use policies do not provide recognition for subsistence as a distinct land use category. (Examples of categories which are recognized include mining, agriculture, public recreation,

wildlife habitat, and heritage resource land.) Therefore, planners could not designate any lands specifically for subsistence hunting or fishing and the NMRRMP was not able to address these conflicts directly. The plan was able to limit overall commercial use of state lands. The drainage was divided into sub-units; permanent commercial facilities, such as lodges and cabins, were prohibited in those areas used by the Nushagak River hunters. Such a prohibition was seen as an important step toward limiting development in the area. The plan was not able to address the question of the appropriate number of temporary commercial facilities or users nor the question of non-commercial recreational users.

The plan designated a number of "public use areas", areas frequently used as camping or air-taxi pick-up spots, including the mouth of the Stuyahok River. Although these sites were thereby protected from development, they were open to all members of the public on a first-come, first-served basis. There was no mechanism to give subsistence users priority for traditional camping sites located on state land.

With the implementation of the NMRRMP, the conflicts described above will be somewhat mitigated, but not eliminated. The plan could only address land use. Game allocation decisions fall under the authority of the Board of Game. Should the Nushagak River residents face a situation when their subsistence needs for moose are not being met, they will need to work through the Board of Game regulatory process.

Wanton Waste

Local residents, in accordance with traditional Yup'ik values, strongly disapprove of wasting food. Over the years, they have reported a number of instances of trophy hunters not salvaging meat, particularly those connected with outfitters based outside the Bristol Bay region. In some cases, their reports have led to prosecution. However, villagers repeatedly have asked for more enforcement efforts during the fall hunting season. The most recent request (10/6/90) took the form of a petition to the Alaska Board of Game which was signed by 179 residents of Ekwok, Koliganek, and New Stuyahok. Specifically, they requested that funding be made available to hire local residents who would assist the game officers during the peak season. In 1990 and 1991, the area game biologist has hired a local resident to assist him in monitoring fall hunting effort in portions of the Mulchatna River.

Moose Hunting Regulations

As described in Chapter 5, moose are hunted most intensively during the legal seasons in the fall (parts of August and September) and again in December. However, moose hunting traditionally occurred outside those periods depending on weather and traveling conditions, the availability of moose, and the need for meat. To some extent, this is still true today. For example, moose is a preferred food for Russian Orthodox Christmas in January. The current regulations reflect a discrepancy between the legal and the traditional seasons.

No moose hunting is legally permitted in the spring. As mentioned previously, moose meat is the preferred meat for drying and spring offers the best drying conditions. During fall there are too many blow flies to dry meat easily. Some families reserve a portion of frozen moose meat for spring drying. Some villagers are interested in a limited spring moose hunt in order to legally harvest moose at the time of year it is traditionally dried.

Spring Waterfowl Hunting

This study documented that the greatest portion of ducks and geese are harvested in the spring when there is no legal hunting season. As discussed above, the Nushagak villages are not on the geese flyway in the fall, and geese are only available in the spring. Residents are aware that the laws governing these seasons are set by international treaty. They strongly support efforts to renegotiate the treaty and legitimize their customary spring hunting season.

CONCLUSIONS

When VanStone (1967) studied the Nushagak region in the early 1960s, he concluded that subsistence activities had declined steadily in importance particularly since the 1930s. Rapid social changes brought about by traders, missionaries, canneries, and educators greatly impacted traditional subsistence patterns. The commercial salmon industry was identified as the most significant change agent. Settlement patterns had changed from nomadic camps to permanent

villages, in large part so children could attend newly introduced schools. Families no longer moved to winter camps and less effort was spent on trapping than previously. However, VanStone noted that the harvest of salmon and moose as well as smaller quantities of small game and birds were still very important aspects of life on the Nushagak.

One might have hypothesized that subsistence activities would continue to decline in the latter part of the twentieth century as social and economic changes proceeded at a rapid pace. Instead, wild resource use patterns in Ekwok, Koliganek, and New Stuyahok have been quite stable since the early 1970s. This study has documented that wild resources were an important part of the economy and sociocultural system of Ekwok, Koliganek, and New Stuyahok in the 1980s when harvests of wild resources for home use provided about 750 pounds per capita in these communities. These were among the highest harvest levels of any community in the region or the state. These harvests substantially exceed those of more densely populated, urban areas of Alaska.

From 1980 to 1990, the population of the Nushagak River grew by 24 percent, primarily through natural births. This reflects the same rate of growth as the region as a whole. However, only two of the communities, New Stuyahok and Koliganek, have witnessed an increase in population. Ekwok has remained stable and Portage Creek has declined to the point where it is no longer a year-round community. This may indicate a tendency for people to coalesce in the larger villages. If the current trends of a stable per capita harvest and a growing regional population continues, there will be increasing pressure on the wildlife resources from area residents. The growth in the number of hunters from outside the regions will compound the problem, particularly for moose.

