

BRISTOL BAY
REGIONAL SUBSISTENCE PROFILE

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ABSTRACT

Planning efforts for the Bristol Bay region were undertaken by federal and state agencies in the early 1980s. Information on the harvest and use of wild resources for subsistence use by residents of the region was compiled by the Division of Subsistence, Alaska Department of Fish & Game, during an inventory of resources and land uses. This report presents maps illustrating the areas used by residents of 36 communities in Bristol Bay for hunting, fishing, trapping, and gathering, along with narratives summarizing certain information on subsistence activities, such as species used, timing of harvests, and quantities used. The communities are Togiak, Twin Hills, Manokotak, Ekuak, Clark's Point, Dillingham, Aleknagik, Portage Creek, Ekwok, New Stuyahok, Koliganek, Levelock, Igiugig, Kokhanok, Pedro Bay, Iliamna, Newhalen, Nondalton, Port Alsworth, King Salmon, Naknek, South Naknek, Egegik, Pilot Point, Ugashik, Port Heiden, Chignik Bay, Chignik Lagoon, Chignik Lake, Perryville, Ivanof Bay, Nelson Lagoon, Cold Bay, False Pass, King Cove, and Sand Point. The report is intended for the use of the general public, in addition to the land and resource managers for whom the planning efforts were originally designed.

Archeaological evidence indicates that Bristol Bay has been continuously inhabited by humans at least since the retreat of the last major glacial period about 10,000 years ago. At the time of European exploration in the eighteenth century, four major groups of indigenous peoples lived in the region -- Aleuts, Pacific Eskimos, Central Yup'ik Eskimos, and Dena'ina Athapaskan Indians. Russian trappers and traders explored the region in the 18th and early 19th centuries and were the first to develop an export, market economy. Along the Pacific side of the Alaska Peninsula, indigenous residents were pressed

into service as hunters and frequently relocated by the Russians. Christianity and diseases were also important factors of change introduced by the Russians. In other parts of the region, trading posts and churches were established in the early 1800s. Following the sale of Alaska to the United States of America in 1867, the fur trade declined. Commercial salmon fishing started in the late 1800s and soon grew to be the dominant export industry in the region. Up until the Second World War, outside labor was commonly imported to work as fishermen and cannery crews. During the war the fishing industry hired local labor, and many regional residents eventually became established as fishermen in the commercial salmon fishery.

In many communities within the Bristol Bay region, traditional patterns of hunting, fishing, and gathering activities have been retained for the most part, though accommodations have been made to participate in the commercial fishery and other cash-generating activities. The commercial salmon fishery is a preferred source of cash income because of its many similarities to traditional hunting and fishing, and because it is a short, intense venture that causes little disruption in the traditional round of seasonal activities while offering the potential for earning sufficient income for an entire year. In other communities, particularly the regional and subregional service centers such as Dillingham, King Salmon-Naknek, and Sand Point, seasonal patterns of activities appear to revolve around commercial, market economy activities.

The types of resources used for domestic consumption, the timing of harvests, estimates of quantities taken, and maps of harvesting areas are presented for communities in seven subregions of Bristol Bay. More than 75 different resources are used by residents of the region, with salmon, caribou, and moose providing the greatest proportion of wild food by weight. The

combined harvests of salmon, caribou, and moose commonly account for 75-90 percent of the total pounds used. In a region-wide survey of subsistence harvests conducted in 1973, community per capita harvests ranged from 200 to more than 1,000 lbs. Two recent studies in the Iliamna Lake and Nushagak River subregions found continued high levels of harvest, with from 700 to more than 1,000 lbs. per capita of wild fish and game being taken. In some subregions resources are harvested in fairly discrete and compact areas, while hunters in other subregions cover vast areas in search of widely dispersed prey. The rivers, lakes, and seas and their shorelines adjacent to each community are commonly the primary areas used for fishing, hunting, trapping, and gathering.

As indicated by these findings, subsistence activities remain important in the 1980s. The taste of wild foods is preferred by many to that of store-bought food. Fishing, hunting, gathering, and processing of wild resources are group activities participated in by relatives and friends. Subsistence products are widely shared within and between communities. Today, as in the past, subsistence activities are important expressions of, and mechanisms for maintaining values such as kinship, community, respect for elders, hospitality to visitors, and traditional ideological concepts.

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PLEASE NOTE: The maps in Appendix D were produced to accompany the Alaska Habitat Management Guide, Southwest Region by the Alaska Department of Fish and Game, Division of Habitat, in 1985. They depict subsistence use areas for the seven subregions discussed in this report, plus the Aleutian-Pribilof Islands and Kodiak Island. Please refer to the Habitat Management Guide, Volume II: Human Use of Fish and Wildlife, for a discussion of subsistence hunting and fishing and other socioeconomic characteristics of these latter two subregions.

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CHAPTER 1

INTRODUCTION

With its numerous large lakes, extensive river systems, and varied topography, the Bristol Bay region supports a diverse array of wild resources, including some of the most productive fisheries in the world. Wild renewable resources are important to the people of the Bristol Bay region. Residents rely to varying degrees on wild fish, game, and plants for food and other products for subsistence use. In addition, the commercial salmon fishery is the primary source of cash income in nearly all of the communities in the region. New development activities are now being considered in the Bristol Bay region, such as oil exploration and land disposals for settlement entry. These new developments have the potential for significantly impacting the traditional uses of fish and game of importance to Bristol Bay communities. It has therefore become necessary to document existing uses in order to properly consider new developments.

Information about the noncommercial use of wild resources by residents of the Bristol Bay region is presented in this report. This information was initially compiled for two inventories of the region: the Bristol Bay Cooperative Management Plan (BBCMP) (Alaska Department of Natural Resources 1984) and the Southwest Regional Habitat Guide (ADF&G 1984). Maps documenting hunting, fishing, trapping, and gathering areas, along with narratives summarizing available information about subsistence uses and cash producing activities within the region were developed for these inventories by the Division of Subsistence ADF&G. The documents produced by these projects were voluminous, with the information on subsistence comprising just a small fraction of the total inventory. The information was compiled for use by governmental agencies

and others involved in resource planning and management. Because of their size and intended use, the documents did not receive wide distribution and specific information within them is sometimes hard to find. Thus, there was a need for a smaller, separate document just pertaining to subsistence uses in the Bristol Bay region.

PURPOSE

This report summarizes information on subsistence uses of fish, game, plants, and other resources by residents of 36 communities in the Bristol Bay region. It provides information on resources used, time of harvest, geographic areas used, and harvest quantities. The report is intended to make information on contemporary (early 1980s) subsistence activities within the Bristol Bay region readily accessible to a wide audience. Readers interested in other information about Bristol Bay should consult the Bristol Bay Cooperative Management Plan (ADNR 1984) and the Southwest Regional Habitat Guide (ADF&G 1984). A description of the history, economy, government, land ownership, physical structures and services available in each community of the region is presented in Nebesky et al. (1983: Vol. II).

ORGANIZATION OF THE REPORT

For this report the Bristol Bay region includes all of the watersheds draining into the Bering Sea from Cape Newenham to Unimak Island, the Pacific side of the Alaska Peninsula, and the adjacent islands and nearshore waters (Figure 1). In order to summarize information on subsistence use, seven subregions were delimited within these boundaries, based primarily on geographic, social, and cultural affinities. The subregions are best thought of as groups of neighboring communities which share some common characteristics, rather

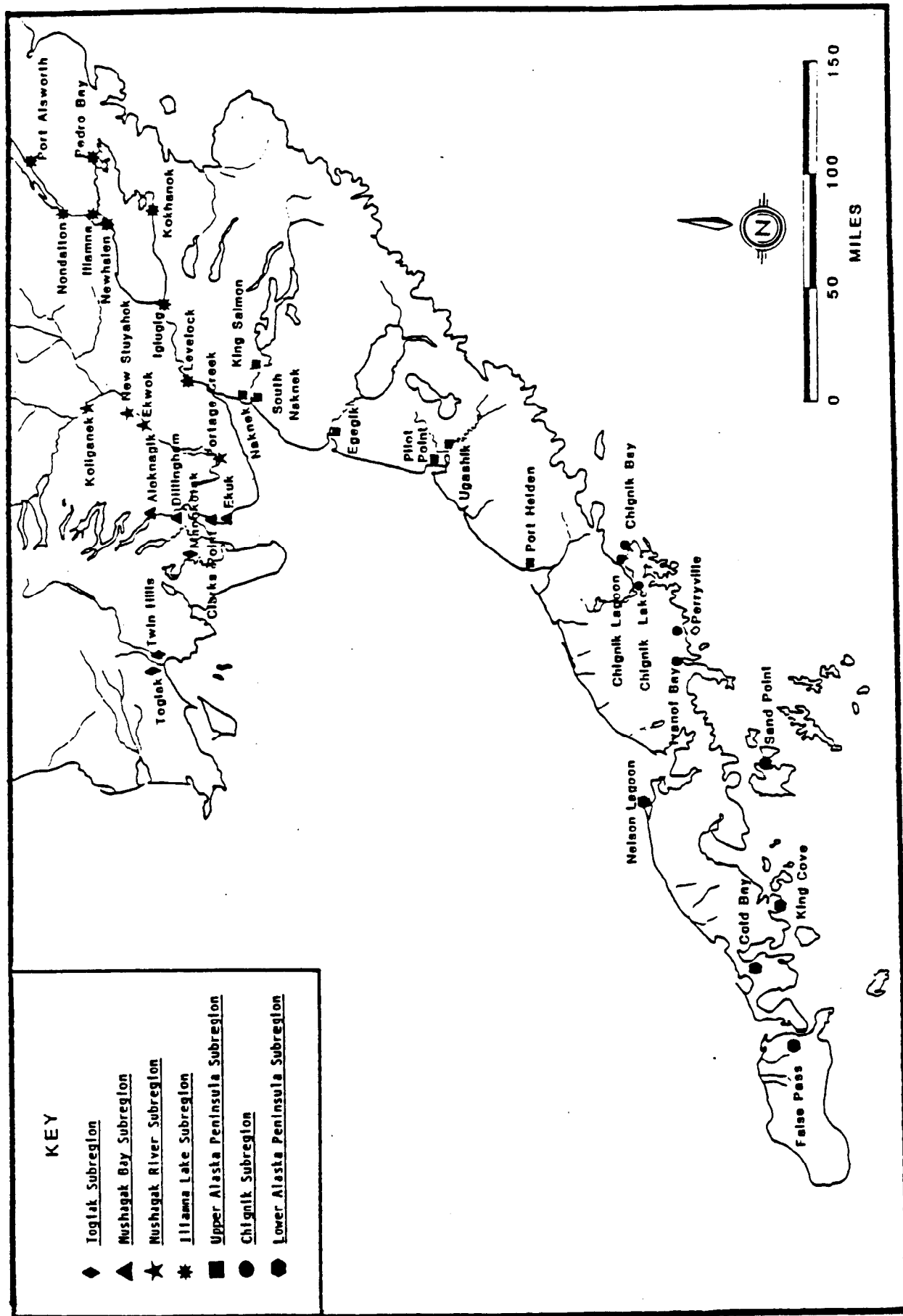


Fig. 1 Communities of the Bristol Bay Region grouped as subregions used to summarize information on subsistence uses.

than as discrete and exclusive geographic areas. The subregions are Togiak (including the communities of Togiak, Twin Hills, and Manokotak), Nushagak Bay (Clark's Point, Ekuk, Dillingham, and Aleknagik), Nushagak River (Portage Creek, Ekwook, New Stuyahok, and Koliganik), Iliamna Lake (Levelock, Igiugig, Kokhanok, Pedro Bay, Iliamna, Newhalen, Nondalton, and Port Alsworth), Upper Alaska Peninsula (King Salmon, Naknek, South Naknek, Egegik, Pilot Point, Ugashik, and Port Heiden), Chignik (Chignik Bay, Chignik Lagoon, Chignik Lake, Perryville, and Ivanof Bay), and Lower Alaska Peninsula (Nelson Lagoon, Cold Bay, False Pass, King Cove, and Sand Point).

Table 1 presents information on the population and ethnic composition of the communities in the region. In the early 1980s, communities ranged in size from 7 in Ekuk to 1,896 in Dillingham. Of the 36 communities, 20 (56 percent) had less than 100 persons, and 15 (42 percent) had between 100-625 persons. Dillingham, the regional center, contained 26 percent of the region's total population of 7,386. Alaska Natives comprised more than 80 percent of the population of 25 communities (about three quarters of the region's communities). About 69 percent of the Bristol Bay region's population was Alaska Native in 1980.

Chapter 2 introduces background information for the entire Bristol Bay region. Brief overviews of the region's environment, prehistory, history, and contemporary cash economy and their relation to traditional seasonal rounds are presented to lay the groundwork for an understanding of current subsistence activities. The continued importance of traditional cultural values is briefly discussed in relation to local economies and to intraregional ties.

Descriptions of subsistence activities by subregion appear in Chapters 3-9. Each chapter presents a list of species known to be used, the annual cycle of subsistence activities, estimates of the quantities harvested, and

TABLE 1. POPULATION AND ETHNIC COMPOSITION OF COMMUNITIES
IN THE BRISTOL BAY REGION

Community	Population	Percent Alaska Native ^a
Togiak	545 ^b	94
Twin Hills	70 ^a	97
Manokotak	299 ^b	93
Ekuk	7	na ^d
Clarks Point	79 ^a	89
Dillingham	1,896 ^b	58
Aleknagik	154 ^a	90
Portage Creek	80 ^b	92
Ekwok	78 ^b	94
New Stuyahok	337 ^b	94
Koliganek	137 ^b	96
Levelock	79 ^a	87
Igiugig	33 ^a	91
Kokhanok	83 ^a	96
Pedro Bay	33 ^a	94
Iliamna	94 ^a	40
Newhalen	87 ^a	94
Nondalton	173 ^a	94
Port Alsworth	40 ^c	na ^d
King Salmon	374 ^b	6
Naknek	369 ^b	52
South Naknek	136 ^b	86
Egegik	75 ^a	76
Pilot Point	66 ^a	86
Ugashik	13 ^a	na ^d
Port Heiden	92 ^a	66
Chignik Bay	178 ^a	53
Chignik Lagoon	48 ^a	85
Chignik Lake	138 ^a	91
Perryville	111 ^a	93
Ivanof Bay	40 ^a	93
Nelson Lagoon	59 ^a	93
Cold Bay	228 ^a	4
False Pass	70 ^a	86
King Cove	460 ^a	80
Sand Point	625 ^a	59
TOTAL	7,386	69 ^e

^a 1980 U.S. Census data, from Nebesky et al. 1983

^b 1981-1983 local census data from a variety of sources, see text

^c Researcher's estimate of 1984 population

^d na = not available

^e deleting Ekuk, Port Alsworth and Ugashik

maps portraying areas covered in the pursuit of subsistence resources. (Maps appear in Appendix D.) These categories of information were selected following recent findings that many Alaskan communities have "mixed subsistence-based socioeconomic systems" characterized by 1) the use of a relatively large number of wild resources, 2) a community-wide seasonal round of activities based on the appearance and availability of wild resources, 3) a domestic mode of production (production groups composed of household members and other close kin), 4) frequent and large-scale non-commercial distribution and exchange of wild resources, 5) traditional systems of land use and occupancy based on customary use by kin groups and communities, and 6) a mixed economy relying on cash and subsistence activities (Wolfe and Ellanna 1983, Wolfe et al. 1984).

METHODS AND LIMITATIONS OF THE REPORT

Sources of Information

This report represents a compilation of information derived from published sources and from unpublished agency records. Much of the recent information in this report derives from research conducted in specific communities in Bristol Bay by the Division of Subsistence -- both published (e.g. Behnke 1982; Morris 1982; Wolfe et al. 1984); and unpublished information from studies in progress (e.g. Iliamna Lake, Alaska Peninsula). Varying amounts of research have been done in the seven subregions. For example, the Division of Subsistence is most familiar with the Nushagak River and Bay, Iliamna Lake, and Upper Peninsula subregions, but has done very little work in the Lower Alaska Peninsula subregion.

An earlier, region-wide survey of subsistence harvests was conducted by Gasbarro and Utermohle (1975) for the Institute of Social, Economic and Government Research of the University of Alaska. In that survey, researchers visited

21 communities and interviewed members of 356 households, representing a sample of from 14 to 94 percent of the households in each of the 21 communities. In these interviews, local residents were asked to recall their harvests of wild resources during the previous year. Much of the detailed information collected by Gasbarro and Utermohle did not appear in their 1975 report, but their unpublished data (Gasbarro and Utermohle 1974) were available for use here.

Information on the harvest of salmon for home consumption in various parts of the region has been collected by the Division of Commercial Fisheries of ADF&G (district summaries appear in Appendix C). In most cases data have been collected through the use of a permit system, whereby individuals or households obtain permits, record their catches, and turn in their harvest records to ADF&G. Estimates of total harvest are derived by extrapolating from the reported catch to a number based on the total number of permits issued. This method probably underestimates the actual harvest because all fishermen do not obtain a permit. Some salmon are fed to dogs, particularly in the Iliamna Lake, Nushagak Bay and River, and Togiak subregions where dog teams are commonly kept. Backbones and heads of fish caught for human use are also frequently processed for dog food.

Additional information has been drawn from other socioeconomic studies in the region, particularly in relation to the important commercial salmon fishery (e.g. Langdon 1982; Payne and Braund 1983). The regional nonprofit Native corporation, the Bristol Bay Native Association, also has produced some reports on subsistence including a description of subsistence harvests in the community of Aleknagik (Nicholson 1976).

Historical information comes primarily from the ethnohistories of the Yup'ik Eskimos of the Nushagak River (VanStone 1967), and the Dena'ina Athapaskans of the Iliamna Lake area (Townsend 1965, 1970). Reviews by Dumond

(1977, 1980, 1981), Oswalt (1967), and Workman (1980) are the main sources of information on the prehistory of the region.

Several qualifications about the report should be kept in mind by the reader when using compiled information. First, the Bristol Bay region includes 36 communities with a diverse array of social, cultural, and economic features. Because of this, it is extremely difficult to make statements which apply generally to all, or even most of the communities. Nevertheless, in comparison with other regions of the state, there are some characteristic features of communities in Bristol Bay--such as the great time depth of its cultural traditions, its high reliance on fish and game, the domination of the region's market economy by the commercial salmon fishery, and the extensive land areas used by the region's population for fishing, hunting, trapping, and gathering. There is value in identifying these region-wide characteristics for comparison with other parts of the state. Accordingly, some broad generalizations about the region and subregional clusters are made in this report. It must be remembered that for any particular community the more general, region-covering statements may not precisely apply. The reader should assess general statements in a critical fashion, particularly when moving from regional or subregional levels to the consideration of particular communities.

Second, there have been relatively few community studies in the Bristol Bay region focused specifically on contemporary patterns of use of wild resources. Thus, many of the generalizations for subregions are based on a few community studies, commonly with tentative or incomplete findings. Because of this, the information presented in this report may be subject to change as more complete data become available. In particular the depiction of resource uses in Dillingham, the regional service center, and by residents of the Chignik subregion will be updated shortly as studies by the Division of Subsistence are

completed.

Thirdly, the reader is especially cautioned to treat the harvest data as incomplete information. Reliable information on harvest levels can be gathered only through long-term, systematic studies. Few have been conducted in the region. Levels of subsistence use of specific species change considerably from year to year. A species contributing significantly to a community's diet in one year may drop from prominence in another due to a number of ecological and economic factors, while other resources assume important roles to fill the void left by the first. Where possible, information from more than one year and from more than one community per subregion are presented in this report. However, the collection of subsistence harvest data in the Bristol Bay region is in its infancy. Harvest figures in this report should not be taken to represent "average" catches for a particular community or subregion. Instead, harvest data should be considered as examples of harvests which occurred in a particular community for a particular year. Until additional studies are conducted, it is impossible to determine how "typical" these harvest numbers are.

Mapping Procedure

In 1981 and 1982, personnel from Dillingham and King Salmon offices of the Division of Subsistence worked with residents of 30 communities in the region to produce maps depicting areas used for subsistence activities in the past 20 years (i.e., roughly 1960-1982). The first step in most cases was contacting community representatives to set up a meeting with the city or village council where the mapping project could be explained and local participation solicited. According to the wishes of each community, mapping was conducted either at a meeting of the council, at a general public meeting, by visiting house to house to interview a number of village residents, or by interviewing a selected group of knowledgeable local experts (see the individual maps for the source

of information for each community). An example from an earlier mapping effort is presented in Figure 2.

Ten categories of resources were mapped in most communities: moose hunting, caribou hunting, trapping, salmon fishing, freshwater fishing (not including salmon), marine fishing, marine mammal hunting, waterfowl hunting, marine invertebrate gathering, and vegetation (primarily berries) gathering. These categories of resources were selected because of the impossibility of mapping all species separately, and were arrived at on the basis of relative importance of the resource, consideration of whether or not specific trips were taken for the purpose of obtaining a certain resource, and following biological taxonomy. These ten categories were not mapped in all communities, and in a few cases additional categories were used.

Outlines of the area used for each of the categories were drawn by persons at the interview sessions on 1:250,000 scale U.S.G.S. topographic maps or on clear overlays atop a base map. If more than one map was drawn for a community (as occurred when several local experts were interviewed individually), the mapped areas were later compiled onto a single map, tracing the outer boundary of all superimposed use areas. Preliminary drafts of the compiled maps were returned to most communities for review and correction by persons at public meetings. The maps produced for this report followed a systematic procedure which is now standardized within the Division of Subsistence (cf. Wolfe 1983).

