

**THE HARVEST OF FISH AND WILDLIFE
IN THREE ALASKA COMMUNITIES:
BREVIG MISSION, GOLOVIN, AND SHISHMAREF**

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ABSTRACT

During June, July and August 1989, researchers surveyed 69 households in Brevig Mission, Golovin, and Shishmaref. Researchers contacted 35 percent of the households in Brevig Mission, 80 percent in Golovin, and 18 percent in Shishmaref. Respondents were asked about their households' harvests of fish and wildlife during the previous twelve months. Responses were tabulated and expanded to estimate the quantity of fish and wildlife harvested by each community. Harvest counts were converted to edible weights. The sampled households reported average harvests of 2,472 pounds per household in Brevig Mission, 2,491 pounds in Golovin, and 2,654 pounds in Shishmaref. The average harvests per person were 579 pounds in Brevig Mission, 604 pounds in Golovin, and 663 pounds in Shishmaref. These harvests are higher than the statewide average, but similar harvests have been reported by other Arctic and sub-Arctic coastal communities. The species harvested varied by community. Marine mammals provided 69 percent of the wild food in Shishmaref's diet, 56 percent in Brevig Mission, and 32 percent in Golovin. By comparison, fish provided only 9 percent of the wild food in Shishmaref, 33 percent in Brevig Mission, and 42 percent in Golovin. Land mammals contributed 16 percent in Shishmaref, only 4 percent in Brevig Mission, and 17 percent in Golovin. Birds contributed 4 percent of the community harvest in Golovin, 3 percent in Brevig Mission, and 2 percent in Shishmaref. The remainder of the wild foods were plants, whose contribution to local diets was similar in all three communities. Relatively large harvests of bearded seal, spotted seal, and moose were reported in all three communities.

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INTRODUCTION

Most of the 5,000 residents of Alaska's Seward Peninsula depend on wildlife for food, dog food, clothing, and raw materials. *Iñupiat* and *Yupik* Eskimos, who comprise 70 percent of the region's population, have subsisted on marine mammals, fish, terrestrial mammals, birds, and plants for at least 4,500 years. Recent studies in several communities in the region have shown that although hunting and fishing equipment has improved in the past century, traditionally used wildlife species were being harvested, processed, and stored in traditional ways in most communities (Eisler 1978, Ellanna 1982, Sherrod 1982, Sobelman, 1980, Thomas 1982, Magdanz and Olanna 1988). These studies were primarily qualitative and descriptive. Most researchers did not collect quantitative harvest data; those who did collected data for only a few species. This study collected quantitative harvest data for a wide range of species in three Seward Peninsula communities.

Background

The Alaska Department of Fish and Game, and the U.S. Fish and Wildlife Service, have responsibilities for managing wildlife on the Seward Peninsula. The USF&WS has the responsibility to identify, provide continued opportunities for, and avoid impacts to subsistence uses. Both agencies need quantitative wildlife harvest information, which is not currently available. This research was partially supported by a cooperative agreement between the U.S. Fish and Wildlife Service and Alaska Department of Fish and Game, and by ANILCA Federal Aid Funds, administered through the U.S. Fish and Wildlife Service.

The purpose of this project was to gather and publish quantitative harvest data for major wildlife resources used by residents of three Seward Peninsula communities: Golovin, Brevig Mission, and Shishmaref. The objectives included:

1. Estimates of the percentage of households in the study communities harvesting or attempting to harvest each major wildlife resource.
2. Estimates of the quantities of wild resources harvested in the study communities, including quantities harvested by season.

These data are being published in two formats. First, the data are being added to the Division of Subsistence's state-wide community database. Second, in this technical paper the data have been compiled in tabular form and accompanied by descriptive material about subsistence, as documented by previous Division of Subsistence research.

The three communities were selected because the Division of Subsistence had conducted baseline studies in each. The Shishmaref study has been published as a division technical paper (Sobelman 1982). The Brevig Mission and Golovin studies are in preparation. These studies provided an extensive context for understanding harvest data, and aided in the design of the harvest survey instrument. Division researchers also were familiar with these communities and their residents. For these reasons, the division could conduct harvest surveys more efficiently and economically in these communities than in most other Seward Peninsula communities.

The three study communities were dispersed along the coast of the Seward Peninsula; harvest species, timing, and quantities differed among them. The three communities' populations, local economies, and local environments also differed, providing samples of different conditions existing on the peninsula. A three-community study provided a broader view of Seward Peninsula subsistence harvests than would any single-community study.

Methods

A harvest survey was used to collect harvest data from random samples of households in each community (see Appendix Three). The harvest survey included approximately 70 wildlife species or species groups, selected on the basis of management concerns and level of use in the study communities. Respondents were asked whether they used each species, whether they attempted to harvest each species, how much of each species they harvested, and how much they received or gave away. Respondents were asked whether they used furbearers for food or furs. They were asked whether migratory waterfowl were harvested in spring, summer, or fall, and whether they harvested eggs from five categories of wild fowl. The summer season was defined as "July-August 1988." The fall season was defined as "September-October 1988." The spring season was defined as "April-June 1989." Otherwise, respondents were instructed to answer these questions based on their activities during the 12 months previous to the survey. Thus the study year varied slightly from the beginning of the study to the end, but could be defined as approximately July 1988 through June 1989.

The survey method relied on respondent recall. Respondents generally could accurately remember harvest quantities when the wildlife was (1) harvested in large units (e.g. moose or bearded seal), (2) rare and valuable (e.g. snow goose, wolverine), or (3) processed or stored in measured units (e.g. buckets of berries, strings of fish). Respondent recall was less reliable when the wildlife was (1) harvested in large quantities of small units, (2) abundant, and (3) minimally processed (e.g. saffron cod, whitefish). The harvest quantities reported here should be considered estimates whose reliability varies by species.

Harvest quantities vary from year to year in response to changing ecological conditions and changing human needs. These data represent a single year.

Therefore, readers should be cautious about drawing conclusions about the importance of particular species in the subsistence diet. In particular, respondents in Brevig Mission and Shishmaref reported lower than normal harvests of marine mammals during the spring 1989 season. Walrus and bearded seal harvest estimates in this report should be considered abnormally low. (For an example of how harvests varied in one northwest Alaska community from 1964-1966 and from 1982-1984, see Burch 1985).

Responses for the variables "attempting to harvest" and "harvesting" were frequently the same. In a few instances, households reported fewer "attempts" than harvests. This can be explained both by local harvesting practices and by *Iñupiat* relationships with wildlife. Practically speaking, hunters and fishers often take species incidental to target species. For example, hunters may leave with walrus in mind, but come back with a ribbon seal. Animals also are taken during non-hunting activities. Most men carry firearms whether they are cutting wood, taking supplies to camps, or traveling to a nearby community. They take animals opportunistically. Traditionally *Iñupiat* believed that fish and wildlife were not "caught," but gave themselves to humans who behaved appropriately. For example, *Iñupiat* brown bear hunting ethics dictated respect and deference on the part of the hunter (Loon and Georgette 1989). Therefore, some *Iñupiat* may have considered it inappropriate to report harvest "attempts," because the human being was not seen as the controlling actor in the relationship.

Sample

The conduct of this study was contingent on the approval of the local governing bodies of Golovin, Brevig Mission, and Shishmaref, and upon the individual cooperation of respondents. Approval was granted by Kawerak, Inc., the Bering

TABLE 1. CHARACTERISTICS OF THE STUDY SAMPLES IN BREVIG MISSION, GOLOVIN, AND SHISHMAREF, ALASKA

	BREVIG MISSION	GOLOVIN	SHISHMAREF
NUMBER OF HOUSEHOLDS			
Community ¹	43	41	118
Sample	15	33	21
Sample Percentage	35 %	80 %	18 %
NUMBER OF PEOPLE			
Community ¹	172	154	438
Sample	64	136	84
Sample Percentage	37 %	88 %	19 %
MEAN HOUSEHOLD SIZE			
Community	4.0	3.6	3.7
Sample	4.3	4.1	4.0
RANGE OF HOUSEHOLD SIZES			
Community	1-13	1-11	1-9
Sample	1-7	1-11	1-9

¹Community census data provided by city governments in Brevig Mission, Golovin, and Shishmaref.

Strait Coastal Resource Area, and the study communities. Once regional and community approval was obtained, only two households declined to participate.

The three study communities ranged in size from 154 people in Golovin (City of Golovin 1989), to 172 in Brevig Mission (City of Brevig Mission 1989), to 438 in Shishmaref (City of Shishmaref 1989). Golovin had 41 households, Brevig Mission 43, and Shishmaref 118. A comparison of the characteristics of each community's samples with the characteristics of each community as a whole appears in Table 1. Given the limited resources available for this study, a 100 percent sample of households in each community was not possible. Researchers attempted 100 percent samples in Golovin and Brevig Mission. Researchers drew a random sample of 40 households from a household list in Shishmaref. Researchers attempted to contact each household on the list; households which were unavailable or which declined to participate were replaced by other randomly drawn households.

In Golovin, virtually all available households were contacted, for a final sample of 80 percent. In Brevig Mission, a similar sample was achieved but approximately 20 surveys were lost in transit from Brevig Mission to Kotzebue. Consequently, the final Brevig Mission sample available for analysis was 35 percent. In Shishmaref, approval from community governments and organizations was not granted until early August, and sufficient time remained for surveying only 20 households. In both the Brevig Mission and Shishmaref samples, however, key demographic variables of the samples were similar to communities as a whole (Table 1). Researchers believe the samples provide a reasonable reflection of each community as a whole.

Procedures

A researcher hired by the Division of Subsistence administered surveys in Golovin, Brevig Mission, and Shishmaref during June, July, and August, 1989. This researcher (Conger) has lived all her life on the Seward Peninsula. Surveys were coded in the field by Conger, reviewed in Kotzebue by Magdanz, then sent to Anchorage for entry into computer files by the Division's data management staff. Survey data were analyzed using the Statistical Program for the Social Sciences (SPSS). In this report, percentages of households using, harvesting, giving and receiving wild resources are the percentages of households in each community sample which reported these activities. The total harvests reported by each sample were expanded to estimate the total harvests by species for each community. Community samples were assumed to be representative; the expansions were not weighted. Confidence intervals were calculated for a 95 percent level of confidence.

Edible weights were calculated for each resource, using the conversion factors in Appendix Three. The conversion factor for ptarmigan, for example, was

0.7 pounds of edible weight per bird. If a household reported harvesting 10 ptarmigan, then the edible portion of that harvest was estimated to be seven pounds. These conversion factors were developed during previous Division of Subsistence studies. Some of the factors were refined during analysis for this study to improve the accuracy of bird and egg weight conversions.

In two instances, grey whale and walrus, expansions were adjusted on the basis of additional information about harvests. In 1988, a grey whale was taken by a household in the Brevig Mission sample. Grey whales are not commonly taken by Brevig Mission; this was the only gray whale harvested during three years (1984, 1985, 1989) of Division of Subsistence work. Given this information, an expansion of this single grey whale harvest would not be appropriate. The weight of the salvaged edible portion of this grey whale, as reported to researchers by one of the hunters, was added to the community total after expansion.

Expansion of walrus harvest data was also adjusted. Fifteen Brevig Mission households reported harvesting 37 walrus; 21 Shishmaref households reported 40. Researchers estimated that an average walrus could provide 770 pounds of edible meat, organs, blubber, and skin. Using this figure, the mean household harvests equaled 1,899 pounds and 1,466 pounds, respectively, of edible products. Two houses reported harvesting 15 walrus each, which would have provided 11,550 pounds edible products for each. Even allowing that walrus were used as dog food, it seemed reasonable to assume that not all edible portions of all walrus were being salvaged.

This was consistent with field observations. Not all walrus or all parts of walrus were equally edible. Not all hunters salvaged equal portions of walrus. For example, walrus taken on ice were salvaged more completely than walrus taken in the water. Hunters evaluated the quality of the walrus harvested, and decided what to salvage on an individual basis. Hunters preferred flippers, blubber with meat,

shoulder meat, heart, liver, intestines, kidney, and ribs for drying (Iya 1989). The amount of meat salvaged varied from year to year, depending on ice conditions, timing of the hunt, and the needs of the hunters. In Brevig Mission, researchers observed that the salvage of edible portions of walrus appeared greater at the beginning of the hunt than at the end.

In 1981, the Eskimo Walrus Commission recorded the salvage of edible portions of walrus in six communities. The EWC staff calculated the percentage of edible weight salvaged from 329 walrus taken by hunters in three of those communities: Mekoryuk, Nome, and *Ingalik* on Little Diomed Island (Lourie 1982). The portions salvaged from individual walrus ranged from 100 percent to less than 2 percent of the total edible weight. Mekoryuk hunters took 14 walrus and salvaged an average of 27.6 percent of the edible weight. Nome hunters took 42 walrus and salvaged 15.7 percent. *Ingalik* hunters took 273 walrus and salvaged 7.2 percent. There are considerable differences between these communities themselves, and between them and the communities in this study. But these data do support a general assumption that a portion of the edible weight of walrus was being salvaged. The data also suggest that quantity of edible portions salvaged declined as the harvest increased.