As previously discussed, the economy of the subregion is best described as a mixed subsistence and market economy but cash-earning opportunities are limited. Many residents depend on commercial salmon fishing, a highly variable industry, as a major source of income. Other jobs were usually of a part-time and seasonal nature with local governments and the school district being the largest employers. In comparison with urban areas like Anchorage and Fairbanks, incomes were shown to be low. In this economic context, harvesting a large portion of a community's own food from local wild stocks continues to be the most economically efficient alternative.

However, subsistence activities must be recognized as more than simply economic undertakings. Fishing, hunting, and gathering are satisfying ends in themselves. Villagers look forward to the changes in seasons and enjoy the accompanying subsistence activities. Nushagak residents want to continue their traditional patterns adapting them to changing economic and acculturative forces. They themselves have testified about the continuing importance of subsistence in many public forums. (For example, see Berger 1985.)

Subsistence activities provide an important framework for the transmission of Yup'ik values, such as sharing, hard work, respect for elders, the importance of kinship, and of long-term ties to the land. People look forward to their annual trips to fishing, hunting, and trapping camps, and spending time in familiar and emotionally meaningful locations. Because of their taste and nutrition, wild foods are preferred over those purchased from stores. Subsistence activities bind together the generations. Parents and grandparents continue to instruct the younger generation in many traditional methods of food preparation

with the strong hope that their children and grandchildren will be able to continue the subsistence way of life.

REFERENCES

Alaska Commercial Fisheries Entry Commission

1990 Commercial Fishing Catch Data Aggregated by Alaska Census Division and City for 1984. Juneau.

1989 Changes in the Distribution of Alaska's Commercial Fisheries Entry Permits 1975-1898. Prepared by E. Dinneford and K. Cohen. CFEC Report #89-3. Juneau.

1988 Special data run prepared for Division of Subsistence. Office Files, Division of Subsistence, Dillingham.

Alaska Department of Community and Regional Affairs

1982 Community Planning Profiles for Ekwok, Koliganek, and New Stuyahok. Prepared by DOWL Engineers, with North Pacific Aerial Surveys and Bristol Bay Native Association.

Alaska Department of Fish and Game

1991 Community Profile Data Base. Division of Subsistence. Juneau.

1990 Management Report - 1989 - Bristol Bay Area. Division of Commercial Fisheries. Anchorage.

1989 Management Report - 1988 - Bristol Bay Area. Division of Commercial Fisheries. Anchorage.

1988 Management Report - 1987 - Bristol Bay Area. Division of Commercial Fisheries. Anchorage.

1987 Alaska Trapping Regulations No. 28. Alaska Board of Game Juneau.

1985a Alaska Habitat Management Guide: Southwest Region. Vol. IV: Human Use of Fish and Wildlife. Division of Habitat. Juneau.

1985b Alaska Habitat Management Guide: Southwest Region. Map and Atlas. Division of Habitat. Juneau.

1985c Alaska Habitat Management Guide Southwest Region Volume I: Fish & Wildlife. Division of Habitat. Juneau.

1960-1978 Alaska Commercial Finfish Regulations. Alaska Board of Fisheries. Juneau.

1979-1988 Alaska Subsistence Fishing Regulations.

1961-1988 Alaska Game Regulations. Alaska Board of Game. Juneau.

Alaska Department of Labor
1987 Alaska Population Overview. Administrative Services Division. Juneau.

1981 Alaska Population Overview. Administrative Services Division. Juneau.

Alaska Department of Natural Resources, Alaska Department of Fish and Game, and Bristol Bay Coastal Resources Service Area Board.
1990 Nushagak and Mulchatna Rivers Recreation Management Plan.

1988 Nushagak and Mulchatna Rivers Recreation Management Plan: Resource Assessment.

1984 Bristol Bay Area Plan For State Lands.

Alaska Department of Revenue
1985 Federal Income Taxpayer Profile 1978, 1981, 1982 by Alaska Community and Income Level and Filing Status. Juneau.

Berger, Thomas R.
1985 Village Journey: The Report of the Alaska Native Review Commission. Hill and Wang. New York.

Chythlook, Molly B.
1988 and 1990 Field Notes. Division of Subsistence. Dillingham.

Fall, James A. and Judith M. Morris
1987 Fish and Wildlife Harvests in Pilot Point, Ugashik, and Port Heiden, Alaska Peninsula, 1986-1987. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 158. Juneau.

Fall, James, Janet Schichnes, Molly Chythlook and Robert Walker
1986 Patterns of Wild Resource Use in Dillingham: Hunting and Fishing in an Alaskan Regional Center. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 135. Juneau.

