USE OF FISH AND WILDLIFE IN MANOKOTAK, ALASKA

by
Janet Schichnes and Molly Chythlook

Technical Paper No. 152

Because the Alaska Department of Fish and Game receives federal funding, all of its public programs and activities are operated free from discrimination on the basis of race, color, national origin, age, or handicap. Any person who believes he or she has been discriminated against should write to:

O.E.O.
U.S. Department of the Interior
Washington, D.C. 20240

This research was partially supported
by ANILCA Federal Aid funds,
administered through the
U.S. Fish and Wildlife Service,
Anchorage, Alaska,
SG-1-5, SG-1-6,
SG-1-7, and SG-1-8.

Alaska Department of Fish and Game
Division of Subsistence
Dillingham, Alaska
December, 1988

EEO STATEMENT

The Alaska Department of Fish and Game operates all of its public programs and activities free from discrimination on the basis of race, religion, color, national origin, age, sex, or handicap. Because the department receives federal funding, any person who believes he or she has been discriminated against should write to:

O.E.O.
U.S. Department of Interior
Washington, DC 20240

ABSTRACT

This report documents contemporary subsistence patterns of hunting, fishing and gathering wild renewable resources of Manokotak residents. Manokotak is an Eskimo community of 309 residents, located approximately 375 miles southwest of Anchorage, in southwest Alaska. Central Yup'ik is still the dominant language spoken by all generations. The Division of Subsistence undertook a study to document the number of resources harvested, estimates of harvest quantities, and patterns of non-commercial distribution and exchange of wild and renewable resources. The study also gathered detailed mapped information on areas used by Manokotak moose hunters.

Data for this report were collected through several methodologies. The primary instrument for data collection was a detailed harvest survey of 54 households (91 percent of community households). Yup'ik speaking interviewers were used to interview those persons in the community who had been identified as dominant or solely Yup'ik speakers. A separate mapping methodology was employed to identify areas used by Manokotak hunters for moose hunting. Researchers also engaged in participant observation at salmon fish camps to identify patterns of social organization. In addition, key extended family groups were identified and subsequently interviewed about their harvesting and sharing networks. Relevant literature was also reviewed. Survey results were computerized and analyzed with the Statistical Package for Social Sciences program (SPSS).

The ancestry of the current Manokotak residents can be traced to the prehistoric era when wild resources were the sole source of

survival. During the historical period, subsistence patterns were altered by the fur trade, the establishment of missions and schools, and especially the commercial salmon industry. During the early 1980s Manokotak's economy can best be described as one based on a mix of cash and subsistence resources. In 1985, commercial salmon fishing provided the primary source of cash income for nearly all households, and many participated in the Togiak commercial herring and spawn-on-kelp fisheries as well. In addition, a limited amount of employment through the local school, city, state, and federal governments, and a small private sector was available. Most jobs were of a seasonal and part-time nature.

Subsistence activities continued to play a key role in Manokotak's economy and way of life. The results of the survey of 54 households demonstrated that respondents used 53 kinds of fish, game, and plant resources, including at least 80 species, during the study year. The mean number of kinds of resources used was 27 per household and the range was 8 to 46. The mean number of kinds of resources harvested was 19 per household. Resource use was extremely high (between 83 and 100 percent of interviewed households) for all major resource categories. Salmon and other fish species were used by every household in the sample. Other resource categories included land mammals, furbearers, plants and berries, birds, marine mammals, and marine invertebrates, and were used by 83 to 96 percent of sampled households. Participation in resource harvesting was widespread - all but one household was involved in some degree of resource harvesting. Harvest levels were relatively high. The community per capita harvest in 1985 was 384 pounds usable weight. Manokotak's subsistence harvest levels have not

changed significantly since 1973. When adjusted to represent comparable species, the per capita harvests between 1973 and 1985 were very similar, showing a difference of only thirty-five pounds per person. Salmon, moose, caribou, and belukha were major resources harvested in both periods, comprising 71 percent of the harvest in 1973 and 55 percent in 1985. In 1985, beaver was also an important resource, contributing 7.6 percent of the harvest.

Manokotak residents participated in a defined seasonal round of harvesting activities, including migration by the entire village to fish camps at the mouth of the Igushik River in June and July for subsistence and commercial salmon fishing. A smaller number of people also set up spring camps in Kulukak Bay during the herring season. This report identifies harvest areas which were used over a recent 20-year period for ten major resources or resource categories, including moose, salmon, caribou, marine mammals, freshwater fish, marine fish, plants, furbearers, marine invertebrates, and waterfowl. The areas used were quite extensive but all harvesting took place in the Bristol Bay region. Transportation used for harvesting most resources was generally skiffs, snowmachines, and all terrain vehicles. Airplanes were occasionally used to reach more distant caribou herds, particularly in years of poor snow cover.

Sharing of wild resources was widespread both within the community and with relatives and friends in other communities. All resource categories were shared to some extent, with the exception of furbearers harvested for their pelts. The most widely shared resources were moose and caribou. Sharing was particularly frequent between residents of Manokotak and the communities of Aleknagik, Togiak, and Twin Hills.

Gifts of food were often sent to relatives and friends in Dillingham and Anchorage as well.

In sum, the research findings indicate that subsistence hunting, fishing, and gathering is still an integral part of the economy, culture, and identity of Manokotak residents. Subsistence continues to provide important nutritional, social, and cultural functions in Manokotak.

TABLE OF CONTENTS

LIST OF TABLES iii
LIST OF FIGURES v
ACKNOWLEDGMENTS vii

CHAPTER 1: INTRODUCTION 1
Background 1
Purpose 3
Methodology 4
Limitations of the Data 7

CHAPTER 2: THE COMMUNITY AND THE AREA 9
Natural Environment 9
Traditional History and Seasonal Round 11
Prehistory 11
Traditional Seasonal Round 12
Historical Period 14
Demograpahy 15
Contemporary Community Description 24
Economy 28
Commercial Salmon Fishery 28
Commercial Herring Fishery 38
Public Sector Employment 40
Private Sector Wage Employment 41
Trapping and Crafts 42
Employment Characteristics of the Sampled Households 42
Monetary Income and Cost of Living 45

CHAPTER 3: GENERAL CHARACTERISTICS OF RESOURCE USE 47
Seasonal Round 47
Land Use Patterns 50
Species Used and Levels of Participation 56
Harvest Quantities 65
Resource Sharing and Receiving 74
Comparison Levels of 1973 and 1985 Harvests 80

CHAPTER 4: SALMON 89
Subsistence Salmon Methods 89
Subsistence Fishing Location - Igushik (*Iyussiiq*) Fish Camp 90
Household Groupings 95
Subsistence Fishing Regulations 95
Harvesting Pattern 102
Social Organization of Processing Groups 105
Other Fishing Locations 116
Preferred Species, Processing, and Preservations Methods 117
King Salmon 117
Sockeye Salmon 120
Coho Salmon 121
Other Species 121

CHAPTER 5: NON-SALMON FISH SPECIES 123
Marine Fish 123
Herring 123
Herring Roe-on-Kelp 127
Smelt 129
Flounder 129
Shellfish 130
Freshwater Fish 130
Regulations 131
Harvest and Use Patterns 132

CHAPTER 6: GAME, MARINE MAMMALS, AND BIRDS 136
Moose 136
Caribou 144
Bear 151
Small game 152
Furbearers 153
Birds 156
Marine Mammals 159

CHAPTER 7: PLANTS 163
Berries 163
Other Plants 164

CHAPTER 8: DISCUSSION AND CONCLUSIONS 169
Regulatory Issues 169
State Land Disposals 169
Moose Harvest Tickets 172
Subsistence Salmon Fishing Time 174
Caribou Transplant to Togiak Wildlife Refuge 175
Conclusions 176

REFERENCES CITED 183
APPENDIX A: SURVEY INSTRUMENT 188
APPENDIX B: CONVERSION FACTORS 200

LIST OF TABLES

Table 1. Number of Households Surveyed, Manokotak, 1986.....6

Table 2. Historic Population of the Togiak-Kulukak Area.....17

Table 3. Manokotak Population and Average Household Size, 1950 - 1985.....21

Table 4. Sockeye Salmon Commercial Catch by District, in Numbers of Fish, Bristol Bay, 1967-1986.....29

Table 5. Average Earnings, Bristol Bay Salmon Permit Holders by Permit Type, 1977-1982.....33

Table 6. Distribution of Bristol Bay Commercial Salmon Permits By Type of Permit and Gender of Permit Holders, Manokotak, 1986 35

Table 7. Manokotak Commercial Fishing Earnings, 1984.....36

Table 8. Percentage of Manokotak Households Reporting Income From Various Economic Sectors, 1985.....44

Table 9 Monetary Incomes for Manokotak, Dillingham, and Anchorage for 1978, 1979, 1981, 1982.....46

Table 10 Levels of Household Harvest and Use of Fish, Game, and Plant Resources, Manokotak, January - December, 1985.....58

Table 11. Selected Resources Used by Manokotak Residents, Common, Yup'ik, and Scientific Names.....60

Table 12. Mean Per Household and Per Capita Harvest by Resource Category Manokotak, 1985.....66

Table 13. Communities Given Wild Resources by Manokotak Residents, 1985.....77

Table 14. Communities From Which Manokotak Residents Received Wild Resources, 1985.....78

Table 15. Resource Harvests, Manokotak 1973.....81

Table 16. Comparision of Fish and Game Harvests of Manokotak Residents, 1973 and 1985.....84

Table 17. Subsistence Salmon Harvest in Numbers of Fish by Gear Type, Manokotak, 1985.....91

Table 18. Subsistence Salmon Regulations, Nushagak District, 1960-1986.....96

Table 19. Subsistence Salmon Harvest by Species, Manokotak, 1966-1986 101

Table 20. Harvest Strategies - King, Red, and Chum Salmon at Igushik Fish Camp 104

Table 21. Compositiion of Subsistence Salmon Processing Groups, Igushik Beach 106

Table 22. Freshwater and Marine Fish Harvest by Species, Manokotak, 1985 128

Table 23. Moose Hunting Regulations, Game Management Unit 17, 1961-1986 138

Table 24. Caribou Hunting Regulations, Game Management Units 17 and 9 (C and E), 1961-1986 146

Table 25. Furbearer Trapping Regulations, Game Management Unit 17, 1985 154

Table 26. Subsistence Hunting Regulations for Selected Species of Birds, GMU 17 - 1985-1986 157

Table 27. Common Usage of Berries by Manokotak Residents, 1985 165

Table 28. Common Usage of Plants by Manokotak Residents, 1985 167

Table 29. Harvest Quantities From Selected Alaska Communities 178

Table 30. Comparisons of Per Capita Wild Resource Harvests and the Composition of Wild Resource Harvests by Resource Category,Manokotak and Other Bristol Bay Communities 179

LIST OF FIGURES

Figure 1. Study Setting, Manokotak, Southwest Alaska.....2

Figure 2. Major Historical Population Settlements in Igushik, Kulukak, and Togiak Areas.....16

Figure 3. Population Profile of Study Sample by Age and Sex 23

Figure 4. Community of Manokotak, 1985 25

Figure 5. Seasonal Round of Resource Harvests, Manokotak 48

Figure 6. Areas Used to Harvest Salmon and Trap Furbearers by Manokotak Residents, 1960-1982.....51

Figure 7. Areas Used to Harvest Marine Fish and Hunt Caribou by Manokotak Residents, 1960-1982.....52

Figure 8. Areas Used to Harvest Marine Invertebrates and Gather Vegetation by Manokotak Residents, 1960-1982.....53