Researchers discussed this assumption with two key respondents in Brevig Mission and one in Nome, and proposed a model of declining utility. The model assumed that -- for a given household -- the first walrus was fully utilized (770 pounds), the second walrus was 50 percent utilized (385 pounds), and all subsequent walrus were 25 percent utilized (192.5 pounds). This model returned a somewhat higher percentage harvested than Lourie's observations showed. An earlier model returned a lower harvest, but one of the key informants said that model's estimate was too low. Researchers recognized that this was a crude model at best, but

believed it returned a more realistic estimate of the walrus harvest than straight expansion.

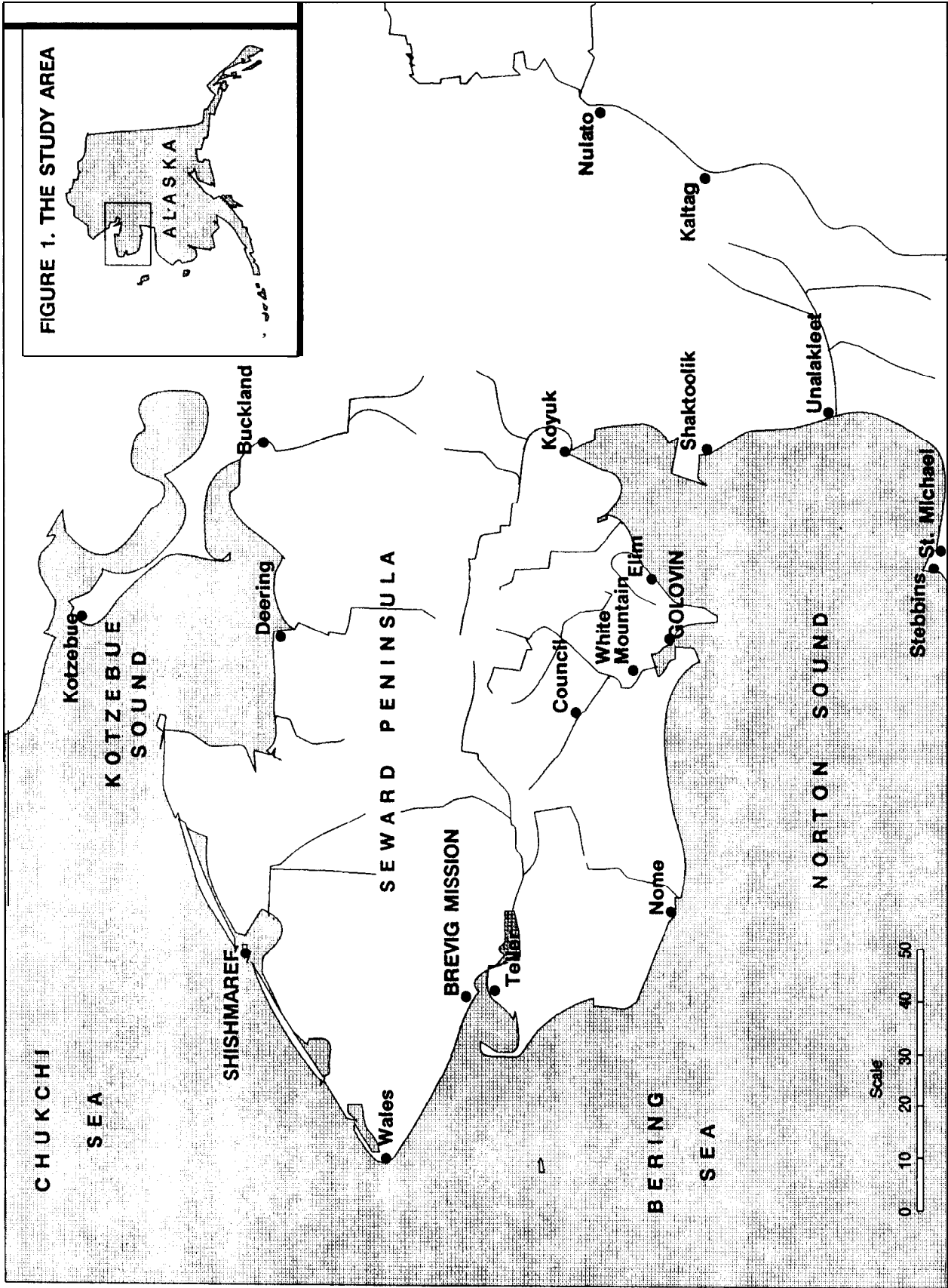
This report summarizes the 1989 survey data, and includes descriptive and qualitative information gathered during previous Division of Subsistence studies. The report includes general information about all the major resource categories. Because of the U.S. Fish and Wildlife Service's specific interests, additional detail is provided about the harvest and use of migratory birds.

THE SETTING

The Seward Peninsula includes approximately 20,000 square miles, bounded on the south by Norton Sound, on the west by the Bering Strait, on the north by the Chukchi Sea, and on the east by mainland Alaska. The Seward Peninsula lies just below the Arctic Circle, between approximately 64 and 67 degrees North. The climate is predominantly sub-Arctic, although local variations are considerable.

Four small mountain ranges divide the peninsula: the Darby, Bendeleben, Kigluaik, and York mountains. The highest point on the peninsula is Mount Osborn (4714 feet) in the Kigluaik Mountains. Beginning in the southeast and following the coast around to the northeast, major river systems include the Koyuk which drains the Darby and Bendeleben mountains, and the Fish River system which drains the Darby, Bendeleben and Kigluaik mountains. Numerous small rivers drain the peninsula's southern coastal plain between Golovnin Lagoon and Point Spencer. The Kuzitrin River system drains the north slopes of the Kigluaik and southern slopes of the York mountains. Numerous small rivers also drain the peninsula's northern coastal plain, the largest of which is the Serpentine River. Headland extensions of the Darby and York mountains reach the coast; otherwise coastal lands are typified by low rolling hills, wet tundra, brackish lagoons, and sandy beaches. Lagoon systems are essentially continuous for 125 miles between Cape Prince of Wales and Cape Espenberg.

The Seward Peninsula grows progressively more Arctic in character from east to west and from south to north. The lower Koyuk, lower Fish, and upper Kuzitrin systems support scattered to locally dense stands of spruce and poplar, interspersed with wet or alpine tundra. In the higher elevations and along the coastal plains, alpine or wet tundra predominate. Stream beds are typically gravel



overgrown with willows and alders. The Seward Peninsula includes a wide diversity of natural environments. The southeastern portion is an extension of subarctic interior forests, while the northwestern coastal plain is arctic tundra.

Wildlife

Although a small number of animal species reside in the Arctic year round, the Arctic hosts phenomenal numbers of migratory animals during its short summer. For centuries, this predictable seasonal abundance has provided for continuous human settlement. This brief discussion of Seward Peninsula wildlife emphasizes those species, both migratory and resident, that are directly useful to humans as food or raw materials.

Most of Alaska's major terrestrial wildlife species are found on the Seward Peninsula. These species include moose, brown bear, caribou, musk ox, wolf, wolverine. Absent are sheep, deer, and black bear. In most areas, caribou have been replaced ecologically by privately owned herds of reindeer, but in winter caribou were usually available in the extreme eastern peninsula. Musk ox died out in the nineteenth century. A small transplanted population has been establishing itself in the south-central portion of the peninsula, but there was no open hunting season for musk ox in 1989. Small terrestrial species are ubiquitous, and include snowshoe hare, arctic hare, arctic ground squirrel, arctic fox, and red fox.

Bowhead whale, grey whale, belukha whale, walrus, bearded seal, ringed seal, spotted seal, and ribbon seal frequent the waters surrounding the Seward Peninsula. Most marine mammals are mobile and many are seasonally concentrated. The entire Pacific walrus population passes through Bering Strait during a few months in spring. Seasonal concentrations of seals and belukhas are

also typical. Hunters rely on these seasonal concentrations for significant portions of their harvest.

All five Pacific salmon species occur on the Seward Peninsula, though not all five inhabit all the major rivers. Only the Kuzitrin system, for example, supports significant numbers of sockeye. Chinook are more widespread, but usually are available only in small numbers. The dominant salmon species in the late 1980s was chum salmon; followed by coho and pink salmon. Pacific herring spawn along Seward Peninsula shores, but only in the southeast peninsula did stocks approach commercial proportions. Other major fish species include Dolly Varden, grayling, burbot, northern pike, and various whitefish species. Saffron cod, arctic cod, starry flounder, and arctic flounder are found in marine waters.

An estimated 177 different species of birds are found on the Seward Peninsula (Kessel 1974). More than a score of these species are used, principally for food. The bulk of the utilized species are waterfowl, but several shorebird and upland species -- notably ptarmigan -- are used. Millions of birds -- waterfowl, shorebirds, wading birds, and seabirds -- summer along the coast. The deltas of Kachauik Creek, Yuonglik River, and Fish River (all at the head of Golovnin Lagoon) provide prime habitat for migrating waterfowl in spring and fall. For example, on September 9, 1976, observers surveying waterfowl along 200 miles of Norton Sound coastline from Cape Wooley to Kwik River found 80 percent of their birds at the head of Golovnin Lagoon: 9,816 geese, swans and ducks out of a total count of 12,232 (Drury et al 1980:250). It is "some of the most heavily used waterfowl and shorebird habitat in the region. The upper part of Golovnin Lagoon in the shallow water at the mouth of the Fish River is very productive, especially in the fall" (Drury et al 1980:266). Between Fish River delta and the mouth of the Yuonglik River is a marsh locally known as "Reindeer Slough." The grass and sedge meadows here, interspersed with numerous small lakes, are favored habitat for

geese, who can retreat to the safety of the lagoon when terrestrial predators threaten. McCarthys Marsh is also habitat for waterfowl in spring (it was not surveyed by Drury).

Lagoons, marshes, and lakes around Cape Douglas, Brevig Lagoon, and Imuruk Basin also attract thousands of migrating and nesting cranes, geese, and ducks. Some arrive with the thawing of fresh water lakes in spring, and depart with freeze-up in September. Others are more transient. Snow geese remain in the area for a few days to two weeks at most, then move on to distant nesting grounds. In the fall snow geese are absent; they return to winter grounds along another route.

Edible plants, especially berries, are a valuable addition to a traditional diet heavy in meats and fats. Although this study did not collect harvest data for individual species of plants, previous studies found that salmonberries, blueberries, and cranberries are the most commonly used. Commonly used green plants include willow shoots, sourdock, wild celery, wild rhubarb, beach greens, and salad greens. Eskimo potato is the dominant root harvested.

Human Settlement

Man has lived in North America for at least 20,000 years and perhaps for 60,000 years. The oldest sites on the Seward Peninsula, Trail Creek caves, have been dated to approximately 7120 B.C. Analysis of the tool kits of these early Arctic peoples indicate they were tundra hunters. By approximately 2,000 B.C., the archaeological record suggests "a broadly based economy, balanced among the products of the land, the sea, and the rivers...an economy that foreshadowed that of later Eskimos." (Dumond 1984:76). Succeeding Arctic peoples were increasingly adept maritime hunters. They hunted whales, walrus, and seals from wooden and skin *umiak* and *qayat*, while continuing to harvest terrestrial and riverine resources. The Thule

culture, appearing on mainland Alaska about 500 A.D. and spreading across the continental Arctic between 900 and 1100 A.D., was the direct precursors of modern *Iñupiat* culture (Anderson 1984:90-91).

In 1989, the *Iñupiat* culture was still the majority culture on the Seward Peninsula. Although European explorers arrived in the seventeenth century and Yankee whalers proliferated after 1850, the first non-Native settlement on the Seward Peninsula was not founded until 1866. In that year, Western Union established a base camp at Port Clarence to build a telegraph line connecting Russia with the United States. The expedition and settlement were abandoned less than a year later. Subsequently small non-Native mining settlements were founded at *Cingik* (now Golovin), Omilak Mine, and Council. In 1898, miners and missionaries from Golovin and Council discovered rich placer gold deposits near Nome, beginning the Nome gold rush. Nome's population briefly reached 30,000, but by 1910 had declined to 2,600 (U.S. Department of Commerce and Labor, Bureau of the Census 1913:573).

Since 1900 Nome has been the largest community on the Seward Peninsula, with a 1985 population estimated at 3,191. Following the gold rush Nome's economy stabilized and gradually expanded as it became a regional center of transportation, government, and commerce. Nome was fundamentally different from the other communities on the Seward Peninsula in history, size, population characteristics, and economy. In 1985, Nome was approximately 10 times larger than the average peninsula community. Sixty-three percent of all the Seward Peninsula's residents lived in Nome; 93 percent of the Seward Peninsula's non-Native residents lived there.