Fall, James, Molly Chythlook, Judith Morris and Janet Schichnes.
n.d. Patterns of Freshwater Fishing in Bristol Bay (unpublished manuscript). Alaska Department Fish & Game, Division of Subsistence Technical Paper No. 166. Juneau.

Fienup-Riordon, Ann
1990 Selaviq: A Yupiq Transformation of a Russian Orthodox Tradition. In Eskimo Essays pp. 94-124. New Brunswick, N.J. Rutgers University Press.

Gasbarro, Anthony G. and George Utermohle
1974 Unpublished field data, Bristol Bay Subsistence Survey. Office Files, Division of Subsistence, Alaska Department of Fish and Game, Dillingham.

Jacobson, Steven A., Compiler
1984 Yup'ik Eskimo Dictionary. Alaska Native Languge Center. University of Alaska, Fairbanks.

Kraus, Karen and John Wright
1984 Field Notes. Division of Subsistence, Dillingham.

Loon, Hannah, and Susan Georgette
1989 Contemporary Brown Bear Use in Northwest Alaska. Alaska Department of Fish and Game, Division of Subsistence Technical Paper 163. Juneau.

Morgan, Sid O., Compiler and Editor
1990a Moose: Annual Report of Survey-Inventory Activities, July 1988-June 1989. Vol. XX, Part IV. ADF&G, Division of Wildlife Conservation, Juneau.

1990b Black Bear: Annual Report of Survey-Inventory Activities, January-December 1988. Vol. XX, Part IV. ADF&G, Division of Wildlife Conservation, Juneau.

Morris, Judith Marek
1987 Fish and Wildlife Uses in Six Alaska Peninsula Communities: Egegik, Chignik, Chignik Lagoon, Chignik Lake, Perryville, and Ivanof Bay. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 151. Juneau.

1986 Subsistence Production and Exchange in the Iliamna Lake Region, Southwest Alaska, 1982-1983. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 136. Juneau.

1985 The Use of Fish and Wildlife Resources By Residents of the Bristol Bay Borough, Alaska. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 123. Juneau.

Nebesky, Will, Steven Langdon, and Teresa Hull
1983 Economic, Subsistence, and Sociocultural Projections in the Bristol Bay Region, Volume I: Analysis and Projections Bristol Bay Cooperative Management Plan and Refuge Comprehensive Plans, U.S. Fish and Wildlife Service, U.S. Department of Interior, Anchorage.

Oleksa, Michael
1986 Manuscript pp.129-135. In Starring and Slava: A Legacy of Russian America. Presented at 13th Annual Meeting of the Alaska Anthropological Association. Fairbanks.

Petroff, I.
1884 Population and Resources of Alaska. 1880 U.S. Census, Department of the Interior. Washington.

Rollins, A.M.
1978 Census Alaska: Number of Inhabitants 1792-1970. University of Alaska Anchorage Library, University of Alaska, Anchorage.

Schichnes, Janet and Molly Chythlook
1988 Use of Fish and Wildlife in Manokotak, Alaska. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 152. Juneau.

Schroeder, Robert F., David B. Anderson, Rob Bosworth, Judith M. Morris, and John M. Wright
1987 Subsistence in Alaska: Arctic, Interior, Southcentral, Southwest, and Western Regional Summaries. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 150. Juneau.

Skrade, Jeff
1990 Personal Communication. Commercial Fisheries Area Biologist. ADF&G, Dillingham.

Southwest Region Schools
1984 *Cetuyaram Qanengsiit*: "Stuyahok Stories". Dillingham.

Townsend, Barbara, Compiler and Editor
1987 Annual Report of Survey - Inventory Activities - Caribou. Alaska Department of Fish and Game, Division of Game. Volume XVII, Part XI. Juneau.

1986 Annual Report of Survey - Inventory Activities - Brown Bear/Grizzly Bear. Alaska Department of Fish and Game, Division of Game. Volume XVII, Part V. Juneau.

U.S. Bureau of the Census
1980 Census of Population and Housing, 1980 -- Summary Tape File 3A. Washington, D.

1985 Mid-Census Estimate. U.S. Government Printing Office. Washington, D.C.

U.S. Department of Agriculture
1983 Food Consumption: Households in the West, Seasons and Year 1977-78. NFCS 1977-78 Report No. H-10. Washington, D.C.

Van Daele, Larry
1990 Personal Communication. Area Game Biologist. Dillingham.

VanStone, James
1984 Mainland Southwest Eskimo. In Handbook of North American Indians David Damas, ed. Washington: Smithsonian Institution. pp. 224-242.

1971 "Historic Settlements in the Nushagak River Region, Alaska." Fieldiana Anthropology. Vol. 61

1970 Akulivikchuk: A Nineteenth Century Eskimo Village on the Nushagak River, Alaska. Fieldiana Anthropology, Vol.60.

1967 Eskimos of the Nushagak River: An Ethnographic History. Seattle: University of Washington Press.

Wolfe, Robert J., Joseph J. Gross, Steven J. Langdon, John M. Wright, George K. Sherrod, Linda J. Ellana and Valerie Sumida
1984 Subsistence-Based Economics in Coastal Communities of Southwest Alaska. Alaska Department of Fish & Game, Division of Subsistence Technical Paper No. 89. Juneau.