Two sets of maps are included in this report (Appendix D, in separate envelope). The first set (Maps 1-6) portrays the total area used by residents of each community in the seven subregions for all resources (that is, it does not distinguish resource categories). The second set (Maps 7-12) portrays areas used by residents of all communities for each of the resource categories (that is, it does not distinguish use by individual communities or subregions). Maps

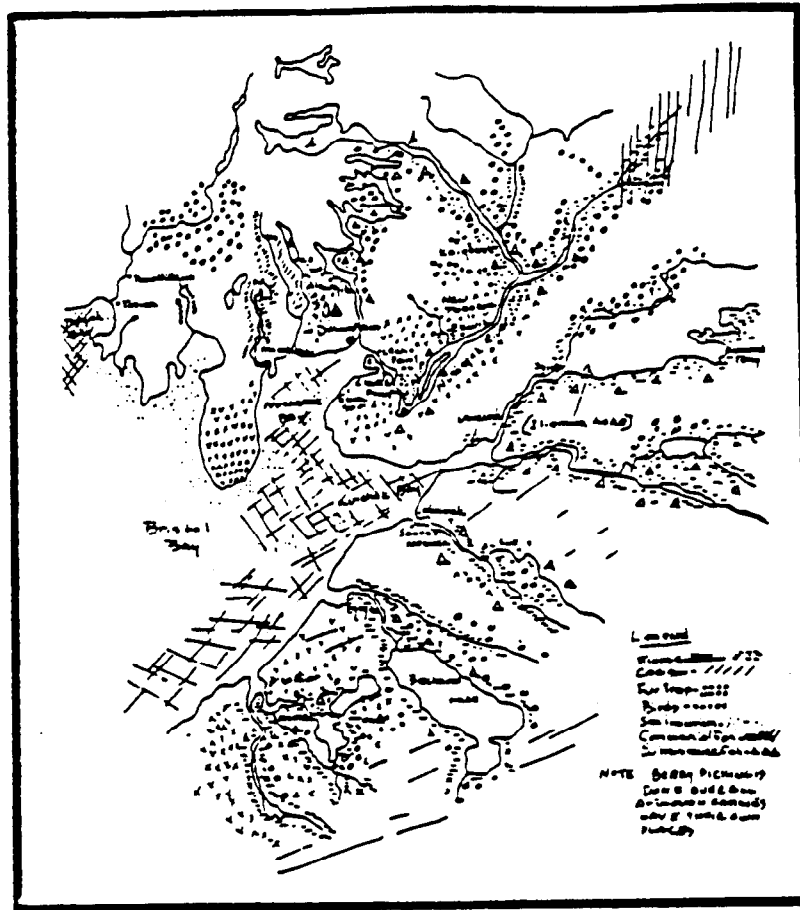


Fig. 2. Land Use Map submitted to Congress by Pete Petla of Koliganek (Arnold 1976).

depicting individual resource use areas for individual communities are on file with the Division of Subsistence as bluelines at 1:250,000.

The maps produced for these 30 Bristol Bay communities show the areas that local residents drew as they responded to the question, "where have you hunted (or fished, trapped, or gathered) this resource category in the past 20 years?" Thus, the maps included in this report portray areas used since about the time of the introduction of the snowmachine and highpowered outboard skiffs. The maps are useful for depicting which sets of communities use a particular area, and by and large show areas about which particular communities are concerned. As time passes different areas are used in response to changes in the distribution or abundance of resources, shifts in human populations, and other factors. Therefore, the maps in this report will be useful in identifying which communities have an interest in any given area. To assess other features of a geographic area, such as determining how important a specific area is to a community, it will be necessary to seek additional information directly from the communities.

CHAPTER 2

REGIONAL INFORMATION

THE NATURAL ENVIRONMENT

Geomorphology and Climate

The topography of the Bristol Bay region ranges from low, flat coastal plains, to tall, rugged mountain systems (Fig. 3). In the northwest portion of the region the Ahklun and Kilbuck mountains separate the Kuskokwim River drainage from the Togiak, Wood River, and Tikchik-Nuyakuk drainages of Bristol Bay. Low, rolling hills form the headwaters of the Nushagak River, while the Mulchatna and Kvichak drainages flow from the western side of the steep Alaska and Aleutian ranges. The lower stretches of the Nushagak and Kvichak rivers lie in low river basins which contain many lakes and ponds. The Kvichak drains Iliamna Lake (the largest lake in Alaska), Lake Clark, and several other large lakes. The area around Nushagak and Kvichak bays is flat, coastal plains. Down the peninsula, the Aleutian Range forms a high, volcanic backbone flanked by coastal flats on the Bristol Bay side and steep, rocky shorelines on the Pacific side. There are several large lakes in the northern peninsula which drain into Bristol Bay, such as Naknek, Becharof, and Ugashik lakes. Further down the peninsula, large bays are common on both sides of the peninsula.

The climate of the region is affected by both maritime and continental influences. On the Pacific side of the Alaska Peninsula the climate is characterized by relatively moderate temperatures, moderate to heavy rainfall, and frequent storms. Inland, in areas like the upper Nushagak and Togiak drainages, continental factors produce greater extremes in temperature and lighter rainfall, but deeper and longer-lasting snowfall at low elevations.

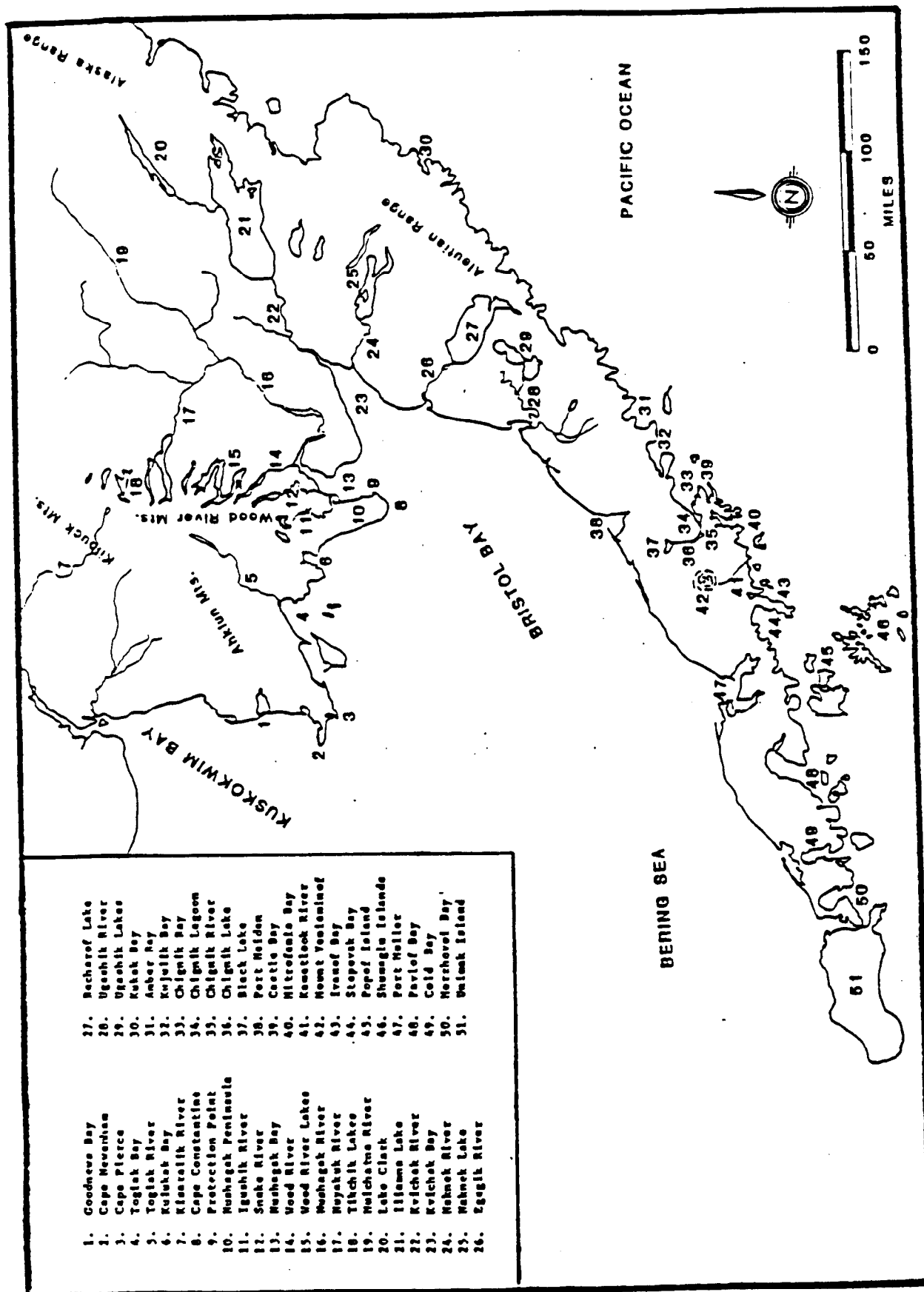


Fig. 3. Geographic features of the Bristol Bay region.

The coastal areas on Bristol Bay have weather intermediate between purely maritime or continental zones. Temperature extremes approach those of the interior, in part because the northern portion of the bay is usually covered with ice in late winter. Precipitation ranges from low to moderately heavy.

Flora

The western edge of tree-line cuts across the region, angling from roughly just south of the Naknek drainage to the northwest just south of Dillingham near Manokotak, and then more northerly up across the upper Togiak drainage. Spruce-deciduous forests are best developed along freshwater lowlands such as the shores of the Wood River lakes, the bottomlands in the Nushagak drainage, and the eastern Iliamna Lake and Lake Clark areas. The coastal plains and most of the upland areas in the river basins are covered by tundra plant communities. Alpine areas are vegetated by tundra, or are barren or snow covered. Shrub communities are found along water courses and on lower slopes. More than half of the BBCMP planning region is covered by low-growing plant communities such as tundra and shrub (ADNR 1984).

Fauna

A number of types of fish and wildlife are found in the Bristol Bay region. Perhaps most remarkable is the red, also called the sockeye, salmon (scientific names are listed in Appendix A) which are produced in greater numbers in Bristol Bay than anywhere else in the world (Middleton 1983). The total run of red salmon in Bristol Bay has ranged from about 3 million to 63 million fish a year between 1963 and 1982, averaging nearly 20 million per year (Middleton 1983). The largest runs occur in the Kvichak, Naknek, Egegik, Wood River, Ugashik, Nuyakuk, Igushik, and Togiak drainages. Significant runs of red salmon also

occur in the Chignik drainage on the Pacific side of the Alaska Peninsula. Four other species of salmon spawn in the Bristol Bay region: king (chinook), chum (dog), pink (humpback), and silver (coho). In most parts of the region these species are overshadowed in abundance by red salmon, but in many areas kings and silvers, especially, are important for home consumption.

A number of other fish are also common or abundant in the region. Dolly Varden (includes both char and Dolly Varden in this report), arctic grayling, trout, whitefish, and northern pike occur in freshwater. Herring, halibut, Dolly Varden, and smelt are some of the varieties of fish caught in marine or brackish waters. Several types of marine invertebrates, such as clams, crabs, and shrimp also occur in some areas.

Marine mammals are found throughout the coastal portions of the region. Harbor (or spotted) seal, and sea lion are very abundant in certain locations, and frequent Bristol Bay year-round. Seals associated with sea ice, such as ringed and bearded seals, are found in the northwestern coastal areas in winter and spring. Sea otter occur year-round on the Pacific side of the Peninsula and in Bristol Bay along the Lower Peninsula. Walrus occur along the ice edge in Bristol Bay in the winter, and males haul out on land in specific locations in the Bristol Bay from spring through fall. Several types of whales are found in Bristol Bay. with belukha and gray whale most common in nearshore areas.

On land, caribou, brown bear, and moose are the most common large mammals. Three herds of caribou were recognized in the region in the 1980s. The Mulchatna herd (around 33,000 animals) ranges in the area east of the Nushagak River, primarily up the Mulchatna drainage. The Northern Alaska Peninsula herd (about 18,000) ranges between the Naknek River and Port Moller, and the Southern Alaska Peninsula herd (numbering about 10,000) ranges south of Port

Moller, including Unimak Island (office files, Division of Game, ADF&G, Dillingham and King Salmon, 1984). Brown bear are common throughout most of the region, concentrating along salmon spawning streams in summer and fall. Moose frequent spruce-deciduous woodlands and willow shrub thickets. Their numbers have declined in some areas on the Alaska Peninsula over the past 10-20 years. A variety of small mammals are found in the region, including snowshoe and arctic hare, porcupine, and ground (parky) squirrel. Beaver are currently abundant in many areas.

The productive continental shelf waters and estuaries of Bristol Bay seasonally support vast numbers of nesting and migrating birds. Seabirds nest along rugged coastlines on the Pacific side of the Peninsula and in the Togiak area. Waterfowl and shorebirds feed in estuaries on the northern side of the Peninsula and around Cape Newenham during spring and fall migration or during late summer molt. Ptarmigan are found in varying numbers throughout tundra and shrub habitats.

PREHISTORY

The environment of the Bristol Bay region was very different 10,000 to 20,000 years ago from what it is today (Dumond 1977, 1981). The maximum extent of ice advance during the late Pleistocene probably occurred 18,000 to 20,000 years ago. At that time glaciers covered the Ahklun and Wood River mountains, and ice spread from the Alaska-Aleutian Range south into what is now the North Pacific Ocean. At that time, the Kvichak and Nushagak basins fronted not on the Bering Sea, but on Beringia, the shelf of land connecting North America and Siberia. A broad land bridge was exposed until about 14,000 years ago and, as ice melted and reformed during later glacial periods, smaller amounts of the

land bridge were above water until just 10,000 years ago. The last major glacial period ended then, but a minor advance retreated about 6,000 years ago. Thus, the Bristol Bay region was vastly different a short time ago in geologic perspective. What is now the Alaska Peninsula fronted on land to the north and ice to the south. The areas which are now large, salmon-producing lakes were covered by glaciers. Spruce-deciduous forests have probably advanced to the Naknek River area in just the past few hundred years.

Archaeological sites representing most of the known periods of prehistoric human activity in Alaska have been found in and adjacent to the Bristol Bay region. Sites in the Ugashik River drainage on the upper Alaska Peninsula and in the eastern Aleutians have been dated at 8,000 to 9,000 years ago. They are considered part of the Paleo-arctic tradition, the earliest documented period of human occupation in Alaska (Dumond 1977:40; Workman 1980). It is likely that substantially earlier human migrations passed over the land bridge from Asia into America during the Wisconsin ice advance, dating back as far as 20,000-40,000 years ago, but evidence of these earlier cultural habitats in the Bristol Bay region is still awaiting discovery (Claiborne 1973:16). Sites from later in the same period have been found near the Kvichak River, and just north of Bristol Bay between Goodnews Bay and Bethel (Dumond 1981:194). Paleo-arctic people evidently lived in areas characterized by dry, steppe-like vegetation found in glacial refugia (isolated areas not covered by ice during periods of glaciation) or in areas recently uncovered by the retreat of glaciers. Near the end of the period, these people seem to have expanded their range to include coastal areas and forests (Dumond 1980:29).

Evidence for human settlements in the region during the period from 4,500 to 6,000 years ago suggests two different cultures. The Northern Archaic tradition is represented by sites in the Naknek, Kvichak and Ugashik drainages;

and from Security Cove and Kagati Lake, just west and north of Togiak (Dumond 1977, 1980, 1981). Northern Archaic people are assumed to have been generalized hunters (Dumond 1980:33). Sites attributed to the Takli Alder-Ocean Bay 1 phase, the second culture, have been found on the Pacific side of the upper Alaska Peninsula and in the Aleutians (Workman 1980). In their reviews, both Dumond (1977) and Workman (1980) consider it possible that people in the Aleutians and along the ice-free coasts of the peninsula and Kodiak Island shared common traits during the time of the Takli Alder-Ocean Bay 1 phase. Dumond (1977) suggests that an Aleutian tradition (including the Port Moller and Chignik areas) started diverging from this common ancestry with Pacific Eskimos about 5,000 years ago and expanded westward through the islands. A variety of faunal remains were found at one Takli Alder site, including evidence of marine mammals, large land mammals, salmon, salt-water fishes, and birds (Dumond 1980). During this period, residents of the Pacific side of the peninsula apparently hunted caribou during seasonal trips to the north of the Aleutian range, based on evidence unearthed in the Naknek River drainage, and at Pedro Bay on Iliamna Lake (Workman 1980:62).

In the Bristol Bay region, the Arctic Small Tool tradition is represented by sites in the Naknek River drainage dated from 3,000 to 4,000 years ago (Dumond 1977). People of this tradition are often cited as the ancestors of present-day Eskimos (Dumond 1980). Once the tradition was established on the Bristol Bay side it appears that the Pacific people no longer crossed over to hunt caribou, perhaps in response to contact with Arctic Small Tool people. However, no artifacts characteristic of the Arctic Small Tool tradition have been found in sites on the Pacific side of the peninsula (Dumond 1977; Workman 1980). On the Naknek River, people of the Arctic Small Tool tradition probably relied on salmon and caribou, and perhaps seal (Dumond 1981).

Artifacts characteristic of the next cultural complex, the Norton tradition (from 1,000 to 2,500 years ago), have been found at Platinum just northwest of Togiak, in the Naknek and Ugashik river drainages, at Kukak Bay on the Pacific side of the upper peninsula, and at Port Moller on the lower peninsula (Dumond 1977; Workman 1980). The largest Norton sites are found on salmon streams where people most likely exploited the abundant runs of salmon. Remains of caribou are also common at many of these sites (Dumond 1977:113).

Evidence for the Thule tradition, beginning 800 to 1,000 years ago and continuing until historical times, has been found on both sides of the upper Alaska Peninsula, on the lower peninsula, and on the Aleutians (Dumond 1980). The Thule influence reached as far east as Greenland and as far west as Kodiak Island, Cook Inlet, and the Aleutians. By AD 1200, it is likely that Thule tradition people had settled major river valleys, including the Naknek and Nushagak, probably well into forested areas where they relied on salmon and caribou (Dumond 1977:149).

THE HISTORIC PERIOD

Indigenous Cultures

At the time of European contact in the mid 1700s, four major groups of indigenous people inhabited the region -- the Aleuts, the Pacific Eskimos, the Central Yup'ik Eskimos, and the Dena'ina (Tanaina) Athapaskan Indians. The Aleuts lived in the Aleutians and on the lower Alaska Peninsula. Dumond (1977:21) suggests that Aleut territory extended as far up the peninsula as 159° W longitude, in the vicinity of present-day Perryville. Though the Thule tradition was apparently still spreading down the Aleutian chain at the time of Russian exploration, the Aleuts remained distinct from other Eskaleutian-speaking people, with their own language and material culture (Dumond 1977).

Residents of the Aleutian Islands were almost totally reliant upon marine resources, such as marine mammals, fish, seabirds, and intertidal invertebrates. Aleuts on Unimak Island and the Lower Alaska Peninsula likely used some terrestrial resources, caribou for example, and anadromous fish such as salmon and Dolly Varden in addition to marine foods (Dumond 1980).

Peninsula Eskimos evidently occupied most of the Alaska Peninsula north of the land held by the Aleuts, nearly up to the Kvichak River and Iliamna Lake (Dumond 1981). Little is known about this group of Pacific Eskimos; they were apparently displaced to the south by Aglegmiut Yup'ik Eskimos soon after the arrival of the Russians (Oswalt 1967:4). The Peninsula Eskimos spoke Sugpiaq, also called Alutiiq, as did the Eskimos of Kodiak Island, the Kenai Peninsula, and Prince William Sound.

At the time of Russian contact, it is thought that at least three groups of Yup'ik Eskimos, the Aglegmiut, the Kiatagmiut, and the Togiagamiut, occupied northern Bristol Bay (VanStone 1967:xxi). The Aglegmiut inhabited the coastal and lower river areas around Nushagak Bay, Kvichak Bay, and the Naknek and Egegik river mouths. The Kiatagmiut were found inland up the Nushagak and Kvichak drainages. The Togiagamiut lived along the coast between Cape Newenham and Cape Constantine, and up the Togiak River. The Yup'ik Eskimos of the Bristol Bay area probably relied upon a mix of anadromous fish (salmon and char), terrestrial mammals (caribou), and marine mammals (seal, walrus) for subsistence foods.

The prehistory of the Dena'ina of the Iliamna Lake and Lake Clark area is uncertain. Linguistic evidence has been interpreted to suggest that Dena'ina ancestors moving into the Iliamna area from interior populations may have acted as a wedge isolating Aleut speakers from other Eskimos 3,000 or more years ago (Oswalt 1967:34-35), but archaeological evidence prior to Russian

exploration is unclear (Townsend 1970:78-79). The Dena'ina are speakers of an Athapaskan Indian language related to others in the Na-Dene linguistic family, which stretched across interior Alaska and Canada in the early historic period. The Na-Dene stock may have consisted of a single close-knit group as late as 2,700 years ago (VanStone 1974:5). The subsistence economy of the pre-contact Iliamna-area Dena'ina was likely based on salmon, supplemented with game animals, which enabled them to maintain a relatively stable and sedentary life (Townsend 1970:73-74).

Euro-American Exploration and Settlement

Recorded European history in the region begins with the Second Kamchatka Expedition led by Bering, with Chirikov as captain of the party's second ship. The two vessels were separated from one another soon after departing Siberia, and each reached land in southern Alaska in 1741. On their separate return voyages to Russia, stops were made in the Shumagins and in the Aleutians. Word of the furs discovered in the new world spurred many voyages to the Aleutians by Russians in the mid 1700s (Dumond 1977).