Figure 9. Areas Used to Harvest Freshwater Fish by Manokotak Residents, 1960-1982.....54

Figure 10. Areas Used to Harvest Marine Mammals and Moose by Manokotak Residents, 1960-1982.....55

Figure 11. Areas Used to Harvest Waterfowl by Manokotak Residents, 1960-1982.....57

Figure 12. Levels of Harvest, Use, and Sharing of Eight Major Resource Categories, Manokotak, 1985 64

Figure 13. Mean Household Harvest of Edible Pounds by Resource Category, Manokotak, 1985.....68

Figure 14. Pounds of Resources Harvested Per Household, Manokotak, 1985 69

Figure 15. Cumulative Household Harvests of Big Game, Manokotak, 1985 70

Figure 16. Cumulative Household Harvests of Marine Mammals, Manokotak, 1985 71

Figure 17. Cumulative Household Harvests of Salmon, Manokotak, 1985 72

Figure 18. Cumulative Household Harvests of All Wild Resources, Manokotak, 1985 73

Figure 19. Comparison of Mean Per Capita Harvest by Weight, 1973 and 1985 85

Figure 20. Comparison of Households Harvesting Major Resource Categories 1973 - 1985, Manokotak 87

Figure 21. Igushik Fish Camp along Nushagak Bay 92

Figure 22. Salmon Processing Group, Case 1. 108

Figure 23. Salmon Processing Group, Case 2. 110

Figure 24. Salmon Processing Group, Case 3 112

Figure 25. Salmon Harvest Composition by Edible Weight, Manokotak, 1985....118

Figure 26. Areas Used for Spring Herring Camps by Manokotak Residents, 1985....125

Figure 27. Game Managagement Units 17 and 9 (A,B,C,E) 137

ACKNOWLEDGMENTS

The authors wish to thank all the residents of Manokotak who graciously offered their hospitality, time, and knowledge to this project. Earlene Whitley did an outstanding job as our research assistant. Henry Alakayak and former mayor Moses Toyukuk got us started on the right foot and kept us on track throughout the project. We also wish to thank past and present members of the City Council, including: Wassillie Alakayak, Gusty Bartman, Chris Gloko, Lucy Gloko, Joanne Itumulria, Moses John, Schwalbe Nukwuk, Wassillie Tugatuk and Mayor Melvin Andrew for their input and review of this endeavor. The late Mary Yohuk helped us understand kinship relationships within and between households. Mary Alexie and Anecia Lomack reviewed Yup'ik terminology and spelling and Anecia subsequently reviewed the final draft in its entirety. In one way or another, every household assisted us and we are grateful to everyone in Manokotak who helped bring this project to completion.

Neither would this report have been possible without an enormous amount of support from other staff members in the Division of Subsistence. First and foremost we wish to thank Jim Fall for his guidance and patience. Through all phases of the project from research design to printing, his advise was invaluable. Cheryl Scott was responsible for translating the survey data into SPSS files. She subsequently performed seemingly endless data runs and reruns and thoroughly reviewed several drafts of the manuscript to be sure all SPSS computations were reported accurately. Most importantly, she did all this cheerfully and with good humor. Bob Wolfe provided critical

insights and editorial comments on earlier versions of this document. Bob Walker also contributed a thoughtful review of this report and much needed advice on our computer's mysterious workings. Our secretary Nancy Wickstrom helped in more ways than we can name and went far beyond the tasks enumerated in her job description such as typing and copying. She was always there when we needed her, kept us in field supplies, and even helped pack up a field camp for a sick researcher. Annie Ollanna spent two weeks in Manokotak to assist with the field work. All graphics were prepared by Dan Foster.

Wes Bucher, Mac Minard, Jeff Skrade, and Ken Taylor, our co-workers in the Department, were most helpful providing information on a variety of resources and resource uses. Cristy Tilden provided excellent editorial comments on the analysis of salmon processing groups. Jerry Lipka made valuable suggestions for many sections of the text. Ina White graciously reviewed portions of the manuscript.

Janet Schichnes also wishes to thank Joe Chythlook for inviting her to accompany his family to the herring grounds. A green researcher to begin with, she got progressively greener as the boat trip wore on but had a wonderful time. She is also grateful to Lillie Gamechuck and her family who made her stay at Igushik so memorable.

Finally, we wish to thank our families for their support throughout the life of this project. Any errors or omissions are the responsibililty of the authors.

CHAPTER 1

INTRODUCTION

BACKGROUND

This report documents contemporary subsistence uses of fish, plants, and wildlife in the village of Manokotak, a Yup'ik Eskimo community located in the Bristol Bay region, 350 miles southwest of Anchorage (Fig.1). This report has been prepared as part of the Division of Subsistence's ongoing effort to compile baseline data for all communities in the state. More specifically, a growing regional population is expected to lead to increased pressure on fish and game resources (Nebesky et al. 1983, Vol 1:III-46). Nonrenewable resource exploration and development on the Nushagak Peninsula (USFWS 1986:182-184) has been discussed and a projected increase in regional tourism (Tryck, Nyman and Hayes 1985:58) is anticipated. Increasing recreational use in the Wood-Tikchik State Park and Togiak National Wildlife Refuge could attract additional users to traditional subsistence lands. The community of Manokotak as well as many of its subsistence harvest areas are located within the boundaries of the Togiak National Wildlife Refuge. Manokotak residents also have been particularly concerned about completed and projected state land disposals in areas traditionally used for moose hunting and trapping. Any of these scenarios, alone or in combination, could all have unfavorable impacts on the community's subsistence patterns. In light of these numerous pressures, it was appropriate at this time to

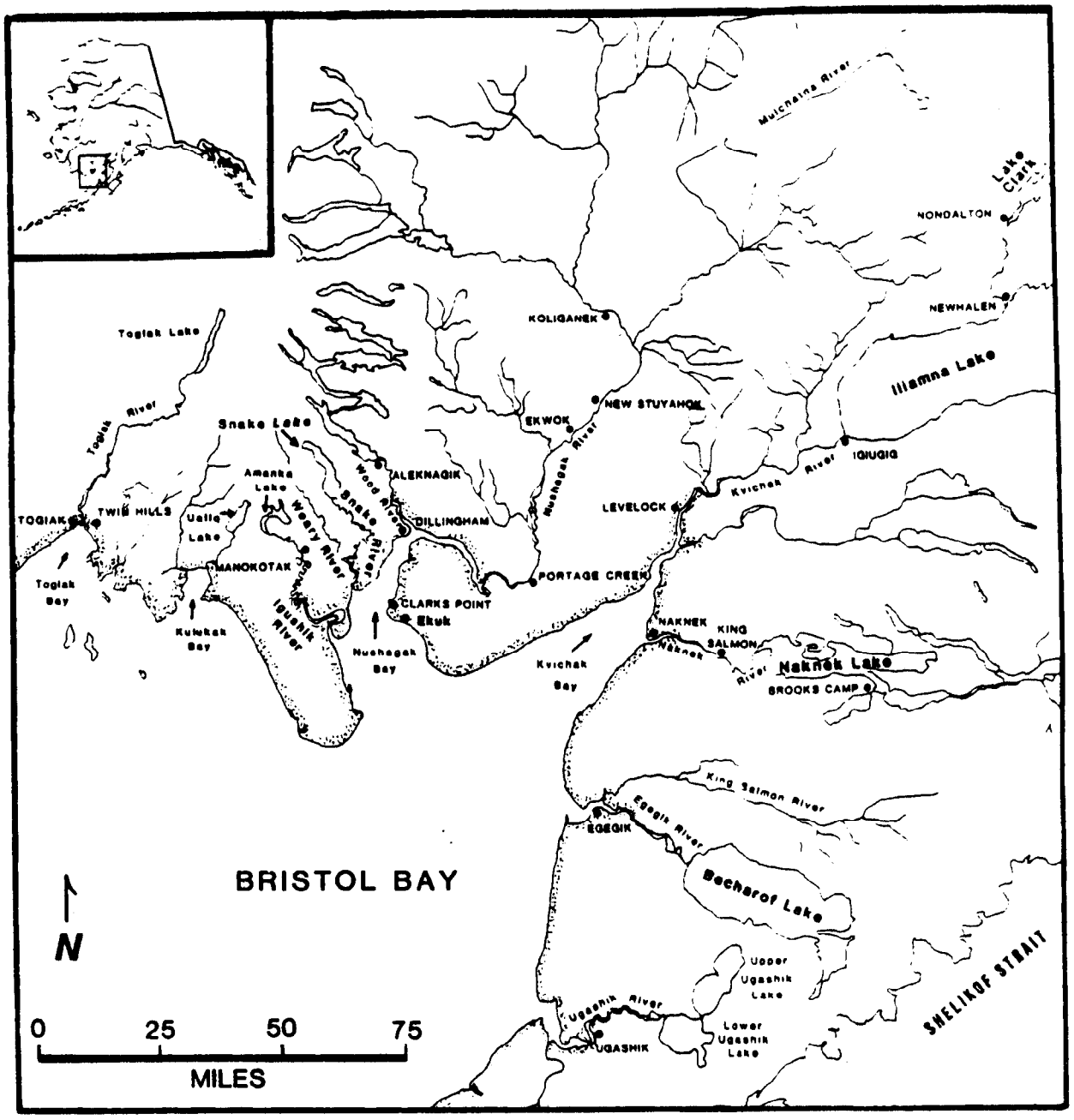

Figure 1. Study Setting, Manokotak, Southwest Alaska.

supplement existing information on subsistence uses in a systematic manner.

Previous research includes a household harvest survey conducted in 1973 (Gasbarro and Uterhmole 1974) which documented a subsistence harvest of 399.7 pounds per capita at Manokotak. Some preliminary data on Manokotak's recent subsistence patterns have been collected in previous research efforts by the Division of Subsistence as part of its contribution to regional planning efforts. Land use patterns for all major resources harvested were documented and maps illustrating areas used over a 20-year period (1963 - 1983) for major resource categories were compiled (Wright, Morris, and Schroeder 1985; ADF&G 1985b). The seasonal round and species harvested in the subregion also were depicted in that report.

In 1982, the Board of Fisheries requested information on the subsistence harvest of roe-on-kelp in the Togiak District while it was considering instituting a permit system. As active participants in that fishery, Manokotak use patterns were described in that report (Wright and Chythlook 1985).

PURPOSE

The primary purpose of this study was to document contemporary patterns of hunting, fishing, and gathering of wild renewable resources by Manokotak residents. This included: the variety and quantities of wild resources used in 1985; the annual seasonal round of subsistence resource activities; and the ways in which wild resources were used, including methods of harvesting, processing, and preservation. The

second purpose was to identify significant patterns of social organization as they related to resource harvesting, processing, or sharing. The third purpose was to explore the non-commercial distribution and exchange of wild and renewable resources within Manokotak and between Manokotak and other communities. Finally, the study gathered detailed mapped information on areas used by Manokotak moose hunters.

METHODOLOGY

The project began with the introduction of the study idea to the mayor and a community elder. With their initial approval and input, a presentation was subsequently made to the Village Council in February, 1986. Minor modifications were made in the study design to address their concerns and permission was granted for the work to begin immediately. The principal researchers were two employees of the Division of Subsistence. One (Chythlook) was a life-long resident of Bristol Bay and a fluent Yup'ik speaker; the other (Schichnes) had lived in Dillingham for six years and had known a number of Manokotak residents during that time. A Yup'ik-speaking local assistant (Earlene Whitley) also was hired to conduct interviews. Another Division of Subsistence employee (Annie Ollana) spent ten days in the village in March 1986 to assist with the field work. Although the research was of a short-term nature, the researchers' familiarity with the community facilitated data collection and analysis.