Wright, John M., Judith Morris, and Robert Schroeder.
1985 Bristol Bay Regional Subsistence Profile. Alaska Department of Fish and Game, Division of Subsistence. Technical Paper No. 114. Juneau.

APPENDIX A: SURVEY INSTRUMENT NUSHAGAK RIVER RESOURCE USE STUDY

COMMUNITY _____

HOUSEHOLD ID# _____ Date _____ Interviewer_____

The purpose of this survey is to gather information about the fish and game resource activities of your household from April 1987 through March 1988. When we ask "Did you use a resource?" we mean did your family eat it, serve it, or otherwise use it in your home.

1. HOUSEHOLD INFORMATION (* = Respondent)

ID #	M/F	BIRTH DATE	RESIDENCE OF PARENT WHEN YOU WERE BORN	YEAR YOU MOVED TO THIS VILLAGE	PREVIOUS RESIDENCE	ETHNICITY
1 HEAD						
2 HEAD						
3						
4						
5						
6						
7						
8						
9						
10						

2. Using Person's I.D. #'s from the table above, indicate which household members participated in harvesting activities during 1987-1988.

Hunting ___ ___ ___ ___ ___ Fishing ___ ___ ___ ___ ___ ___ ___ ___

Plant Gathering ___ ___ ___ ___ ___ Trapping ___ ___ ___ ___ ___ ___

3. COMMERCIAL FISHING

Did members of your household participate in commercial fishing during 1987? YES ___ NO ___

If YES, please complete the following table:

SPECIES	FISHED YES	FISHED NO	INCIDTL.	LOCATION	GEAR TYPE Drift	GEAR TYPE Set	NUMBER REMOVED FOR OWN HOME USE	NUMBER REMOVED GAVE AWAY	I.D.#'S OF FISHERMEN Permit H.	I.D.#'S OF FISHERMEN Crew
KING/Tarayaqvak 001										
RED/Sayak 002										
CHUM/Kangitneq 003										
PINK/Amaqaayak 004										
SILVER/Qakiiyaq 005										
HERRING/Iqalluarpak 006					Gillnet	Seine	Bkts	Bkts		
ROE ON KELP/Melucuaq 007					XXXXXXX		Bkts	Bkts		
OTHER										

4. NON-COMMERCIAL FISHING

A. Did your household have a subsistence salmon fishing permit in 1987? YES _____ NO _____
ID# of Permitholder _____
If helped on another's permit, HH ID #_____, relationship to that household _____
B. Did your household try to harvest or use any salmon in 1987? YES _____ NO _____

If YES, please complete the following table:

SALMON SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NO. HARVESTED BY GEAR TYPE SUBS. NET	ROD & REEL	OTHER (specify)	REC. YES	REC. NO	GAVE AWAY YES	GAVE AWAY NO
KING/Taryaqvak 011											
RED/Sayak 012											
CHUM/Kangitneq 013											
PINK/Amaqaayak 014											
SILVER/Qakiiyaq 015											
SLM (unk) 016											
REDFISH/Sayalleq (Spawned-outs) 017											

Does your household have a fish camp? Yes ___ No ___ If yes, where? _____

If your household harvests redfish (spawned-outs), where do you usually get them?_____
(Specific location)

5. Did your household try to harvest or use any other fish in 1987-88? YES ____ NO ____
If YES, please complete the following table:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NO. HARVESTED BY GEAR TYPE: SUBS. NET	ICE FISH (jig)	ROD & REEL (open wtr)	OTHER (specify)	REC. YES	REC. NO	GAVE AWAY YES	GAVE AWAY NO
SMELT/Iqalluaq 021					gal	gal.	XXX					
HERRING/Iqalluarpak 022					bkts.	XXX	XXX					
HHRNGROE/Meluk 023					bkts.	XXX	XXX					
ROE-ON-KELP/Melucuaq 024					bkts	XXX	XXX					
WHITEFISH/Uraruq 025												
PIKE/Cuukvak 026												
GRAYLING/Nakrulugpak 027												
RAINBOW/Talaariq 028												
LAKE TROUT/Anerrluaq 029												
DOLLY/Yugyaq 030 VARDEN												
BURBOT/LUSH/ 031 Manignag												
BLACK FISH/Cangiiq 032												

5. Con't.

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NO. HARVESTED BY GEAR TYPE: SUBS NET	ICE FISH (jig)	ROD & REEL (open wtr)	OTHER	REC. YES	REC. NO	GAVE AWAY YES	GAVE AWAY NO
SUCKERS/ 033 Cungartak												
FLOUNDER/Naternaq 034						XXX						
OTHER												