Private Russian hunters exploited the Pacific coastal area and pressed local residents into servitude until 1799, when the Russian crown granted a monopoly on trade in the new colonial area to the Russian American Company. At this time there were trading stations on the Alaska Peninsula and other coastal areas within the range of the Aleuts and Pacific Eskimos (Dumond 1977: 18), and attempts at establishing trade had begun in the Iliamna (Townsend 1965:33,53) and Nushagak areas (Kowta 1963:12). In 1818, a Russian party passed through the Iliamna area on its way to Nushagak Bay where they established Aleksandrovski Redoubt (Townsend 1965:56). Members of the same party continued north, on land, and explored the coast as far north as the Kuskokwim River

(Kowta 1963:12). By 1821 a trading post was established on Iliamna Lake (Townsend 1965:56).

Missionary activities in Alaska by the Russian Orthodox Church began in the 1790s (Townsend 1965). A chapel was constructed at Aleksandrovski Redoubt in 1832 (VanStone 1967:22), while missionary activities in the Iliamna area at that time were administered from Kenai (Townsend 1965:58).

The Russians continued to exert the strongest outside influence on the region until Alaska was purchased by the United States in 1867. Throughout the Russian period, the fur trade was the dominant cash economic activity in the region. Within the Bristol Bay region, the Russians had the greatest impact on the lives of residents of the Pacific side of the Alaska Peninsula. In the Aleutians, along the Pacific side of the Alaska Peninsula, and east to Southeast Alaska, the Russians dramatically disrupted aboriginal settlement patterns and the daily lives of indigenous residents. Warfare was not uncommon between the Native inhabitants and the Russian invaders. Aleuts were forced to work for the Russian traders, and were frequently taken far from their homes into areas occupied by other cultures. Smallpox, introduced by the Russians, ravaged residents of the Alaska Peninsula and Cook Inlet areas in the late 1830s (Townsend 1965:57). In contrast, in the northern part of the Bristol Bay region many Kiatagmiut probably dealt with the Russians no more than once or twice a year (VanStone 1967), though the commercial fur trade instituted by the Russians impacted the traditional pattern of seasonal activities by placing a greater emphasis upon the trapping of furbearers. Diseases were also introduced which affected local populations.

American Period

After the United States purchased Alaska from the Russians in 1867, there was an initial period during which competition between fur traders provided

some benefits to local trappers, but in 1883 the Alaska Commercial Company gained a monopoly and the short period of relatively bountiful credit ended (Townsend 1965). A drop in fur prices also affected the fur trade at this time.

As the fur trade declined, the commercial salmon industry began in the region. The commercial salmon fishery started off with the export of salted fish, but expanded rapidly once the canning industry took hold in the 1880s. Salmon salteries and canneries were established throughout the Bristol Bay region in the late 1800s and early 1900s. Cod, as well as salmon, were sought as a commercial commodity on the lower peninsula at this time. The salmon fishery grew to be the largest industry in the region and became a dominant outside influence on local residents of Bristol Bay at that time.

Disease continued to be a factor in local settlement patterns through the early American period. In 1899-1900, two infectious diseases, measles and influenza, swept through western Alaska killing as many as 25 percent of the area's Eskimo inhabitants (Wolfe 1982:91). Influenza was the cause of another disastrous epidemic in 1918-1919 (VanStone 1967:103). These widespread outbreaks directly caused the death of large numbers of local residents, and also led to starvation of many survivors who were unable to stockpile food supplies for winter. Entire villages were wiped out or abandoned. It is likely that other, unreported, epidemics occurred during the Russian and early American periods (VanStone 1967:101).

Participation by Local Bristol Bay Residents in the Commercial Salmon Fishery

During the first several decades of the commercial fishing, Alaska Natives were not actively involved in the commercial salmon fishery, either as fishermen or as cannery workers. (This discussion is based on the Nushagak Bay

fishery described by VanStone 1967.) Fishermen were primarily Euro-Americans recruited by the canneries from outside of Alaska, while cannery workers were almost exclusively Chinese immigrants. Workers were imported by cannery operators as a cheap, conscripted labor force. Local Native residents, on the other hand, were characterized by cannery representatives as being unreliable. If given the opportunity to work, most worked only until their limited desire for cash for store goods was fulfilled; they then left employment to return to their traditional subsistence activities. Even with this bias against hiring local residents, Eskimos and Indians found some jobs with the canneries, especially at the peak of the salmon run. Relatively few Alaskan Natives fished commercially or worked all season in canneries until it became impossible for the canneries to import outside labor during the Second World War. At that time workers were recruited from Bristol Bay and from other rural areas in western and northern Alaska. VanStone (1967) suggests that it was not until the 1960s that men from the Nushagak River communities became fully involved as commercial fishermen. By the mid 1960s most adult men in the Nushagak River communities participated in the salmon fishery as fishermen.

The commercial salmon fishery attracted many outsiders to the Bristol Bay region. Some of these fishermen became permanent or semi-permanent residents of the region. A large number of these fishermen were of Scandinavian descent.

In the mid 1970s the State of Alaska instituted a limited entry permit system in the salmon fishery to facilitate conservation and management of the commercial fishery and to help insure the economic health and stability of the commercial fishermen. Permits were distributed to a limited number of fishermen who qualified by prior participation in the commercial fishery, their degree of dependence upon the cash income from fishing, their potential for alternative employment, and their previous investment in the fishery.

THE CONTEMPORARY PERIOD

Present-day Economies

In the 1980s, commercial salmon fishing continues to be the most important source of cash income in the Bristol Bay region (Nebesky et al. 1983; Wolfe et al. 1984). In many communities it is the primary source of monetary income, supplemented by limited employment in schools and other local services funded by government. Cold Bay and King Salmon are exceptions; in these communities most employment is with government or transportation services. In regional and subregional centers, such as Dillingham, Iliamna, and Sand Point, a greater proportion of residents are employed in occupations not directly related to the fishery, but the local economies are based on commercial fisheries. Shellfish and types of fish other than salmon are important commercially in the Lower Peninsula and Chignik subregions. Communities of the Iliamna subregion are furthest removed from the commercial salmon fishery, yet it is still their primary source of cash income in most years.

In several communities it has been noted that the traditional patterns of fishing, hunting, and gathering activities have been retained for the most part, with accommodations being made to participate in cash-generating activities (e.g. Nondalton, Behnke 1982; Togiak and New Stuyahok, Wolfe et al. 1984). For instance in Nushagak River communities, while men are participating in the short, intense commercial salmon season, women catch and process the large quantities of subsistence salmon that are a staple for most families throughout the year. In other subregions, people use similar arrangements to participate in both the subsistence and commercial salmon fisheries, or they reschedule their subsistence catch before or after the commercial fishery. In some communities, salmon are retained from the commercial catch for home use.

In communities like Togiak and New Stuyahok, commercial salmon fishing is a preferred type of cash employment. Many of the skills used in commercial fishing are the same as those used in other fishing and hunting pursuits. Much like subsistence hunting and fishing, commercial fishing is an autonomous endeavor where an individual is in control of most factors of production. Commercial fishing crews in many communities are kin-based, as are most subsistence activity groups, and knowledge is passed down through the generations as children fish with their parents and other close relatives.

In small communities, wage employment is also integrated as much as possible into traditional patterns. Many of the locally controlled jobs are designed to be flexible so that time can be taken off for hunting, fishing, or gathering (Wolfe et al. 1984). The majority of the full-time jobs in most small communities are nine-month positions which have the summer off, permitting people to participate in important summer fishing activities. In addition, a large proportion of the full-time jobs are held by women, freeing men to hunt and trap. Men often work at short-term, temporary jobs that do not tie them down.

Cash is used to purchase many forms of equipment used for subsistence pursuits. Aluminum skiffs, outboard motors, snowmachines, rifles, nylon nets, and other gear are paid for with cash. With expensive transportation charges, equipment and fuel costs are high in rural Alaska. In many communities, commercial fishing boats are used in subsistence activities. This is common in the Lower Peninsula and Chignik subregions where commercial fishing occurs over a greater part of the year and subsistence harvests are often taken incidental to commercial harvests or fitted in during short closures between commercial periods.

Cultural and Social Values of Harvesting Wild Resources

Wild resources and their harvesting, processing, and distribution continue to play important roles in the lives of many residents in the subregion, particularly in the smaller communities. Subsistence activities are an important mechanism for maintaining values such as kinship, community, respect for elders, hospitality to visitors, and traditional ideological concepts.

The harvest of wild foods in the Bristol Bay region is usually accomplished by several individuals working in concert. In many communities, work groups are composed primarily of close relatives. For instance, in New Stuyahok hunting parties are often based on brother/brother, brother/brother-in-law, uncle/nephew pairings, though they are also frequently made up of less closely related age-mates. Freshwater fishing with nets for whitefish, Dolly Varden, and pike, is often done by older men and their young sons or grandsons. Berry-picking groups are usually composed of female relatives, such as mothers with daughters, daughters-in-law, and their offspring. Processing of resources gathered in large quantities, such as salmon and freshwater fish, is done by groups of closely related women with the assistance of male relatives if they are available. The tasks of catching and processing resources draw relatives and friends within the community together in traditional activities. Children learn first by watching, then by assisting, and eventually as full participants. The specific roles filled by women and men follow a sexual division of labor which is characteristic of traditional tasks.

Among newcomers to the region, harvesting and processing work groups are probably composed primarily of nuclear family members, work associates and friends (Morris 1982). Subsistence activities provide these participants with a feeling of belonging to the local area and a measure of self-sufficiency, as well as a means of developing friendships.

In some communities, subsistence products are stored in caches (Wolfe et al. 1984). Often these caches are used by extended families living in several different households. The flow of goods into and out of the cache may be controlled by the elder of the extended family or access to the cache may be unrestricted among members of the extended kin group. Frequent sharing and distribution of large quantities of fish and game is a common feature in many of the communities in the region. Being a proficient supplier of food and other products derived from wild resources has long been one of the primary methods of gaining prestige in local societies. Elders commonly receive gifts of traditional foods, both from close kin and from unrelated donors. Invitations to meals and gifts of food are the most common forms of hospitality to visitors and strangers. Subsistence foods are commonly taken along as gifts by visitors to present to those who provide them hospitality. It is a common way for products of one subregion to be shared with other subregions. For example, when Togiak hunters travel to Aleknagik or New Stuyahok to go moose or caribou hunting they often bring seal oil or other marine mammal products as gifts. Most often when people travel to a different community to hunt or gather berries, they will rely on kin ties in that community to gain access. Such travel, and the sharing of gifts and subsistence activities renew and strengthen ties between the participants.

Many residents of the Bristol Bay region prefer the taste of traditional wild foods to store-bought foods. This is manifested in the daily diets, in the statements of questioned individuals, and in the celebration of holidays and festivities. Russian Orthodox Christmas, Selavi, is celebrated in many communities throughout the region. One of the most important aspects of Selavi is the feasting from home to home which occurs as the celebrations rotate from community to community. It is a major concern of hosts to be able

to provide sufficient quantities of traditional foods to each guest. Moose, caribou, salmon, and berries prepared in traditional fashion are the most desirable foods to provide to guests. Feasting on Native foods is also an important part of Moravian song feasts, celebrated by residents of the region in the Togiak and Nushagak Bay subregions and to the north in the Kuskokwim Bay area. These religious celebrations, and the winter and spring festivals held throughout the region, are in many respects the modern counterparts of the traditional winter dance festivals held in the past.

Subsistence activities have been found to be important links to persistent traditional ideologies in other parts of the state (cf. Nelson Island Yup'ik, Fienup-Riordan 1983; Upper Koyukok Athapaskan, Nelson 1977). This occurs also for many Bristol Bay communities. Features of the "world-view" of the indigenous cultures of Alaska are very different from the "world-view" about resources held by most North American residents of European descent. For instance, one widespread Alaskan Native belief is that success in fishing and hunting is contingent upon the fulfillment of certain signs of respect toward the fish and game taken. Concepts about property, such as rights of access to tools, labor, the land, and its resources may differ from those prevalent in industrial, western societies. In the past, traditional, customary law regulated access and use of land, and the distribution of harvests. Today, it is still common practice for residents of many subregions in Bristol Bay to gain access to neighboring resource areas through kinship or other social ties, and to follow local "rules" while hunting, fishing, or gathering there. Under the traditional ideology, wild resources are not the common property of state residents, but are "regulated" by local societies with "laws" governing use by members of the society and by visiting outsiders (cf. Magdanz and Olanna 1984).

Individual resources are imbued with supernatural as well as earthly characteristics. For example, in the Togiak, Nushagak Bay, and Nushagak River subregions brown bears are greatly respected not only for their superhuman physical strength and dangerous teeth and claws, but also for their ghost-like qualities such as their ability to hear for miles and to appear from nowhere. The breath of bears is especially feared. One man said it felt like needles poking his skin, and another compared it to sand blasting and said it caused him to be blinded in one eye. People say that hunters who are parents of young children should not kill bears, because the bear's spirit might harm the children. Special precautions are followed when hunting and handling bears. Following traditional practices, after killing a bear the head should be buried facing the east (office files, Division of Subsistence, ADF&G, Dillingham). Because they are such a powerful and dangerous animal the traditional lore and rules concerning brown bears are especially interesting, but the use of most wild resources is similarly imbedded in legend and prescribed behavior.

Subsistence harvests are important in many ways to residents of the Bristol Bay region. The above discussion does not apply equally to all communities, but the connection between subsistence activities and the local culture is evident in all subregions.

CHAPTER 3

TOGIAK SUBREGION

LOCATION AND ENVIRONMENT

Three communities are included within this subregion: Manokotak, Togiak, and Twin Hills. The subregion is bounded on the west by Cape Newenham, on the east by the Snake and Weary rivers draining into Nushagak Bay, and to the north in the high country near the headwaters of the Kisaralik River. Much of the mainland coast and the shores of the offshore islands are rocky, and nearshore waters in these areas are clear. Mountain ranges extend to the coast at Cape Newenham and around Kulukak Bay. The terrain surrounding the lower Togiak drainage and on the Nushagak Peninsula is mostly flat or gently rolling, with many ponds and small lakes. Tundra is the dominant vegetation type. Willows and scattered clumps of cottonwoods grow along rivers. Small patches of spruce are found in the eastern and northeastern edges of the subregion. Marine mammals, seabirds, marine fish, and invertebrates are abundant near shore. All five Alaskan species of salmon run in local rivers. Brown bear is the only common large terrestrial mammal in the subregion.

POPULATION

There are approximately 915 people residing in the subregion. Village censuses conducted in 1983 for revenue sharing purposes enumerated 545 residents in Togiak and 299 in Manokotak (Alaska Department of Community and Regional Affairs (ADCRA), Dillingham, pers. comm., 1984). The 1980 U.S. Census provides the most recent count, 70, for Twin Hills. The vast majority, 93 to 97 percent, of residents of the three communities are Alaska Natives (Nebesky

et al. 1983). The Yup'ik language is dominant over English in all three communities. In the local schools, Yup'ik is the primary language of more than three-quarters of the students (Southwest Region School District, Dillingham, pers. comm., 1983).

USE OF FISH AND WILDLIFE AND OTHER NATURAL RESOURCES

Species Used and Seasonal Round of Harvest

Residents of the Togiak subregion harvest resources from marine and shoreline habitats, and from rivers, lakes, tundra, and forest. From the ocean and seashore they harvest seal, walrus, sea lion, several types of fish, herring spawn-on-kelp, waterfowl, seabird eggs, clams, and other invertebrates, and basket grass. From rivers, several types of salmon and other fish, furbearers, and waterfowl are taken. Tundra in the subregion provides brown bear, tundra hare, ptarmigan, furbearers, and berries. People often travel to other subregions to harvest moose and caribou, though a few are taken within the eastern and northern portions of the Togiak subregion. See Table 2 for a listing of resources known to be used by residents of the subregion.

The seasonal round of subsistence activities for the Togiak subregion is portrayed in Figure 4. Spring harvests begin with the arrival of eiders and emperor geese, and the emergence of brown bear and parky (ground) squirrel. Hunters travel to coastal sites by snowmachine to catch waterfowl and marine mammals. Some hunters head inland to shoot or trap parky squirrel and catch the last ptarmigan of the spring. A few brown bear are also harvested for food at this time. A little later, usually around the first week of May, herring enter nearshore waters to spawn, and the fish are netted to dry or salt for home consumption. Herring spawn-on-kelp is also picked to eat fresh or is preserved by salting, freezing or drying. Many residents of the subregion

TABLE 2. WILD RESOURCES KNOWN TO BE USED BY RESIDENTS OF THE SEVEN SUBREGIONS OF BRISTOL BAY

Resource ^a	Subregion						
	Togiak	Nushagak Bay	Nushagak River	Iliamna Lake	Upper Ak Pen	Chignik	Lower Ak Pen
King salmon	x	x	x	x	x	x	x
Red salmon	x	x	x	x	x	x	x
Silver salmon	x	x	x	x	x	x	x
Chum salmon	x	x	x	x	x	x	x
Pink salmon	x	x	x	x	x	x	x
Dolly Varden	x	x	x	x	x	x	x
Whitefish	x	x	x	x	x		
Lake trout	x	x	x	x	x	x	
Rainbow/steelhead	x	x	x	x	x	x	x
Grayling	x	x	x	x	x		
Pike	x	x	x	x	x		
Burbot	x	x	x	x	x		
Blackfish	x	x					
Sucker			x	x			
Smelt	x	x	x	x	x	x	
Halibut, sole, flounder	x	x			x	x	x
Herring	x	x			x		x
Capelin	x						
Cod	x					x	x
Bass						x	x
Snapper							x
Harbor/spotted seal	x	x		x	x	x	x
Ringed seal	x	x					
Bearded seal	x	x					
Sea lion	x					x	x
Walrus	x	x				x	x
Belukha	x	x		x	x		
Other whales	x						x
Moose	x	x	x	x	x	x	x
Caribou	x	x	x	x	x	x	x
Brown bear	x	x	x	x	x	x	
Black bear		x	x	x			
Porcupine	x	x	x	x	x	x	x
Arctic hare	x	x	x	x	x	x	x
Snowshoe hare	x	x	x	x	x	x	
Marmot	x						
Parky squirrel	x	x	x	x	x		

----- Continued on next page -----

TABLE 2 (continued). WILD RESOURCES KNOWN TO BE USED BY RESIDENTS OF THE SEVEN SUBREGIONS OF BRISTOL BAY

Resource ^a	Subregion						
	Togiak	Nushagak Bay	Nushagak River	Iliamna Lake	Upper Ak Pen	Chignik	Lower Ak Pen
Beaver	x	x	x	x	x	x	
Red fox	x	x	x	x	x	x	x
Arctic fox	x						
Wolf	x	x	x	x	x	x	x
Coyote				x			
River otter	x	x	x	x	x	x	x
Wolverine	x	x	x	x	x	x	x
Mink	x	x	x	x	x	x	x
Marten		x	x	x			
Weasel	x	x	x	x			
Lynx	x	x	x	x			
Muskrat	x	x	x	x			
Ducks*	x	x	x	x	x	x	x
Geese*	x	x	x	x	x	x	x
Swan	x	x	x	x	x		
Crane	x	x	x	x	x		
Ptarmigan	x	x	x	x	x	x	x
Grouse	x	x	x	x	x		
Bird eggs	x	x	x	x	x	x	x
Clams*, mussel	x	x	x	x	x	x	x
Crabs*	x					x	x
Octopus						x	x
Sea urchins						x	x
Shrimp						x	x
Herring spawn-on-kelp	x	x					
Salmonberries	x	x	x	x	x	x	x
Blueberries	x	x	x	x	x	x	x
Blackberries	x	x	x	x	x	x	x
Low-bush cranberries	x	x	x	x	x	x	x
High-bush cranberries	x	x	x	x			
Huckleberries	x	x	x	x	x		
Strawberries							x
Vegetables*	x	x	x	x	x	x	x
Herbs*	x	x	x	x	x	x	x
Basketgrass	x	x					
Firewood*	x	x	x	x	x	x	x

^a Scientific names in Appendix A.

* Known types listed in Appendix A.