Nome's economy was a mixture of government, services, and retail businesses on the one hand, and subsistence hunting, fishing, and gathering on the other. Some residents relied entirely on the cash sector of the economy, but most relied on both

TABLE 2. CHARACTERISTICS OF SEWARD PENINSULA COMMUNITIES

	Estimated 1985 Population ¹	Percentage Native Alaskan ²	1982 Taxable Income ³
Brevig Mission	165	100 %	\$ 6,830
Deering	153	92 %	12,781
Elim	237	96 %	8,175
Golovin	131	98 %	7,822
Koyuk	202	96 %	7,696
Nome	3,191	59 %	19,745
Shishmaref	410	94 %	9,855
Teller	247	93 %	9,087
Wales	143	92 %	7,257
White Mountain	164	93 %	9,942
TOTAL (AVERAGE)	5,043	()	()

1 SOURCE: Alaska Department of Labor. 1987. Alaska Population Overview 1985 Estimates. Juneau.

2 SOURCE: Alaska Department of Labor. 1985. Alaska Population Overview. Juneau.

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

cash and wild resources. Native subcommunities such as King Island were especially reliant on wild resources, while short-term non-Native residents were less so. Partly as a result of the high proportion of non-Natives, the average taxable income per return in Nome was \$19,745, twice as high as other Seward Peninsula communities (Table 2).

When Nome was founded at the turn of the century, the Native population of the Seward Peninsula resided in more than a score of small villages. The largest had no more than a few hundred residents. In 1900, and again in 1918, the Seward Peninsula suffered epidemic diseases with devastating impact on Native populations. Shishmaref was spared, but in some other communities the loss of life

was almost 100 percent. Consequently a number of smaller communities were abandoned; survivors moved to nearby communities, to orphanages, or to Nome.

In 1985, 1,852 Seward Peninsula residents lived in nine communities other than Nome, including Brevig Mission, Golovin, and Shishmaref. These smaller communities were similar to one another in many respects. They were home to an average 206 residents. Ninety five percent were Alaska Native. Almost all relied on traditional subsistence hunting, fishing, and gathering for food. The cash sector of the other communities' economies consisted primarily of government construction, education, and health care. Domestic industries like reindeer herding, ivory carving and skin sewing provided some additional income. In 1982, the average taxable income per return ranged from \$6,830 (in Brevig Mission) to \$12,781 (in Deering).

The study communities represented a cross section of these other Seward Peninsula communities' geography, demography, culture, and economics. Golovin lies near the mouth of the Fish River in the southeast Seward Peninsula, Brevig Mission near the mouth of the Kuzitrin in the southwest, and Shishmaref near the mouth of the Serpentine in the northwest. Golovin was among the smaller communities, with a mixed *Iñupiat*, *Yupik*, and non-Native population. Brevig Mission was an insular-like *Iñupiat* community with strong kinship ties to Shishmaref and Wales. Shishmaref was the Seward Peninsula's second largest community, after Nome, but like Brevig Mission had an insular-like *Iñupiat* population.

Some Golovin residents fished during commercial fisheries for salmon and herring, but recently they have had difficulty finding markets for their fish. Brevig Mission had a commercial salmon fishery until the mid-1960s, but not since then. Shishmaref had no commercial fisheries. All three communities have hosted reindeer herds in the past. Herders in Golovin were not actively herding deer in the late 1980s; Brevig Mission and Shishmaref each had two active herders. Skin sewing

provided supplemental income for families in all three communities. In Brevig Mission and Shishmaref, carvers worked ivory and bone into small sculptures and jewelry. Individual carvers, especially in Shishmaref, probably earned significant incomes although no reliable estimates were available.

Uses of Wildlife

Previous studies have described in considerable detail the use of wildlife by residents of northwest Alaska (see, for example, Bogojavlensky 1969, Burch 1985, Eisler 1978, Ellanna 1983, Magdanz and Olanna 1988, Ray 1975, Sobelman 1985, Thomas 1982). With the exception of small commercial salmon fisheries in Norton Bay, Golovnin Bay, and near Safety Sound, and a small commercial king crab fishery offshore near Nome, commercial uses of Seward Peninsula wildlife were virtually non-existent. Sport uses were limited; small numbers of sportsmen took brown bear, moose, salmon, trout, and grayling. Most wildlife harvested were for subsistence uses. This section describes the harvesting patterns and the uses of wildlife, with an emphasis on wildfowl.

In harvesting wild resources, Golovin residents predominantly used coastal and inland habitat. Few Golovin hunters ventured into the open ocean for large marine mammals; they did harvest seals and belukha that entered the sheltered waters of Golovnin Bay and Golovnin Lagoon. Brevig Mission residents divided their energies among the uplands, the coast, and the open ocean. Like their fellows at Wales, *Ingalik*, and King Island, they ranged far into the open ocean to hunt walrus and bearded seals. Their hunting areas and camp locations indicated an economy balanced among inland, coastal, and marine activities. To a greater degree than most Seward Peninsula communities, Shishmaref was oriented towards the ocean. Hunting of bearded seal, walrus, and polar bear were major activities.

Shishmaref residents also used extensive land areas for harvesting, but their local terrestrial environment was not so diverse nor so productive as that of Brevig Mission and Golovin.

For migratory birds, Brevig Mission residents hunted in the spring in the marshes between Cape Douglas and Port Clarence, along Port Clarence Spit, and along the length of Brevig Lagoon. Sea ducks, like king eiders, were hunted along the ice edge at the entrance to Port Clarence. In the late summer and fall, waterfowl were hunted again at Cape Douglas and Brevig Lagoon, and in the Imuruk Basin area, including the lower Agiapuk River drainage, the aptly named Duck Creek, and the southern shore of Imuruk itself. Years ago, some Brevig Mission residents traveled as far as Ikpek Lagoon, northeast of Cape Prince of Wales, and hunted waterfowl and gathered eggs there.

Egg gathering was a common spring activity, especially during spring camping. Hunters ate them while in the country, children gathered them near the camps, and women cooked them for breakfast and snacks. Brevig Mission residents gathered waterfowl eggs around the lakes north of Cape Douglas, and along the length of Brevig Lagoon. Seagull eggs were found in the same locations. Small islands, which protected nests from fox and other predators, were especially productive gathering locations. Murre eggs were gathered at Fairway Rock in the Bering Strait, an occasional activity. The smaller birds' eggs were gathered in the vicinity of camps and the village, often by children who would bring them home for their mothers to cook.

Golovin residents hunted migratory birds in spring on the ice in Golovnin Bay and Lagoon, and later, along the north shore of the Bay and Lagoon, especially in the Kachavik River area and Reindeer Slough. After the ice in the bay broke up, people traveled by boat to Rocky Point and occasionally west to Bluff to gather eggs from murres and gulls. To hunt geese in spring, Golovin hunters have used small

airplanes (one local family runs an air taxi) to fly to the Fish River flats where they land on frozen lakes. In the fall, Golovin residents hunted in wetlands on both sides of the bay and lagoon. Some hunt from a fishing camp at the mouth of the Kachavik Rivers, near areas where flocks of thousand of sandhill cranes and smaller flocks of Canada geese assemble in September each year.

Sobelman reported that Shishmaref residents hunt for migratory birds as part of their fall hunting, gathering, and camping activities. Shishmaref Inlet, Cowpack Inlet, Arctic River, and Serpentine River were especially popular areas for waterfowl hunting (Sobelman 1985:86). Sobelman also reported that Shishmaref hunters generally pursued ducks and geese as they flew south in the fall and that the hunting of waterfowl occurs to a much lesser extent in the spring. These findings were only partly consistent with the results of this survey. In 1989, the Shishmaref sample did report harvesting a greater percentage of its migratory birds in the fall (40 percent) than either Brevig Mission (8 percent) or Golovin (36 percent). But the greatest harvest (52 percent of the total) and the greatest number of species (10 of 11) were reported for the spring hunt.

Since 1974, when a major storm occurred, Shishmaref residents have noticed that waterfowl on their migration northward in the spring appeared to be travelling further inland (Sobelman 1985:86). Hunters in Wainwright, located along the Arctic coast north of Shishmaref, have noticed similar changes in migratory patterns (Nelson 1981).

In all three study communities, residents used wildlife primarily for food. People consumed not only edible meat, but also eggs, blubber, and organs including intestines. The oils and fats of marine mammals, in particular, were staples in all three communities. Hides from marine mammals were made into water-proof footgear, parkas, and hunting bags. Seal skins were used whole for rendering and storing blubber and oil. Hides from terrestrial mammals like wolverine, caribou, fox,

and ground squirrel were made into clothing such as ruffs, footgear, mittens, parks, and caps for personal use and for sale in the handicrafts market.

The meat from wild fowl was used in virtually all cases, but other parts were also used. In Brevig Mission in 1984, for example, between 5 and 20 percent of the households reported using other parts of the bird: heart, liver, stomach, and intestines (not necessarily for human food). People also used down and feathers from waterfowl. Some people wormed dogs by feeding them a mixture of ptarmigan feathers and seal oil.

Although all three villages had electricity in 1989, this is a relatively recent development (Golovin's generator was installed in 1982). Some wild foods were frozen fresh, but traditional processing techniques were still common. Seal blubber was rendered to make oil, meat from fish and mammals was air dried, and walrus blubber and flippers were fermented in covered pits. Most households used wild birds fresh, especially during the spring hunt when waterfowl offered a welcome change of diet. Some households froze birds for later use. Traditional processing techniques were as much a matter of taste as technology; people preferred dried, aged, or fermented products. Even if freezer capacity were available for an season's entire harvest, much food still would be processed traditionally.

WILDLIFE HARVESTS IN 1988-89

During the study year 1988-89, Brevig Mission households reported harvesting an average of 2,472 pounds of edible wild foods, Golovin households reported 2,491 pounds, and Shishmaref households reported 2,654 pounds of wildlife per person. The mix of wildlife species harvested varied from community to community, although in every community marine mammals accounted for more edible weight than any other resource group. These findings are summarized here by community. The average household harvests for major resource groups in each of the three communities appear in Table 3. The proportions of wild foods contributed by major resource groups appear in Figure 2. Complete data for each resource in each community can be found in the tables in Appendix 1.

Brevig Mission

In Brevig Mission, marine mammals accounted for 56.4 percent of the total edible weight harvested, followed by salmon (20.4 percent), other fish (12.6 percent), land mammals (4.4 percent), birds (3.3 percent), plants (3.3 percent), and shellfish (0.3 percent). In other years the proportion of marine mammals harvested might have been greater, because Brevig Mission's spring 1989 hunt was poor.

Of the marine mammals harvested by Brevig Mission residents, walrus accounted for the most edible weight per household (821 pounds), followed by bearded seal (252 pounds), ringed seal (173 pounds), and spotted seal (144 pounds). Of the fish, whitefish harvests per household totaled 154 pounds, followed by sockeye salmon (151 pounds), coho salmon (144 pounds), and chum salmon (122 pounds). Significant harvests of Dolly Varden (57 pounds), saffron cod (56 pounds),

TABLE 3. ESTIMATED AVERAGE HOUSEHOLD HARVESTS IN BREVIG MISSION, GOLOVIN, AND SHISHMAREF, ALASKA

	BREVIG MISSION	GOLOVIN	SHISHMAREF
SALMON			
Households Harvesting	80.0 %	87.9 %	42.9 %
Mean Household Harvest	503.2 lbs	664.3 lbs	69.2 lbs
OTHER FISH			
Households Harvesting	100.0 %	90.9 %	61.9 %
Mean Household Harvest	311.1 lbs	336.3 lbs	170.0 lbs
SHELLFISH			
Households Harvesting	26.7 %	57.6 %	33.3 %
Mean Household Harvest	6.2 lbs	44.2 lbs	18.3 lbs
MARINE MAMMALS			
Households Harvesting	73.3 %	57.6 %	57.1 %
Mean Household Harvest	1,394.4 lbs	788.6 lbs	1,843.0 lbs
LARGE TERRESTRIAL MAMMALS			
Households Harvesting	20.0 %	60.6 %	38.1 %
Mean Household Harvest	108.0 lbs	417.9 lbs	406.7 lbs
SMALL TERRESTRIAL MAMMALS			
Households Harvesting	26.7 %	51.5 %	23.8 %
Mean Household Harvest	1.0 lbs	16.8 lbs	7.0 lbs
GEESE			
Households Harvesting	73.3 %	72.7 %	38.1 %
Mean Household Harvest	58.1 lbs	40.2 lbs	24.4 lbs
DUCKS			
Households Harvesting	66.7 %	69.7 %	42.9 %
Mean Household Harvest	12.7 lbs	21.4 lbs	15.5 lbs
OTHER BIRDS			
Households Harvesting	46.7 %	87.9 %	38.1 %
Mean Household Harvest	7.6 lbs	36.9 lbs	7.5 lbs
WILD EGGS			
Households Harvesting	60.0 %	33.3 %	33.3 %
Mean Household Harvest	2.4 lbs	2.9 lbs	2.8 lbs
PLANTS			
Households Harvesting	93.3 %	93.9 %	81.0 %
Mean Household Harvest	67.3 lbs	121.5 lbs	89.4 lbs

Data were collected during a retrospective survey administered by A.O. Conger during June, July, and August 1989. The samples included 35 percent of the occupied households in Brevig Mission, 80 percent of the occupied households in Golovin, and 18 percent of the occupied households in Shishmaref. Harvests reported by the samples were expanded on a household basis to estimate total community harvests.