6. Did your household try to harvest or use any type of marine invertebrate in 1987-1988? YES ____ NO ____? If YES, please complete the table below:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NUMBER HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
BUTTER CLAMS/Tavtaaq 041					bkts.				
RAZOR CLAMS/Aliruaq 042					bkts.				
OTHER									

7. MARINE MAMMALS Did your household try to harvest or use marine mammals or marine mammal products during 1987-1988? YES _____ NO _____ If YES, please complete the table below:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	AMOUNT OR NUMBER HARVESTED**	PORTIONS USED*	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
HARBOR SEAL/Issuriq 045										
OTHER SEAL specify 046										
WALRUS/Asveq 048										
SEA LION/Uginaq 049										
BELUKHA/Cetuaq 050										
OTHER										

* Which parts were used for food? ** Number brought home

8. LAND MAMMALS

Did your household try to harvest or use game in 1987-1988? YES _____ NO _____

If YES, please complete the following table:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	# HARV.	# USED FOR FOOD	# USED FOR FUR	RECEIVED YES FOOD	RECEIVED YES FUR	RECEIVED NO FOOD	RECEIVED NO FUR	GAVE AWAY YES FOOD	GAVE AWAY YES FUR	GAVE AWAY NO FOOD	GAVE AWAY NO FUR
BR. BEAR/Taqukaq 055															
BL. BEAR/Tan'gerliq 056															

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NUMBER HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
CARIBOU/Tuntuq 057					# Brought home_____				
MOOSE/ 059 Tuntuvak					# Brought home_____				
PORCUPINE/Issaluuq 061									
SNOWSHOE HARE/ 062 Nullutuuyak									
JACK RABBIT/063 Qayuqueggliq									
OTHER									

9. FURBEARERS

Did anyone in your household try to harvest or use furbearers during 1987-1988? YES _____ NO _____

If YES, please complete the following table:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	# HARV.	# USED FOR FOOD	# USED FOR FUR	# SOLD	AVG PRICE	RECEIVED YES FOOD	RECEIVED YES FUR	RECEIVED NO	GAVE AWAY YES FOOD	GAVE AWAY YES FUR	GAVE AWAY NO
BEAVER/Paluqtaq 070															
MINK/Imarmiutaq 071						xx				xx			xx		

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	# HARV.	# USED FOR FOOD	# USED FOR FUR	# SOLD	AVG PRICE	RECEIVED YES FOOD	RECEIVED YES FUR	RECEIVED NO	GAVE AWAY YES FOOD	GAVE AWAY YES FUR	GAVE AWAY NO
FOX/Kaviaq 072						xx				xx			xx		
WOLF/Kegluneq 073						xx				xx			xx		
WOLVERINE/ 074 Terikaaniaq						xx				xx			xx		
LAND OTTER 075 Cuignilnguq															
MUSKRAT/ 076 Kanaqlak															
LYNX/Tertuli 077															
PARKA SQUIRREL Qanganaq 078															
MARTEN/ Qavcicuar 079						xx				xx			xx		
OTHER															

11. PLANTS

Did your household harvest or use wild plants in 1987-1988? YES ____ NO ____

If YES, please complete the table below:

	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	AMOUNT HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
BERRIES 085					gal.				
PLANTS 086					qts.				

12. BIRDS

Did your household try to harvest or use birds during 1987-1988? YES ____ NO ____

If YES, please complete the table below:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	SEASON	NUMBER HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
SPRUCE GROUSE/Egtuk 091					XXXX					
PTARMIGAN/Qangiig 092					XXXX					
CANADA GOOSE (little) Cacklers 093					A M					
Neqlernaq 094					A S O N					
CANADA GOOSE (big) 095					A M					
(Lesser) 096					A S O N					

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	SEASON	NUMBER HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
WHITEFRONT 097					A M					
'Lagiq (specklebelly)098					A S O N					
BLACK BRANT 099					A M					
(Sea Geese) 100					A S O N					
EMPERORS 101					A M					
Nacaullget 102					A S O N					
Other Geese (specify)103					A M					
104					A S O N					
SWAN 105					A M					
Qugyuk 106					A S O N					
SANDHILL CRANE 107					A M					
Qucillgaq 108					A S O N					
MALLARD 109					A M					
Uqulkatagpak 110					A S O N					
PINTAILS 111					A M					
Uqulkatak 112					A S O N					

12. (CONT.)

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	SEASON	NUMBER HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
EIDER/Qengallek 113					XXXX					
OTHER DUCKS 114					A M					
115					A S O N					
GULL EGGS 116 Kayanguq						doz.				
GEESE EGGS/ 117 Neqleq						doz.				
DUCK EGGS/ 118						doz.				
SWAN EGGS 119										

13. DOGS

A. Please indicate the number of all dogs that you own:_____ B. How many dog teams: _____

C. Do you put up fish for your dogs? Species _____ # _____ Included on previous page?

Species _____ # _____ Included on previous page?