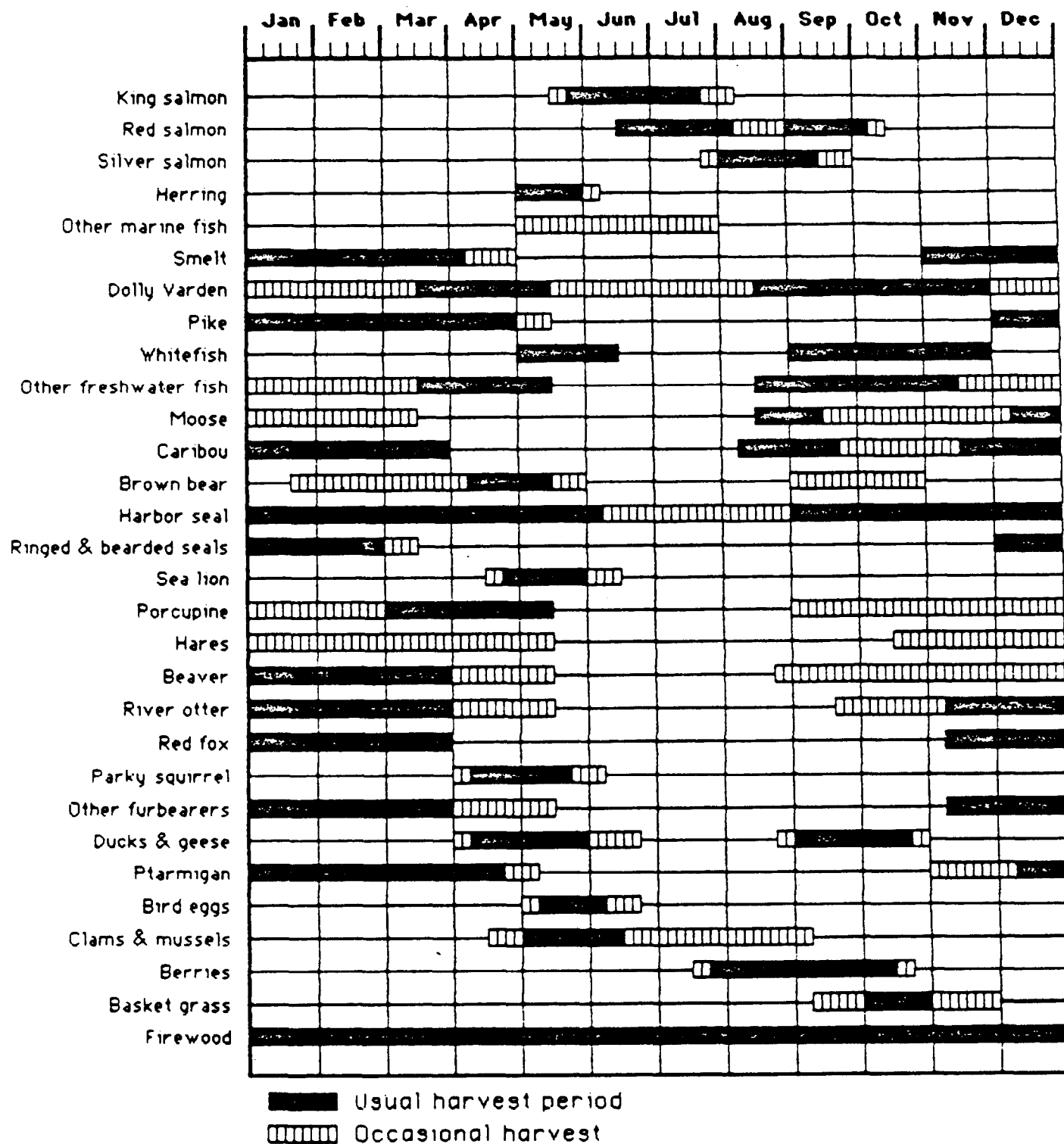


Fig. 4. Seasonal round of subsistence activities for selected resources, Togiak.

participate in the commercial spawn-on-kelp and herring fisheries. Clams are dug at this time, and some hunting of marine mammals and waterfowl occurs while people are camped during the herring season. Later in May or June, eggs of gulls and seabirds are collected.

The arrival of the first kings marks the start of the salmon season. Kings and other species are caught in subsistence nets or are kept out of the commercial catch for home use. In Togiak Bay, incidental catches of halibut, and sometimes flounder, are saved for consumption at home or to be shared in the village. Kings are eaten fresh, frozen, or made into strips. Reds are mostly split and dried. Chums are preferred by some older people because they have less fat and are easier to dry. Silvers are the last to run up the rivers. They are eaten fresh or frozen, though some are salted or dried. Fall red fish (spawned-out red salmon) are a preferred food, taken upriver or in the lakes that feed the Togiak and Igushik rivers. Dolly Varden are taken throughout the year, but in largest quantities in fall and spring. Smelt, whitefish, pike, and other fish are taken by jigging or in nets from late fall through spring. Berry picking begins in mid July, with salmonberries, blueberries, huckleberries, blackberries, and lowbush cranberries being gathered as the season progresses.

In August and September, many hunters travel to Nushagak River villages or to Aleknagik to gain access to hunting areas for moose or caribou, usually being accompanied on the hunt by a relative living in that area. Some moose hunting is done along local rivers and lakes, but few moose are available in these areas. Spotted (harbor) seal, waterfowl, small mammals, and a few brown bear are taken within the subregion. Later in the fall and in winter, hunters travel to neighboring subregions by airplane or snowmachine to hunt caribou.

During the winter, trapping and shooting of furbearers occur. Beaver, red

fox, and river otter are the most common species taken. Beaver are important as a source of food as well as fur. When ice is in Togiak Bay in late winter, bearded seal and ringed seal are available to hunters, in addition to spotted seal, walrus, and sea lion, which are present year-round. As the ice moves out of the bay, the spring migration of eider ducks and emperor geese begins, and the seasonal cycle starts again.

Harvest Levels and Inter-Community Differences in Resource Use

Little information has been gathered on the quantities of specific types of fish and game harvested in the subregion. Manokotak was included in the 1973 survey of subsistence harvests by Gasbarro and Utermohle (1974) (Table 3). Just over half of the households in Manokotak were interviewed. Subsistence salmon harvests for all three communities in 1982 (Table 3) were gathered through the permit system of the ADF&G's Division of Commercial Fisheries. Dolly Varden are a very important resource to residents of the subregion. In the 1970s, ADF&G's commercial fish biologists conservatively estimated that 100,000 char were taken each year by residents of Togiak and Twin Hills (office files, Division of Commercial Fisheries, ADF&G, Dillingham).

Harvest reports from Manokotak should not be used to estimate resource use in Togiak and Twin Hills because the three communities are not located in identical environments, and the history of each community is unique. Togiak and Twin Hills are just a few miles apart, but there are differences between these two communities in harvests related to the historical residence of their populations. Most Twin Hills residents moved recently from the Kuskokwim Bay area and have retained preferences for resources from their previous home. Some have not yet acquired a taste for certain resources in the Togiak area, such as herring. Many Manokotak families originated in the Kulukak and Togiak areas and used resources similar to those used by Togiak people, but today they

TABLE 3. HARVESTS OF SELECTED FISH AND GAME FOR NON-COMMERCIAL USE IN THE TOGIAC SUBREGION

Resource	Household Harvest ^a		
	1973 ^b	1982 ^c	
	Manokotak	Manokotak	Subregion
King salmon		48	85
Red salmon		375	234
Silver salmon		187	150
Chum salmon		19	22
Pink salmon		14	17
Total salmon	790	643	508
Pike	264		
Whitefish	41		
Grayling	19		
Dolly Varden	38		
Smelt	36		
Herring	16		
Other fish species	42		
Moose	483		
Caribou	158		
Seal	41		
Walrus	21		
Belukha	147		
Beaver	78		
Other mammal species	26		
Geese	49		
Ducks	33		
Ptarmigan and grouse	57		
TOTAL HARVEST PER HOUSEHOLD	2339		
TOTAL HARVEST PER CAPITA	396		

^a Pounds dressed weight per household. Conversions from number of animals to pounds made using conversion factors in Appendix B.

^b Derived from Gasbarro and Utermohle 1974. 19 households surveyed in Manokotak.

^c Derived from ADF&G subsistence salmon permit returns, Division of Commercial Fisheries, Dillingham. Based on 18 permits returned by Manokotak households 35 from Togiak - Twin Hills.

are situated inland between Nushagak Bay and Kulukak Bay. Therefore, they do not have as ready access to marine resources as Togiak and Twin Hills residents do. Manokotak is closer to spruce forests and other interior vegetation types, and its residents have a greater opportunity to harvest resources from those habitats, such as moose and huckleberries, than do Togiak and Twin Hills residents.

The Geography of Harvest Activities

Subsistence harvests are generally focused on the river drainage each community is located along and on traditionally used coastal sites (Map 1). Although subsistence activities commonly involve short excursions from the home community, many longer-term seasonal camps continue to be used as they were in the past. In the spring many people travel to coastal sites to harvest marine mammals, waterfowl, and herring. In summer, many families move to camps at commercial salmon set net sites; all but a few families from Manokotak move to Igushik at the mouth of the Igushik River. In fall, residents of all three communities head up their local rivers in skiffs, primarily to harvest fish.

Extremely large areas are covered by hunters and trappers of this subregion because many terrestrial resources are not abundant. Snowmachines are used to travel within the subregion and occasionally to reach hunting areas in adjacent subregions. Some hunters fly to the Nushagak River and Upper Alaska Peninsula subregions to hunt caribou and, less frequently, moose. People also fly to communities to the north on Kuskokwim Bay to combine visiting with harvesting berries and basket grass.

CHAPTER 4

NUSHAGAK BAY SUBREGION

LOCATION AND ENVIRONMENT

The Nushagak Bay subregion includes four communities, Aleknagik, Clark's Point, Dillingham, and Ekuk. The land surrounding the bay is predominantly flat alluvial plain, with mountains of the Wood River range lying to the northwest. Tundra is the dominant vegetative community of the flat areas. Spruce-deciduous forests are limited to the better-drained river margins, rolling hills, and lower slopes of the mountains. Millions of salmon pass through Nushagak Bay most summers enroute to spawning grounds up the Wood and Nushagak drainages. All five Alaskan salmon species are present in abundance. Smelt are plentiful in the bay and a variety of freshwater fish are common in the Wood River system. Belukha and harbor (spotted) seal are found in the bay. Only a few moose are found near the bay, but they are more common around the Wood River lakes. Small groups of caribou are occasionally seen east of the bay, but they are not common. Brown bear are the most common large land mammal.

POPULATION

More than 2,000 people live in the Nushagak Bay subregion with nearly 90 percent of the population concentrated in the regional center, Dillingham. A 1983 census conducted by the city enumerated 1,896 residents (ADCRA, Dillingham, per. comm., 1984). In the 1980 U.S. Census, the population of Aleknagik was 154, Clark's Point was 79, and one household (seven people) lived year-round in Ekuk. During the commercial fishing season, Dillingham, Clark's Point, Ekuk,

and other locations on the bay are flooded with fishermen, cannery workers, and other seasonal workers. The percent of Alaska Natives in the Dillingham population declined from 64 percent in 1970 to 58 percent in 1980 (Nebesky et al. 1983). The other communities in the subregion are more comparable to other small communities in the northern Bristol Bay area, with nearly 90 percent of their residents of Native descent (Nebesky et al. 1983).

USE OF FISH AND WILDLIFE AND OTHER NATURAL RESOURCES

Species Used and Seasonal Round of Harvest

Many residents of the subregion rely on local marine, freshwater, and terrestrial resources. They harvest marine mammals, waterfowl, clams, salmon, and a variety of other fish from Nushagak Bay and neighboring coastal areas. Salmon, a number of other types of fish, and waterfowl are harvested in the bay and from rivers and lakes. They harvest moose, porcupine, spruce grouse, furbearers, berries, and firewood from the forests. From the tundra, caribou, ptarmigan, furbearers, and berries are taken. A listing of species known to be harvested by residents of the subregion is presented in Table 2.

Although many Dillingham residents are new to the region and a relatively large portion are committed to full-time jobs, many participate in the traditional and common pattern of resource harvest activities of the subregion. This pattern is depicted in Figure 5. Beginning with break-up in spring, the annual cycle starts with waterfowl hunting around Nushagak Bay and along the rivers and lakes. Hunters travel down the bay to intercept flights of eiders and emperor geese. Seal are hunted at the same time. In late April, parky squirrel and a few brown bear are harvested in the vicinity of the Wood River Lakes soon after they emerge from hibernation. Some families travel to the Kulukak and Togiak coastal areas to harvest herring and herring eggs on kelp, clams, sea mammals, waterfowl, and bird eggs -- often in conjunction with commercial herring fishing.

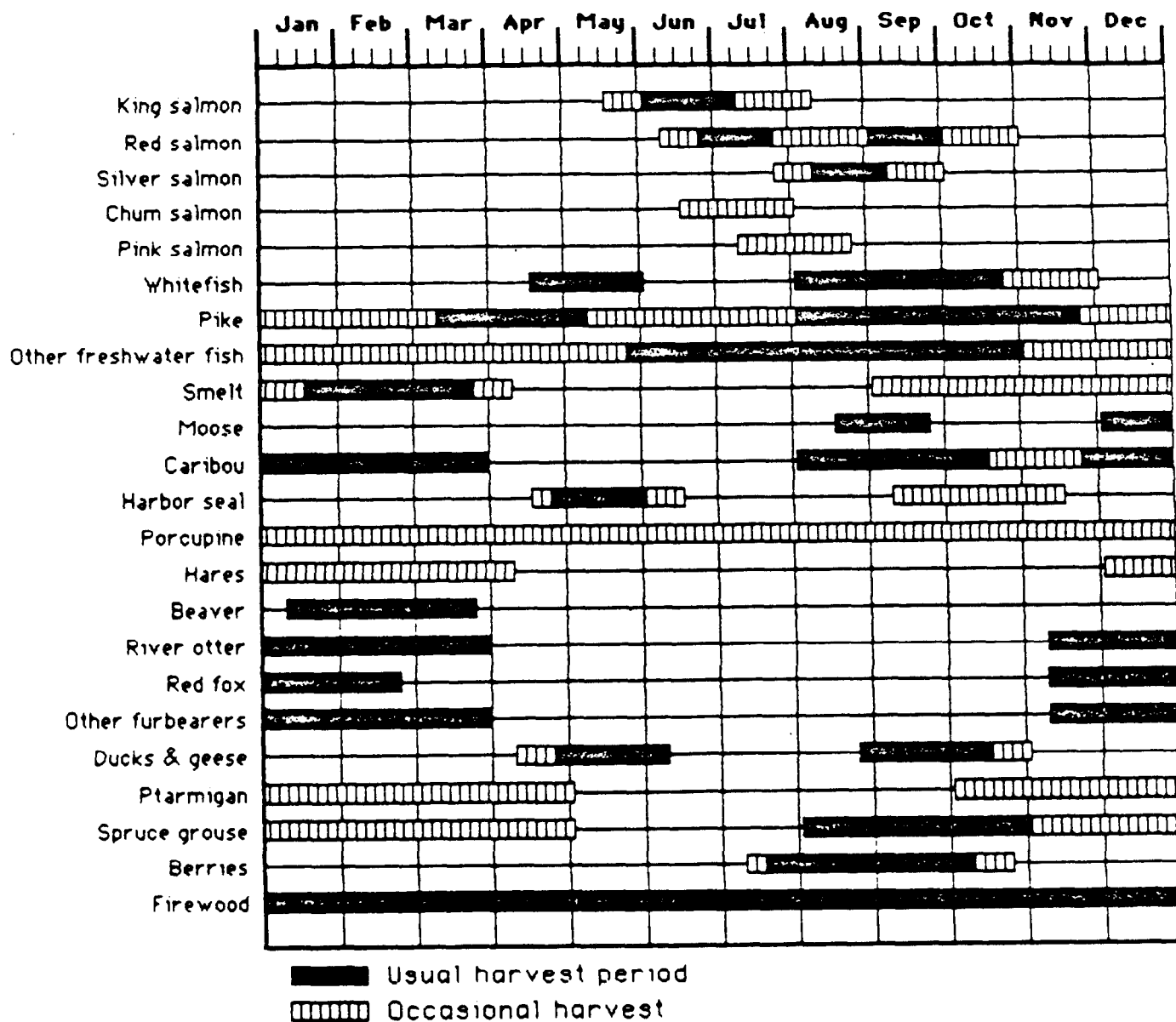


Fig. 5. Seasonal round of subsistence activities for selected resources, Nushagak Bay subregion.

The first king salmon are usually caught in set nets along the Nushagak Bay in late May. The king run stretches through June and July, and these fish are the most eagerly sought salmon for eating fresh, freezing, smoking, and salting. Reds run from late June through late July and are the next most popular salmon. They are primarily dried, or frozen. Chums and pinks also run in summer. Silvers pass through the bay in August and September, and are caught in set nets or with rod and reel, with most eaten fresh or frozen. Trout, Dolly Varden, and grayling are caught in lakes and rivers with rod and reel during summer months.

Salmonberries are the first berries to ripen in summer. Large quantities of this favorite berry are picked in the Nushagak Bay area in July and early August. Blueberries, huckleberries, blackberries, and lowbush cranberries are also sought as they ripen later in the summer and fall.

Caribou and moose hunting begins in late summer and early fall. Most caribou hunters travel inland, up the Nushagak and Mulchatna rivers. Moose hunters also head upriver or to the Wood River Lakes. In fall, most hunters use skiffs or other fishing boats for transportation, although increasing numbers of Dillingham residents fly. In winter, snowmachines or airplanes are used. Some hunters travel to the Alaska Peninsula by air. Some fall waterfowl hunting takes place around Nushagak Bay, but many Dillingham residents prefer to fly down the Alaska Peninsula to hunt geese. Seal are also taken in the fall when hunters are travelling about the bay by boat.

As ice begins to form in rivers and lakes, nets are set for whitefish and smelt. Smelt are also dip netted around the bay. Following freeze-up, people jig for Dolly Varden, lake trout, and pike up in the Wood River lakes area. Nets are set throughout the winter near Aleknagik for whitefish, Dolly Varden, and burbot. In late winter, smelt are caught by jigging in lower river

areas near Nushagak Bay. A few people still set traps for blackfish.

Many Nushagak Bay residents trap furbearers. Beaver, land otter, and red fox are caught in greatest numbers. Beaver meat is an important late winter food in the smaller communities and for some residents of Dillingham. Small mammals and birds are taken at various times throughout the year. Porcupines are taken whenever they are encountered but are most desired in late fall. Spruce grouse are primarily hunted in September and October. Ptarmigan are hunted when they form large flocks in late winter. Firewood is gathered year-round. Wood-heated steam baths are a common and frequently used feature throughout the subregion.

Harvest Levels and Inter-Community Differences in Resource Use

No recent estimates of harvests of fish and game within the subregion are available. A 1973 survey of subsistence harvests in Bristol Bay (Gasbarro and Utermohle 1974) included Aleknagik, Clark's Point, and Dillingham, although only a small sample of Dillingham households were surveyed. Results from that survey are summarized in Table 4. These data indicate that salmon and large mammals provide the bulk of subsistence foods in the subregion. Some variation among communities is obscured in the subregional averages. Clark's Point residents rely more heavily on marine mammals than do those of Aleknagik and, especially, Dillingham. On the other hand, Clark's Point residents have poorer access to several types of freshwater fish and use fewer of them in their diet. A second survey was conducted in Aleknagik in 1975 (Nicholson 1976). Data from this survey suggest that considerably more fish and wildlife were harvested than were reported in the 1973 survey. The 1982 subsistence salmon permit returns show that residents of the subregion continue to use large numbers of king and red salmon.

TABLE 4. HARVESTS OF SELECTED FISH AND GAME FOR NON-COMMERCIAL USE IN THE NUSHAGAK BAY SUBREGION

Resource	Household Harvest ^a				
	1973		1975	1982 ^b	
	Aleknagik ^c	Subregion ^d	Aleknagik ^e	Aleknagik	Subregion
King salmon		410		118	225
Red salmon		315		533	154
Silver salmon		57		45	87
Chum salmon		88		56	30
Pink salmon		2		1	32
Total salmon	450	872	923	753	528
Pike	42	19	128		
Whitefish	27	8	47		
Dolly Varden	19	19			
Smelt	1	23			
Other freshwater fish	45	23	49		
Moose	232	190	718		
Caribou	57	170	80		
Seal	20	19			
Beaver	78	18	158		
Porcupine	5	17	13		
Other mammals	5	10			
Geese and ducks	17	26	31		
Ptarmigan & grouse	12	43	57		
TOTAL HARVEST PER HOUSEHOLD	1010	1457	2204		
TOTAL HARVEST PER CAPITA	202	310	329		

^a Pounds dressed weight per household. Conversions from numbers of animals to pounds follow conversion factors in Appendix B.

^b Derived from ADF&G subsistence salmon permit returns, Division of Commercial Fisheries, Dillingham. Based on 12 permit returns from Aleknagik, 233 from Dillingham.

^c Derived from Gasbarro and Utermohle 1974, 16 households surveyed from Aleknagik.

^d Derived from Gasbarro and Utermohle 1974, 59 households surveyed -- 16 from Aleknagik, 11 from Clark's Point, and 32 from Dillingham; and ADF&G subsistence salmon permit returns, Division of Commercial Fisheries, Dillingham.

^e Derived from Nicholson 1976. Based on a survey of 15 households from Aleknagik.

The Geography of Harvest Activities

Map 2 portrays the areas used by residents of Aleknagik, Clark's Point, and Dillingham for resource harvesting in the past 20 years. Extensive areas are covered in the harvest of subsistence resources. Access to these areas is by boat, snowmachine, aircraft, and in the Dillingham and Aleknagik area by automobile. Caribou are generally sought up the Nushagak River and its main tributary, the Mulchatna. Moose are hunted in the same area and also around the Wood River Lakes. A few hunters, mostly from Dillingham, fly across to the Alaska Peninsula to hunt caribou and, occasionally, moose. A number of Dillingham hunters fly down the peninsula to hunt waterfowl in the fall. Most marine mammal hunting occurs near Protection Point, down Nushagak Bay, but some hunters also travel to the Kulukak and Togiak areas to sites their families have traditionally used.

CHAPTER 5

NUSHAGAK RIVER SUBREGION

LOCATION AND ENVIRONMENT

The Nushagak River subregion includes the drainages of the Nushagak River and its tributaries above the confluence of the Nushagak and Wood rivers. Four communities are located in the subregion: Portage Creek, Ekwok, New Stuyahok, and Koliganek. All four villages are situated on the banks 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 in the subregion. Forests are best developed on bottom lands along rivers. Tundra covers most of the rolling upland areas in the basin. Five species of salmon and several other anadromous and freshwater fish species are abundant in the Nushagak River system. 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.

POPULATION

Approximately 670 people live in the four communities in the Nushagak River subregion. Recent censuses conducted by the communities for revenue sharing purposes enumerated 173 in Koliganik and 337 in New Stuyahok in 1983, and 78 in Ekwok in 1982 (ADCRA, Dillingham, pers. comm., 1984). Portage Creek's population is estimated to be 80 (Bristol Bay Native Association, Dillingham, pers. comm., 1983). Residents are predominantly of Yup'ik descent; from 91 to 96 percent of the residents in each community are Alaskan Natives (Nebesky et al 1983).