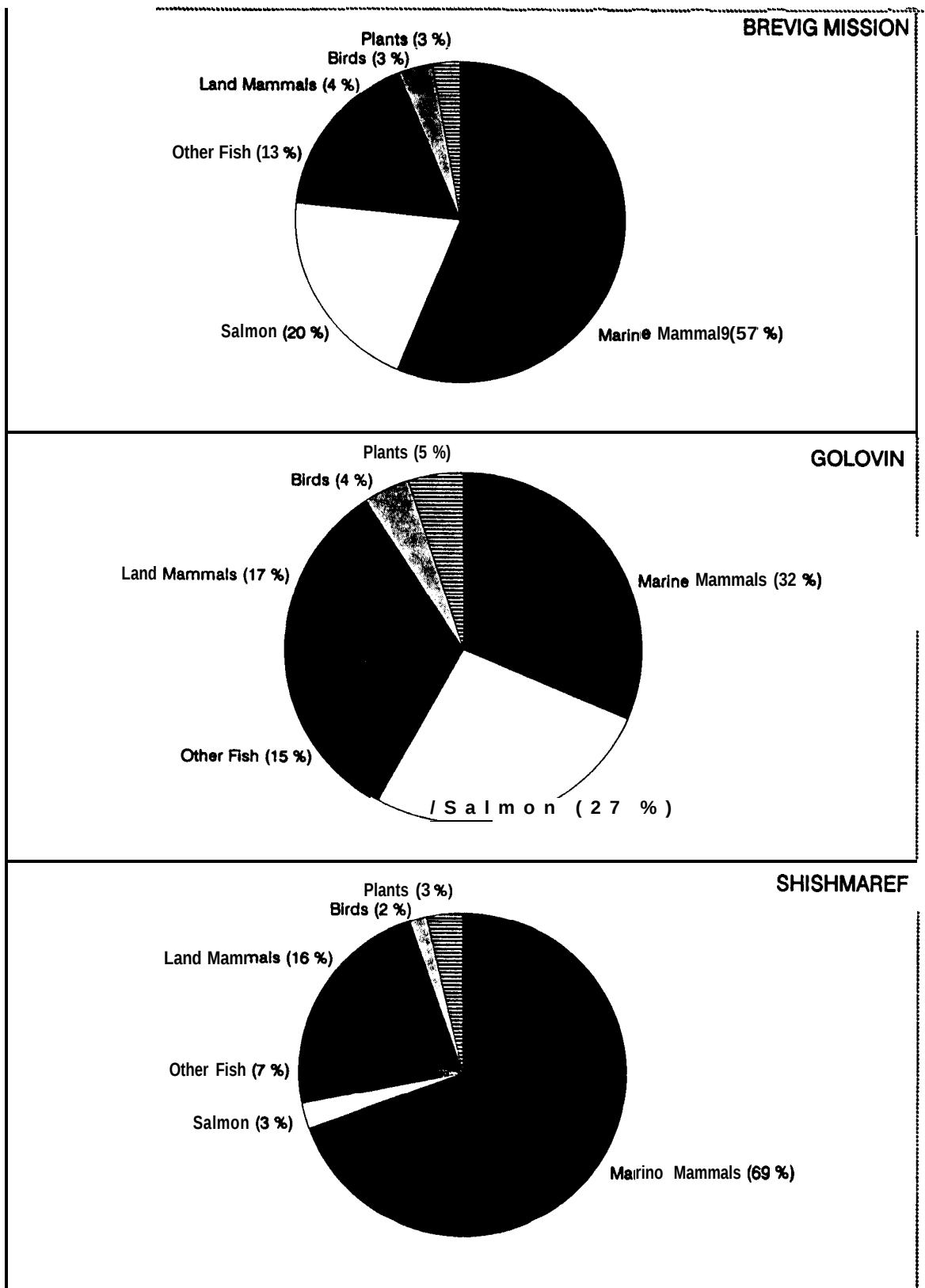


FIGURE 2. COMPOSITION OF ESTIMATED HARVESTS OF WILD FOODS BY EDIBLE WEIGHT, BREVIG MISSION, GOLOVIN, AND SHISHMAREF, ALASKA

and burbot (29 pounds) also were reported. Moose accounted for virtually all of the edible harvests from land mammals (108 pounds per household). Wolverine were reported by two households; arctic hare, arctic ground squirrel, and muskrat harvests each were reported by one household.

Birds accounted for 81 pounds of Brevig Mission's average household harvest (Appendix Tables 4, 5, and 6). Of that 58 pounds were geese. Eighty percent of the households used brants; the average household harvest was estimated to be 23 pounds. Sixty percent of the households used Canada geese and snow geese, with estimated harvests of about 13 pounds each per household. About one third of the households used white-fronted and emperor geese, with harvests of five pounds and four pounds per household, respectively. Duck species were used by fewer households than geese. Eider were reported by 47 percent, pintail by 33 percent, and mallard by 13 percent. Duck harvests totaled approximately 13 pounds per household. Ptarmigan accounted for approximately 6 pounds per household. Wild eggs comprised approximately 2.2 pounds of the average household harvest; most eggs were from gulls, ducks, and swans. In total, Brevig Mission harvested approximately 850 geese, 227 ducks, 376 ptarmigan, six cranes and three swans (Appendix Table 5).

Brevig Mission's harvest of plants was predominantly berries, 57 pounds of the 67 pounds per household reported. Greens accounted for nine pounds, and roots for one pound.

Golovin

In Golovin, the 1988-89 harvest was composed of salmon (26.7 percent), other fish (13.5 percent), marine mammals (31.6 percent), land mammals (17.4 percent), birds

(4.1 percent), plants (4.9 percent), and shellfish (1.8 percent). Birds and plants also played a larger role in the Golovin diet than in Brevig Mission or Shishmaref diets.

Of the marine mammals harvested by Golovin residents, belukha whale accounted for the most edible weight (332 pounds per household), followed by spotted seal (235 pounds), bearded seal (191 pounds), and ringed seal (31 pounds). With their shallow water and narrow shape, Golovnin Bay and Lagoon provided good hunting conditions for belukha. No harvests of belukha were reported by sampled households in Brevig Mission or Shishmaref during the study year. Of the fish harvested by Golovin residents, pink salmon accounted for the most edible weight (278 pounds per household), followed by chum salmon (239 pounds), Dolly Varden (146 pounds), coho salmon (94 pounds), whitefish (83 pounds), saffron cod (55 pounds), and king crab (44 pounds). Chinook (33 pounds) and sockeye (21 pounds) salmon were also reported. Households harvested, on average, less than one herring but more than 40 pounds of herring roe on kelp. Of the land mammals, Golovin residents reported average household harvests of 278 pounds of moose, 132 pounds of caribou, 10 pounds of snowshoe hare, and 8 pounds of brown bear.

Brants and Canada geese were the most commonly used migratory birds in Golovin (Appendix Tables 11, 12, and 13). Eighty five percent of the households used brants and 76 percent used Canada geese. The average household harvest of all geese totaled 40 pounds, of which 18 pounds were brants and 19 pounds were Canada. Pintails and mallards were the most commonly used ducks. Seventy-nine percent of the households used pintails and 55 percent used mallards. The average household harvests of ducks totaled 21 pounds, of which approximately 16 pounds were pintails and 5 pounds were mallards. Ptarmigan were used by 97 percent of the Golovin households, which reported an average harvest of 16.3 pounds. Wild eggs accounted for 2.9 pounds; almost all were gull and murre eggs. In total, Golovin

residents used approximately 591 geese, 584 ducks, 957 ptarmigan, 106 sandhill cranes, 20 swans, and 1 loon (Appendix Table 12).

Of the plants, berries accounted for almost 96 pounds, green plants accounted for 25 pounds, and roots accounted for less than one pound of Golovin's total harvest.

Shishmaref

In Shishmaref, marine mammals accounted for 69.4 percent of the total harvest, three times as much as any other resource category. The next largest component of the harvest was land mammals (15.6 percent), followed by fish (6.4 percent), plants (3.4 percent), salmon (2.6 percent), birds (2.0 percent), and shellfish (0.7 percent).

Of the marine mammals, bearded seal accounted for the largest amount, approximately 680 pounds per household. The walrus harvest was 578 pounds per household, spotted seal 299 pounds, and ringed seal 226 pounds. Polar bear contributed 35 pounds per household, and ribbon seal 25 pounds. No whale harvest was reported, although some use of bowhead did occur. Shishmaref's use of fish was atypical for rural Alaska communities. In most Alaska and most Seward Peninsula communities, salmon harvests outweigh all other fish species combined. But Shishmaref reported an average household harvest of only 69 pounds of salmon, compared with 170 pounds of other fish. This included 41 pounds of whitefish, 47 pounds of tomcod, 31 pounds of herring, 24 pounds of burbot, and smaller amounts of char, grayling, pike and flounder.

Although Shishmaref residents had to travel more than 100 miles east to harvest caribou, caribou was a preferred meat and comprised the majority of land mammals taken by weight, 227 pounds per household. Moose, which were available locally, accounted for 180 pounds. No other large terrestrial mammals were

reported. Use of arctic hare, muskrat, and red fox were reported by about 5 percent of the households; edible portions of these other species were less than ten pounds per household.

In Shishmaref, brant was the most commonly used bird (by 67 percent of the households), followed by Canada geese (57 percent) and pintails (52 percent) (Appendix Tables 18, 19, and 20). Households harvested an average of 24 pounds of geese, of which 13 pounds were Canada geese, 7 pounds were brants, and the remainder were snow geese and white-fronted geese. Households harvested an average of 15 pounds of ducks, of which 8 pounds were pintails, 4 pounds were mallards, and the remainder were scaups, scoters, eiders, and teal. Ptarmigan accounted for about 7 pounds of the average household harvest; sandhill cranes accounted for about 1 pound. Eggs from gulls and ducks provided about 3 pounds to the average household; of which more than 2 pounds were from the gulls. The total community harvest was estimated to be 951 geese, 1167 ducks, 17 sandhill cranes, and 1,113 ptarmigan (Appendix Table 19).

Eighty nine pounds of the harvest was plants. Of this harvest, 70 pounds were berries, almost 19 pounds were green plants, and less than half a pound was roots.

SUMMARY

The three Seward Peninsula communities surveyed in this study reported substantial and diverse harvests of fish and wildlife. The average harvests per person were 579 pounds in Brevig Mission, 604 pounds in Golovin, and 663 pounds in Shishmaref. These harvests are consistent with the average 610 pounds per capita reported by other Arctic and Sub-Arctic coastal communities (Wolfe and Walker 1987:65). Per capita harvests of major resource categories are shown for each of the study communities in Figure 3. The Arctic and Sub-Arctic coasts have the highest average per capita harvests of any other Alaska region communities surveyed by the Division of Subsistence (Wolfe and Walker 1985).

Respondents reported harvests of 45 different categories of resources in Shishmaref, 47 in Brevig Mission, and 57 in Golovin. (Categories usually included a single species, except for shellfish and plants which included more than one species). But a smaller, core group of resources comprised the majority of the harvest. Five species accounted for 55 percent of Golovin's harvest, 63 percent of Brevig Mission's harvest, and 76 percent of Shishmaref's harvest. Ten species provided 81 percent of Golovin's harvest, 86 percent of Brevig Mission's harvest, and 90 percent of Shishmaref's harvest.