Species _____ # _____ Included on previous page?

What do you use your dog team for? racing ____ recreation ____ hunting/trapping___

14. EMPLOYMENT HISTORY

Please complete the following information for all jobs held by the employed households members listed in question 1 from April 1987 through March 1988. Include commerical fishing and crafts sales.

ID # FROM QUESTION 1	JOB TITLE	EMPLOYER	# OF MONTHS WORKED P/YEAR	HOURS WORKED PER WEEK	AMOUNT EARNED
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		
			A M J J A S O N D J F M		

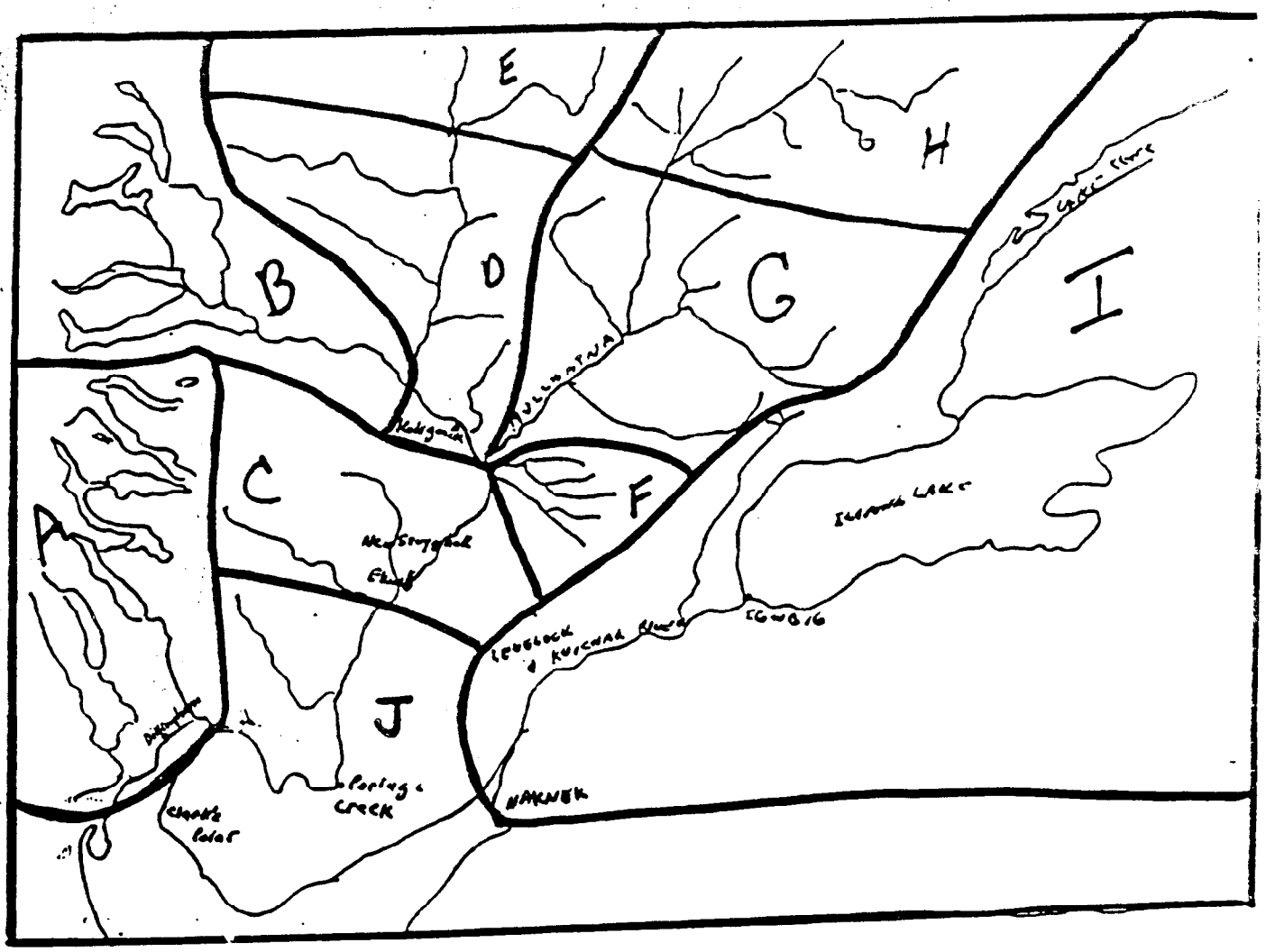
15. Other Income Sources (Check all that apply and indicate amount)