The data for this report were collected from a variety of sources. The primary instrument was a detailed household harvest survey (Appendix

A). The survey was pre-tested in English and Yup'ik and appropriate revisions were made. All year-round households in Manokotak were contacted and asked to participate. Subsequently, ninety-one percent of Manokotak's households (54 of 59 households) were surveyed about their use and harvesting patterns of all locally available fish and game species for the calendar year 1985 (Table 1). Household heads who were exclusively Yup'ik speakers were interviewed by one of the Yup'ik-speaking researchers. The two bilingual researchers conducted interviews in whatever language the respondents chose. Usually one person from a household answered all the questions but sometimes researchers were referred to a different household member for particular information. When other household members were present, it was not unusual for them to be consulted also.

In addition to questions about use and harvest levels, information was collected on patterns of distribution and exchange. Socioeconomic and demographic information about households was collected to help interpret the results. More detailed questions about harvest patterns for salmon, moose, caribou, and marine mammals were asked of successful harvesters as part of supplemental sections (see Table 1).

A separate mapping methodology was developed (following Coffing and Pederson 1984) to identify areas of particular importance to moose hunters. Using mylar-covered maps of Manokotak's general moose hunting range (1:250,000 scale U.S. Geological Survey quadrangles), researchers sought to identify areas used most intensively. This was accomplished by asking respondents to indicate where they had hunted for moose in the fall and winter of 1985 and where they were usually able to find moose. Respondents then drew circles around those areas. They indicated the

TABLE 1. NUMBER OF HOUSEHOLDS SURVEYED, MANOKOTAK, 1986. (N = 59)

	Number	Percentage
Total Manokotak households	59	100.0
Households surveyed, all resources	54	91.5
Households completing moose harvest supplement	20	33.9
Households completing caribou harvest supplement	5	8.5
Households completing salmon harvest supplement	37	62.7
Households completing marine harvest supplement	12	20.3
Households completing moose harvest mapping	32	54.2

locations of successful harvests by marking the spot with an "x". In total, 32 individual household maps were completed and compiled to illustrate the community pattern. The surveys and mapping were undertaken in March and April, 1986.

Participant observation was conducted at spring herring and summer salmon camps. One researcher made two short (2-3 day) trips to herring camps in Kulukak Bay to observe harvesting and processing and also spent two weeks at the Igushik summer fish camp to collect information on the social organization of salmon harvesting and production. The other researcher had camped and fished extensively at these sites and was already familiar with the resource harvesting and processing methods as well as the typical social organization of the camps. Brief follow-up trips were made to Manokotak in October 1986 and April 1987. While in Manokotak, researchers visited many families and were invited to share meals and feasts and participate in community activities. Relevant literature has been reviewed as have records from the various divisions of the Department of Fish and Game. Survey results were computerized and analyzed by Division of Subsistence data management staff with the Statistical Package for Social Sciences program (SPSS). Spelling of Yup'ik words follows the orthography in Jacobsen (1984).

LIMITATIONS OF THE DATA

Harvest surveys, by their very nature, rely on recollection and must be viewed as estimates rather than precise figures. Almost without exception, respondents were extremely cooperative with the surveys and tried to recall their household harvests to the best of their ability.

Although they are retrospective estimates, the harvests are thought to be a fairly close representation of the community's wild food production in the study year. When interpreting harvest data, it is important to realize that weather, regulations, and resource conditions change from year to year. The data presented in this report represent the harvests in one year. The contribution of particular resources to the community's food supply can change from year to year. Finally, although the researchers have tried to present the information as accurately as possible, the time spent in Manokotak and its camps was limited. This study cannot be an exhaustive description of all aspects of subsistence hunting, fishing, and gathering in Manokotak. This report was reviewed for accuracy by various Manokotak residents whose comments were incorporated into the report. The final report was approved by the Manokotak Council.

CHAPTER 2

THE COMMUNITY AND THE AREA

Manokotak is located 25 miles by air west of Dillingham on the Igushik River. The Igushik River is the outlet for the Ualik and Amanka Lake system and drains into Nushagak Bay (Fig.1). Manokotak's salmon fish camp, also named Igushik, is located at the river's mouth. The village sits between the east bank of the river and a lone hill which rises to an elevation of about 850 feet. The Tuklung Hills are visible in the background to the west. Farther to the west, but unseen, lie the Kulukak Mountains.

NATURAL ENVIRONMENT

Manokotak is within a climatic transition zone and is affected by both maritime and continental influences. The area is characterized by cloudy skies, mild temperatures, and moderately heavy precipitation. Average summer temperatures range from 40 to 70 degrees F. Average winter temperatures range from 4 to 30 degrees F. (ADCRA 1982:1).

Tundra is the dominant vegetation type in the area used by Manokotak for harvesting wild resources. Willows and scattered clumps of cottonwoods grow along the rivers. Small patches of spruce grow in some areas. The land is dotted with small ponds and lakes.

Bristol Bay drainages are the world's most productive area for sockeye (red) salmon. Four other species of Pacific salmon also spawn in Bristol Bay drainages, including chinook (king), chum (dog), pink

(humpy), and coho (silver). Marine fish present in the region include herring, smelt, halibut, and flounder. Butter and razor clams are the primary marine invertebrates present in the general study area. A variety of freshwater fish species, particularly rainbow trout, Dolly Varden and arctic char (both referred to as Dolly Varden in this report), arctic grayling, and northern pike are common in many drainages. Lake trout, whitefish, burbot, and blackfish are also present in the community's use area.

Although not present in the immediate vicinity of Manokotak, two herds of caribou roam parts of the Bristol Bay region. The Mulchatna Herd ranges the area generally north of Iliamna Lake and west of the Alaska Range while the Northern Alaska Peninsula Herd ranges from the Naknek River south to Port Moller. Moose inhabit most of the study area in low to moderate densities near willow and alder-lined stream banks. Brown bear are fairly common and some black bear are also present. The area supports an abundant beaver population and numerous other furbearers are also present, including lynx, fox, wolf, land otter, muskrat, and mink. Small mammals include snowshoe and arctic hare, porcupine, and arctic ground squirrel.

Sea birds nest along the rugged coastline of the Togiak area north of Manokotak. Waterfowl and shorebirds are seasonally abundant. Ptarmigan are found in varying numbers throughout the tundra and shrub habitats.

The coastal waters are home to a number of marine mammal species. Harbor (or spotted) seals are very abundant in certain locations and frequent Bristol Bay year round. Seals associated with the sea ice, such as ringed and bearded seals, are found in the northwest coastal

areas in winter and spring. Walrus occur at the ice edge in Bristol Bay in the winter, and males haul out on land in specific locations from spring through fall. Several types of whales are found in Bristol Bay with belukha and gray whale most common in nearshore areas (Wright et al 1985:16).

TRADITIONAL HISTORY AND SEASONAL ROUND

Prehistory

Three regional groups of Central Alaska Yup'ik speaking Eskimos inhabited the western portion of Bristol Bay. (Unless noted otherwise, this section is based on VanStone 1984:224-239.) The first group was the *Tuyuryarmiut* (also known as the *Togiagamiut*) who lived along the Togiak River, its tributaries and the adjacent coast from Cape Newenham to Cape Constantine. The *Aglurmiut* (also known as *Aglegmiut*) were coastal Eskimos of the Nushagak Bay area. Their general territory is thought to have included the upper portion of the Alaska Peninsula and slightly beyond the Naknek River to the north. The final group were the *Kiatagmiut* who inhabited the area along the Nushagak River, the lower Mulchatna River, and the area to the north possibly including the Wood River Lakes, upper Kvichak River, and probably the lower end of Iliamna Lake. A reliable population estimate of 900 for the combined *Aglurmiut-Kiatagmiut* exists as early as 1829.

Unfortunately, not much is known about the prehistory of this area since little archaeological work has been done in the region. It is difficult to reconstruct the prehistoric subsistence cycle with any

certainty since Eskimos were drawn into the fur trade before their aboriginal way of life was recorded. Yup'ik Eskimos probably relied upon a mix of anadromous fish (salmon and char), terrestrial mammals (caribou), and marine mammals (seal and walrus) for subsistence foods (Wright 1985:21.)

Traditional Seasonal Round

VanStone (1984) provides a description of a general subsistence pattern for Southwest Alaska for the early historic period, particularly for residents of the Nushagak River, although he assumed the pattern was fairly similar for other groups as well. The seasonal round began in the spring, when winter food supplies were running low. VanStone notes, however, that starvation rarely occurred. In late March or early April, people left their winter villages and headed to spring camps by dog team. The primary activity was the taking of furbearers with fixed and spring-pole traps. Migrating game birds were hunted with fine-meshed nets, snares, or spears. In some locations, people hunted caribou, and whitefish were caught while at tundra camps. In addition to interior trapping, coastal residents hunted seals with harpoons and dipnetted for smelt.

Sometime before June, people returned to their permanent villages to prepare for salmon fishing. Nushagak villages in particular set-up summer fish camps in locations where gill-netting was efficient. In certain areas funnel-shaped basket traps and spears were used as well. Salmon fishing began in earnest with the arrival of the kings in mid-June and concluded with the fall run of cohos which in the Nushagak area

could be taken until freeze-up. Large quantities of kings, sockeyes, and cohos were preserved for the winter, and salmon was probably the most reliable food source.

By early September people left their summer fish camps and villages. Men headed up the rivers as early as mid-August to hunt caribou and furbearers. Caribou were hunted with snares and bows and arrows. Prior to European contact, caribou were important not only for their meat but for the skins which were an important item used in clothing. The Russians encouraged the Eskimos to adopt Western-style dress in order to release more furs for trading.

By the time of the first snowfall, the men returned to the winter villages and hunted caribou nearby. There was some fishing in early winter, particularly for whitefish, which were taken with nets under the ice, and grayling, harvested with hooks through the ice. By early December, when severe winter weather set in, most fishing and hunting came to an end. Through late December to February, dance festivals with both religious and secular connotations were the major village activities.

Although the seasonal round described was particularly applicable to riverine people, it was roughly the same for those living in coastal settlements. The major difference was the hunting of sea mammals in those communities. Nevertheless, VanStone emphasized that coastal groups throughout Bristol Bay were never primarily sea mammal hunters but concentrated on fishing, exploiting inland rather than coastal resources.

Historical Period

The Bristol Bay and Nushagak areas were first explored by the Russians in the early nineteenth century and soon thereafter opened up to the fur trade. In 1818 Aleksandrovskiy Redoubt was established at the mouth of the Nushagak River. The Russians subsequently brought the Eskimos into the fur trade and introduced them to a cash economy. Subsistence activities were altered to place more emphasis on fur trapping as Eskimos became dependent on particular trade goods. Previously unknown diseases arrived as well and reduced the population.

The explorers and fur traders were soon followed by missionaries and in 1841 a Russian Orthodox church was established at Aleksandrovskiy Redoubt. By the end of the Russian era, Christianity had become the predominant religion for the Eskimos of Southwest Alaska. The United States' acquisition of Alaska had no immediate effect on the pattern of cultural contact which had been established by the Russians. Involvement in the fur trade continued under the ownership of the Alaska Commercial Company and a wider variety of trade goods was introduced. Other Christian churches, particularly the Moravians, sent missionaries seeking converts.