Although species mix varied, especially between Golovin on the one hand, and Shishmaref and Brevig Mission on the other, three species contributed large amounts of food to all three communities. These were bearded seal, spotted seal, and moose. Salmon were major resources for Golovin and Brevig Mission, but less so for Shishmaref where tomcod and whitefish provided more food. Households in Shishmaref and Golovin relied heavily on caribou, a resource that was not available near Brevig Mission. Shishmaref and Brevig Mission were well situated to harvest

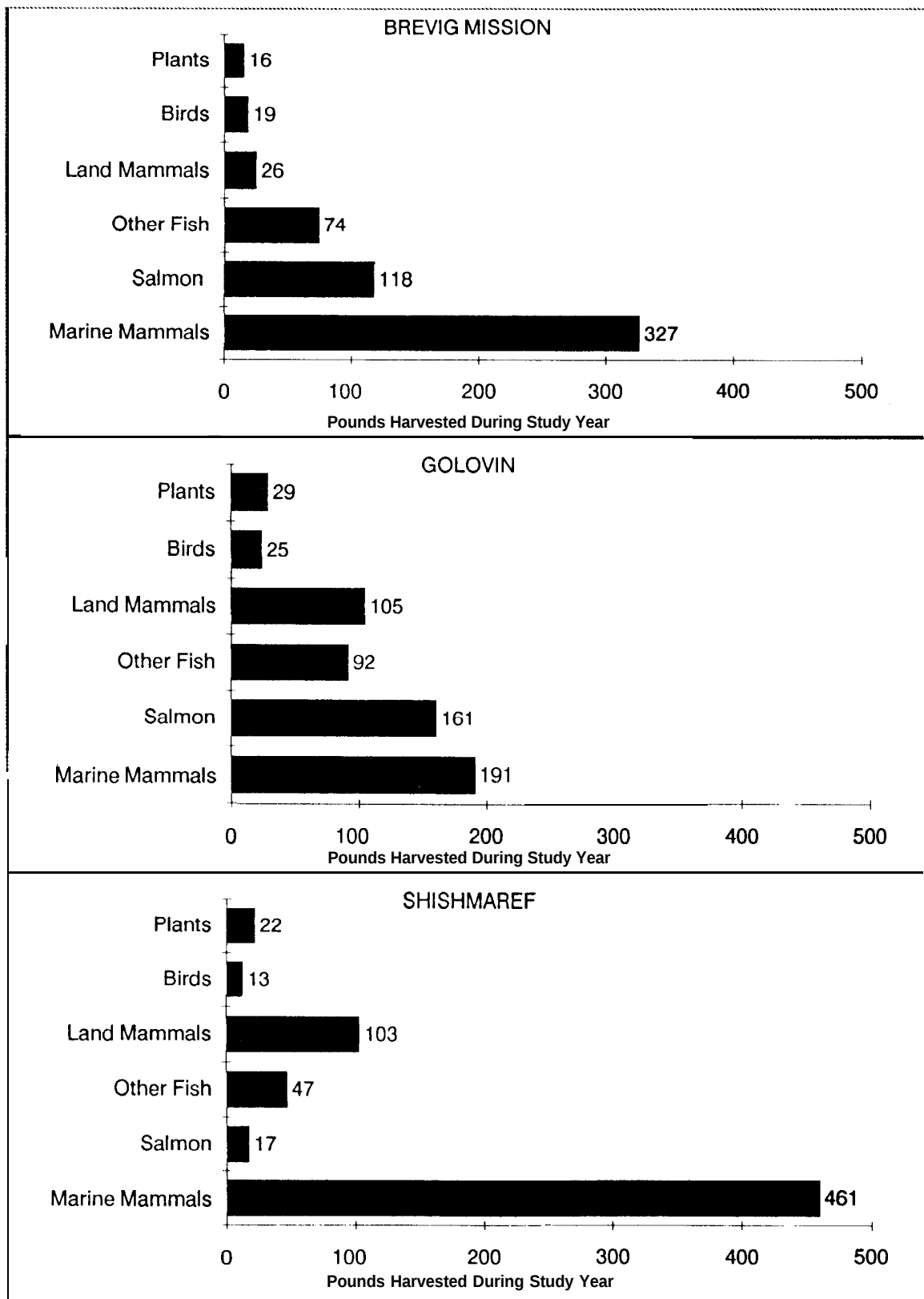


FIGURE 3. ESTIMATED ANNUAL PER CAPITA HARVESTS OF WILD FOODS BY EDIBLE WEIGHT, BREVIG MISSION, GOLOVIN, AND SHISHMAREF, ALASKA

walrus. Walrus was the leading food source in Brevig Mission and the second in Shishmaref. But walrus were uncommon near Golovin, and none were reported during the study year. Migratory birds were a significant component of the diet in all three communities. Brants, Canada geese, pintails and mallards in particular were harvested by all three communities. In addition significant numbers of snow geese and eider ducks were harvested by Brevig Mission. Golovin was well situated for sandhill cranes in the fall, and Golovin harvests reflected that. Lest anyone discount the importance of plants in the subsistence diet, berries were among the top ten resources in Golovin and Shishmaref by edible weight, and were ranked twelfth in Brevig Mission.

Although numerous scientists have studied Seward Peninsula's history and culture in considerable detail, these data are the first comprehensive quantified harvest data published. They indicate that reliance on marine mammals may be even greater than was suspected, but otherwise are consistent with the findings of earlier investigations.

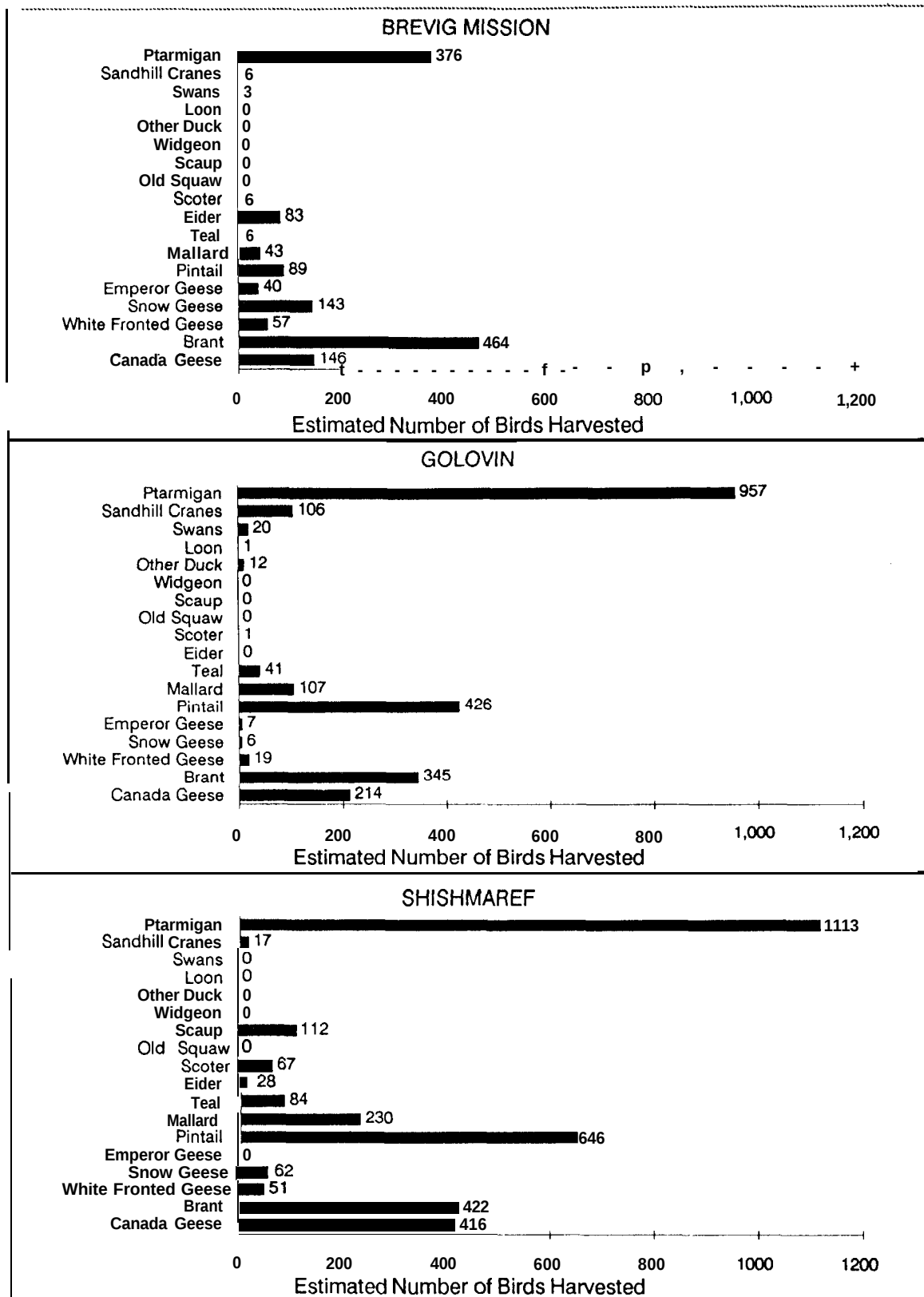
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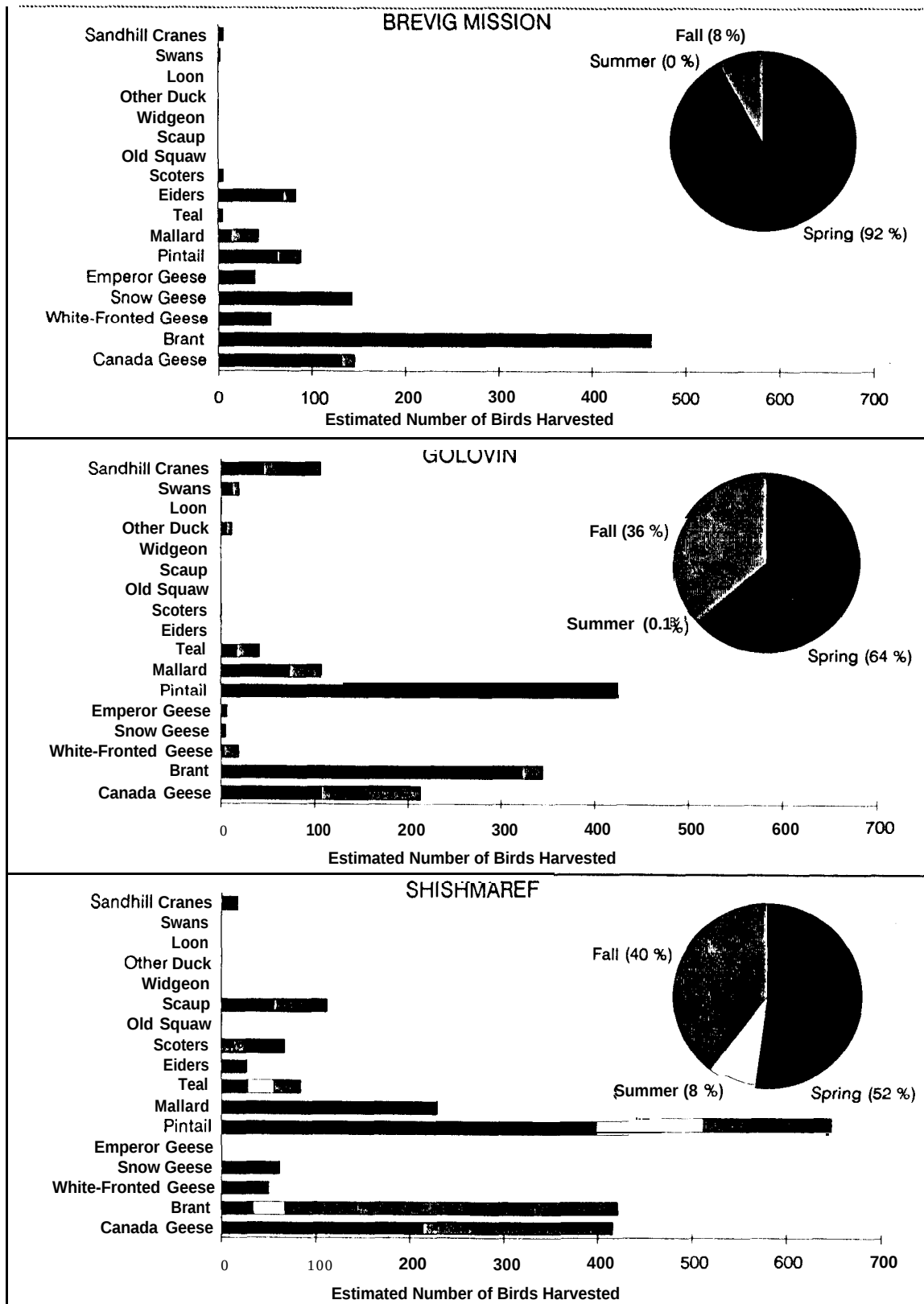
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APPENDIX 1

**FIGURES SHOWING THE EXPANDED ESTIMATED
HARVESTS OF BIRDS BY RESIDENTS OF BREVIG
MISSION, GOLOVIN, AND SHISHMAREF**



APPENDIX FIGURE 1. ESTIMATED NUMBER OF BIRDS HARVESTED FROM JULY 1, 1988, TO JUNE 30, 1989, BY RESIDENTS OF BREVIG MISSION, GOLOVIN, AND SHISHMAREF, ALASKA



APPENDIX FIGURE 2. ESTIMATED NUMBER OF MIGRATORY BIRDS HARVESTED BY SEASON, BREVIG MISSION, GOLOVIN, AND SHISHMAREF, ALASKA

APPENDIX 2

**TABLES OF USE AND EXPANDED ESTIMATED
HARVESTS OF FISH AND WILDLIFE IN BREVIG
MISSION, GOLOVIN, AND SHISHMAREF**

APPENDIX TABLE 1. USE AND EXPANDED ESTIMATED HARVESTS OF MARINE MAMMALS, BREVIG MISSION, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Belukha	0.0	0.0	0.0	0 (± 0 %)	0.0
Bowhead	0.0	0.0	0.0	0 (± 0 %)	0.0
Gray Whale	60.0	6.7	6.7	1 (± 0 %)	4.7
Polar Bear	0.0	0.0	0.0	0 (± 0 %)	0.0
Bearded Seal	60.0	46.7	33.3	25 (± 79 %)	252.0
Ribbon Seal	0.0	0.0	0.0	0 (± 0 %)	0.0
Ringed Seal	20.0	26.7	20.0	100 (± 110%)	172.7
Spotted Seal	60.0	60.0	53.3	63 (± 66 %)	143.7
Walrus	46.7	53.3	46.7	106 (± 76 %)	821.3