	Monthly Amount	# Months Received
_____ Social Security (blue/green)	$ _____	_____
_____ SSI (Supplemental Security, gold)	$ _____	_____
_____ Longevity Bonus (white/blue)	$ _____	_____
_____ Energy Assistance	$ _____	_____
_____ Adult Public Assistance (white)	$ _____	_____
_____ AFDC (Aid to Families with Dependent Children) (white)	$ _____	_____
_____ Pension	$ _____	_____
_____ Corporation Dividends	$ _____	_____
_____ Other	$ _____	_____

16. Please estimate your monthly expenses:

_____ Heating fuel _____ Transportation fuel (gas) _____ water _____ housing

_____ Food _____ Electricity _____ Propane _____ phone



A. Wood River & Lakes
B. Tikchik Lake & Nuyakuk River
C. Middle Nushagak & the Kokwok
D. Upper Nushagak below Chickitnok
E. Nushagak, Chickitnok and above
F. Nunachuak Drainage
G. Lower Mulchatna
H. Upper Mulchatna, Mosquito Creek and above
I. Lake Clark/Iliamna/Kvichak
J. Lower Nushagak and Iowithla

USE AREA QUESTIONS

MOOSE HUNTING

While living in this community, have members of this household ever hunted moose?

YES _____ NO _____ ID #'s _____ _____ _____ _____ _____

If YES, refer to map:

While you have lived in this community, please indicate the frequency of your use of each of these areas for hunting moose:

AREA	USED WHILE LIVING IN THIS COMMUNITY		FREQUENCY OF USE		USED IN 1987 - 1988	
	YES	NO	REGULARLY ev.1,2-3yr	SELDOM once/twice	YES	NO
A. Wood River & Lks						
B. Tikchik Lake & Nuyakuk River						
C. Middle Nushagak & the Kokwok						
D. Upper Nushagak below Chickitnok						
E. Nushagak, include Chickitnok						
F. Nunachuak Drainage						
G. Lwr. Mulchatna						
H. Upper Mulchatna (incld.Mosquito Creek)						
I. Lake Clark/ Iliamna/Kvichak						
J. Lower Nushagak and Iowithla						
K. Other (specify)						

CARIBOU HUNTING

While living in this community, have members of this household ever hunted caribou?

YES _____ NO _____ ID #'s _____ _____ _____ _____ _____

If YES, refer to map:

While you have lived in this community, please indicate the frequency of your use of each of these areas for hunting moose:

AREA	USED WHILE LIVING IN THIS COMMUNITY		FREQUENCY OF USE		USED IN 1987 - 1988	
	YES	NO	REGULARLY ev.1,2-3yr	SELDOM once/twice	YES	NO
A. Wood River & Lks						
B. Tikchik Lake & Nuyakuk River						
C. Middle Nushagak & the Kokwok						
D. Upper Nushagak below Chickitnok						
E. Nushagak, includ- Chickitnok						
F. Nunachuak Drainage						
G. Lwr. Mulchatna						
H. Upper Mulchatna (incld.Mosquito Creek)						
I. Lake Clark/ Iliamna/Kvichak						
J. Lower Nushagak and Iowithla						
K. Other (specify)						

USE AREA QUESTIONS

FRESHWATER FISH : (non-salmon)

While living in this community, have members of this household ever harvested freshwater species?

YES ____ NO ____ ID #'s ____ ____ ____ ____ ____

If YES, refer to map:

While you have lived in this community, please indicate the frequency of your use of each of these areas for hunting moose:

AREA	USED WHILE LIVING IN THIS COMMUNITY YES	NO	FREQUENCY OF USE REGULARLY ev.1,2-3yr	SELDOM once/twice	USED IN 1987 - 1988 YES	NO
A. Wood River & Lks						
B. Tikchik Lake & Nuyakuk River						
C. Middle Nushagak & the Kokwok						
D. Upper Nushagak below Chickitnok						
E. Nushagak, include Chickitnok						
F. Nunachuak Drainage						
G. Lwr. Mulchatna						
H. Upper Mulchatna (incld.Mosquito Creek)						
I. Lake Clark/ Iliamna/Kvichak						
J. Lower Nushagak and Iowithla						
K. Other (specify)						

Appendix Table B: Conversion Factors For Nushagak River Data Analysis
1988 Survey