It was not until the 1880s that the development of a commercial salmon fishery in Bristol Bay by U.S. commercial firms made the most significant impact on Eskimo culture. Eskimos were slowly drawn into the processing sector as cannery workers until, after World War II, all-Native cannery crews were common. By the 1960s Natives had made significant inroads into the harvesting sector as well with many acting as fishermen. The fishery affected Eskimos well beyond the Nushagak Bay

region and eventually Eskimos from the most remote villages were drawn to Bristol Bay in the summer months where they came into "direct and instructive contact with many different races and nationalities" (VanStone 1984:239). Earnings from commercial fishing and cannery work became the major annual source of cash income for many Eskimo families in Bristol Bay and trapping in particular declined as result. Commercial fishing continues to be the major sector of Bristol Bay's cash economy.

DEMOGRAPHY

Established in 1947, Manokotak is a fairly recent community. The original residents came from the areas of Kulukak, Nushagak, and Togiak bays (Fig. 2). The following section will provide some background information about how residents of each of those three areas migrated to Manokotak.

The only village in Kulukak Bay for which historical census data are available is Kulukak (spelled *Quluqaq*), reported as 65 people in 1880 and 83 in 1920 (Table 2) but there were other smaller villages in the area as well. Kulukak was a permanent winter community located on the southwest shore of the Kulukak River where it enters Kulukak Bay. In 1911, a school was established for a short time and a reindeer station begun the following year (Shields 1978) and both continued until sometime in the 1920s or 1930s.

Shields (Field Notes, 1978) reports that the village of Kulukak itself may have been abandoned in the middle 1930s, while other smaller villages in the area were vacated in the early 1940s, for a variety of

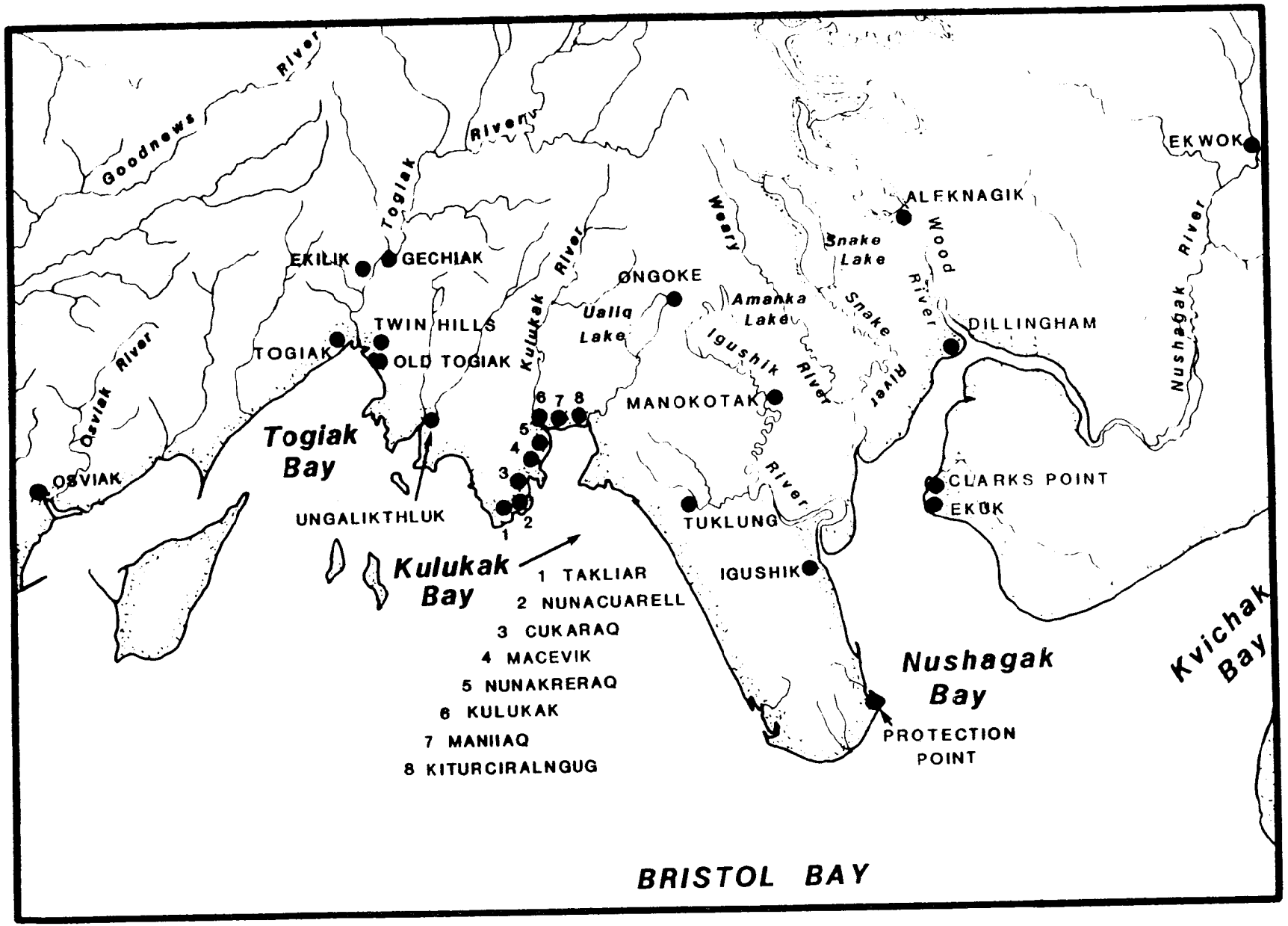

Figure 2. Major Historical Population Settlements in Igushik, Kulukak, and Togiak Areas.

TABLE 2. HISTORIC POPULATION OF THE TOGIAK-KULUKAK AREA

Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Igushik											
Igushek	74										
Igushik Village						28	16				
Tuklung											
Tokelung Village						39					
Tuklung Village								30			
Kukukak											
Kulluk	65										
Kulukak Village					83	28	55				
Manokotak									149	214	294
Manokotak Village								120			
Ungalikthluk											
Ooalikh	68										
Togiak		14							220	373	470
Togiagamute	276										
Togiak Station	24										
Togiagamiut		94									
Togiak Village					91	71	10	108			
Togiak Bay							46				
Togiak River communities											
Ikaliukha	192										
Ikalinkamiut		60									
Tunniakhpuk	137										
Kassianmute	615										
Kassiachamiut		50									
Kashiagamut Village							33				
Nulatok	211										
Nulochtagmiut		31									
Kissaikh	181										
Annugannok	214										
Twin Hills										67	70
Osviak											
Aziagvigamute	132										
Aziavigamiut		90									
Uzavigiakamut Village							63				
Aleknagik										128	154
Aleknagik Village							78	153			
Aleknagik Lake									181		
Aleknagik Mission									50		

Source: U.S. Census data (1880-1970 from Rollins 1978, Togiak-Kulukak communities not included in 1900 and 1910 censuses; 1980 data from Nebesky et al. 1983 as cited in Wright and Chythlook, 1985).

reasons. Some people moved because of a disease which they believed was the result of a curse placed on Kulukak by a resident disliked by other villagers. This event is placed in the middle 1930s. Another person, who lived in a small village just upriver from Kulukak, *Nunnaquq*, left in the early 1940s because of a series of bad luck incidents including the death of some relatives. It was not uncommon in the past to change villages (*nunalinqiggluki*) when unusual deaths occurred. Some former residents of Kulukak moved to *Ang'uuq*, upstream from Ualik Lake and later to *Nunakreraq*, a short distance up the Kulukak River (Wright and Chythlook 1985).

Economic incentives and religious reasons also played a role in ending permanent occupation of the Kulukak area. Fish tenders never came to Kulukak Bay perhaps because it was located too far from the Nushagak Bay canneries, and Moravian missionaries encouraged people to live around existing churches. In any case, by the mid-1940s, no permanent settlements remained in the area (Shields 1978).

Some former residents of Kulukak moved to Tuklung (*Toqlung*), a site located on the western shore of the Tuklung River, a tributary of the Igushik. Archaeological evidence of settlements during the early part of the 20th century has been found along the shores of the Amanka (*Amatmek*) and Ualiq (*Qulliq*) lakes (Shields 1977) and some elder respondents for the current study reported that they had been "born up the lakes."

Some other of Manokotak's earliest residents came from the village of Igushik (*Iyuussiiq*), located on Nushagak Bay. At the time of earliest contact, Igushik was one of four large settlements in Nushagak Bay, and the only one on the west side. Residents of the Nushagak Bay

communities had diverse origins not only from the interior area of the Nushagak River, but also from inland and coastal locations as far west as the Kuskokwim River and as far south as the Alaska Peninsula (VanStone 1967:115). In 1880, Petroff recorded Igushik's population as 74 (Table 2). But the population was depleted by the influenza epidemic of 1918-19 when every person in Igushik either died or moved away (VanStone 1967:103). Sometime later the village was re-established as the U.S. census data recorded the population as 28 in 1930 and 16 in 1940. The village was abandoned as a year-round settlement sometime in the 1940s.

The final group of Manokotak founders came from the western Bristol Bay area, particularly the settlements of Togiak (*Tuyuryaq*) and Osviak (*Asviryaq*), as well as sites reported near Goodnews Bay and Platinum. The Togiak area has historically supported a large coastal and riverine population as depicted in Table 2. Although Oswalt (1967) considered Petroff's figure of 2,200 suspect, he still estimated a population as large as 1,000 in 1880. The Togiak fishery was not developed commercially until 1950 when a cannery was established there. In contrast, canneries were built on Nushagak Bay as early as the late 1880s and some people from the Togiak area were consequently drawn east by financial opportunities.

The origin of the community of Manokotak is recounted by lifelong village resident Anecia Lomack in Harrison 1985:9-10. Evon Minista is credited with being the founder of Manokotak. Originally from the Nushagak Peninsula, his wife Susie was from Togiak. He was one of many who spent the winters of 1944 and 1945 at the end of the Igushik River to be closer to his commercial fishing grounds in Nushagak Bay.

Following World War II, when gas was still in short supply, Minista's ration was insufficient either to get to Togiak to re-establish his family's residence or to return to their winter home. Searching for a new winter home along the Igushik River, he selected the current site of Manokotak in 1946 and other families soon joined his.

A number of factors were responsible for Manokotak's growth. Proximity to the salmon fishing grounds in Nushagak Bay has already been mentioned. This became timely since World War II had finally opened the industry's doors to greater participation by Alaskan Natives as fishermen. Some people were drawn by a Moravian church which was built in 1948 and staffed by a Yup'ik missionary couple. The desire for improved education was another factor. The missionary's wife began a limited instructional program in the late 1940s although no formal school was established until 1958 when the village requested such a service from the Bureau of Indian Affairs. Access to health care was another inducement. When a measles epidemic struck in 1948, Manokotak was closer to the hospital in Dillingham than the other settlements mentioned. The BIA teacher provided some rudimentary health care in the late 1950s and in 1960 a trained health aide was assigned to provide services to the village. Finally, in the 1950s several small family-owned stores were in operation, offering additional convenience (Harrison 1985:10).

Table 3 depicts the population and number of households in Manokotak since 1950. It can be seen that the population has grown steadily since its founding with the greatest increase in the decade between 1970 and 1980. At the same time, the average household size has

TABLE 3: MANOKOTAK POPULATION AND AVERAGE HOUSEHOLD SIZE 1950 - 1985.

	Population	Percentage Population Growth	Number Households	Average Household Size
1950	120	---	NA	NA
1960	149	24	NA	NA
1970	214	44	37	5.8
1980	294[a]	37	57	5.2
1985	309[b]	2	59[c]	5.2[c]

Source: a. Alaska Department of Community and Regional Affairs, 1981.
b. Alaska Department of Labor, 1985.
c. Alaska Department of Fish and Game, Division of Subsistence, 1986.

declined slightly from 5.8 in 1970 to 5.2 in 1985. Household size ranged from a low of one to a high of 11 in 1985.