Data were collected during a retrospective survey administered by A.O. Conger to 35 percent of the occupied households in Brevig Mission during July 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 2. USE AND EXPANDED ESTIMATED HARVESTS OF FISH AND SHELLFISH, BREVIG MISSION, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Chum Salmon	100.0	73.3	66.7	1,175 (± 51 %)	122.2
Coho Salmon	93.3	80.0	66.7	1,353 (± 51 %)	144.4
Chinook Salmon	93.3	60.0	53.3	80 (± 59 %)	25.8
Pink Salmon	93.3	60.0	60.0	1,132 (± 74 %)	60.3
Sockeye Salmon	100.0	66.7	66.7	1,533 (± 58 %)	150.5
Burbot	0.0	0.0	0.0	0 (± 0 %)	0.0
Tom Cod	100.0	93.3	93.3	11,357 (± 51 %)	55.5
Flounder	20.0	20.0	20.0	1,238 (± 123 %)	28.8
Grayling	0.0	0.0	0.0	0 (± 0 %)	0.0
Herring	40.0	33.3	33.3	2,267 (± 110 %)	9.5
Roe on Kelp	0.0	0.0	0.0	0 (± 0 %) gal	0.0
Pike	26.7	6.7	6.7	2 (± 173 %)	0.2
Sculpin	13.3	13.3	13.3	43 (± 125 %)	1.5
Smelt (Eulachon)	6.7	6.7	6.7	1,430 (± 173 %)	4.7
Dolly Varden	80.0	66.7	66.7	748 (± 108 %)	57.4
Whitefish	86.7	66.7	66.7	2,201 (± 76 %)	153.6
Other Fish	0.0	0.0	0.0	0 (± 0 %)	0.0
Clams	0.0	0.0	0.0	0 (± 0 %) gal	0.0
King Crab	26.7	26.7	26.7	126 (± 118 %)	6.2
Mussels	0.0	0.0	0.0	0 (± 0 %) gal	0.0

Data were collected during a retrospective survey administered by A.O. Conger to 35 percent of the occupied households in Brevig Mission during July 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 3. USE AND EXPANDED ESTIMATED HARVESTS OF LAND MAMMALS, BREVIG MISSION, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Brown/Grizzly Bear	0.0	0.0	0.0	0 ($\pm$ 0 %)	0.0
Caribou	26.7	0.0	0.0	0 ($\pm$ 0 %)	0.0
Moose	86.7	40.0	20.0	8 ($\pm$ 93 %)	108.0
Arctic Fox	0.0	0.0	0.0	0 ($\pm$ 0 %)	0.0
Beaver	0.0	0.0	0.0	0 ($\pm$ 0 %)	0.0
Arctic Hare	6.7	6.7	6.7	5 ($\pm$ 173 %)	0.8
Snowshoe Hare	6.7	0.0	0.0	0 ($\pm$ 0 %)	0.0
Land Otter	0.0	0.0	0.0	0 ($\pm$ 0 %)	0.0
Muskrat	6.7	6.7	6.7	2 ($\pm$ 173 %)	0.1
Red Fox	0.0	0.0	0.0	0 ($\pm$ 0 %)	0.0
Weasel	0.0	0.0	0.0	0 ($\pm$ 0 %)	0.0
Wolf	0.0	0.0	0.0	0 ($\pm$ 0 %)	0.0
Wolverine	13.3	13.3	13.3	5 ($\pm$ 118 %)	0.0
Arctic Ground Squirrel	6.7	6.7	6.7	5 ($\pm$ 173 %)	0.0

Data were collected during a retrospective survey administered by A.O. Conger to 35 percent of the occupied households in Brevig Mission during July 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 4. USE OF BIRDS, BREVIG MISSION, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS				
	USING	ATTEMPTING TO HARVEST	HARVESTING	GIVING AWAY	RECEIVING
Canada Geese	60.0	60.0	53.3	40.0	20.0
Brant	80.0	80.0	66.7	53.3	26.7
White-Fronted Geese	26.7	26.7	26.7	13.3	6.7
Snow Geese	60.0	60.0	60.0	26.7	6.7
Emperor Geese	33.3	33.3	33.3	13.3	6.7
Pintail	33.3	33.3	33.3	13.3	6.7
Mallard	13.3	13.3	13.3	6.7	0.0
Teal	6.7	6.7	6.7	0.0	0.0
Eider	46.7	40.0	40.0	26.7	13.3
Scoter	6.7	6.7	6.7	0.0	0.0
Old Squaw	0.0	0.0	0.0	0.0	0.0
Scaup	0.0	0.0	0.0	0.0	0.0
Widgeon	0.0	0.0	0.0	0.0	0.0
Other Duck	0.0	0.0	0.0	0.0	0.0
Loon	0.0	0.0	0.0	0.0	0.0
Swans	6.7	6.7	6.7	0.0	0.0
Sandhill Cranes	13.3	13.3	13.3	6.7	6.7
Ptarmigan	53.3	46.7	46.7	40.0	26.7

Data were collected during a retrospective survey administered by A.O. Conger to 35 percent of the occupied households in Brevig Mission during July 1989.

APPENDIX TABLE 5. EXPANDED ESTIMATED HARVESTS OF BIRDS BY SEASON, BREVIG MISSION, ALASKA

	TOTAL NUMBER OF BIRDS HARVESTED BY COMMUNITY					AVERAGE HOUSEHOLD HARVEST (POUNDS)
	SUMMER 1988	FALL 1988	SPRING 1989	TOTAL	CONFIDENCE INTERVAL	
Canada Geese	0	14	132	146	± 56 %	12.6
Brant	0	0	464	464	± 62 %	22.7
White-Fronted Geese	0	0	57	57	± 89 %	5.5
Snow Geese	0	0	143	143	± 53 %	13.3
Emperor Geese	0	0	40	40	± 86 %	4.0
Pintail	0	26	63	89	± 88 %	3.1
Mallard	0	29	14	43	± 125 %	1.8
Teal	0	0	6	6	± 173 %	0.1
Eiders	0	14	69	83	± 64 %	7.5
Scoters	0	0	6	6	± 173 %	0.2
Old Squaw	0	0	0	0	± 0 %	0.0
Scaup	0	0	0	0	± 0 %	0.0
Widgeon	0	0	0	0	± 0 %	0.0
Other Duck	0	0	0	0	± 0 %	0.0
Loon	0	0	0	0	± 0 %	0.0
Swans	0	0	3	3	± 173 %	0.7
Sandhill Cranes	0	0	6	6	± 118 %	0.8
Ptarmigan				376	± 60 %	6.1

Data were collected during a retrospective survey administered by A.O. Conger to 35 percent of the occupied households in Brevig Mission during July 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 6. USE AND EXPANDED ESTIMATED HARVESTS OF WILD EGGS, BREVIG MISSION, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Murre	0.0	0.0	0.0	0 (± 0 %)	0.0
Gull	46.7	40.0	40.0	252 (± 79 %)	0.9
Swan	13.3	13.3	13.3	23 (± 151 %)	0.3
Duck	40.0	33.3	33.3	295 (± 85 %)	0.6
Goose	6.7	6.7	6.7	14 (± 173 %)	0.1
Tern	6.7	6.7	6.7	57 (± 173 %)	0.1
Plover	26.7	20.0	20.0	80 (± 108 %)	0.1
Snipe	20.0	20.0	20.0	120 (± 98 %)	0.1

Data were collected during a retrospective survey administered by A.O. Conger to 35 percent of the occupied households in Brevig Mission during July 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 7. USE AND EXPANDED ESTIMATED HARVESTS OF PLANTS, BREVIG MISSION, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Berries	86.7	73.3	73.3	306 ($\pm$ 49 %)	gal 57.1
Plants	80.0	80.0	80.0	51 ($\pm$ 47 %)	gal 9.6
Roots	26.7	26.7	26.7	28 ($\pm$ 94 %)	lbs 0.7

Data were collected during a retrospective survey administered by A.O. Conger to 35 percent of the occupied households in Brevig Mission during July 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 8. USE AND EXPANDED ESTIMATED HARVESTS OF MARINE MAMMALS,
GOLOVIN, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Belukha	75.8	36.4	15.2	13 ($\pm$ 43%)	331.7
Bowhead	18.2	0.0	0.0	0 (20%)	0.0
Gray Whale	0.0	0.0	0.0	0 ($\pm$ 0%)	0.0
Polar Bear	3.0	0.0	0.0	0 (20%)	0.0
Bearded Seal	57.6	36.4	30.3	18 ($\pm$ 30%)	190.9
Ribbon Seal	0.0	3.0	0.0	0 (20%)	0.0
Ringed Seal	15.2	12.1	9.1	17 ($\pm$ 67%)	31.4
Spotted Seal	87.9	57.6	54.5	98 ($\pm$ 29%)	234.6
Walrus	6.1	9.1	0.0	0 ($\pm$ 0%)	0.0

Data were collected during a retrospective survey administered by A.O. Conger to 80 percent of the occupied households in Golovin during June 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 9. USE AND EXPANDED ESTIMATED HARVESTS OF FISH AND SHELLFISH, GOLOVIN, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Chum Salmon	100.0	87.9	84.8	2,190 (± 22 %)	238.8
Coho Salmon	75.8	60.6	60.6	836 (± 34%)	93.7
Chinook Salmon	69.7	45.5	42.4	98 (± 37 %)	33.1
Pink Salmon	87.9	72.7	72.7	4,968 (± 28 %)	277.5
Sockeye Salmon	39.4	33.3	30.3	206 (± 72%)	21.2
Burbot	12.1	9.1	6.1	16 (± 72%)	1.7
Tom Cod	81.8	78.8	78.8	10,742 (± 20 %)	55.0
Flounder	3.0	6.1	9.1	133 (± 84%)	3.2
Grayling	54.5	45.5	36.4	299 (± 26%)	5.1
Herring	15.2	12.1	12.1	174 (± 63%)	0.8
Roe on Kelp	72.7	48.5	48.5	207 (± 22 %) gal	40.5
Pike	12.1	12.1	6.1	14 (± 82 %)	0.9
Sculpin	0.0	0.0	0.0	0 (± 0 %)	0.0
Smelt (Eulachon)	3.0	3.0	3.0	124 (± 90 %)	0.4
Dolly Varden	87.9	75.8	75.8	1,809 (± 23 %)	145.6
Whitefish	42.4	33.3	30.3	1,131 (± 52 %)	82.7
Other Fish	3.0	3.0	3.0	12 (± 90 %)	0.3
Clams	21.2	27.3	21.2	17 (± 39 %) gal	0.7
King Crab	87.9	48.5	42.4	850 (± 38%)	43.5
Mussels	0.0	3.0	0.0	0 (± 0 %) gal	0.0

Data were collected during a retrospective survey administered by A.O. Conger to 80 percent of the occupied households in Golovin during June 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests. Data include salmon removed from commercial catches for subsistence uses as well as salmon caught in subsistence fisheries.

APPENDIX TABLE 10. USE AND EXPANDED ESTIMATED HARVESTS OF LAND MAMMALS, GOLOVIN, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Brown/Grizzly Bear	15.2	12.1	9.1	4 (± 50 %)	7.8
Caribou	87.9	24.2	18.2	40 (± 37 %)	131.9
Moose	90.9	54.5	45.5	21 (± 19 %)	278.2
Arctic Fox	6.1	3.0	3.0	1 (± 90 %)	0.0
Beaver	12.1	9.1	9.1	12 (± 59 %)	6.1
Arctic Hare	9.1	9.1	6.1	4 (± 66 %)	0.6
Snowshoe Hare	54.5	51.5	45.5	163 (± 24 %)	9.9
Land Otter	6.1	3.0	3.0	1 (± 90 %)	0.0
Muskrat	12.1	6.1	6.1	6 (± 64 %)	0.3
Red Fox	12.1	15.2	12.1	55 (± 55 %)	0.0
Weasel	3.0	3.0	3.0	1 (± 90 %)	0.0
Wolf	6.1	9.1	3.0	2 (± 90 %)	0.0
Wolverine	0.0	3.0	0.0	0 (± 0 %)	0.0
Arctic Ground Squirrel	6.1	6.1	6.1	31 (± 64 %)	0.0

Data were collected during a retrospective survey administered by A.O. Conger to 80 percent of the occupied households in Golovin during June 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 11. USE OF BIRDS, GOLOVIN, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS				
	USING	ATTEMPTING TO HARVEST	HARVESTING	GIVING AWAY	RECEIVING
Canada Geese	75.8	51.5	51.5	24.2	24.2
Brant	84.8	57.6	51.5	24.2	45.5
White-Fronted Geese	9.1	12.1	9.1	6.1	0.0
Snow Geese	3.0	3.0	3.0	3.0	0.0
Emperor Geese	6.1	6.1	3.0	0.0	3.0
Pintail	78.8	66.7	66.7	30.3	33.3
Mallard	54.5	48.5	45.5	9.1	12.1
Teal	21.2	21.3	18.2	3.0	3.0
Eiders	0.0	0.0	0.0	0.0	0.0
Scoters	3.0	3.0	3.0	0.0	0.0
Old Squaw	0.0	0.0	0.0	0.0	0.0
Scaup	0.0	0.0	0.0	0.0	0.0
Widgeon	0.0	0.0	0.0	0.0	0.0
Other Duck	6.1	6.1	6.1	3.0	0.0
Loon	3.0	3.0	3.0	0.0	0.0
Swans	24.2	21.2	21.2	6.1	3.0
Sandhill Cranes	66.7	57.6	51.5	21.2	21.2
Ptarmigan	97.0	84.8	81.8	54.5	39.4

Data were collected during a retrospective survey administered by A.O. Conger to 80 percent of the occupied households in Golovin during June 1989.