USE OF FISH AND WILDLIFE AND OTHER NATURAL RESOURCES

Species Used and Seasonal Round of Harvest

Residents of the four communities of the subregion appear to use a similar variety of wild resources. They have access to resources in mixed spruce-deciduous forest, tundra, riverine, and lake environments. From the forests they commonly take moose, porcupine, snowshoe hare, furbearers, spruce grouse, berries, firewood, and some wild vegetables and herbs. On the tundra, they harvest caribou, arctic hare, furbearers, ptarmigan, berries, and some herbs and vegetables. From the waters of the subregion come furbearers, waterfowl, salmon, and many other types of freshwater and anadromous fish. Table 2 contains a list of resources known to be used within the subregion.

Figure 6 portrays the general pattern of wild resource harvest activities for the subregion. In the spring, following breakup of the river ice, gillnets are set in sloughs for whitefish and pike. Most of the catch is split and dried for use during the summer, when many fish camp residents are without refrigeration. Following traditional practice, some meat from caribou and moose is also dried about this time and stored for use in summertime. Waterfowl are hunted as they return from their wintering grounds in the south. Spring is the only time geese are readily available on the river, and they are eagerly sought. As people prepare for salmon fishing, some make use of fresh, spring growth of wild celery and fiddlehead ferns. Wild spinach is also picked for a few meals during summer.

The first king salmon are caught in gillnets near the village, usually at the end of May, and are widely shared to be eaten fresh. The bulk of the kings are caught at fish camps or near the village in set gillnets and split, cut, dried, and smoked to make "strips," the favorite form of preserved salmon.

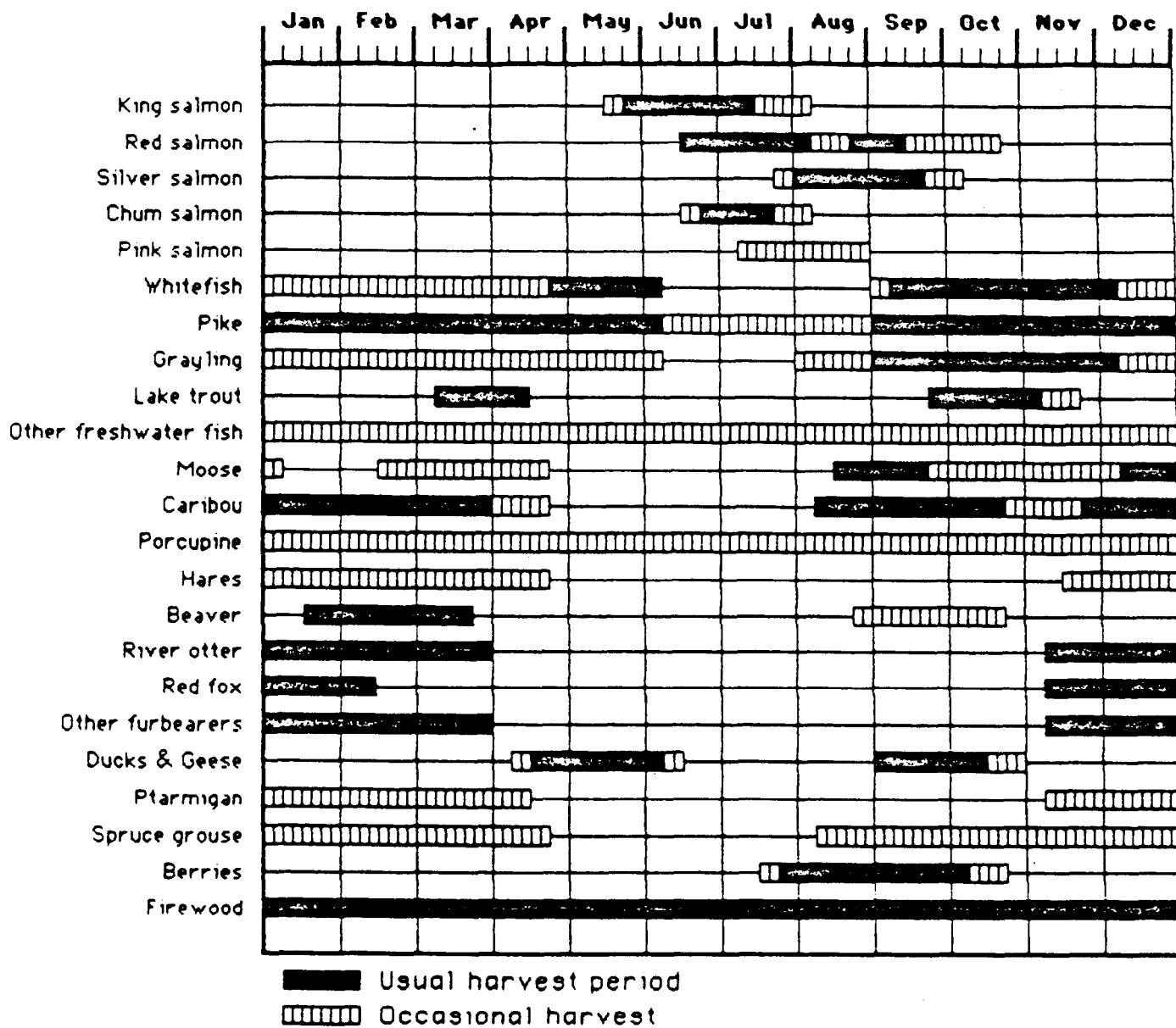


Fig. 6. Seasonal round of subsistence activities for selected resources, Nushagak River subregion.

Some are eaten fresh or frozen whole to be cooked later. Heads and bellies may be salted or dried for dogfood. Red salmon run next, primarily from mid June to mid July. They are split, scored, lightly smoked, and dried to make "dry fish," the staple form of preserved salmon. They are also eaten fresh and a few may be frozen. Heads are sometimes fermented as they were traditionally to make "stinky heads." Some heads and backbones are also dried for dog food. Dog (chum) salmon are also caught in nets, especially by owners of dog teams who dry them for dog food. Pink salmon are caught in set gillnets or on rod and reel and consumed fresh or frozen. A few pinks may be smoked. Silvers are the last salmon to head upriver to spawn, in August and early September. They are caught in set gillnets near the villages and also with rod and reel. Silvers are eaten fresh, frozen to be cooked later, smoked, or salted.

In mid July, salmonberries begin to ripen on the tundra. These are the preferred berry for use in agutag ("Eskimo ice-cream"). Blackberries and blueberries are picked a little later, and low-bush cranberries are gathered until snow falls. The berries are frozen as picked or made into agutag and frozen. Cranberries are also cooked into a pudding or sauce.

Some grayling, pike, and rainbow trout are caught with rod and reel in August and September and eaten fresh, but the bulk of freshwater fish, whitefish, pike, suckers, and grayling, are caught later in the fall. Gillnets are set in late September and October for whitefish, with substantial incidental catches of pike and suckers. Most of these netted fish are frozen for later consumption. Suckers are primarily used for dog food, but heads and soft-dry fish are eaten by some people. Spawned-out red salmon, called "red fish," are also netted in the fall for drying or freezing. These spawned-out fish are easily dried and are the preferred dried fish for eating with seal oil. Long-distance trips are often taken in fall to net whitefish and sometimes lake trout. As ice begins

to run in the river a few people put out baited set lines for burbot. Just following freeze-up, people jig with hook and line for grayling, freezing the catch. Through the winter, some jigging and under-ice netting of freshwater fish takes place.

Caribou and moose are hunted from skiffs in the fall. Much of the fall-caught meat is distributed within the community and eaten fresh. Ducks and a few geese are also taken in the fall. Once the river is frozen and snow cover is adequate, hunters travel by snowmachine to catch big game. Moose are especially sought for use during the celebration of Russian Orthodox Christmas (Selavi) in mid January. Caribou are hunted as long as snow and ice conditions permit travel by snowmachine. Most meat is eaten fresh or frozen.

Trapping is another winter-time activity. Some early winter sets are made for land otter, red fox, mink, lynx, and a few other species, but most trapping activity occurs later in winter during beaver season. Beaver are the primary furbearer sought for commercial sale. In addition, almost all of the meat is eaten, either fresh, frozen, or partially dried and smoked. Partially dried beaver meat is eaten during late spring and early summer when other sources of red meat are not readily available. Some beaver skins are used locally in the manufacture of hats and mitts.

Small game is taken year-round. Porcupine are taken whenever they are encountered. A few snowshoe hare are snared by young boys. Tundra hare are occasionally hunted near the village or taken incidentally while out after other game. Spruce grouse are hunted in the woods near the village, and ptarmigan are caught on the tundra in winter or in the brush along river channels in late winter.

Firewood is collected year-round. Dry, standing dead spruce is the preferred wood for steambath stoves. Some homes are heated by firewood, and

most cabins at fish camps depend on wood for heat. Wood cutting, hauling, and splitting is primarily done by young men and boys. Wood is constantly in demand, for steambaths are used almost daily.

Harvest Levels and Inter-Community Differences in Resource Use

Information on the quantities of fish and game harvested by upriver residents are presented in Table 5. Data for 1973 harvests were collected in three communities, Ekwok, Koliganek, and New Stuyahok (Gasbarro and Utermohle 1974). Comparable information was collected in New Stuyahok for 1982 (office files, Division of Subsistence, ADF&G, Dillingham). Salmon harvests for both years are derived from ADF&G subsistence salmon permit returns. The average reported harvest of fish and game for the three communities in 1973 was 1,050 lbs. dressed weight per capita. In New Stuyahok, harvests of 835 lbs. per capita were reported in 1973, and 948 lbs. per capita were reported in 1982. In 1982 in New Stuyahok, 18 households reported an average harvest of 33 gallons of berries (range = 0-96 gals. per household).

For the subregion as a whole and for the two years surveyed in New Stuyahok, four key species -- red salmon, king salmon, moose, and caribou -- consistently provided three fourths of the fish and game harvested. There were some shifts in the proportion contributed by key species between 1973 and 1982 in New Stuyahok. Moose and caribou, combined, accounted for 38 percent of all fish and game harvested in 1973 in New Stuyahok. In 1982, moose and caribou contributed 25 percent of the total harvest. This was closer to the 1973 sub-regional proportion of moose and caribou, 26 percent. Other resources are important during specific seasons as sources of fresh food, or they may become emergency alternatives, if key species are unavailable. Silver salmon, pike, whitefish, grayling, beaver, porcupine, and waterfowl are some of the important alternative foods. Many other foods are available in the subregion and may

TABLE 5. HARVESTS OF SELECTED FISH AND GAME FOR NON-COMMERCIAL USE IN THE NUSHAGAK RIVER SUBREGION

Resource	Household Harvest ^a			
	1973 ^b		1982 ^c	
	New Stuyahok	Subregion	New Stuyahok	Subregion
King salmon	1,050	1,250	1,827	1,498
Red salmon	1,000	1,610	876	1,395
Silver salmon	50	70	235	239
Chum salmon	396	700	383	668
Pink salmon	35	40	119	90
Total salmon	2,531	3,761	3,440	3,890
Pike	249	168	218	
Whitefish	49	86	104	
Grayling	100	69	44	
Other freshwater fish	38	53	21	
Moose	1,183	886	680	
Caribou	796	693	718	
Beaver	188	170	192	
Porcupine	46	32	85	
Other mammals	7	5	5	
Geese and ducks	58	47	81	
Ptarmigan and grouse	13	13	7	
TOTAL HARVEST PER HOUSEHOLD	5,258	5,983	5,595	
TOTAL HARVEST PER CAPITA	835	1,050	948	

^a Pounds dressed weight per household. Conversions from numbers of animals to pounds made using conversion factors in Appendix B.

^b Derived from Gasbarro and Utermohle 1974 (26 households surveyed in New Stuyahok, 17 from Ekwok, and 15 from Koliganek); except for salmon data which are from ADF&G subsistence salmon permit returns, Division of Commercial Fisheries, Dillingham (13 from Ekwok, 8 from Kokiganek, and 24 from New Stuyahok).

^c Division of Subsistence, ADF&G, Dillingham (19 households surveyed at New Stuyahok); except for salmon data which are from ADF&G subsistence salmon permit returns, Division of Commercial Fisheries, Dillingham.

become important if the availability of key species decreases.

The Geography of Harvest Activities

The geographic areas used in the recent past by residents of Ekwok, Koliganek, New Stuyahok, and Portage Creek are shown on Map 3. The map shows that extensive areas are covered in search of moose, caribou, furbearers, waterfowl, fish, and berries. A great amount of overlapping use by the four communities occurs, though this varies by activity. Salmon fishing generally takes place close to each community or at traditionally used fish camp sites. Some summer salmon fishing camps have been established near Nushagak Bay to allow families to be close to members participating in the commercial fishery. Most freshwater fishing is done within a short skiff ride of the village, but longer trips are regularly taken in fall and spring. Large areas are covered by hunters and trappers. In fall, most traffic is confined to rivers and lakes. Koliganek hunters make greater use of the upper Nushagak and Nuyakuk drainages, whereas New Stuyahok hunters are more likely to head up the Mulchatna. These affinities are reflections of long-term traditional ties to the respective areas. Hunters from Ekwok and Portage Creek also use the upper reaches of the Nushagak and Mulchatna rivers, sometimes travelling with kin from Koliganek or New Stuyahok. In winter, a wider area is covered as snowmachines permit travel overland. Berries are generally harvested near home but are also gathered on long hunting trips or on special trips outside the subregion.

CHAPTER 6

ILIAMNA LAKE SUBREGION

LOCATION AND ENVIRONMENT

The Lake Iliamna subregion includes eight communities with year-round populations: Igiugig, Iliamna, Kokhanok, Levelock, Newhalen, Nondalton, Pedro Bay, and Port Alsworth. In addition to the population in these settlements, about 20 to 30 people live at isolated locations around Iliamna Lake and Lake Clark.

This area is ecologically diverse. The Alaska Range in the northern and eastern parts of the subregion has permanent snowfields and supports montane flora and fauna. The valleys of upper Lake Clark and the eastern shore of Lake Iliamna are heavily forested with spruce. Rolling, open tundra with many small lakes extends westward from the shores of Lake Iliamna and down the Kvichak River drainage to Kvichak Bay. The major lakes and rivers of the subregion support the largest red salmon runs in the world. The subregion also has a large number of terrestrial mammals, birds, and freshwater fish species.

POPULATION

About 620 people live in the eight communities of the Iliamna Lake subregion. In 1980, Igiugig had a population of 33, Iliamna 94, Kokhanok 83, Levelock 79, Newhalen 87, Nondalton 173, and Pedro Bay 33 (1980 U.S. Census). Port Alsworth had approximately 40 residents in 1983. All of the communities are composed of 87 percent or more Alaskan Natives, except for Iliamna which is 40 percent Native and Port Alsworth which is a recently established Christian community. Nondalton and Pedro Bay are predominantly Dena'ina Athapaskan,

whereas Levelock, Igiugig, Kokhanok, and Newhalen are Yup'ik Eskimo. Currently, English is the common language of the subregion. Older members of the Native population of the subregion continue to speak Dena'ina or Yup'ik. Before English became the common language of the area, Russian was widely spoken and many Dena'ina understood and spoke Yup'ik.

USE OF FISH AND WILDLIFE AND OTHER NATURAL RESOURCES

Species Used and Seasonal Round of Harvest

The subregion supports populations of fish and game species common to interior forests, subarctic tundra, and river and lake environments. Table 2 indicates fish and game species known to be used locally within the subregion. Use of other species may occur but has yet to be documented.

Of the species used, sockeye salmon, moose, and caribou provide the bulk of the food harvested by residents of the Iliamna Lake area (Behnke 1982). In addition a number of freshwater fish species, including lake trout, grayling, pike, rainbow trout, several species of whitefish, and Dolly Varden are important in the diet of residents of several communities. Beaver, porcupine, and waterfowl are particularly important during spring and fall when other game may be scarce. A few black bear and brown bear are also harvested and continue to be used as a traditional source of food by some area residents. Large quantities of many species of berries are used by most residents throughout the area. Many residents rely on local spruce and birch for heating their homes and steambaths. Some use of local timber also occurs in construction.

Figure 7 illustrates a generalized seasonal round of harvest activity for the subregion. Late spring has traditionally been a time of resource scarcity in the Iliamna Lake area. Some salmon preserved by smoking and drying from the

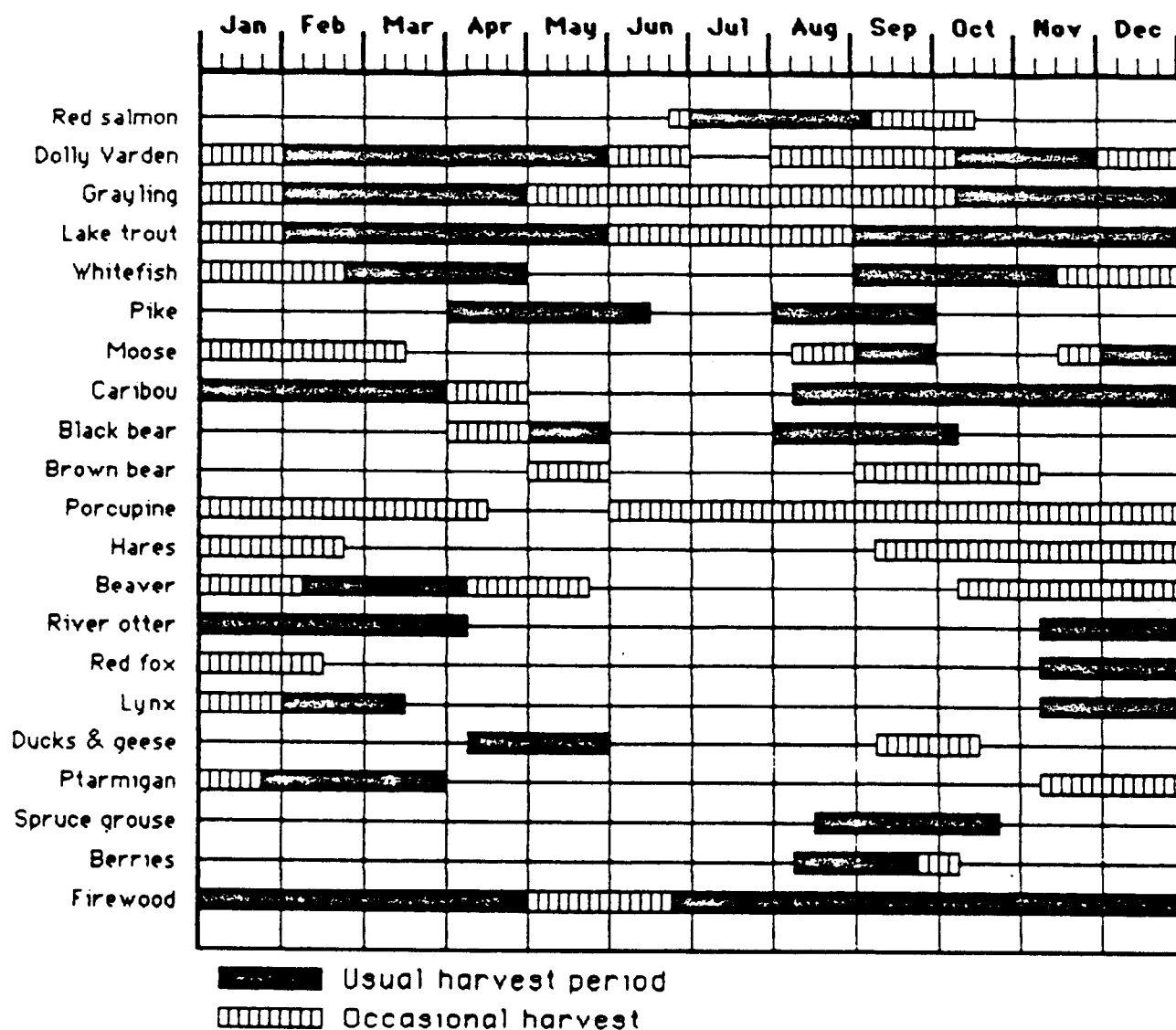


Fig. 7. Seasonal round of subsistence activities for selected resources, Iliamna Lake Subregion.

previous year's harvest may remain, but it is likely that this supply is limited and that quality is deteriorating. Some moose or caribou meat may remain from winter hunts. However, thawing snow conditions and the dispersed distribution of these species contribute to make spring hunting difficult. Snowmachines continue to be used as long as there is adequate snow cover, and lake and river ice is solid. Skiffs are used to reach spring harvesting locations after break-up. Freshwater fish, waterfowl, beaver, and muskrat are the main target species during this season. Large numbers of whitefish are harvested by intercepting the migration of these fish back to small tundra lakes. Hunting for migratory fowl contributes fresh meat during this season, and beaver are hunted as the spring thaw progresses.

Salmon fishing is the main activity during early and mid summer. Members of many families travel to the Naknek area to participate in the short commercial salmon season, from late June through mid July. Belukha and seal may be harvested while in the coastal areas. People begin to put up subsistence salmon during this time. An initial stock of dried fish may be stored, in case conditions for putting up fish are not good later in the season. Often families put up salmon at fish camps located near good fishing locations. A number of families may share a fish camp location. Other activities include fishing for trout, grayling, and other fresh water fish, porcupine hunting, and gathering of edible plants.

Late summer and fall are seasons of major resource harvest activity. Commercial fishing is over, and attention focuses on putting up a good supply of food for the winter months. Families continue to fish for sockeye salmon and to process fish as late as September. The major varieties of berries ripen during August and September, and families travel to places known to be good for berries during these months. Hunters travel very extensively throughout the

subregion searching the lake shores and river banks for moose. The usual mode of travel is by an open 16 to 18 foot aluminum skiff powered by a 20 to 50 horsepower outboard engine.