	Weight per animal	Source
King Salmon	13.81	a
Red Salmon	4.22	a
Chum Salmon	4.47	a
Pink Salmon	2.29	a
Silver Salmon	4.59	a
Spawned-Out Salmon	2.0	Russell, 1985
Herring	30/5 gal. bkt.	Reed 1985
Roe on Kelp	25/5 gal. bkt.	Researcher estimate
Roe	40/5 gal. bkt	Researcher estimate
Rainbow Trout	1.4	Wright et al. 1985
Lake Trout	2.7	Wright et al. 1985
Grayling	.7	Wright et al. 1985
Dolly Varden	1.4	Wright et al. 1985
Burbot	1.0	Wright et al. 1985
Pike	2.8	Wright et al. 1985
Whitefish	1.0	Wright et al. 1985
Suckers	1.5	Russell 1985
Trout, unknown	1.8	Morris, 1986
Blackfish	No harvest	
Flounder	1.0	KANA 1983
Smelt	30/5 gal. bkt.	Reed 1985
Butter Clams	15/5 gal.bkt.	Fall et al. 1985
Razor Clams	15/5 bal.bkt.	Fall et al. 1984
Caribou	150.0	Wright et al. 1985
Moose	540.0	Wright et al. 1985
Brown Bear	100.0	Wright et al. 1985
Black Bear	58.0	Stratton and Georgette 1984
Porcupine	8.0	Wright et al. 1985
Snowshoe Hare	2.0	Wright et al. 1985
Arctic Hare	5.6	Wright et al. 1985
Harbor Seal	56.0	Wright et al. 1985
Other Seal	No harvest	
Walrus	No harvest	
Sea Lion	No harvest	
Belukha	No harvest	
Beaver	20.0	Wright et al. 1985
Land Otter	3.0	Wolfe 1981
Muskrat	.75	Researcher estimate
Parka Squirrel	.5	Researcher estimate
Spruce Grouse	1.0	Wright et al. 1985
Ptarmigan	.7	Wright et al. 1985
Canada Geese(cacklers)	1.0	Taylor 1989
Canada Geese (lesser/ Taviner)	1.2	Taylor 1989
Whitefront	2.4	Bellrose 1978
Black Brant	1.2	Bellrose 1978
Emperors	2.5	Bellrose 1978
Other Geese		
Cranes	5.0	Taylor 1989

Appendix Table B (continued: Conversion Factors For Nushagak River Data Analysis 1988 Survey

	Weight per animal	Source
Swans	8.0	Taylor 1989
Mallards	1.0	Bellrose 1978
Pintails	.8	Bellrose 1978
Eiders	1.6	Bellrose 1978
Sea Gull Eggs	3 lbs/doz	Researcher estimate
Geese Eggs	4 lbs/doz	Researcher estimate
Duck Eggs	3 lbs/doz	Researcher estimate
Berries	4.0/gal	Stratton and Georgette 1984
Plants	1.0/gal	Researcher estimate

[a] Average 1987 Round Weights of Commercial Salmon, Nushagak District,

	Weight	Conversion Factors	Usable Weight
King	19.73	.7	13.81
Red	6.03	.7	4.22
Chum	6.39	.7	4.47
Pink	3.27*	.7	2.29
Silver	6.55	.7	4.59

Source: Alaska Department of Fish and Game, 1987 and 1988.

Appendix Table C. Average Subsistence Harvests of Selected Fish and Game, New Stuyahok, 1982.[a]

	Household Harvest	
	Pounds[b]	% Overall Harvest
Fish		
Salmon		
Sockeye	1,000	18.1
Chinook	1,680	30.3
Chum	440	7.9
Pink	88	1.5
Coho	175	3.3
Total Salmon	3,383	61.0
Pike	218	3.9
Whitefish	86	1.8
Grayling	44	.7
Other spp.	21	.3
Total	3,770	68.1
Mammals		
Moose	680	12.2
Caribou	718	12.9
Beaver	192	3.4
Porcupine	85	1.5
Other spp.	5	*
Total Mammals	1,680	30.3
Birds		
Geese	36	.6
Ducks	45	.8
Ptarmigan, grouse	7	*
Total Birds	88	1.5
Total Harvest		
Per Household	5,538	
Total Harvest		
Per Capita	939	

[a]Wolfe et al. 1984, except for salmon data, which are from ADF&G subsistence permit returns, Dillingham Division of Subsistence Office Files.

[b]Pounds dressed weight per household.

Appendix Table D. Conversion Factors for Nushagak River Data Analysis, 1973.

Species	Weight per animal
King Salmon	14.0
Red Salmon	4.0
Chum Salmon	4.4
Silver Salmon	5.0
Herring	.25
Rainbow Trout	1.4
Lake Trout	2.7
Grayling	.7
Pike	2.8
Whitefish	1.0
Char, Dolly Varden	1.4
Smelt	.25
Sucker	1.5
Flounder	1.0
Caribou	150.0
Moose	540.0
Brown Bear	100.0
Black Bear	58.0
Porcupine	8.0
Hare	2.0
Beaver	20.0
Ptarmigan	.7
Grouse	.7
Geese	4.0
Swans	8.0
Ducks	1.4
Cranes	6.0

Source: Original data collected by Gasbarro and Utermohole, 1973; conversion factors developed ADF&G, Subsistence Division, 1990.