APPENDIX TABLE 12. EXPANDED ESTIMATED HARVESTS OF BIRDS BY SEASON, GOLOVIN, ALASKA

	TOTAL NUMBER OF BIRDS HARVESTED BY COMMUNITY					AVERAGE HOUSEHOLD HARVEST (POUNDS)
	SUMMER 1988	FALL 1988	SPRING 1989	TOTAL	CONFIDENCE INTERVAL	
Canada Geese	0	107	107	214	± 33 %	19.3
Brant	0	23	322	345	± 34 %	17.7
White-Fronted Geese	0	16	3	19	± 73%	1.9
Snow Geese	0	0	6	6	± 90 %	0.6
Emperor Geese	0	0	7	7	± 90 %	0.8
Pintail	0	191	235	426	± 22 %	15.6
Mallard	0	34	73	107	± 23 %	4.7
Teal	0	24	17	41	± 41 %	0.5
Eiders	0	0	0	0	± 0 %	0.0
Scoters	0	1	0	1	± 90 %	0.0
Old Squaw	0	0	0	0	± 0 %	0.0
Scaup	0	0	0	0	± 0 %	0.0
Widgeon	0	0	0	0	± 0 %	0.0
Other Duck	0	6	6	12	± 63 %	0.5
Loon	1	0	0	1	± 90 %	0.1
Swans	0	8	12	20	± 36 %	5.1
Sandhill Cranes	0	61	45	106	± 23 %	15.5
Ptarmigan				957	± 18%	16.3

Data were collected during a retrospective survey administered by A.O. Conger to 80 percent of the occupied households in Golovin during June 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 13. USE AND EXPANDED ESTIMATED HARVESTS OF WILD EGGS, GOLOVIN, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING To HARVEST	HARVESTING		
Murre	12.1	12.1	12.1	184 (± 63 %)	0.8
Gull	24.2	24.2	24.2	458 (± 46%)	1.8
Swan	6.1	6.1	6.1	4 (± 66 %)	0.1
Duck	3.0	3.0	3.0	62 (± 90 %)	0.1
Goose	3.0	3.0	3.0	25 (± 90 %)	0.1
Tern	0.0	0.0	0.0	0 (± 0 %)	0.0
Plover	0.0	0.0	0.0	0 (± 0 %)	0.0
Snipe	0.0	0.0	0.0	0 (± 0 %)	0.0

Data were collected during a retrospective survey administered by A.O. Conger to 80 percent of the occupied households in Golovin during June 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 14. USE AND EXPANDED ESTIMATED HARVESTS OF PLANTS, GOLOVIN, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING To HARVEST	HARVESTING		
Berries	97.0	90.9	90.9	491 (± 17 %)	gal 95.8
Plants	90.9	87.9	87.9	129 (± 19 %)	gal 25.1
Roots	21.2	18.2	15.2	25 (± 47 %)	lbs 0.6

Data were collected during a retrospective survey administered by A.O. Conger to 80 percent of the occupied households in Golovin during June 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 15. USE AND EXPANDED ESTIMATED HARVESTS OF MARINE MAMMALS, SHISHMAREF, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Belukha	0.0	0.0	0.0	0 (± 0 %)	0.0
Bowhead	4.8	0.0	0.0	0 (± 0 %)	0.0
Gray Whale	4.8	0.0	0.0	0 (± 0 %)	0.0
Polar Bear	4.8	4.8	4.8	11 (± 190%)	35.4
Bearded Seal	81.0	47.6	47.6	191 (± 53 %)	680.0
Ribbon Seal	19.0	19.0	19.0	39 (± 90 %)	25.0
Ringed Seal	38.1	19.0	19.0	359 (± 117 %)	225.5
Spotted Seal	47.6	33.3	33.3	359 (± 88 %)	298.7
Walrus	61.9	33.3	28.6	224 (± 83 %)	577.5

Data were collected during a retrospective survey administered by A.O. Conger, H.B. Loon, and E. Ningeulook to 18 percent of the occupied households in Shishmaref during August 1989.

APPENDIX TABLE 16. USE AND EXPANDED ESTIMATED HARVESTS OF FISH AND SHELLFISH, SHISHMAREF, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Chum Salmon	57.1	38.1	38.1	798 ($\pm$ 69 %)	30.2
Coho Salmon	38.1	33.3	33.3	826 ($\pm$ 87%)	32.1
Chinook Salmon	23.8	4.8	0.0	0 ($\pm$ 0 %)	0.0
Pink Salmon	23.8	23.8	19.0	247 ($\pm$ 114%)	4.8
Sockeye Salmon	19.0	9.5	4.8	56 ($\pm$ 189%)	2.0
Burbot	38.1	19.0	14.3	663 ($\pm$ 137%)	23.6
Tom Cod	71.4	52.4	47.6	26,511 ($\pm$ 82%)	47.2
Flounder	9.5	4.8	4.8	450 ($\pm$ 189 %)	3.8
Grayling	57.1	23.8	23.8	1,163 ($\pm$ 79 %)	6.9
Herring	57.1	19.0	19.0	20,099 ($\pm$ 116 %)	30.7
Roe on Kelp	0.0	0.0	0.0	0 ($\pm$ 0 %) gal	0.0
Pike	0.0	0.0	0.0	0 ($\pm$ 0 %)	0.0
Sculpin	23.8	9.5	9.5	337 ($\pm$ 132%)	4.3
Smelt (Eulachon)	33.3	19.0	19.0	5,085 ($\pm$ 112%)	6.0
Dolly Varden	42.9	23.8	23.8	309 ($\pm$ 109%)	8.6
Whitefish	81.0	52.4	47.6	1,605 ($\pm$ 61 %)	40.8
Other Fish	0.0	0.0	0.0	0 (20 %)	0.0
Clams	23.8	9.5	9.5	39 ($\pm$ 143 %) gal	0.5
King Crab	57.1	33.3	33.3	1,000 ($\pm$ 78 %)	17.8
Mussels	0.0	0.0	0.0	0 ($\pm$ 0 %) gal	0.0

Data were collected during a retrospective survey administered by A.O. Conger, H.B. Loon, and E. Ningeulook to 18 percent of the occupied households in Shishmaref during August 1989.

APPENDIX TABLE 17. USE AND EXPANDED ESTIMATED HARVESTS OF LAND MAMMALS, SHISHMAREF, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNIN	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Brown/Grizzly Bear	0.0	0.0	0.0	0 (± 0 %)	0.0
Caribou	47.6	19.0	19.0	196 (± 102 %)	226.7
Moose	76.2	33.3	33.3	39 (± 60 %)	180.0
Arctic Fox	0.0	0.0	0.0	0 (± 0 %)	0.0
Beaver	0.0	0.0	0.0	0 (± 0 %)	0.0
Arctic Hare	4.8	4.8	4.8	112 (± 189 %)	6.0
Snowshoe Hare	4.8	0.0	0.0	0 (± 0 %)	0.0
Land Otter	0.0	0.0	0.0	0 (± 0 %)	0.0
Muskrat	4.8	4.8	4.8	67 (± 189 %)	1.0
Red Fox	4.8	4.8	4.8	28 (± 189 %)	0.0
Weasel	0.0	0.0	0.0	0 (± 0 %)	0.0
Wolf	0.0	0.0	0.0	0 (± 0 %)	0.0
Wolverine	0.0	4.8	0.0	0 (± 0 %)	0.0
Arctic Ground Squirrel	42.9	23.8	23.8	505 (± 93 %)	0.0

Data were collected during a retrospective survey administered by A.O. Conger, H.B. Loon, and E. Ningeulook to 18 percent of the occupied households in Shishmaref during August 1989.

APPENDIX TABLE 18. USE OF BIRDS, SHISHMAREF, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS				
	USING	ATTEMPTING TO HARVEST	HARVESTING	GIVING AWAY	RECEIVING
Canada Geese	57.1	28.6	28.6	23.8	38.1
Brant	66.7	33.1	28.6	23.8	47.6
White-Fronted Geese	23.8	9.5	9.5	4.8	19.0
Snow Geese	23.8	9.5	9.5	4.8	19.0
Emperor Geese	28.6	0.0	0.0	0.0	28.6
Pintail	52.4	38.1	33.3	14.3	33.3
Mallard	23.8	9.5	9.5	4.8	19.0
Teal	14.3	4.8	4.8	4.8	14.3
Eiders	33.3	9.5	9.5	0.0	23.8
Scoters	4.8	4.8	4.8	4.8	4.8
Old Squaw	4.8	0.0	0.0	0.0	4.8
Scaup	4.8	4.8	4.8	4.8	4.8
Widgeon	0.0	0.0	0.0	0.0	0.0
Other Duck	0.0	0.0	0.0	0.0	0.0
Loon	0.0	0.0	0.0	0.0	0.0
Swans	14.3	0.0	0.0	0.0	14.3
Sandhill Cranes	19.0	4.8	4.8	4.8	19.0
Ptarmigan	66.7	38.1	38.1	28.6	47.6

Data were collected during a retrospective survey administered by A.O. Conger, H.B. Loon, and E. Ningeulook to 18 percent of the occupied households in Shishmaref during August 1989.

APPENDIX TABLE 19. EXPANDED ESTIMATED HARVESTS OF BIRDS BY SEASON,
SHISHMAREF, ALASKA

	TOTAL NUMBER OF BIRDS HARVESTED BY COMMUNITY					AVERAGE HOUSEHOLD HARVEST (POUNDS)
	SUMMER 1988	FALL 1988	SPRING 1989	TOTAL	CONFIDENCE INTERVAL	
Canada Geese	0	202	214	416	± 76 %	13.0
Brant	34	354	34	422	± 72 %	7.5
White-Fronted Geese	0	0	51	51	± 131 %	1.8
Snow Geese	0	0	62	62	± 172 %	2.1
Emperor Geese	0	0	0	0	± 0 %	0.0
Pintail	112	135	399	646	± 79 %	8.2
Mallard	0	0	230	230	± 167 %	3.5
Teal	28	28	28	84	± 189 %	0.4
Eiders	0	0	28	28	± 132 %	0.9
Scoters	0	67	0	67	± 189 %	0.9
Old Squaw	0	0	0	0	± 0 %	0.0
Scaup	0	56	56	112	± 189 %	1.5
Widgeon	0	0	0	0	± 0 %	0.0
Other Duck	0	0	0	0	± 0 %	0.0
Loon	0	0	0	0	± 0 %	0.0
Swans	0	0	0	0	± 0 %	0.0
Sandhill Cranes	0	0	17	17	± 189 %	0.9
Ptarmigan				1,113	± 86 %	6.6

Data were collected during a retrospective survey administered by A.O. Conger, H.B. Loon, and E. Ningeulook to 18 percent of the occupied households in Shishmaref during August 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

**APPENDIX TABLE 20. USE AND EXPANDED ESTIMATED HARVESTS OF WILD EGGS,
SHISHMAREF, ALASKA**

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING TO HARVEST	HARVESTING		
Murre	0.0	0.0	0.0	0 (± 0 %)	0.0
Gull	57.1	38.1	33.3	1618 (± 108%)	2.2
Swan	4.8	0.0	0.0	0 (± 0 %)	0.0
Duck	42.9	23.8	23.8	697 (± 125%)	0.5
Goose	9.5	0.0	0.0	0 (± 0 %)	0.0
Tern	0.0	0.0	0.0	0 (± 0 %)	0.0
Plover	9.5	4.8	4.8	67 (± 189 %)	0.003
Snipe	0.0	0.0	0.0	0 (± 0 %)	0.0

Data were collected during a retrospective survey administered by A.O. Conger, H.B. Loon, and E. Ningeulook to 18 percent of the occupied households in Shishmaref during August 1989. Harvests reported by the sample were expanded on a household basis to estimate total community harvests.