Winter is a period of intermittent resource harvest activity. Major fishing does not occur again until the coming spring. The main activities include hunting, trapping, and maintenance of hunting and fishing gear. Weather and travel conditions, fish and game regulations, resource distribution and sharing, adequacy of food preserved earlier in the year, holidays, and alternate employment have major effects on harvest effort and success. Small game, including ptarmigan, hare, spruce grouse, and porcupine are taken near the communities or when encountered while travelling. Freshwater fish are taken by jigging through the ice, particularly early and late in the winter. Some ice fishing with nets occurs. Grayling, lake trout, pike, whitefish, and Dolly Varden are species commonly caught. As previously mentioned, trapping has declined in recent years. Some members of all communities continue to maintain traplines, however. Beaver is the species most actively trapped, although fox, lynx, river otter, wolf, and wolverine are also taken. Several residents of Iliamna and Port Alsworth use private aircraft to trap. The high value many families place on beaver meat adds impetus to trapping for this species, even in years when prices for beaver pelts are low.

Harvest Levels and Inter-community Differences in Resource Use

Table 6 presents the results of resource harvest and utilization surveys conducted in the Iliamna Lake subregion in 1973 (Gasbarro and Utermohle 1974) and in Nondalton in 1980 and in 1981 (Behnke 1982). The total food weight for the species listed amounted to from 3,521 lbs. to 4,959 lbs. per household over this time period. Per capita food harvests from these sources amounted to 736 lbs. to 1,033 lbs. The higher harvest total for 1980 reflects the large number

TABLE 6. HARVESTS OF SELECTED FISH AND GAME FOR NON-COMMERCIAL USE IN THE ILIAMNA SUBREGION

Resource	Household Harvest ^a			
	1973 ^b		1980 ^c	1981 ^c
	Nondalton	Subregion	Nondalton	Nondalton
Sockeye salmon	2,614	2,228	3,985	2,883
Whitefish	57	56	18	36
Grayling	44	25	23	65
Pike	28	36	5	14
Lake trout	68	45	64	39
Other freshwater fish	11	92	20	51
Moose	518	470	366	483
Caribou	576	384	332	347
Black bear	32			47
Brown bear	4	22		26
Beaver	114	52	114	143
Porcupine	34	57	14	27
Other mammals	13	3	10	11
Geese and ducks	13	24		11
Ptarmigan	16	27	8	12
TOTAL HARVEST PER HOUSEHOLD	4,142	3,521	4,959	4,195
TOTAL HARVEST PER CAPITA	803	736	1,036	738

^a Pounds dressed weight per household

^b Derived from Gasbarro and Utermohle 1974. 26 households surveyed in Nondalton, 6 from Igiugig, 9 from Iliamna, 9 from Kokhanok, 16 from Levelock, 11 from Newhalen, and 8 from Pedro Bay. Converted from number of animals to pounds dressed weight using conversion factors in Appendix B.

^c From Behnke 1982. 14 households surveyed in 1980, 19 in 1981 from Nondalton.

of salmon put up in that year. A portion of the salmon harvest is used for dog food.

Although residents of the Iliamna Lake subregion use many species, harvests of just three species, red salmon, moose and caribou comprise about 90 percent of meat, fish, and fowl available from subsistence use of resources. Sockeye salmon account for 63 to 80 percent of total harvest.

Even though the communities of the subregion generally have access to similar fish and game resources, differences in resource availability influence use patterns and dependence on certain species. Kokhanok and Pedro Bay, for example, are located far from the usual range of caribou and use less than residents of Iliamna, Newhalen, and Nondalton. Communities around the eastern part of Iliamna Lake occasionally harvest seal from the small freshwater seal population that inhabits the lake, and meat and oil may be shared with relatives in other communities. Residents of Levelock and Igiugig also take seals in the Kvichak River and occasionally harvest belukha as well. These products are shared widely throughout the subregion. Levelock and Igiugig are the only communities in the subregion that regularly harvest significant numbers of salmon species other than sockeye, though some residents of the lake area retain kings from commercial catches. Igiugig residents harvest a major early winter run of whitefish in the Kvichak River and provide residents of other communities with these fish. Nondalton residents obtain caribou and moose meat from relatives in Lime Village, located 100 miles to the north in the Kuskokwim River drainage.

The Geography of Harvest Activities

Maps 4 and 5 illustrate that communities have broadly overlapping areas of use for wide-ranging, highly valued species such as caribou, which is only infrequently and unpredictably available close to most villages. Moose harvests

tend to be concentrated along the major waterways, where moose are more easily located and killed, particularly in the open-water season. Fish, on the other hand, are generally taken quite close to the communities, whose sites were often chosen with these resources in mind. Certain species may be sought at more distant locations at particular times of the year. As noted above, for a few communities, notably Nondalton, and to a more limited extent, Kokhanok, camps are established at good fishing locations at certain times of the year. Berries, wood, and small game are generally harvested relatively close to the communities, although long trips may be taken to harvest a certain species or particularly abundant population.

CHAPTER 7

UPPER ALASKA PENINSULA SUBREGION

LOCATION AND ENVIRONMENT

The communities of the Upper Peninsula subregion are situated on the western, or Bristol Bay, side of the Alaska Peninsula between the Kvichak River and Port Moller. All seven communities -- King Salmon, Naknek, South Naknek, Egegik, Pilot Point, Ugashik, and Port Heiden -- are located along major river drainages.

The area is physiographically quite homogeneous. The generally flat coastal plain west of the Aleutian Range is covered with tundra. Shrub plant communities are found along the protected banks of some of the larger drainages. Forests are limited to the King Salmon area. Migratory waterfowl and salmon are natural resources of particular significance. Bays and estuaries on the Upper Alaska Peninsula afford suitable habitat for millions of migratory waterfowl. The peninsula estuaries are favored staging grounds for geese, ducks, swans, and shorebirds. Salmon stocks, particularly sockeye returning to Upper Peninsula river systems, constitute some of the largest runs in Alaska. In addition to salmon, the subregion supports a variety of freshwater fish species in its rivers, lakes, and streams, including rainbow trout, Dolly Varden, grayling, and lake trout. Caribou of the Northern Alaska Peninsula herd range throughout the subregion. Moose have declined in number since the late 1960s (office files, Game Division, ADF&G, King Salmon) but are still fairly common. Brown bear are abundant within the subregion.

POPULATION

Approximately 1,200 persons reside in the Upper Alaska Peninsula subregion. The population center for this area is the Naknek drainage, where three communities are located. King Salmon with 374 residents, Naknek 369, and South Naknek 136, account for more than three quarters of the subregion's total population (1981 Bristol Bay Borough Census, Bristol Bay Borough, pers. comm.). Port Heiden with 92 residents, located in the southern portion of the subregion, is the next largest community. Egegik with 75 residents, Pilot Point 66, and Ugashik with 13 are smaller communities (1980 U.S. Census).

The residents of the Upper Alaska Peninsula share some common characteristics. With the exception of those residing in King Salmon, all are predominately Alaska Native. Though some refer to themselves as "Eskimo," or "Sugpiaq" which is the Yup'ik dialect spoken by Peninsula Eskimos, the majority consider themselves "Aleut" (Langdon 1982). English is the common language throughout the subregion. A few of the older residents speak Yup'ik or Sugpiaq.

King Salmon has a bureaucratic and transient character when compared to other communities in the subregion. In addition to the presence of several state and federal agencies, approximately 340 military personnel are stationed at the King Salmon Air Force Base. Though there are residents with long established ties to the local area, most have arrived from other areas in Alaska or the Lower 48. Most households are associated with fulltime employment related to government or transportation services.

USE OF FISH AND WILDLIFE AND OTHER NATURAL RESOURCES

Species Used and Seasonal Round of Harvest

The Upper Alaska Peninsula provides a wide variety of natural resources,

many of which are, or have been, used by local residents for domestic consumption. Salmon, caribou, and moose are the three staples. Among the other land mammals utilized are Arctic hare, snowshoe hare, beaver, and porcupine. Additionally, river otter, muskrat, lynx, wolf, wolverine, red fox, and other furbearers are taken. Table 2 lists the resources known to be used in this subregion.

A general pattern of resource harvest is followed throughout the region, illustrated in Figure 8. The resource harvest calendar begins when breakup occurs in spring and waterfowl return to the area. Though the exact time varies from year to year, by March or April the rivers and bays are usually ice-free. Belukha and gulls are two of the early arrivals. Formerly, groups of men drove the belukha onto sand bars in local rivers, where the animals became stranded with the outgoing tide. Both meat and blubber were used. Today, there is little active belukha hunting. Beached whales are occasionally used if still in good condition when discovered. The flippers are a delicacy. Traditionally, spring was an active waterfowl hunting period as the birds stopped during migration to regroup and feed. Spring is also a favorite time for clam digging. Butter clams found locally and razor clams from the Pacific coast can be taken any season when the waters are ice-free; however, clamming is particularly good in spring. Tides are frequently very low in early spring, and clamming is particularly good. Although not a great deal of seal hunting is undertaken by residents of the Upper Peninsula subregion, early spring is a preferred time for hunting. Wild vegetables are also gathered at this time. Fishing for Dolly Varden and rainbow trout occurs, and an occasional porcupine is taken.

In May, the return of the salmon is anticipated, and gear is prepared. Subsistence salmon fishing gear consists of set gillnets. The first king

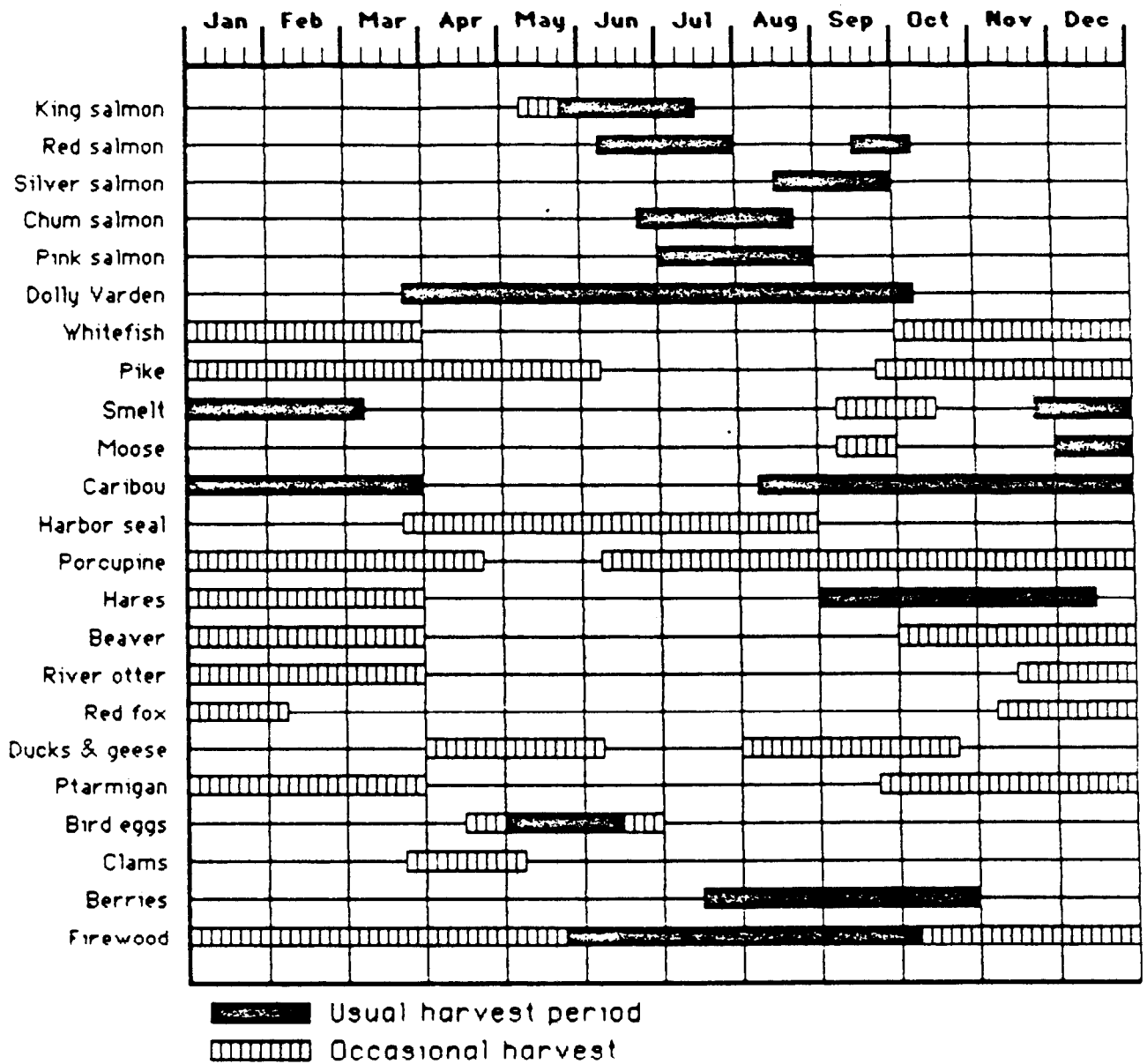


Fig. 8. Seasonal round of subsistence activities for selected resources, Upper Alaska Peninsula subregion.

caught is typically shared with friends and family. In 1982, the first king caught by a local resident of South Naknek was shared with a total of nine households, which included 25 people (office files, Division of Subsistence, King Salmon). Kings traditionally are a highly valued resource in this subregion because of the large amount of meat on the fish, the high quality of smoked strips, and the timing of the run, which allows families to put up fish before the onset of the commercial salmon fishing season. Families that do not participate in the commercial fishery generally set fewer king nets, but often increased effort is devoted to catching kings with rod and reel. Subsistence fishing effort increases as the sockeye run nears. Commercial fishermen frequently elect to keep salmon harvested with commercial gear for family consumption. Keeping fish from a commercial catch is convenient because it allows the family to keep only the amount and species desired, and the remainder can be sold. Kings are often obtained in this manner for home use.

Sockeye subsistence fishing continues through July. Also around this time the first of the year's berries begin ripening. Salmonberries are the first picked, followed closely by blueberries and then crowberries (blackberries). Berries are picked by entire families, by groups of women, or by individual women. Berries are gathered by the gallons, and long distances are traversed to take advantage of productive locations.

The month of August brings renewed interest in salmon fishing as the silvers begin arriving. They are caught with rod and reel and with gillnet. The run comes after the commercial sockeye run, when time is available for processing resources for home consumption. Silvers are a favored species for making salt fish. Individuals desiring pink or chum salmon set their nets during July or August. Not only is August an important month for fish and berry harvesting,

it also marks the beginning of the caribou hunting season. Caribou are desirable at this time of year for several reasons: they provide a change from a fish diet; the bulls are fat; and it is possible to use a skiff for transportation. The biggest disadvantage to the early hunting season is the difficulty of preserving the meat in the warm weather. Families without refrigeration or freezers must utilize the meat immediately. Moose and waterfowl hunting seasons begin in September. Hunting of ducks and geese is generally good, and waterfowl is a resource used by many local residents. Hare, porcupine, and grouse are also hunted during this time.

A number of families fish as late as September and October for spawned-out salmon, locally referred to as "fall" or "red" fish. These fish are preserved by drying. For a short while during this time of year conditions are sometimes right for dip-netting smelt. Only a few individuals participate in the harvest, but the smelt are widely distributed among households.

As the weather turns colder and water begins to freeze, attention turns again to caribou hunting. Frozen rivers provide increased access to hunting areas, unavailable during the in-between season when use of skiffs and land vehicles is not feasible. When a December cow moose season is allowed, people take advantage of the opportunity. Hare, porcupine, and ptarmigan are hunted throughout the winter months. When conditions are right, people catch large numbers of smelt jigging through the ice on rivers near the various settlements. Trapping of furbearers at this time is undertaken on a limited scale throughout most of the subregion. Winter activities continue until the lengthening days portend the approach of spring.

Harvest Levels and Inter-Community Differences in Resource Use

Table 7 displays harvest levels for resources commonly used in the sub-region, as estimated by Gasbarro and Utermohle's 1973 survey of households at

TABLE 7. HARVESTS OF SELECTED FISH AND GAME FOR NON-COMMERCIAL USE IN THE UPPER ALASKA PENINSULA SUBREGION

Resource	Household Harvest ^a	
	<u>1973</u> Subregion ^b	<u>1982</u> Subregion ^c
Salmon	349	880
Smelt	43	4.7
Trout	10	30
Pike	8	6
Other freshwater fish	14	17
Moose	184	144
Caribou	394	715
Seals	3	85
Beaver	13	7
Porcupine	4	3
Geese and ducks	24	84
Ptarmigan and grouse	14	24
TOTAL HARVEST PER HOUSEHOLD	1,060	2,000
TOTAL HARVEST PER CAPITA	236	444

^a Pounds dressed weight per household. Conversions from numbers of animals to pounds made using conversion factors in Appendix B.

^b Derived from Gasbarro and Utermohle 1974. 133 households surveyed in the subregion: 20 from Egekik, 15 from King Salmon, 56 from Naknek, 10 from Pilot Point, 10 from Port Heiden, 17 from South Naknek, and 5 from Ugashik.

^c Division of Subsistence, King Salmon: 17 households in South Naknek, 7 households in Egegik, and 6 in Port Heiden.

Naknek, Egegik King Salmon, Pilot Point, Port Heiden, South Naknek, and Ugashik, and Division of Subsistence surveys at South Naknek in 1980 and 1982 (Morris 1982). In terms of quantities, caribou, salmon, and moose are the most important species. Salmon, taken in all communities, are eaten fresh or preserved for later use. Smoking, either by means of a smokehouse and firewood or an electrically run smoker, is an extremely popular method of preservation. Some households dry-smoke, others kipper their fish, and some put them up in jars or cans. Salting is another popular method of processing. Heads and bellies are most frequently preserved this way. Freezing is common among households with freezers and a reliable source of electricity. Salmon are used throughout the year as daily fare and on special occasions for the family or community. Pickled fish and smoked salmon are always served at weddings, funerals, and most large gatherings held in the community.

Berries are used in a variety of ways. Salmonberries are a favorite for making agutag, a dish made with shortening, sugar, and berries. Many families freeze their agutag, ready to eat, in plastic bags or containers. Cranberries are most frequently used in baked goods and for juice. Moose and caribou are eaten fresh or frozen for later use. They will be shared among family and friends, both at the time of harvest and later from supplies kept in the freezer. Some families preserve their meat by canning it in a pressure canner. When waterfowl hunting is at its prime, hunters often distribute fresh fowl through much of the community. What is not eaten fresh is frozen for later use.

The Geography of Harvest Activities

The area immediately surrounding each village is the major resource harvest area for that community (Map 5). Rivers and their tributaries that run adjacent to the communities provide most of the fish harvested by their residents. The river systems often provide access to areas for big game hunting, either by

means of a skiff during seasons with open water, or by motor vehicle over the ice. If caribou are not taken in the immediate vicinity of the community, the midsection of the Alaska Peninsula near the Becharof Wildlife Refuge is a commonly used hunting ground for those with air transportation. Other resources, such as berries, hare, porcupine, or ptarmigan, are usually harvested in the vicinity of the home community. The major exception is berry picking. It is not unusual for groups of women or husband and wife to fly to known locations of productive berry picking.

Located in the upper peninsula area is Katmai National Park and Preserve. Initially authorized in 1918, boundary changes through the years have brought into the park areas traditionally used for hunting, trapping, fishing, and gathering by local residents. Sports fishing and berry gathering is allowed in all areas of Katmai with sports hunting and most subsistence activities allowed in the preserve areas only.

CHAPTER 8

CHIGNIK SUBREGION

LOCATION AND ENVIRONMENT

Located on the Pacific side of the Alaska Peninsula, the Chignik subregion includes the communities of Chignik Bay, Chignik Lagoon, Chignik Lake, Ivanof Bay, and Perryville. The Aleutian Range dominates the landscape in this area, with mountains dropping abruptly into the Pacific, forming high, rugged cliffs. Numerous bays, including Amber, Kujulik, Chignik, Castle, Anchor, Mitrofinia, and Ivanof, dot the coastline. The Chignik River is the major drainage system in the subregion. The ocean is ice-free year-round.

The isolated drainages on the Pacific side provide the major exception to the tundra cover dominating most of the Alaska Peninsula. Shrubs are common along the protected draws of the rivers. Caribou and brown bear are the most common large mammals found on land in the Chignik subregion. Moose are declining in numbers in the area. In addition to large mammals, hare, porcupine, wolf, mink, wolverine, river otter, red fox, and arctic ground squirrel are found in the Chignik subregion. Marine mammals such as Steller sea lions and sea otters are abundant along the coastline (USFWS 1981). A number of species of sea birds nest on inaccessible cliffs along the coastline. Five species of salmon spawn in the streams of the Chignik area. Shellfish, including king, tanner, and dungeness crab, and razor and butter clams, are found in the waters and shoreline areas of the subregion. Halibut and cod, along with freshwater fish such as Dolly Varden, contribute to the abundant resources in the Chignik subregion.

POPULATION

The 1980 population in the Chignik subregion was 515 (1980 U.S. Census). Chignik Bay was the largest community in the subregion with 178 residents, followed by Chignik Lake with 138 Perryville 111, Chignik Lagoon 48 and Ivanof Bay with 40 residents. Just more than half of the residents of Chignik Bay are of Alaska Native descent, whereas 85-93 percent of the residents in the other four communities are Alaska Natives (Table 1). Many of the residents have Russian ancestors from the period of Russian colonization, or a Scandinavian background from immigrant fishermen.