The growth of Manokotak is due to the in-migration explained above and a natural increase in population due to the birth rate. Researchers identified no single post-marriage residence pattern at the time of the study and spouses of both sexes were recruited into the community through marriage. Of the sixty-one marriages in the village, 34.4 percent displayed a neolocal residence pattern, where both partners had moved to the village to establish a new residence. Many of these were older couples who moved to Manokotak when it was first established. Of the remaining couples, 32.8 percent were patrilocal, 21.3 percent were matrilocal, and in the remaining 11.5 percent both spouses were from Manokotak.

Nearly all household heads, male and female, were born in the Bristol Bay (76.2 percent) or Yukon/Kuskokwim region (21.8 percent). One percent were born in Anchorage and data for the remaining one percent were missing. The overwhelming majority, 89.2 percent, had lived in Manokotak for at least six years and the mean length of residence for household heads was 28.8 years.

In 1985, the population of Manokotak was 309 (ADOL 1985) and the number of households was 59. Fifty-four households, including 282 persons, were represented in the Division's study. Households composed of part-year residents (namely, teachers and the school administrator) were excluded. Year-round residents who were also teachers were included. Figure 3 depicts the age and gender breakdown of the sample. The population is slightly skewed with more males (53.2 percent) than

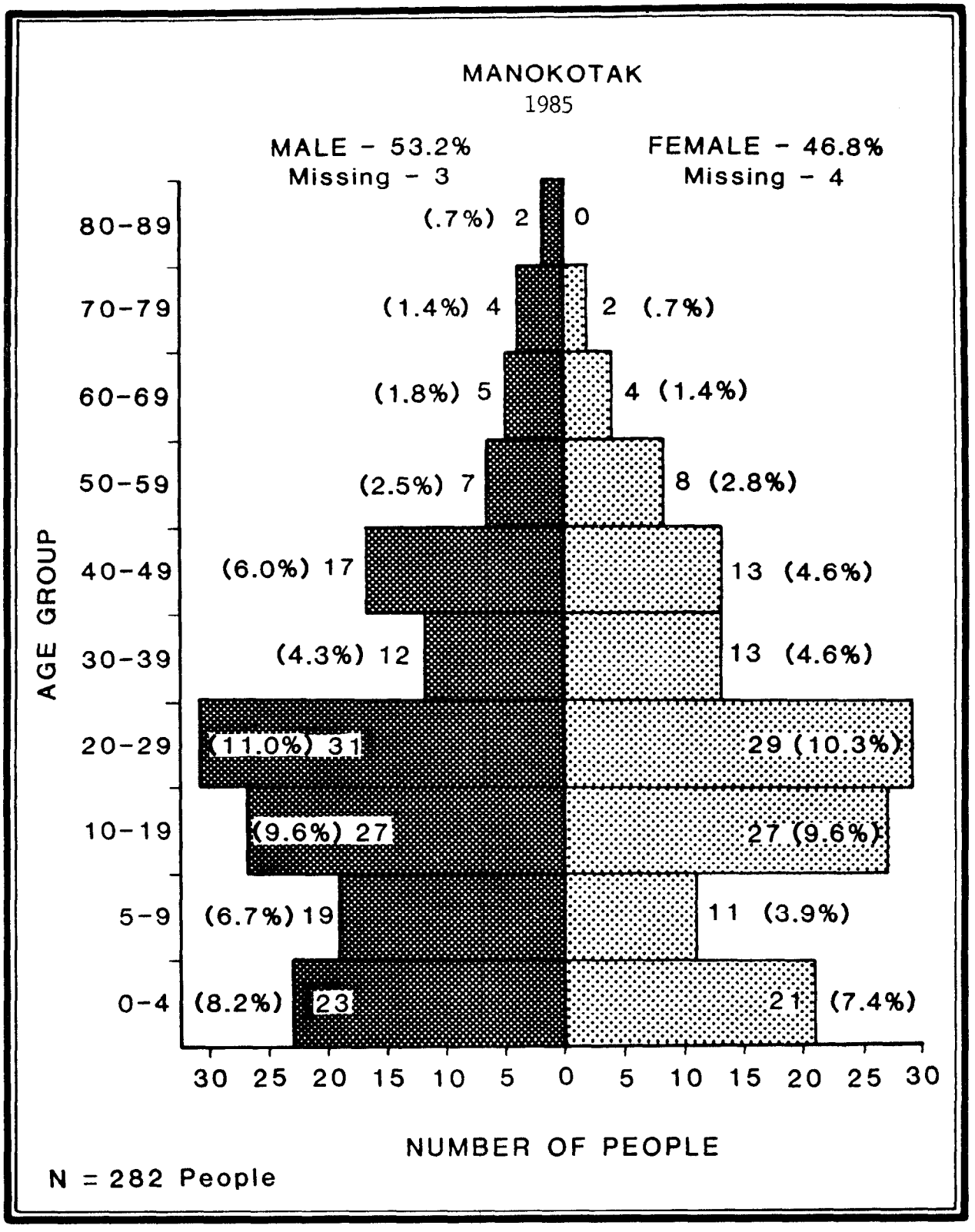

Figure 3. Population Profile of Study Sample by Age and Sex.

females (46.8 percent) particularly in the 5-9 year age group where the number of males is nearly double the number of females.

The ethnic composition of the sample was 100 percent Native Alaskan, nearly all Yup'ik Eskimo. Although some former residents of Manokotak have married non-Natives and have resided in the community at other times, none lived in Manokotak during the study year. Yup'ik is the primary language in the village and many of the older residents as well as pre-school children speak no English at all, although almost all school-aged through middle-age persons are bilingual.

CONTEMPORARY COMMUNITY DESCRIPTION

Manokotak is set along the east bank of the Igushik River (Fig. 4). Located 25 miles west of Dillingham, Manokotak is situated in a roadless area and is accessible by air, boat, or snowmachine depending on the season. There is a gravel runway and in good weather, frequent service to Dillingham and other villages is provided by several air taxis. During the study year, two air taxis employed dispatchers in the village to facilitate travel. In good snow cover, the "Manokotak Trail" to Dillingham is used frequently for snowmachine travel.

Houses are of wood frame construction with wood or oil used as the primary heat source. All houses have running water, sewer service, and seasonal electricity. The electricity is discontinued in the summer when nearly all families move to fish camps. The few residents who are left in the village rely on their own generators for power. One consequence of this is that food which was previously frozen must be preserved by other methods in the summer.

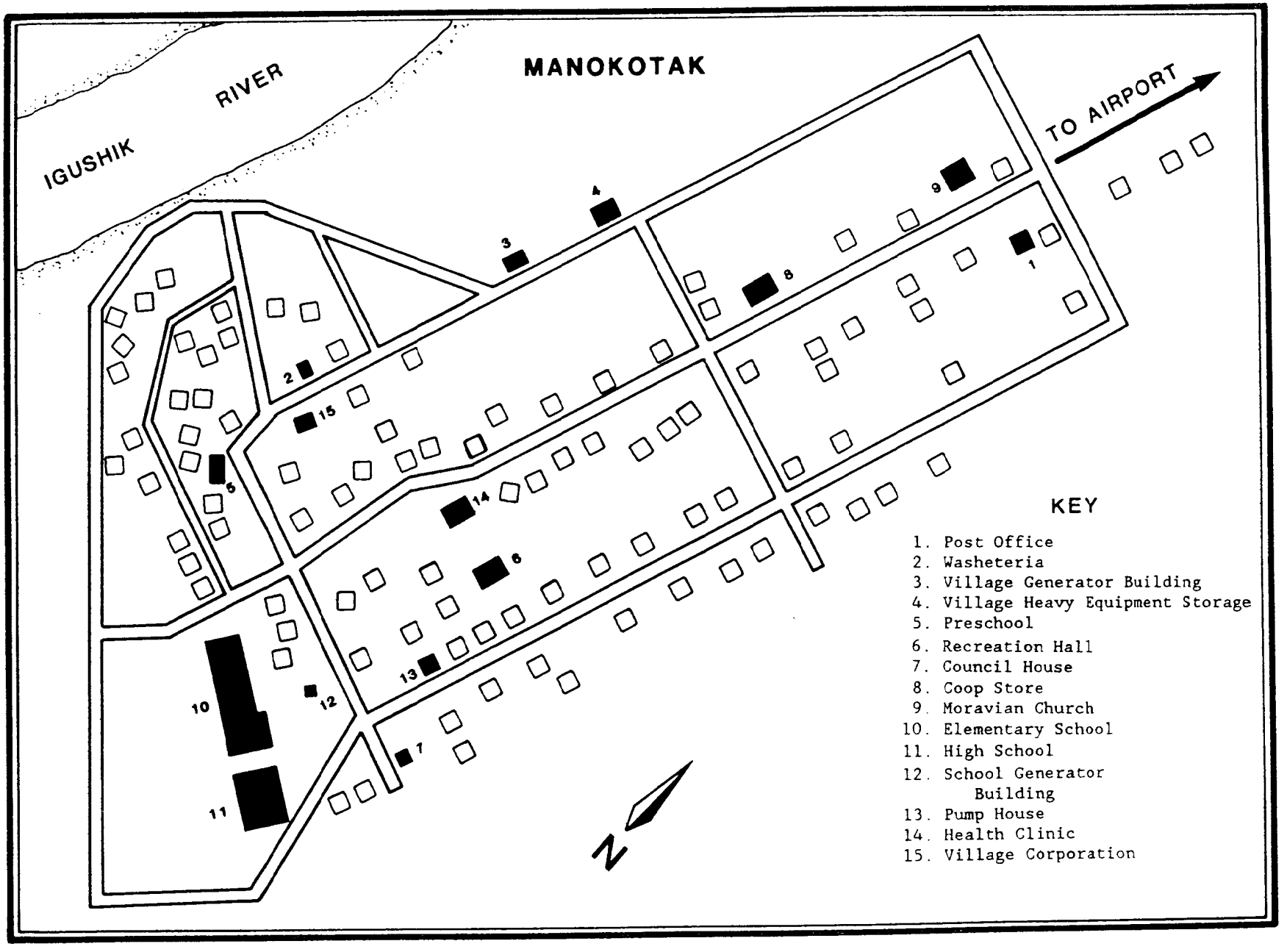

Figure 4. Community of Manokotak, 1985.

In spite of the presence of running water, most residents vastly prefer their steambaths (*maqis*) for washing, relaxing, and socializing. Television is available through the village-franchised cable service or the state operated satellite station. Only one radio station, broadcast from Dillingham, is received. Until 1985, there was only one telephone in the village, but subsequently home phone service became available and many households have subscribed. Phone service is also discontinued in the summer. CB and VHF radios are still used to communicate between houses or beyond the village boundaries. There is a small co-op store which sells a variety of basic canned goods and a limited supply of clothing. A washeteria connected with the community's water supply is available for doing laundry.

In recent years there has been a lack of physical space for new housing to accommodate the increasing population. The village is bordered on all sides by the river, the airport, a mountain, and wet tundra. At the time of the study, there were no vacant houses. New housing is planned through HUD at a site approximately five miles eastward. As this report went to press, the road and new houses were completed during the fall of 1988. The significant physical distance between the two areas will most likely affect the village's social organization.

Manokotak has both an elementary and high school. During the study year, its staff was unique within the Southwest Region School District since the entire elementary staff, certified teachers as well as classroom aides, were all Yup'ik speakers and year-round community residents. The community was quite proud of this distinction. The University of Alaska through its various branches also offered adult

basic education classes (GED) and distance education programs leading to an associate of arts degree or baccalaureate degrees in education or rural development.