APPENDIX TABLE 21. USE AND EXPANDED ESTIMATED HARVESTS OF PLANTS, SHISHMAREF, ALASKA

	PERCENTAGE OF SAMPLED HOUSEHOLDS			TOTAL NUMBER HARVESTED BY COMMUNITY	AVERAGE HOUSEHOLD HARVEST (POUNDS)
	USING	ATTEMPTING To HARVEST	HARVESTING		
Berries	85.7	81.0	81.0	1034 (± 50 %)	gal 70.1
Plants	61.9	52.4	52.4	278 (± 54 %)	gal 18.8
Roots	9.5	9.5	9.5	51 (± 168 %)	lbs 0.4

APPENDIX 3
CONVERSION FACTORS USED TO CALCULATE
EDIBLE WEIGHTS

1989 SEWARD PENINSULA SURVEY CONVERSION FACTORS

RESOURCE	UNIT OF MEASUREMENT	POUNDS PER UNIT	REFERENCE OR COMMENT
MARINE MAMMALS			
Belukha	each	995.0	Kotzebue Survey
Bowhead	each		no conversion used
Gray Whale	each		no conversion used
Polar Bear	each	372.0	Kotzebue Survey
Bearded Seal	each	420.0	Kotzebue Survey
Ribbon Seal	each	75.0	Kotzebue Survey
Ringed Seal	each	74.0	Kotzebue Survey
Spotted Seal	each	98.0	Kotzebue Survey
Walrus	each	770.0	see methodology
FISH			
Chum Salmon	each	4.47	1987 Nushagak
Coho Salmon	each	4.59	1987 Nushagak
Chinook	each	13.81	1987 Nushagak
Pink Salmon	each	2.29	1987 Nushagak
Sockeye Salmon	each	4.22	1987 Nushagak
Herring	each	0.18	1987 Nushagak
Burbot	each	4.2	1986 Kotzebue
Tom Cod	each	0.21	1986 Tununak
Flounder	each	1.0	1987 Nushagak
Grayling	each	0.7	1987 Nushagak
Herring	each	0.18	1987 Nushagak
Roe on Kelp	gallon	8.0	1987 Nushagak
Pike	each	2.8	1987 Nushagak
Sculpin	each	1.5	1986 Tununak
Smelt (Eulachon)	each	0.14	1986 Kotzebue
Dolly Varden ("Trout")	each	3.3	1986 Kotzebue
Whitefish	each	3.0	198? Beaver
Other Fish	each	1.0	estimate
SHELLFISH			
Clams	gallon	1.6	1987 Nushagak
King Crab	each	2.1	1986 Kotzebue
Mussels	gallon	1.0	1985 Cordova
TERRESTRIAL MAMMALS			
Brown/Grizzly Bear	each	86.0	Kotzebue Survey
Caribou	each	136.0	Kotzebue Survey
Moose	each	540.0	1987 Nushagak
Arctic Fox	each		not eaten
Beaver	each	20.0	Kotzebue Survey
Arctic Hare	each	6.3	Kotzebue Survey
Snowshoe Hare	each	2.5	Kotzebue Survey
Land Otter	each		not eaten
Muskrat	each	1.8	Kotzebue Survey
Red Fox	each		not eaten
Weasel	each		not eaten

RESOURCE	UNIT OF MEASUREMENT	POUNDS PER UNIT	REFERENCE OR COMMENT
Wolf	each		not eaten
Wolverine	each		not eaten
Arctic Ground Squirrel	each		not eaten
BIRDS			
Canada Geese	each	3.7	Bellrose and Kortright 1976
Black Brant	each	2.1	Bellrose and Kortright 1976
Emperor Geese	each	4.3	Bellrose and Kortright 1976
Snow Geese	each	4.0	Bellrose and Kortright 1976
White-Fronted Geese	each	4.1	Bellrose and Kortright 1976
Eider	each	3.9	Bellrose and Kortright 1976
Mallard	each	1.8	Bellrose and Kortright 1976
Old Squaw	each	1.4	Bellrose and Kortright 1976
Pintail	each	1.5	Bellrose and Kortright 1976
Scoter	each	1.6	Bellrose and Kortright 1976
Teal	each	0.5	Bellrose and Kortright 1976
Widgeon	each	1.2	Bellrose and Kortright 1976
Other Duck	each	1.5	Eng.Bay/Port G.
Loon	each	3.0	Eng.Bay/Port G.
Sandhill Crane	each	6.0	1987 Nushagak
Grouse	each	1.0	1987 Nushagak
Ptarmigan	each	0.7	1987 Nushagak
Swan	each	10.5	Bellrose and Kortright 1976
WILD EGGS			
Murre Egg	each	0.18	Birkhead and Nettleship 1981
Gull Egg	each	0.16	Kotzebue Survey
Swan Egg	each	0.62	Scott 1972:95
Duck Egg	each	0.09	Duncan 1987:993
Goose Egg	each	0.22	1987 Nushagak
Plover (Golden) Egg	each	0.07	Johnsgard 1981
Tern Egg	each	0.05	Johnsgard 1981
Snipe Egg	each	0.04	Johnsgard 1981
PLANTS			
Berries	gallon	8.0	1987 Nushagak
Plants	gallon	8.0	1987 Nushagak
Roots	pound	1.0	none

APPENDIX 4
SEWARD PENINSULA SURVEY

SEWARD PENINSULA HARVEST SURVEY

Hello, My name is _____.

I am working for the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service. I am surveying several different villages this summer, asking about the harvest of wild foods for subsistence. My survey has been reviewed and approved by the Brevig Mission City Council, the Golovin City Council, and the Bering Straits Coastal Zone Management Program. This information will inform federal and state agencies about subsistence. It will also be available to the Bering Straits Coastal Zone Management Program, Kawerak, and similar regional organizations.

I would like to ask you some questions. You do not have to answer any questions, but I hope you do. The more people who answer them, the more accurate my work will be. I want to ask you how much subsistence food your household has harvested in the past year. Depending on how much subsistence food you use, my survey will take from 5 to 30 minutes.

I will not use your name. I will not tell anyone else in the village what you tell us. Harvests will only be reported for the village as whole.

May I ask you some questions today?

HOUSEHOLD ID _____ COMMUNITY ID# _____ DATE _____

I will be asking about wild foods your household has used or tried to harvest this year. If you don't understand any of my questions, please ask me to explain.

When I say "YOUR HOUSEHOLD"

I mean you and the people who lived with you in your house.

When I say "USED"

I mean that either you or other people who lived in your house harvested it, received a share of it, ate it, served it, or otherwise used it in your camp or house.

When I say "TRIED TO HARVEST"

I mean that either you or other people who lived in your household looked for, fished for, hunted for, set a net or trap for, or otherwise tried to find or get. I want to know if you tried, even if you did not get anything.

When I say "THIS YEAR"

I mean from today back to one year ago.

When I ask "HOW MANY WERE HARVESTED"

I want to know the number of animals that members of your household caught. Include animals that you shared with other people who did not hunt or fish with you. If you hunted or fished with a crew, include only your share of the harvest. Please estimate if your share was about half, about a third, about a quarter, or some other fraction of the animals.

1. How many people lived in your household this year? _____

2. Does anyone in your household have a commercial fishing permit? YES NO

3. In the past year, were any fish from commercial catches kept for your household's use? YES NO

(If YES, please complete the table below. Record only COMMERCIALLY caught fish removed for home use. Include commercially caught fish whether or not they were caught by a member of this household.)

SPECIES "LOCAL NAME" (CODE)	NUMBER REMOVED FOR HOME USE
Commercial Chum Salmon (11101)	
Commercial Coho Salmon (11401)	
Commercial Chinook Salmon (11501)	
Commercial Pink Salmon (11601)	
Commercial Sockeye Salmon (11701)	
Commercial Herring (12451)	

4. Besides commercial fishing, did your household use or try to harvest salmon during the past year? (If YES, please complete table below.)

YES NO

SPECIES "LOCAL NAME" AWAY? (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED?	RECEIVED? (Y OR N)	GIVEN (Y OR N)
Chum Salmon "dog" (11100)					
Coho Salmon "silvers" (11400)					
Chinook Salmon "king" (11500)					
Pink Salmon "humpy" (11600)					
Sockeye Salmon (11700)					

5. Did your household use or try to harvest other fish during the past year? (If YES, please complete table below.)

SPECIES "LOCAL NAME" AWAY? (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED?	YES		NO	
				RECEIVED? (Y OR N)		GIVEN (Y OR N)	
Burbot "lingcod" (12100)							
Saffron Cod "tom cod" (12200)							
Flounder (12310)							
Grayling (12350)							
Herring (12450)							
Herring Roe on Kelp (12510)			(gallons)				
Northern Pike (12600)							
Dolly Varden "trout" (12830)							
Whitefish (broad, round, humpback) (12900)							
Other Fish							

6. Did your household use or try to harvest shellfish during the past year? (If YES, please complete table below.)

SPECIES "LOCAL NAME" AWAY? (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST?	HOW MANY HARVESTED?	RECEIVED? (Y OR N)	GIVEN (Y OR N)
Clams (47150)			(gallons)		
King Crab (47220)					
Mussels (47450)			(gallons)		
Other Shellfish					

7. Did your household use or try to harvest marine mammals during the past year? (If YES, please complete table below.)

YES NO

SPEC AWAY	"LOCAL NAME" (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED?	RECEIVED? (Y OR N)	GIVEN Y OR N)
	Belukha Whale (35050)					
	Bowhead Whale (35100)					
	Polar Bear (35200)					
	Bearded Seal (35300)					
	Ribbon Seal (35400)					
	Ringed Seal (35450)					
	Spotted Seal (35500)					
	Walrus (35500)					
	Other Marine Mammals					

8. Did your household use or try to harvest any large land animals during the past year? (If YES, please complete table below.)

YES NO

SPECIES "LOCAL NAME" AWAY? (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED?	RECEIVED? (Y OR N)	GIVEN (Y OR N)
Moose (23400)					
Caribou (23200)					
Brown Bear (23150)					
Other Big Game					

9. Did your household use or try to harvest small land animals during the past year? (If YES, please complete table below:)

YES NO

SPECIES "LOCAL NAME" FOR (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED? (Y OR N)	RECEIVED? GIVEN AWAY? (Y OR N)	W MAN USED OD/FU
Arctic Hare "hare" (24210)					/
Snowshoe Hare "rabbit" (24220)					/
Arctic Fox "white fox" (24050)					/
Red Fox (24600)					/
Wolf (24700)					/
Wolverine (24750)					/
Land Otter (24250)					/
Beaver (24100)					/
Muskrat (24500)					/
Ground Squirrel (24800)					/
Other Small Animals					/

10. Did your household use or try to harvest geese during the past year? (If YES, please complete the table below:)

YES NO

SPECIES "LOCAL NAME" AWAY? (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED? SP/SU/FA	RECEIVED? (Y OR N)	GIVEN (Y OR N)
Brant (46310)			/ /		
Canada Geese (46320)			/ /		
Emperor Geese (46330)			/ /		
Snow Geese (46340)			/ /		
White-Fronted Geese (46350)			/ /		
Other Geese _____? (46360)			/ /		

SP = SPRING April, May, June 1989
 SU = SUMMER July, August 1988
 FA = FALL September October 1989

11. Did your household use or try to harvest ducks during the past year? (If YES, please complete the table below:)

SPECIES "LOCAL NAME" (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED? SP/SU/FA	YES		NO
				RECEIVED? (Y OR N)	GIVEN (Y OR N)	
Eider Ducks (49120)			/ /			
Mallards (49160)			/ /			
Pintails, "sprigs" (49190)			/ /			
Scoters (49200)			/ /			
Teal (49260)			/ /			
Other Dabblers or Divers* (49350)			/ /			
Other Sea Ducks** (49450)			/ /			

* shoveler, widgeon, scaup...? Please identify _____

** old squaw, merganser...? Please identify _____

SP = SPRING April, May, June 1989
 SU = SUMMER July, August 1988
 FA = FALL September October 1989

12. Did your household use or try to harvest any birds (other than ducks and geese) during the past year? (If YES, please complete table below:)

YES NO

SPECIES "LOCAL NAME" AWAY? (SP) (SU) (FA)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED? SP/SU/FA	RECEIVED? (Y OR N)	GIVEN (Y OR N)
Sandhill Crane (46190)			/ /		
Swan (46500)			/ /		
Ptarmigan (46450)					
Other Birds					

SP = SPRING April, May, June 1989
 SU = SUMMER July, August 1988
 FA = FALL September October 1989

13. Did your household use or try to harvest wild eggs during the past year? (If YES, please complete table below:)

SPECIES "LOCAL NAME" AWAY? (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST? (Y OR N)	HOW MANY HARVESTED?	RECEIVED? (Y OR N)	GIVEN Y OR N
Murre Eggs					
Gull Eggs (46250)					
Swan Eggs (46270)					
Duck Eggs (46280)					
Geese Eggs (46290)					
Plover Eggs (49460)					
Other Wild Eggs					

14. Did your household use or try to harvest berries, greens or roots during the past year? (If YES, please complete table below.)

YES NO

SPECIES "LOCAL NAME" AWAY? (CODE)	USED THIS YEAR? (Y OR N)	TRIED TO HARVEST?	HOW MANY HARVESTED?	RECEIVED? (Y OR N)	GIVEN (Y OR N)
Berries (48050)			(gallons)		
Greens (48100)			(gallons)		
Roots masru (48300)			(lbs)		

15. Did your household use any wild food for dog food? (If YES, please complete the table below.)

YES NO

Animals Used for Dogfood?	Quantity Used
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

COMMUNITY ^{ra} will be separated from survey)
(This page _s

16 Do you have any questions or comments? (Answer questions as best you can. Write down those you can't, so we can answer them later. Write down comments, and any of your own observations about the interview)