USE OF FISH AND WILDLIFE AND OTHER NATURAL RESOURCES

Species Used and Seasonal Round of Harvest

Of the variety of species utilized by the residents of the Chignik subregion, salmon, caribou, and moose provide the greatest amount of food in terms of weight (Evergreen State College 1977). Though these three species are the ones most frequently mentioned with reference to local domestic use, many other locally available natural resources add to the diets of the residents. Brown bear is used by residents of Chignik Lake and Perryville. Residents in all of the communities harvest ducks, particularly pintails and green-winged teal, geese (mainly emperors), and ptarmigan. Marine resource such as halibut, crab, shrimp, octopus, clams, and mussels are used. Wild vegetables, berries, and seagull eggs are gathered at various times of the year. See Table 2 for a list of species known to be used in the subregion.

Figure 9 depicts a generalized seasonal round of resource harvest activities in the Chignik subregion. The end of May marks the first period of activity in each year's subsistence salmon fishing effort. People begin checking equipment and gear. Seining and gillnetting are the common methods of

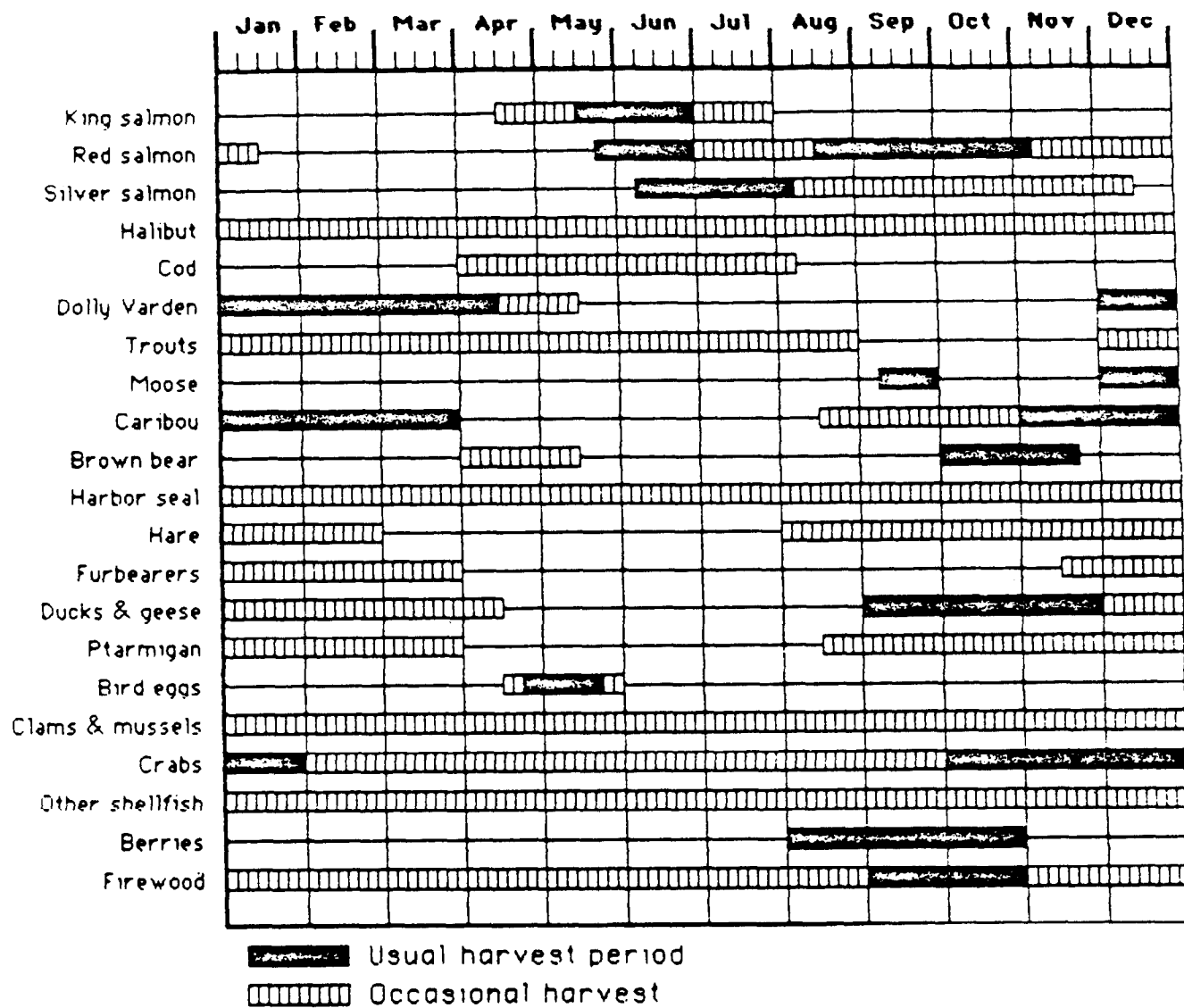


Fig. 9. Seasonal round of subsistence activities for selected resources, Chignik subregion.

harvesting subsistence salmon. For the commercial fishing families that move from Chignik Lake, Perryville, and Ivanof Bay to Chignik Bay or Chignik Lagoon for the commercial salmon season, salmon for home consumption are first harvested at these locations during the first half of June. Many families concentrate on processing fish while simultaneously preparing for the commercial fishing season. Families remaining in Perryville and Ivanof Bay fish streams nearby the village. Once the commercial fishing season opens, men and older boys leave for the fishing grounds, while remaining family members continue to harvest and process subsistence catches. Catches of halibut and other marine resources are taken incidentally in small numbers in commercial salmon seines. Halibut is occasionally taken with handlines. Seal are sometimes harvested during spring and summer. Some wild vegetables are picked as they appear in the early spring and summer months. Wild celery and spinach are two varieties of greens noted for use in all the communities (Nebesky et al. 1983). Cottonwood and alder are gathered for use in the smokehouses. As summer continues, berries begin ripening. Groups of women, children, or entire families make trips out around the community to collect blackberries, salmonberries, blueberries, and cranberries (Tuten 1976).

August marks the opening of the caribou season. In late summer, caribou are often hunted in areas accessible by commercial fishing vessel. Three-wheelers, taken aboard the boats, are used for travelling inland from the bays where the boats are anchored. In some instances, hunting takes place in conjunction with commercial fishing activities. Other times, men take younger boys and family members out on trips that are viewed specifically as hunting ventures. Early fall is also a time for moose hunting, most often along waterways reached with skiffs or fishing boats. The families that have moved back to Ivanof Bay, Perryville, and Chignik Lake make greater use of skiffs

and three-wheelers for moose and caribou hunting than they do of fishing boats. As access to caribou grounds is harder for the residents of Chignik Bay and Chignik Lagoon, more effort is placed on moose hunting. Drainages emptying into the Pacific Ocean and accessible by fishing boat are the favored hunting areas for these hunters. For local residents with private aircraft, greater distances are covered to gain access to good hunting grounds.

September marks the beginning of waterfowl season. Ducks and geese are used in every community. The Pacific side of the Alaska Peninsula does not attract the large numbers of migrating waterfowl that the Bering Sea estuaries attract; however, the Pacific coastline, bays, and river drainages normally provide an opportunity to procure a limited number of waterfowl. Chignik Lake residents maintain kinship links with Port Heiden and Pilot Point, both locations of exceptionally productive waterfowl hunting, and trips are made to these communities during the fall season to harvest geese.

A few brown bear are harvested in the late fall just before they go into hibernation, principally for the fat. Late fall is also a time for continued subsistence fishing. "Fall fish" are a preferred type of salmon. They are taken upstream after the fish have lost most of their fat and will air-dry easily. Chignik Lake is a favorite place to catch silvers, which are preserved by drying or salting. Small mammals are also hunted. Often, after school, boys take three-wheelers and skirt the village looking for hare or porcupine. Ptarmigan hunting is a late fall or winter activity. The birds are often driven down by snow from the higher elevations and become more accessible at this time of the year.

The year-round open water of the Pacific allows for continual harvest of marine resources, such as halibut, clams, octopus, mussels, and seals. Crabs are a favored winter resource and are taken from commercial and subsistence

pots.

Other winter activities include ice fishing, particularly in Chignik Lake, where fishing for Dolly Varden takes place on the lake in front of the village. According to residents of the Chignik subregion, low pelt prices and time constraints caused by a strong participation in commercial fishing are the primary factors contributing to the diminishing effort directed toward trapping (Tuten 1976).

As winter gives way to spring, plans once again focus on the upcoming salmon season. There is a slower pace to resource harvesting. Spring bear are occasionally taken; the meat at this time of the year is said to be particularly tender because of the long inactive period of the animal. Seal, sea lion, or walrus are taken close to home communities if the opportunity presents itself. Fishing with hook and line or seining for Dolly Varden provides a change of pace for some of the residents. As May nears, the annual cycle of events is once again repeated.

Harvest Levels and Inter-Community Differences in Resource Use

Limited information on harvests is available for the Chignik subregion (Table 8). Salmon is an important resource in all the communities. Levels of recorded harvest indicate that between 100 and 250 fish is a common number put up by individual households. (These totals may not apply to Perryville, where no studies have been conducted.) Caribou is a locally obtainable red meat source. Chignik Lake residents depend greatly on caribou. In 1975, 12 households indicated that they took a total of 57 animals (Tuten 1976). They also took five moose. In the same year, 15 households in Chignik Lagoon reported 25 caribou and 9 moose. Twenty households in Chignik Bay took 8 moose and 15 caribou. As moose populations decline, hunters are putting more effort into taking caribou.

Many resources are taken in conjunction with commercial fishing operations,

TABLE 8. HARVESTS OF SELECTED FISH AND GAME FOR NON-COMMERCIAL USE IN THE CHIGNIK SUBREGION

	Household Harvest ^a	
	Resource 1975 ^b	1981 ^c
Sockeye salmon		280
King salmon		10
Silver salmon		34
Pink salmon		<u>22</u>
Total salmon	630	346
Dolly Varden		32
Halibut	38	33
Clams		56
Moose	292	178
Caribou	356	200
Seal	25	38
Geese and ducks	26	36

^a Pounds dressed weight per household. Conversions from numbers of animals to pounds made using conversion factors in Appendix B.

^b Derived from Tuten 1976. 41 households surveyed.

^c Division of Subsistence, ADF&G, King Salmon. 3 households surveyed.

which complicates assessing the quantities of resources harvested for subsistence uses. Crabs are kept from commercial catches as well as being taken under subsistence fishing guidelines. Shrimp, clams, and seals are also taken incidentally during commercial fishing operations for other species, and are distributed among family and friends upon returning to the village. Similarly, halibut most frequently taken by families with commercial fishing vessels, is divided and shared with a number of households in the community, and occasionally, to households in other communities. In 1975, Chignik Bay residents reported that 50 halibut were harvested and distributed throughout the sub-region (Tuten 1976).

The Geography of Harvest Activities

The residents of Chignik Bay and Chignik Lagoon use coastline areas of the Pacific ocean north of the villages for a good portion of their resource harvest activities. As Map 2 shows, moose are hunted in the sheltered bays, and waterfowl are hunted along the coastline. Marine resources are taken from the water in close proximity of the communities, usually in the lagoon itself. For the most part, hunters harvest caribou farther inland, on the tundra lowlands or flats.

Perryville and Ivanof Bay residents frequently use the Stepanof Flats and lower elevations of Mt. Veniaminof, including the Kametlook River uplands. The ocean in front of each village is used to search for crabs, seal, salmon, and other marine resources.

Chignik Lake residents hunt for caribou and moose in the Chignik--Black Lake lowlands. Salmon and Dolly Varden are taken from the lake in front of the village of Chignik Lake. Waterfowl hunting occurs at Black Lake, Chignik Lake, Chignik River, and Chignik Lagoon, or, for some, on the Bering Sea side of the peninsula. Brown bear are hunted in the mountains surrounding the villages.

CHAPTER 9

LOWER ALASKA PENINSULA SUBREGION

LOCATION AND ENVIRONMENT

The area from Port Moller south to Unimak Island constitutes the subregion referred to here as the Lower Alaska Peninsula. Human settlements are located at Cold Bay, False Pass, King Cove, Nelson Lagoon, and Sand Point. This is the southern end of the Alaska Peninsula, a relatively narrow land mass with several large bays protruding inland from both the Bering Sea and the Pacific Ocean. Several islands are located along the Pacific side. On the Bering Sea side of the peninsula, wet and moist tundra are the dominant vegetation. On the eastern side, volcanoes as high as 8,000 feet dot the coastline.

Wildlife is abundant throughout much of the area, and the remoteness of the subregion tends to protect resources from excessive hunting pressures. Brown bear and waterfowl in the Lower Alaska Peninsula command widespread attention due to their abundance and large seasonal aggregations. Caribou range from Port Moller to Unimak Island. All five species of Alaskan salmon are found in the waters of the subregion and, together with shellfish and bottomfish, are important resources.

POPULATION

The population of the subregion was 1,442 in 1980 (1980 U.S. Census). Sand Point is the largest community 625 people, and functions in many ways as the subregional service center. Both Sand Point and King Cove (population of 460) have grown dramatically in the past twenty years, due in large part to

their roles as ports and processing locations for commercial fish and shellfish industries. Cold Bay (228 people) serves primarily as a transportation hub for the Aleutians and surrounding areas. False Pass (70 people) and Nelson Lagoon (59 people) are small fishing communities. Four communities of the subregion, Nelson Lagoon, False Pass, King Cove, and Sand Point, share a number of unifying elements. Aleut, Scandinavian, and Russian ancestry characterize the backgrounds of most of the residents of these communities. Kinship networks, commercial fishing interests, ancestral ties to the land, and an association with Russian Orthodoxy contribute to the shared cultural identity. English is the common language, but Aleut is understood and used by some older residents. Cold Bay does not share these common elements. Rather, the majority of the community is transient, is not involved with commercial fishing, and does not possess kinship ties with other communities in the subregion. Only 4 percent of the residents of Cold Bay are Alaska Native, compared to at least 59 percent for the other communities of the subregion (Nebesky et al. 1983).

USE OF FISH AND WILDLIFE AND OTHER NATURAL RESOURCES

Species Used and Seasonal Round of Harvest

Residents of the Lower Peninsula Subregion have access to a wide variety of marine resources. Of these, salmon is probably the resource harvested in greatest quantities. Other aquatic resources used include crab, halibut, shrimp, seal, sea lion, clams, octopus, cod, sea urchins, and mussels. Among the land mammals, caribou is an important food source for local residents. Waterfowl are harvested during the fall. Dolly Varden are caught and seagull eggs gathered in the spring. A variety of food plants and berries are also used throughout the subregion. A listing of species known to be used is pre-

sented in Table 2. Figure 10 depicts a generalized seasonal round for the subregion. Early summer, the months of May and June, marks the beginning of the salmon season for both commercial and subsistence fishing. Salmon are often kept for home use from a household's commercial catch. If not procured in this manner, subsistence salmon are harvested with set gillnets or beach seines. Kings, sockeyes, and silvers are three species most frequently harvested. In Sand Point, set gillnets are located near the village. King Cove residents use beach seines. Salmon, particularly kings and sockeyes, are eaten fresh during the early part of the run. For later use, salmon is frozen, smoked, dried, canned, or salted. Some families continue to process the backs and heads of chum and pink salmon for traditional uses, such as "choomlaw," an Aleut dish.

Fall is the most intensive period for subsistence activities. As the commercial salmon season slows down, people take the opportunity to harvest resources for their own use. Berries become available towards the latter part of summer, and groups of women, children, or entire families gather large quantities of the valued food source. The favored berries of the subregion include blueberries, salmonberries, mossberries (blackberries), strawberries, and cranberries. They are used fresh or preserved by freezing or jarring for later in the year. August and September are the time when many people process silvers, a preferred salmon species in the area. August also marks the opening of the caribou season, and many households begin hunting for fresh meat. Various forms of transportation are used in harvesting efforts: skiffs, commercial fishing boats, off-road vehicles, highway vehicles, and airplanes. Commercial fishing boats are also used to scout the shores of bays for caribou. Fall waterfowl are a highly prized food resource in all the communities of the Lower Alaska Peninsula. Hunting begins in September when the season opens and

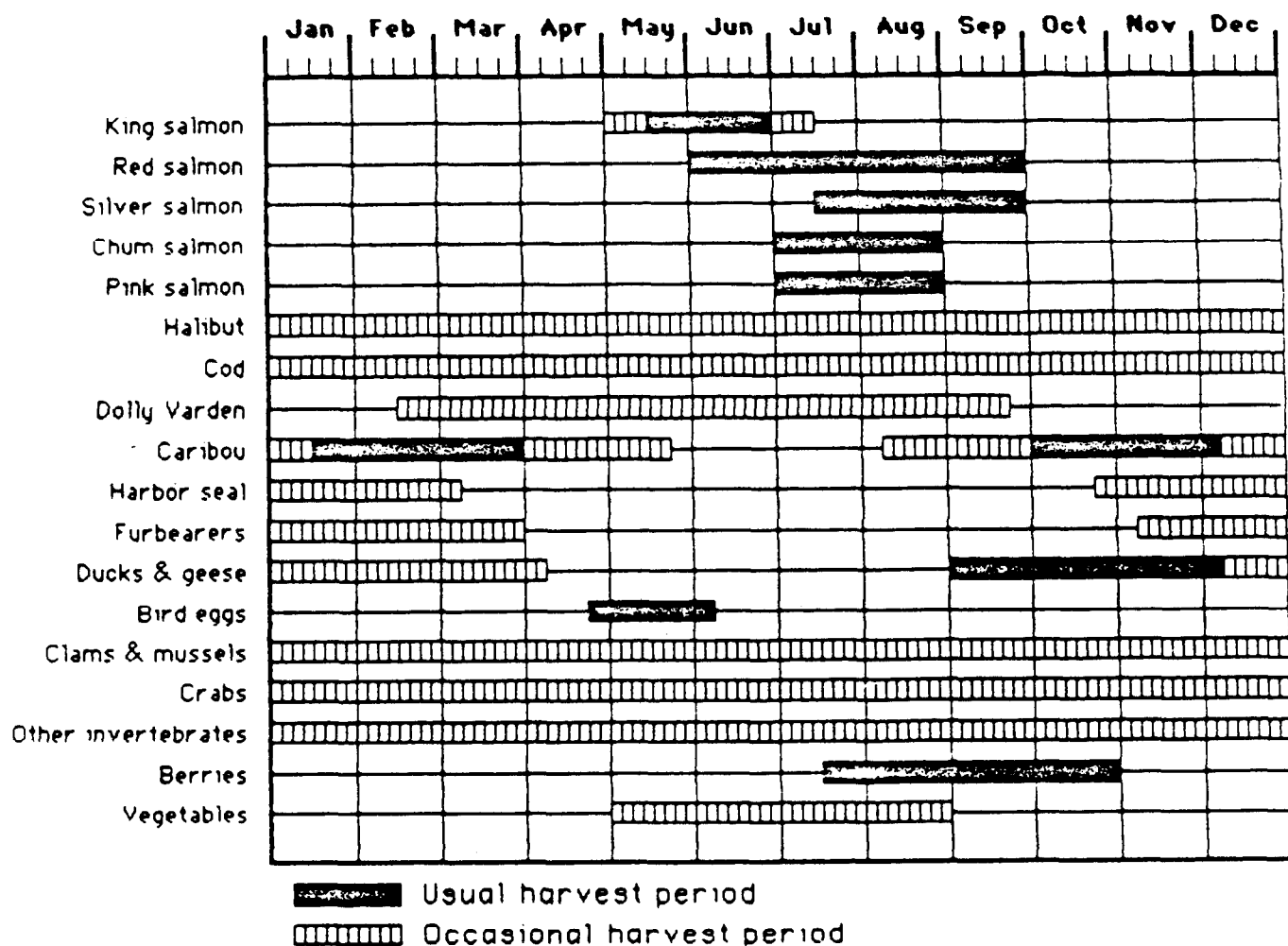


Fig. 10. Seasonal round of subsistence activities for selected resources, Lower Alaska Peninsula subregion.

continues throughout the fall.

Seal hunting, while feasible throughout the year, most frequently occurs during the winter months. Seal oil is used as a condiment with dried fish, and seal meat may be boiled or roasted (Reed 1981). Sea lion are taken occasionally, and sea lion flippers are considered a delicacy. Blubber and meat are occasionally used from whales that have recently washed up on the beach.

Commercial crab fishing takes place in the fall and winter months, and vessels coming home often have catches to share with family and friends. With the ice-free ocean conditions, crab and a number of other marine resources are available for harvest during winter. Pots for shellfish are put out on a year-round basis. In addition, octopus, bidarkis, sea urchins, shrimp, and clams are harvested on a regular basis. Halibut and cod are frequently taken when commercial fishing. At other times, a special trip may be made by local residents for the express purpose of fishing for these species.

Spring months are a time of limited resource harvest. Some commercial fishermen go out for herring; others begin getting their gear and boats readied for the upcoming commercial salmon season. As birds begin nesting, a few eggs are gathered on nearby islands. When edible greens become available they too are gathered. Today, these plants are mainly used fresh in a variety of soups and chowders, although in the past they were often dried for use during the winter months. Occasionally, this is done by older residents today. Beach celery, called "pushky," is a commonly used green, as is wild parsley, "petrouski." Petrouski is a favored condiment used with salmon.

Harvest Levels and Inter-Community Differences in Resource Use

Only rough estimates of the quantities of wild resources harvested for domestic use in the Lower Alaska Peninsula subregion are available. In terms of quantity, caribou and salmon are the important resources (Langdon 1982).

Between two and four caribou are used by most households. False Pass residents indicated a higher level of consumption. Harvests of salmon vary, but between 50 and 200 fish are reported by the majority of households. Some households in False Pass use as many as 500 fish (Langdon 1982).

The major differences in harvest and use patterns among the residents of the Lower Alaska Peninsula subregion are due to resource availability (Map 6). Cold Bay is situated near good caribou and waterfowl areas. Nelson Lagoon, however, is located on a sandy spit, and community residents must travel a considerable distance for many subsistence activities, such as caribou hunting.