Incorporated in 1970, Manokotak is a second-class city. As such it has diverse powers including the power to tax, and the city levies a two percent sales tax. An eight member city council is in charge of decision-making, but day to day affairs are overseen by the mayor. The city participates in state revenue sharing. Its main services are to administer federal and state grants, administer construction grants, provide public safety through Bristol Bay Native Association Village, Police Safety Office program, operate water and sewer in accordance with Public Health Service standards, and maintain the light plant and the heavy equipment for airport and road maintenance.

Manokotak's Native population is also represented by a traditional village council. It is recognized by the BIA as the official, traditional governing body of the village. Although eligible to administer a variety of federal programs, including local health care, employment assistance, college assistance, and social services, Manokotak has chosen to have most of those services provided through the regional non-profit Native corporation, Bristol Bay Native Association.

The Bristol Bay Area Health Corporation provides limited health services in the village through two trained village health aides. A public health nurse also makes regularly scheduled visits to provide assessments and immunizations. Doctors and dentists visit the community once or twice each year. For more extensive treatment, residents travel to the hospitals in Dillingham or Anchorage.

A very important influence on life in Manokotak is the Moravian Church. The only church in the village, services are held every Sunday and several evenings each week. Manokotak residents regularly participate in church-sponsored regional events such as song fests. A full-time Yup'ik pastor resides in the community.

ECONOMY

Like other communities of Bristol Bay, Manokotak's cash economy is heavily dependent on fishing in the commercial salmon industry. Also, in the past ten years, participation in the commercial herring fishery at Togiak has increased and become an important supplemental income source for many families. In the wage sector, the school is the largest employer. There is also some wage employment, usually on a part-time basis with other government agencies, most notably the city council. A few private employers also provide a limited number of jobs to local residents, namely the local village corporation, several air taxi services, and the co-op store. Income from trapping and crafts are supplemental income sources for many families. In the following section each of these sectors will be described in detail.

Commercial Salmon Fishery

Bristol Bay supports the world's largest commercial salmon populations. Five species, kings, sockeyes, pinks, chums, and cohos spawn in the major drainages. Sockeyes comprise the largest portion of the harvest (ADF&G 1986b). Table 4 reports the overall Bristol Bay

TABLE 4. SOCKEYE SALMON COMMERCIAL CATCH BY DISTRICT, IN NUMBERS OF FISH, BRISTOL BAY, 1967-1986.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1967	2,337,226	1,070,942	163,744	657,711	101,107	4,330,730
68	1,216,858	671,554	82,457	749,281	72,699	2,792,849
69	4,655,072	889,322	169,845	773,207	134,252	6,621,698
70	17,803,805	1,403,509	171,541	1,188,534	153,377	20,720,766
71	5,857,378	1,306,682	954,068	1,256,799	209,060	9,583,987
1972	1,102,365	839,820	17,440	381,347	75,261	2,416,233
73	168,249	221,337	3,920	272,093	95,723	761,322
74	538,163	172,253	2,151	510,571	139,341	1,362,479
75	3,085,416	964,024	14,558	645,902	188,914	4,898,814
76	2,547,276	1,329,788	174,923	1,265,422	301,883	5,619,292
1977	2,167,214	1,780,567	92,623	619,025	218,451	4,877,880
78	5,123,668	1,207,294	7,995	3,137,166	452,016	9,928,139
79	14,991,826	2,257,332	391,118	3,327,346	460,984	21,428,606
80	15,120,457	2,623,066	885,875	4,497,787	634,561	23,761,746
81	10,992,809	4,361,406	2,116,066	7,493,093	639,707	25,603,081
1982	5,005,802	2,447,514	1,139,192	5,916,187	595,696	15,104,391
83	21,559,372	6,755,256	3,349,451	5,119,744	588,208	37,372,031
84[a]	14,237,955	5,301,198	2,661,330	2,164,667	318,863	24,684,013
85[a]	8,135,810	7,457,295	6,346,489	1,323,492	210,470	23,473,556
86[a]	2,889,894	5,008,779	4,928,502	2,757,730	303,677	15,888,582
20 Year Average	6,976,831	2,403,447	1,183,664	2,202,855	294,713	13,061,510
1967-76 Average	3,931,181	886,923	175,465	770,087	147,162	5,910,817
1977-86 Average	10,022,481	3,919,971	2,191,864	3,635,624	442,263	20,212,203

a. Preliminary

Source: Alaska Department of Fish and Game, 1987.

commercial sockeye salmon harvest as well as Nushagak District totals for the past 20 years. As can be seen from these summaries, harvests have been highly variable from year to year, depending on such factors as health of the stocks, management strategies, weather, and market conditions.

As stated previously, commercial fishing began to develop as an industry in the late 1800s. (The following discussion is drawn from VanStone 1967:63-79.) VanStone considered commercial fishing to be the greatest agent of change which influenced local Eskimos since it resulted in major seasonal population fluctuations and brought the Eskimos into first-hand contact with many different cultural groups, including Euro-Americans, Chinese, and Filipinos. Commercial fishing also became, and still is, the main source of cash income in the area's mixed subsistence-cash economy.

The first attempt to harvest salmon commercially in Bristol Bay began in the 1870s when Alaska Commercial Company attempted to establish a saltery. The first cannery to operate in the Bering Sea was established in Nushagak Bay in 1884 by Arctic Packing. Although the canneries had a major economic influence on the region from the 1880s on, there was very little participation by local Natives. Canneries preferred to hire Asians and Mexicans who were far from home and dependent on the cannery for room, board, and return transportation. The fish processors thus considered these workers more controllable, and hence more reliable and efficient, than local residents who had obligations and work roles outside the cannery during the summer. Local workers commonly quit when conditions became intolerable or enough cash had been earned to meet a family's winter needs.

The small number of Eskimos who were employed by the canneries prior to 1929 were employed primarily in the processing sector while the actual fishermen were from the lower 48. After 1929, a few Eskimos became cannery fishermen, operating boats and gear which were supplied by the canneries. The real economic breakthrough for Natives was brought about by the labor shortage due to World War II. The canneries were then forced to depend on the resident workforce due to the difficulty of finding eligible workers from outside. By the late 1940s, all-Native cannery crews had become common although the actual fishing continued to be done primarily by non-Native non-local fishermen who were connected to powerful unions in California and Seattle.

It was finally the development of local fishermen's associations which enabled the Natives to actively participate in the commercial fishery. In 1937, resident fishermen in Bristol Bay had formed the Bering Sea Fishermen's Union with its major goal to "obtain precedence for residents as fishermen in the canneries" (VanStone 1967:79). In that same year, only 194 Eskimos were employed as cannery workers in Southwest Alaska out of a work force of 4,328. Even then, few Natives become fishermen themselves and it was not until 1961 that Native fishermen were used in even moderate numbers.

Another important change in the fishery was the institution of a limited entry permit system in 1974 (Petterson et al 1984:131). Gill net permits were issued for set netting and drift netting. The limited entry system has severely restricted entry into the salmon fishery. Permits were granted after lengthy applications were completed and proper documentation submitted. Many Natives who would have since entered the fishery have been "frozen out." Permits can be passed down

through inheritance but this is still problematic in large families. Permits can also be bought on the open market, but the average Bristol Bay Drift permit in 1985 sold for $117,983, making its acquisition out of reach for most local residents (CFEC 1986a).

In 1985, there were a total of 931 Bristol Bay set net permits and 1,738 Bristol Bay drift net permits. There is an increasing trend for permits to be owned by non-Bristol Bay residents. State-wide, Bristol Bay drift and set gill net fisheries have had the largest numerical net decrease (250 permits) in Alaskan rural participation of any fishery. This total represents 39.2 percent of the statewide decrease in permits (CFEC 1986a:91). The situation for Native fishermen is even worse. Of the Bristol Bay Natives who were issued permits, 21.3 percent no longer held them in 1983 (Tryck et al 1985:32). As the value of Bristol Bay permits has soared upwards of $100,000 and the cost of competitive boats has also gone up dramatically, some local fishermen have decided to sell their permits. Fishing is a highly variable industry and such an action is often precipitated by one or more bad seasons which make it nearly impossible to keep up with high boat payments.

As illustrated in Table 5, the average Manokotak fisherman earns substantially less that the average Bristol Bay fisherman. In 1982, Bristol Bay drift permit holders had an average gross income of $42,956 as compared to $32,124 for Manokotak fishermen with drift permits. This is probably the result of superior gear and vessels owned by fishermen from outside Alaska (Petterson 1984).

To date, Manokotak does not fit the regional pattern of losing permits. There were 41 initial permanent drift permits issued and 43

TABLE 5. AVERAGE EARNINGS, BRISTOL BAY SALMON PERMIT HOLDERS BY PERMIT TYPE, 1977 - 1982.

	Bristol Bay[a]	Manokotak[b]
Drift	$43,850	$32,316
Set	14,683	4,771

Source: a. Commercial Fisheries Entry Commission, 1986[a]
b. Langdon, 1985.

retained in 1986 (including five emergency transfers), representing a net gain of two permits. Manokotak has, however, lost a number of its less lucrative set net permits. Of the initial 53 permanent permits, 48 remained in the community in 1985 (CFEC 1985).

During the study year of 1985, 91 percent of the sampled households in Manokotak participated in the commercial salmon fishery. In 1986, including both permanent and interim use permits, eighty three Bristol Bay permits were held by Manokotak residents (CFEC 1986b), 39 of which were drift and 44 set net (Table 6). (Since these numbers include both permanent and interim use permits, they cannot be directly compared with the figures in the previous paragraph.) There was a strong correlation between type of permit owned and gender of permit holder (Table 6). With the exception of one female drift permit holder who had inherited the permit from her brother, drift permits were held by men. A second woman also obtained a permit through inheritance (from her father) but during the study year, transferred it to her husband on an emergency basis. In contrast, 32 of the 44 set net permits were held by women. During the study year, two male set permit holders opted to drift fish with relatives, two did not use their permits, and the remaining eight fished their set net sites.

The average earnings for Manokotak permit holders differ dramatically by gear type as illustrated in Table 7. In 1984, the mean gross value per salmon drift permit was $28,349 while the value of a set net permit was only $3,060. This pattern was consistent over time as indicated in Table 5. The average earnings for all Bristol Bay drift net holders between 1977-1982 were $48,150; while the average set net earnings for that same time period were $14,788 (CFEC 1986a). Not

TABLE 6. DISTRIBUTION OF BRISTOL BAY COMMERCIAL SALMON PERMITS BY TYPE OF PERMIT AND GENDER OF PERMIT HOLDERS, MANOKOTAK, 1986*

Permit	Male	Female	Total
Drift	38	1	39
Set	12	32	44
Total	50	33	83

*Excludes five permits tranferred away on an emergency basis.

Source: Commercial Fisheries Entry Commission, 1986,

TABLE 7. MANOKOTAK COMMERCIAL FISHING EARNINGS, 1984.

Gear Type	No. Permits Fished	Pounds Harvested	Estimated Gross Value	Mean Gross Value per Permit
Salmon drift	44	2,462,912	$ 1,247.351	$ 28,349
Salmon setnet	50*	251,833	153,015	3,060
Herring roe gill net	16	572,327	83,740	5,234
Herring roe-on-kelp	20	52,102	26,051	1,303
Total	130**	3,339,174	$ 1,510,157	$ 11,617 per permit $ 15,410 per person

* Two set nets were for the Kuskokwim Area.
** 130 permits registered to 98 different people (social security numbers).

Source: Commercial Fisheries Entry Commission, 1986d.

surprisingly, average earnings for Manokotak residents were substantially lower. Drift net permit holders earned $26,977 annually and set netters $4,055 (Langdon 1985).

Commercial fishing crews from Manokotak are usually composed of kin. Crews on boats are primarily male relatives, typically a captain and two crew members. A typical crew share is between 15-20 percent. Set net crews are most frequently composed of female relatives, usually a permit holder and a partner. Some younger men hold their own set net permits and others assist female relatives. In addition, a few non-Natives, married to women originally from Manokotak, also worked as set net partners with their wives.

Most Manokotak fishermen, regardless of gear type, fished for the cannery at Ekuk which is located across the Nushagak Bay from Igushik. Each winter the cannery sent representatives to Manokotak to make arrangements for the next season. The cannery extended credit for new fishing equipment, such as engines, nets, and ATVs. In turn, Manokotak fishermen signed agreements to deliver to that particular cannery for as long as it had the capacity to process the fish. As previously mentioned, the cannery also provided boat storage and repair services. During the fishing season, drifters delivered to cannery tenders in Nushagak Bay and set netters to a scow dispatched to Igushik Beach at the close of each opening. Deliveries were occasionally made to cash buyers as well.

Commercial Herring Fishery

Manokotak fishermen are active participants in the herring sac roe and roe-on-kelp fisheries which take place in the Togiak District. Of fairly recent origin, the sac roe fishery began in 1967 and was followed by the roe-on-kelp fishery the following year. For the first ten years effort levels and the number of processors remained small and the herring sac roe fishery did not operate at all in 1971 and 1976 due to poor market conditions. Favorable market conditions and additional incentives provided by the Fishery Conservation and Management Act of 1976 (the 200 mile limit) resulted in a major expansion of the Togiak herring fishery in 1977 (ADF&G 1986:142). The ex vessel value of the fishery in 1985 was $23.8 million, a new record for the Togiak district and well above the previous high of $10.5 million paid in 1983 (ADF&G 1986:152).

The sac roe fishery has a fairly short but controversial history due to competition between fishermen using two different gear types. The largest portion of the harvest is caught by seiners who with a few exceptions are not local residents of Bristol Bay. In 1985, the purse seine fleet harvested 82.6 percent of the total catch, with gill netters harvesting 17.4 percent (ADF&G 1986:152). Local fishermen primarily use gill net gear. Since the seiners are capable of much larger catches (an average of 100 tons in a seine set compared to five tons for a gillnet set) domestic processors have preferred to buy from the seiners for reasons of efficiency (Golia 1980:14). Local gillnetters have perennially had difficulty in securing confirmed markets with participating processors.

In an attempt to compete in the fishery, local gillnetters formed the Bristol Bay Herring Marketing Cooperative in 1979. The cooperative was unsuccessful in its early years in securing any domestic market for the gill netters. In fact, the 1980 season proved a financial disaster for gill netters, who were unable to deliver their catch and the combined loss for all gillnetters was estimated at between $1.5 million and $2.5 million (Golia 1980:18). In 1981, gillnetters were able to establish a joint venture with a Japanese processor and secure the necessary government approval. Although this arrangement has continued each year since then, it is constantly challenged by domestic processors who are economically threatened by joint ventures with foreign businesses. In addition, proposals to the Board of Fisheries are submitted each year to deal with the controversial issue of allocation between seine and drift gillnet gear.

Perhaps even more troublesome to the future of this fishery is the health of the stock itself. For the last several years, fishermen have been harvesting from the older age classes, with no new recruitment (ADF&G 1987). Biologists are uncertain of the reasons for this trend.

Unlike the commercial salmon fishery, herring permits have not been restricted by a limited entry system. Rather, interim use permits are issued upon application and an annual fee of $50. In 1984, Manokotak residents fished 16 herring sac roe gill net permits and 20 permits for roe-on-kelp. The average earnings that year were $5,234 for sac roe and $1,303 for roe-on kelp (Table 7). This income arrives at the time of year when cash is usually low.

Sixty-nine percent of the households in Manokotak had members who participated in the Togiak commercial herring sac roe or spawn-on-kelp

fisheries in 1985. In 1986, 40 gill net herring permits were held by Manokotak residents. Salmon gill net boats of 28 and 32 feet in length have been adapted with herring gill net gear. Similar to the salmon crews, most herring crews are composed of male relatives although some female relatives, wives, sisters and daughters are also employed as crew members. Three herring permits were also held by women. In 1985 the mean earnings for local Alaskan participants in the Togiak gill net herring fishery was $6,034 (Focht 1987).

Public Sector Employment

The largest wage employer in the village was Southwest Region School District, which provided 17 jobs to year-round Manokotak residents (non-Native teaching staff excluded). Four residents were full-time certified teachers. Thirteen other part-time academic year positions for the 1986-87 school year included directors of Johnson O'Malley and community education programs; aides in the bilingual, special education, and pre-school programs; cooks; custodians; a resource center supervisor; and a secretary. The Rural Education Center in Dillingham, which is part of the University of Alaska, employed a part-time adult basic education instructor. Two regional Native corporations employed a number of residents using state and federal funds. The Bristol Bay Area Health Corporation hired two full-time health aides and two alternates. Bristol Bay Native Association employed a public safety officer and two part-time workers to provide nutrition and homemaker services to elders.

The city government employed a mayor, a secretary, two water and sewer technicians, a fuel operator, a road equipment operator, and a billing clerk. Most of these jobs were of a part-time or seasonal nature. In addition, the city sometimes administered state-funded construction grants. Its most recent projects were the building of a road, approximately five miles long, and the installation of water and sewer to service a planned HUD housing development. A number of workers were employed on this project in the spring and fall for two seasons. Local workers were also employed to build the houses. The federal government operated a post office on a year round basis and employed one full-time staff person.

Private Sector Wage Employment

The village corporation employed a number of full-time and part-time staff in its various operations, including attendants for the washeteria, light plant operators, and a secretary. The village corporation operated an air taxi service headquartered in Dillingham between 1984 - 1987. A number of village residents were employed as pilots, dispatchers, van drivers, and freight handlers. Some commuted from Manokotak to Dillingham by plane on a daily basis. The air taxi business was in the process of being sold as this report was prepared and it is unclear whether local job opportunities will be affected. Another private air taxi, also based from Dillingham, had a strong presence in Manokotak and employed residents in similar capacities. Finally, the village had a small co-op store which employed a full-time manager and two part-time clerks.

Trapping and Crafts

Furbearers were trapped and sold by a large number of Manokotak households. For many, this money was an important source of cash in the winter when other sources of wage empoyment and self employment were scarce. The fur harvests for 1985 are reported in subsequent chapters. A number of women supplemented the household income throughout the year by production of grass and skin crafts and garments. No data were available which indicated how much money was earned from these sources although one woman reported she had earned $3,000 in a five month period from the sale of her crafts (Field Notes, Chythlook 1986).

Employment Characteristics of the Sampled Households

The participation of households in monetary employment in 1985 was documented in the Division of Subsistence survey. As indicated, commercial fishing comprised the largest part of the community's cash sector. Ninety one percent of the households participated in commercial salmon fishing. Eighty nine persons were employed fishing for king, red and chum salmon, and 80 of those continued to fish in the silver salmon season. Interestingly, only one resident was employed in a cannery job in 1985. This indicates a clear preference for harvesting rather than the processing roles (see also Wolfe et al 1985). The small number of jobs also is due to lack of opportunity, since there was no cannery at Igushik, Manokotak's summer fish camp. However, in the past when no other cash sources were available, households commonly travelled to other communities for seasonal cannery employment. This pattern no

longer was present in 1985. In addition, 66.7 percent of the households and a total of 58 persons were involved in the commercial herring sac roe or roe-on-kelp fisheries.

Table 8 reports the percentage of households reporting income from non-fishing sources. In total, there were 72 non-fishing jobs reported by surveyed households in 1985. The largest percentage (45.8 percent) was with local government, which included Southwest Region Schools and the city. This was followed by services (23.6 percent), and transportation, utilities, and communication (16.7 percent). The remaining sectors had much smaller representation: trades (6.9 percent); other wage employment (4.2 percent); manufacturing (1.4 percent); state government (1.4 percent); federal government (1.4 percent); and self-employment, other than trapping or cottage crafts (1.4 percent).

Excluding the commercial fishing, 27 households of the 54 surveyed (50.0 percent) reported one member was employed 1985; 14 households (29.5 percent) reported 2 members employed; 4 households (7.4 percent) had 3 employed members; and 9 households (16.7 percent) stated that none of their members had been employed during the study year. Two-thirds of all jobs, including commercial fishing, were held by heads of households. The percentage of non-fishing jobs held by heads of households was even higher, 75.0 percent. All jobs held by non-adults were in the commercial fishing sector. The average number of weeks worked per year per job, (including estimated time spent in commercial fishing) was 10.1 weeks. The mean number of hours worked per year (excluding fishing and other jobs where information was missing or not applicable) was 783.1 hours per year. To provide a point of comparison,

TABLE 8. PERCENTAGE OF MANOKOTAK HOUSEHOLDS REPORTING INCOME FROM VARIOUS ECONOMIC SECTORS, 1985. (N = 54 Households)

Sector[a]	Percentage[b]
Commercial Fishing	90.7
Local Government	45.8
Services	23.6
Transportation/utilities/ communication	16.7
Trades	6 9
Other wage employment	4.2
Manufacturing	1.4
State government	1.4
Federal government	1.4
Self-employment	1.4

a. Systematic information was not collected on the number of households earning income from trapping or crafts sales in 1985.
b. Since households had more than one source of income, figures do not add up to 100%.

a forty hour per week, 52 week per year job would equal 2080 hours worked per year, thus indicating that the average job in Manokotak was less than a half time job.

Monetary Income and Cost of Living

Table 9 presents information on income levels for Manokotak residents from 1978-1982 from two different sources. Income fluctuated widely between years. The mean taxable income per income tax return ranged from a low of $6,435 in 1982, to $11,027 in 1978 (Alaska Department of Revenue 1985). Figures for 1979 reflect a mean household income of $34,118 (U.S. Census 1980). 1979 was an exceptionally profitable season for Bristol Bay salmon fishermen. These figures further show that in comparison with mean incomes in Dillingham and Anchorage, Manokotak earnings were consistently lower with the exception of 1979 when Manokotak household earnings outpaced Anchorage by $2,000.

Although Manokotak residents usually earned less than those of Anchorage and the regional center of Dillingham, their cost of living was much higher. Most purchased foods were either secured from Dillingham or Anchorage. Goods from Anchorage were mailed or barged in, entailing significant shipping costs. Alternatively, groceries were purchased in Dillingham where food costs were 72 percent higher than Anchorage from June 1981 through December 1985. In other words, a food basket which cost $100 in Anchorage cost $172 in Dillingham ((University of Alaska 1986). Round trip air fare for one person from Manokotak to Dillingham was an additional $30 in 1986.

TABLE 9. MONETARY INCOMES FOR MANOKOTAK, DILLINGHAM, AND ANCHORAGE FOR 1978, 1979, 1981, 1982.

	Manokotak	Dillingham	Anchorage
1978[a]	11,027	16,870	18,255
1979[b]	34,118	35,573	32,073
1981[a]	10,689	19,609	23,043
1982[a]	6,435	16,213	23,590

[a] Mean taxable income per income return.
Source: Alaska Department of Revenue (1985).

[b] Mean gross household income.
Source: United States Bureau of the Census 1980.

CHAPTER 3

GENERAL CHARACTERISTICS OF RESOURCE USE

SEASONAL ROUND

Manokotak residents followed a patterned seasonal round of harvesting activities in the mid-1980s as depicted in Figure 5. The timing of harvests was governed by hunting and fishing regulations, weather conditions, resource availability, and resource abundance.