The Geography of Harvest Activities

The communities of the Lower Alaska Peninsula are located on or near the ocean and use waterways extensively for access to hunting and fishing sites. The communities are relatively isolated from one another and there is less overlapping of resource harvesting areas in this subregion than in other parts of Bristol Bay (Map 6). Most of the far-reaching harvest activities occur in conjunction with commercial fishing activities. The commercial fleet ranges throughout the Alaska Peninsula commercial fishing district.

Caribou hunting in all the communities is generally concentrated near waterways (Langdon 1982). Sand Point, located in the Shumagin Islands, uses the area closest to the community, particularly the Lefthand Bay area. Nelson Lagoon residents concentrate in the Hoodoo River area or near Port Moller. The Unimak Island herd provides False Pass residents with most of their caribou while Cold Bay residents use the road system in the immediate vicinity for their hunting purposes. King Cove residents mainly hunt near the village in the valleys to the north or at the head of Pavlof Bay.

Lagoons and bays near each community provide a variety of marine and

waterfowl resources. Izembek Lagoon is a particularly productive area and is utilized by members from all communities, in addition to areas closer to the individual communities. Subsistence fishing areas are located, among other places, in streams near Sand Point, King Cove, at Uruia Bay, Thin Point, and Mortensen's Lagoon.

CHAPTER 10

CONCLUSION

Prior to European exploration and settlement in the Bristol Bay region, indigenous Eskimos, Indians, and Aleuts relied on local, wild resources produced and consumed by small, kin-based groups. The Russians were the first to introduce a commercial, export economy when they established fur trading posts and pressed local residents to work as trappers and hunters, beginning in the mid 1700s. Within the Bristol Bay region, the Russians had the greatest effect on the traditional settlement patterns and seasonal round of activities in the Lower Alaska Peninsula and Chignik subregions. Although they were not forced to work for the Russians, residents of other subregions were exposed to trading posts, the Russian Orthodox religion, and to new diseases. Soon after the United States purchased Alaska, commercial fishing became the dominant export market industry in the region, though in some areas Native residents did not become active participants until imported fishermen and laborers were excluded during the Second World War. Today, in the 1980s, the salmon fishery is the dominant commercial fishery throughout the region, but in the Lower Alaska Peninsula and Chignik subregions shellfish and bottomfish are also important commercial fisheries.

The growth of a large, commercial, market economy within the Bristol Bay region has not supplanted the traditional reliance upon local, wild resources for subsistence use. Two recent studies in single communities in the Nushagak River (Wolfe et al. 1984) and the Iliamna (Behnke 1982) subregions show that large quantities of fish and game continue to be harvested and consumed. Subsistence salmon reports from the region (Appendix C) indicate that salmon harvests for home consumption have remained fairly stable since records were

first kept in the 1960s and 70s. Salmon, caribou, and moose provide the bulk of subsistence foods in most subregions. In Nondalton (in the Iliamna subregion) and in Nushagak River communities, salmon, caribou, and moose make up from 75 to 90 percent of the pounds of food harvested for domestic use (Behnke 1982; Gasbarro and Utermohle 1974; Wolfe et al. 1984). At least 75 other types of wild resources are harvested in the region for food, some regularly used and others eaten only occasionally for variety in the diet or for other reasons.

In most subregions, today's subsistence harvesting activities generally follow patterns similar to those reported historically -- with accommodations for participation in the short, mid-summer commercial salmon fishery. In other subregions, such as Chignik and Lower Alaska Peninsula, the contemporary annual cycle appears to revolve around commercial fishing activities with subsistence pursuits fitted into a longer and more diversified commercial schedule. Throughout the region, commercial fishing is a preferred cash-earning occupation, for it is a form of self employment requiring many of the same skills, and allowing nearly the same freedom of choice as traditional hunting and fishing -- along with the potential for high cash income. Most commercial fishing crews are kin-based, domestic production units, as are subsistence activity groups. Other sources of cash income, primarily government-funded wage labor, are integrated in small communities as much as possible into the traditional patterns by making working hours flexible, having summers off, and filling a large proportion of jobs with women rather than men. However, in the regional and subregional centers and transportation hubs, such as Dillingham, Iliamna, King Salmon-Naknek, Sand Point, and Cold Bay increasing populations of immigrants are supported largely by wage employment and are not tied as directly to seasonal activity patterns dictated by the availability of natural resources.

Local issues and concerns among residents of the study region were elicited during the initial phase of the Bristol Bay Cooperative Management Plan (ADNR 1984). One of the greatest concerns was for the future of subsistence uses in the face of potential development and growth within the region. Oil and gas developments, and also mining and hydropower proposals, were a primary concern because of their potential for affecting the extremely valuable fish resources of Bristol Bay. Land disposals by State and Federal governments were a grave concern of residents of the smaller rural communities who were apprehensive about the potential for increased competition for wildlife resources and the social impacts of rapid growth. Increased recreational fishing and hunting were also viewed with concern because of the potential for competition with existing users. In general, when considering the future of the Bristol Bay region the primary issue was the continued availability of fish and wildlife resources which form the basis of the regional subsistence and commercial economies. Salmon, in particular, was recognized by most residents of Bristol Bay as their most important resource.

Wild resources are a vital component of the diet, economy, social organization, and culture of Bristol Bay. Reliance on local animals and plants for domestic consumption continues in the 1980s even though commercial, market economies were introduced throughout the region more than 150 years ago. As some residents of Bristol Bay put it, "subsistence is like money in the bank." They realize they live in the midst of unspoiled waters, forests, and tundra, and they count on the annual reproduction of wild resources. People feel secure when their freezers and caches are stocked full with these wild foods.

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APPENDIX A

COMMON AND SCIENTIFIC NAMES OF RESOURCES

Common name	Scientific name
Red (sockeye) salmon	<u>Onchorhynchus nerka</u>
King (chinook) salmon	<u>O. tshawytscha</u>
Silver (coho) salmon	<u>O. kisutch</u>
Chum (dog) salmon	<u>O. keta</u>
Pink (humpy) salmon	<u>O. gorbuscha</u>
Dolly Varden (includes Arctic char)	<u>Salvelinus</u> spp.
Rainbow trout and steelhead	<u>Salmo gairdneri</u>
Lake trout	<u>Salvelinus namaycush</u>
Arctic grayling	<u>Thyallus arcticus</u>
Whitefish	subfamily Coregoninae
Northern pike	<u>Esox lucius</u>
Longnose sucker	<u>Catostomus catostomus</u>
Blackfish	<u>Dallia pectoralis</u>
Burbot (lusk)	<u>Lota lota</u>
Smelt	family Osmeridae
Halibut, flounder and sole	family Pleuronectidae
Herring	<u>Clupea harengus pallasii</u>
Cod	family Gadidae
Capelin	<u>Mallotus villosus</u>
Moose	<u>Alces alces</u>
Caribou	<u>Rangifer tarandus</u>
Brown (grizzly) bear	<u>Ursus arctos</u>
Black bear	<u>Ursus americanus</u>
Porcupine	<u>Erethizon dorsatum</u>
Arctic (tundra) hare	<u>Lepus othus</u>
Snowshoe hare	<u>Lepus americanus</u>
Parky (ground) squirrel	<u>Spermophilus parryii</u>
Marmot	<u>Marmota caligata</u>
Beaver	<u>Castor canadensis</u>
Muskrat	<u>Ondatra zibethicus</u>
Red fox	<u>Vulpes vulpes</u>
Arctic fox	<u>Alopex lagopus</u>
Wolf	<u>Canis lupus</u>
Lynx	<u>Felis lynx</u>
Wolverine	<u>Gulo gulo</u>
River (land) otter	<u>Lutra canadensis</u>

Appendix A cont.,

Common name	Scientific name
Mink	<u>Mustela vison</u>
Marten	<u>Martes americana</u>
Spotted (harbor) seal	<u>Phoca vitulina</u>
Ringed seal	<u>Pusa hispida</u>
Bearded seal	<u>Erignathus barbatus</u>
Sea lion	<u>Eumatopias jubatus</u>
Walrus	<u>Odobenus rosmarus</u>
Belukha (beluga or white whale)	<u>Delphinapterus leucus</u>
Grey whale	<u>Eschrichtius robustus</u>
Swan (tundra)	<u>Olor columbianus</u>
Geese	subfamily Anserinae including:
including: Canada goose	<u>Branta canadensis</u>
Brant	<u>B. bernicla</u>
Emperor goose	<u>Philacte canagica</u>
White-fronted goose	<u>Anser albifrons</u>
Snow goose	<u>Chen carulescens</u>
Ducks	subfamilies Anatinae and Aythyinae
including: Mallard	<u>Anas platyrhynchos</u>
Gadwall	<u>Anas strepera</u>
Pintail	<u>Anas acuta</u>
Green-winged teal	<u>Anas crecca</u>
Shoveler	<u>Anas clypeata</u>
Wigeon	<u>Anas americana</u>
Greater scaup	<u>Aythya marila</u>
Goldeneyes	<u>Bucephala</u> spp.
Bufflehead	<u>Bucephala albeola</u>
Oldsquaw	<u>Clangula hyemalis</u>
Harlequin	<u>Histrionicus histrionicus</u>
Steller's eider	<u>Polysticta stelleri</u>
Common eider	<u>Somateria mollissima</u>
King eider	<u>Somateria spectabilis</u>
Scoters	<u>Melanitta</u> spp.
Mergansers	<u>Mergus</u> spp.
Sandhill crane	<u>Grus canadensis</u>
Ptarmigan	<u>Lagopus</u> spp.
Spruce grouse	<u>Canachites canadensis</u>
Clams and mussels	class Bivalvia
(including: razor, butter, and softshell	
clams, and cockles, emmas, and bidarkis)	
Octopus	class Cephalopoda
Crabs and shrimp	order Decapoda
(including: king, tanner, dungeness and	
horse crabs)	
Limpets and snails	class Gastropoda

Appendix A cont.,

Common name	Scientific name
Sea urchins	class Echinoidea
Salmon (cloud) berry	<u>Rubus chamaemorus</u>
Blueberry	<u>Vaccinium uliginosum</u>
Huckleberry	<u>Vaccinium ovalifolium</u>
Low-bush cranberry	<u>Vaccinium vitis-idaea</u>
High-bush cranberry	<u>Viburnum edule</u>
Black (crow, moss) berry	<u>Empetrum nigrum</u>
Strawberry	<u>Fragaria chiloensis</u>
Basketgrass	<u>Elymus arenarius</u>
Firewood including: Spruce	<u>Picea</u> spp.
Birch	<u>Betula</u> spp.
Cottonwood (poplar, aspen)	<u>Populus</u> spp.
Alder	<u>Alnus</u> spp.
Willow	<u>Salix</u> spp.
Vegetables	
including: Wild celery	<u>Angelica lucida</u>
Wild spinach	<u>Rumex arcticus</u>
Fiddlehead ferns	<u>Dryopteris dilatata</u>
Herbs including: Stinkweed	<u>Artemesia Tilesii</u>
Tundra tea	<u>Ledum decumbens</u>

APPENDIX B

CONVERSION FACTORS USED TO ESTIMATE DRESSED WEIGHT OF ANIMALS

Resource	Dressed weight (lbs) ^a
Red salmon	4
King salmon	14
Silver salmon	5
Chum salmon	4.4
Pink salmon	2.2
"Salmon" (predominantly reds)	5
Dolly Varden	1.4
Rainbow	1.4
Lake trout	2.7
Grayling	0.7
Whitefish	1
Pike	2.8
Burbot	1
Smelt	
Herring	0.4
Moose	540
Caribou	150
Brown and black bear	100
Beaver	20
Porcupine	8
Arctic hare	5.6
Snowshoe hare	2
Spotted/harbor and ringed seals	56
Bearded seal	140
Belukha	700
Geese	4
Ducks	1.4
Cranes	6
Ptarmigan	0.7
Spruce grouse	1

^a primarily from Behnke 1982 and Wolfe 1981

APPENDIX C
SUBSISTENCE SALMON HARVESTS

TOTAL SUBSISTENCE SALMON HARVEST FOR TOGIAK, NUSHAGAK, NAKNEK-KVICHAK,
EGEGIK, AND UGASHIK DISTRICTS, BRISTOL BAY.

Year	Permits Issued	Number of Fish ^a					
		Sockeye	King	Chum	Pink	Coho	Total
1964		118,000	3,400	8,700	5,200	5,700	141,000
65		119,400	5,100	18,500	200	5,700	148,900
66		99,100	4,300	6,300	7,600	2,800	120,100
67		104,100	4,200	14,200	800	5,000	128,300
68		101,300	7,100	8,800	6,100	2,400	125,700
1969		104,100	7,500	8,300	100	7,700	127,700
70	301	147,800	7,200	9,500	1,100	1,200	166,800
71	310	109,100	4,600	4,200	+	2,500	120,400
72	353	76,500	4,500	8,700	1,900	1,400	93,000
73	452	69,800	7,200	8,000	100	3,300	88,400
1974	607	149,800	9,900	12,700	6,200	7,100	185,700
75	701	175,400	8,600	7,500	1,300	8,500	201,300
76	716	120,900	8,400	9,100	4,400	3,500	146,300
77	738	127,900	7,000	9,100	300	6,600	150,900
78	773	127,600	8,100	16,200	12,700	4,400	169,000
1979	829	116,500	10,300	7,700	500	7,300	142,300
80	1,243	168,600	14,100	13,100	10,000	7,300	213,100
81	1,112	132,100	13,000	11,500	2,600	12,200	171,400
82	806	110,800	13,700	12,400	8,600	11,500	157,000
83	834	149,400	13,500	10,500	900	7,100	181,400
20 year Total	9,775	2,428,200	161,700	205,000	63,800	113,200	2,978,700
1964-73 Total	1,416	1,049,200	55,100	95,200	21,900	37,700	1,260,300
1974-83 Total	8,359	1,379,000	106,600	109,800	41,900	75,500	1,718,400
20 Year Average	698	121,400	8,100	10,300	6,400	5,700	148,900
1964-73 Average	354	104,900	5,500	9,500	4,400	3,800	126,000
1974-83 Average	836	137,900	10,700	11,000	8,400	7,600	171,800

^a Estimates extrapolated from returned permits, rounded to nearest 100 fish
" +" means some harvest, but less than 50 fish.

Source: Division of Commercial Fisheries, ADF&G, Dillingham

APPENDIX C (continued)

SUBSISTENCE SALMON HARVESTS, TOGIAC DISTRICT.

Permits		Number of Fish ^a					
Year	Issued	Sockeye	King	Chum	Pink	Silver	Total
1965	36	4,600	100	1,600	100	2,200	8,600
74	68	7,400	1,200	2,000	500	1,800	12,900
75	41	4,600	800	1,600	+	2,800	9,800
76	30	2,800	500	900	100	500	4,800
77	41	2,100	400	800	+	1,100	4,400
1978	29	900	300	700	300	500	2,700
79	25	800	200	300	0	700	2,000
80	46	3,600	900	300	300	1,200	6,300
81	52	1,900	400	800	100	2,200	5,400
82	50	1,900	400	300	400	1,300	4,300
1983	38	1,900	700	900	200	800	4,500
11 Year Total	456	32,500	5,900	10,200	1,600	15,100	65,700
11 Year Average	41	3,000	500	900	300	1,400	6,000

^a Estimates extrapolated from returned permits, rounded to nearest 100 fish.
 "+" means some harvest, but less than 50 fish.

Source: Division of Commercial Fisheries, ADF&G, Dillingham

APPENDIX C, (continued)

SUBSISTENCE SALMON HARVESTS, NUSHAGAK DISTRICT.

Year	Permits Issued	Number of Fish ^a					Total
		Sockeye	King	Chum	Pink	Silver	
1964	74	31,800	2,900	8,700	4,100	4,900	52,400
65	121	47,500	4,600	18,400	200	5,400	76,100
66	110	23,600	3,700	6,000	4,900	2,400	40,600
67	128	34,900	3,700	14,000	800	4,000	57,400
68	115	30,000	6,600	8,600	5,800	1,900	52,900
1969	162	27,700	7,100	8,200	100	7,100	50,200
70	147	38,200	6,900	8,800	1,000	1,000	55,900
71	164	42,400	4,400	4,200	+	2,300	53,300
72	168	24,100	4,000	8,200	1,200	1,000	38,500
73	216	28,000	6,600	7,600	100	2,200	44,500
1974	261	39,300	7,600	9,600	4,100	4,600	65,200
75	340	47,300	7,100	5,600	1,300	4,300	65,600
76	317	34,700	6,900	7,200	2,700	2,100	53,600
77	306	43,300	5,200	7,300	200	4,500	60,500
78	331	33,000	6,500	14,300	11,000	2,500	67,300
1979	364	40,200	8,900	6,800	500	5,200	61,600
80	425	76,500	11,700	11,600	7,600	5,100	112,500
81	395	44,500	11,600	10,300	2,400	8,700	77,500
82	376	34,700	12,200	11,500	7,300	8,900	74,600
83	389	38,400	11,800	9,200	400	5,300	65,100
20 Year Total	4,909	760,100	140,000	186,100	49,700	83,400	1,225,300
20 Year Average	245	38,000	7,000	9,300	5,000	4,200	61,300

^a Estimates extrapolated from returned permits, rounded to nearest 100 fish.
 "+" means some harvest, but less than 50 fish.

Source: Division of Commercial Fisheries, ADF&G, Dillingham

APPENDIX C (continued)

SUBSISTENCE SALMON HARVESTS, NAKNEK-KVICHAK DISTRICT.

Year	Permits Issued	Number of Fish ^a					
		Sockeye	King	Chum	Pink	Silver	Total
1964		85,900	500	+	1,100	800	88,300
65		71,900	500	100	+	300	72,800
66		74,500	600	300	2,700	400	78,500
67		68,500	500	100	0	500	69,600
68		71,000	500	100	300	200	72,100
1969		76,300	400	100	+	400	77,200
70	145	108,200	300	700	100	200	109,500
71	137	66,400	200	+	+	100	66,700
81	170	52,200	400	400	700	100	53,800
73	219	41,600	600	300	+	500	43,000
1974	263	102,600	1,000	1,100	1,600	200	106,500
75	301	122,600	700	300	+	200	123,800
76	346	82,200	900	900	1,500	600	86,100
77	352	81,400	1,300	600	100	300	83,700
78	392	93,000	1,200	1,000	1,400	300	96,900
1979	424	75,000	1,200	600	0	1,200	78,000
80	759	88,200	1,500	1,200	2,100	800	93,800
81	649	85,100	1,000	400	100	1,100	87,700
82	350	71,400	1,100	600	900	1,000	75,000
83	385	107,900	1,000	400	300	900	110,500
20 Year Total	4,892	1,625,900	15,400	9,200	12,400	10,100	1,673,500
20 Year Average	349	81,300	800	500	1,200	500	83,700

^a Estimates extrapolated from returned permits, rounded to nearest 100 fish.
 "+" means some harvest, but less than 50 fish.

Source: Division of Commercial Fisheries, ADF&G, Dillingham

APPENDIX C (continued)

SUBSISTENCE SALMON HARVESTS, EGEK DISTRICT

Year	Permits Issued	Number of fish ^a					Total
		Sockeye	King	Chum	Pink	Silver	
1972	2					100	100
73	3					100	100
74	7	300	+	0		+	300
75	3	200	+	0	+	+	200
76	2						
1977	20	100	+	100	+	200	400
78	13	200		100		200	500
79	8	300				100	400
80	3	100		100			
81	4	+	+			+	+
1982	19	2,400	+			+	2,400
83	14	700	+			+	700
12 Year Total	98	4,300	+	200	+	700	5,200
12 year Average	8	400	+	+	+	100	400

^a Estimates extrapolated from returned permits, rounded to nearest 100 fish.
 "+" means some harvest, but less than 50 fish.

Source: Division of Commercial Fisheries, ADF&G, Dillingham

APPENDIX C (continued)

SUBSISTENCE SALMON HARVESTS, UGASHIK DISTRICT.

Year	Permits Issued	Number of Fish ^a					Total
		Sockeye	King	Chum	Pink	Silver	
1964	2	300					300
66	4	1,000					1,000
67	5	700	+	100	+	500	1,300
68	8	300	+	100	+	300	700
69	3	100				200	300
1970	9	1,400	+	+		+	1,400
71	9	300		+		100	400
72	13	200	100	100	+	300	700
73	14	200	+	100	+	600	900
74	8	200	100	+	+	500	800
1975	1	700	+	+	+	1,200	1,900
76	21	1,200	100	100	100	300	1,800
77	19	1,000	100	300	+	500	1,900
78	8	500	100	100	+	900	1,600
79	8	200	+	+	+	100	300
1980	10	200	+	+	+	200	400
81	12	600	+	+		200	800
82	11	400	+	+	+	300	700
83	8	500	+	+		100	600
19 Year Total	173	10,000	500	900	100	6,300	17,800
19 Year Average	9	500	+	+	+	300	900

^a Estimates extrapolated from returned permits, rounded to nearest 100 fish.
 "+" means some harvest, but less than 50 fish.

Source: Division of Commercial Fisheries, ADF&G, Dillingham

APPENDIX C (continued)

SUBSISTENCE SALMON HARVESTS, SOUTH PENINSULA DISTRICT.

Year	Permits Issued	Number of Fish ^a					
		Sockeye	King	Chum	Pink	Silver	Total
1975	61	1,367	4	818	1,662	676	4,527
1976	-	409	0	208	350	338	1,305
1979	55	1,550	50	350	500	1,150	3,600
1980	85	2,440	100	500	900	1,800	5,700
1982	85	1,600	20	300	1,700	3,550	7,170

^a Estimates extrapolated from returned permits, rounded to nearest 100 fish.
Source: Division of Commercial Fisheries, ADF&G, Dillingham; Langdon 1982:176.