The annual cycle began with the breakup of ice on Nushagak Bay, usually by late April, when hunters sought seals and waterfowl. If the Igushik River was still frozen, hunters towed their skiffs by snowmachine to open water at Igushik or Protection Point in late March or April to hunt. Shortly thereafter, some fishermen began traveling to Nushagak Bay to begin work on their boats which were usually stored at a cannery at Ekuk. Sometimes special trips were made for hunting purposes and on other occasions, men hunted opportunistically while in the bay to ready their fishing boats for the commercial season.

Freshwater fish, especially Dolly Varden, were harvested with nets when the Igushik River opened. In May, many fishermen traveled west to Kulukak Bay to set up spring camps, where they were often joined by their families for periods of a few days or weekends. Many households participated in the commercial herring and roe-on-kelp fisheries and engaged in subsistence activities. Herring were dried and smoked or salted in brine. Roe-on-kelp was frozen or salted in brine. Men continued to hunt for seals and waterfowl. Kulukak Bay was also

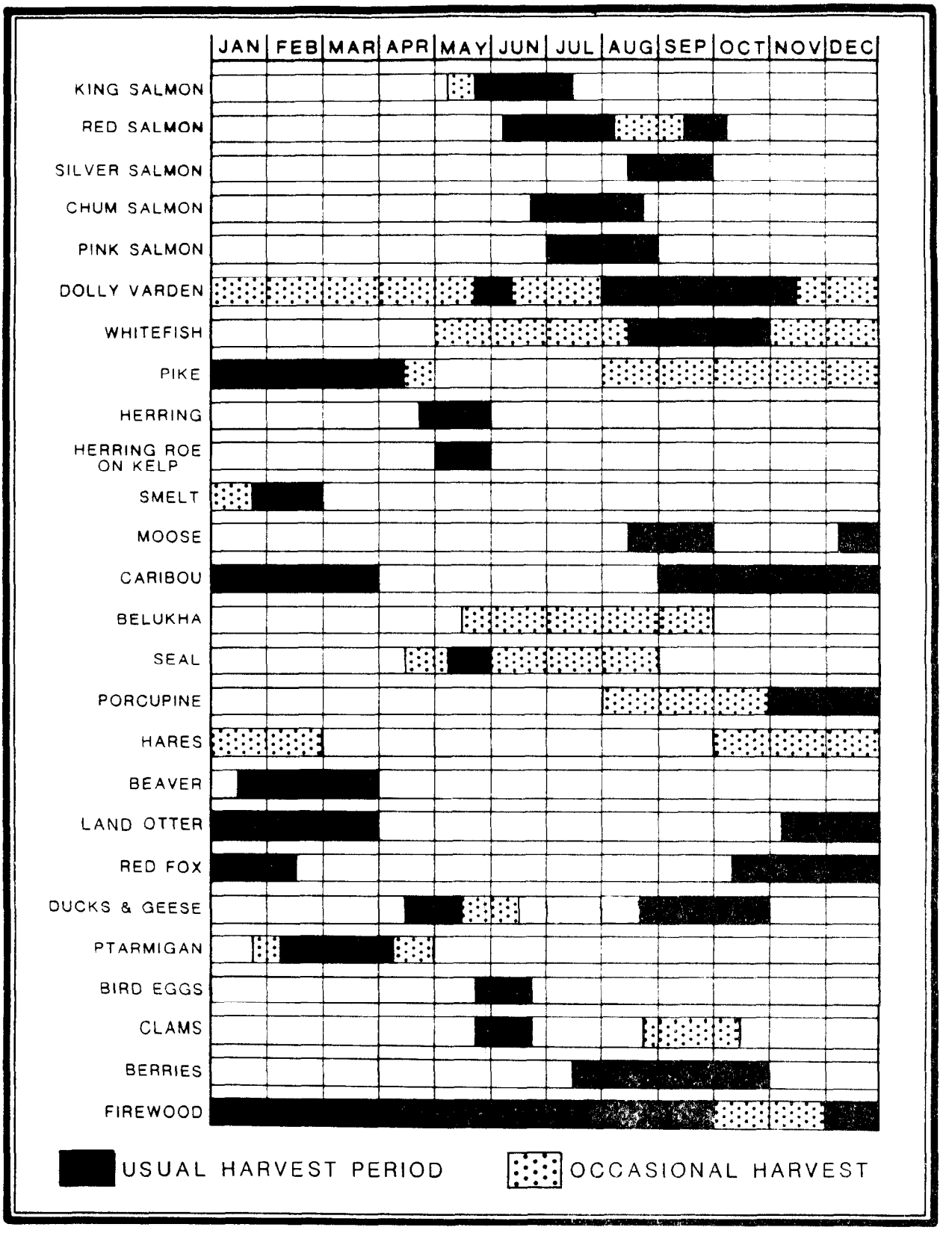

Figure 5. Seasonal Round of Resource Harvests, Manokotak.

considered a good place to hunt sea lions. At low tide, families dug clams. People began gathering gull eggs in May, continuing into June.

At the end of May and in early June, almost all residents migrated to their summer fish camps at the mouth of the Igushik River where they fished for subsistence and commercial purposes. The salmon season began in early June with the arrival of the first king salmon. Reds, chums, and pinks were harvested in July. By the end of July, most families had returned to the winter village and harvested silvers for subsistence there. In September, trips were made to Amanka and Ualik lakes to harvest spawned-out red salmon. Berries and plants were harvested throughout the summer and fall as the various species ripened. In the fall, some women traveled to the coast to gather grass for basket-making.

Moose hunting was a dominant resource activity in late August and September when hunters traveled up the Igushik River and around Amanka and Ualik Lakes in skiffs. Marine mammal and waterfowl hunting continued as well. Freshwater fish, especially Dolly Varden and whitefish, were harvested with nets throughout the fall. Later in the winter, men began to hunt caribou, often flying to the Nushagak-Mulchatna area or the Alaska Peninsula. When snow conditions were good, some hunters traveled by snowmachine up the Nushagak River to hunt caribou, sometimes with residents of New Stuyahok, Ekwok, or Koliganek. In December, there was a second moose season and men traveled by snowmachines particularly to the Weary and Snake River areas.

When freeze-up occurred, a few families set out traps for blackfish and many people fished through the ice for pike, smelt, and other species. Trapping furbearers, especially beavers, was a

significant winter activity for many households. Beavers were an important source of both food and cash during the winter months. Porcupines were harvested opportunistically and especially favored during the early winter. Ptarmigan were hunted in the late winter and early spring when they formed large flocks. Arctic ground squirrels were snared in the spring and valued for their food and fur. Firewood for heating homes and steambaths was gathered throughout the year.

LAND USE PATTERNS

As has been documented for other rural Alaskan communities in the Bristol Bay region (Wright et al. 1985), Manokotak residents exploited a relatively large area for their subsistence activities during a recent 20 year period (Wright et al. 1985). Salmon were harvested in Nushagak and Kulukak Bays and the Igushik River and lakes system (Fig. 6). Marine fish (Fig. 7) and invertebrates (Fig. 8) were harvested in Nushagak Bay and westward in favored spots in Kulukak Bay and the eastern portion of Togiak Bay. Freshwater fishing activities covered a number of waterbodies, including the Igushik River and lakes system, the Wood River lakes, Tikchik Lake, Togiak Lake, and Ongivinuk Lake (Fig. 9).

Hunting for moose occurred from the mouth of the Igushik River as far north as the uppermost of the Wood River lakes (Fig. 10). Caribou hunting occurred in two major areas, along the Nushagak-Mulchatna drainage north of Ekwok and on the Alaska Peninsula (Fig. 7). A significant amount of coastal area was used to hunt for marine mammal species beginning in Nushagak Bay and continuing westward as far as

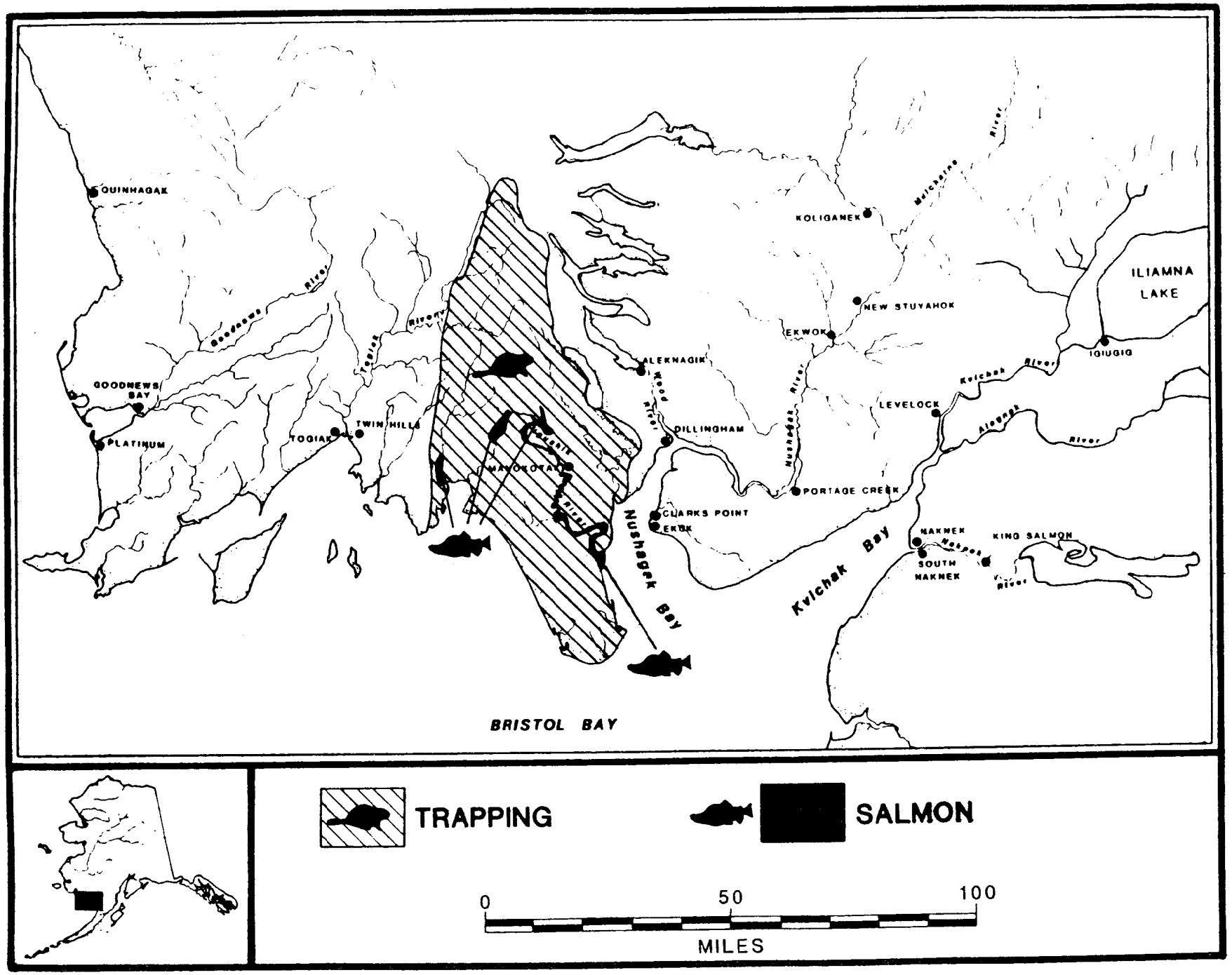

Figure 6. Areas Used to Harvest Salmon and Trap Furbearers by Manokotak Residents, 1960-1982.

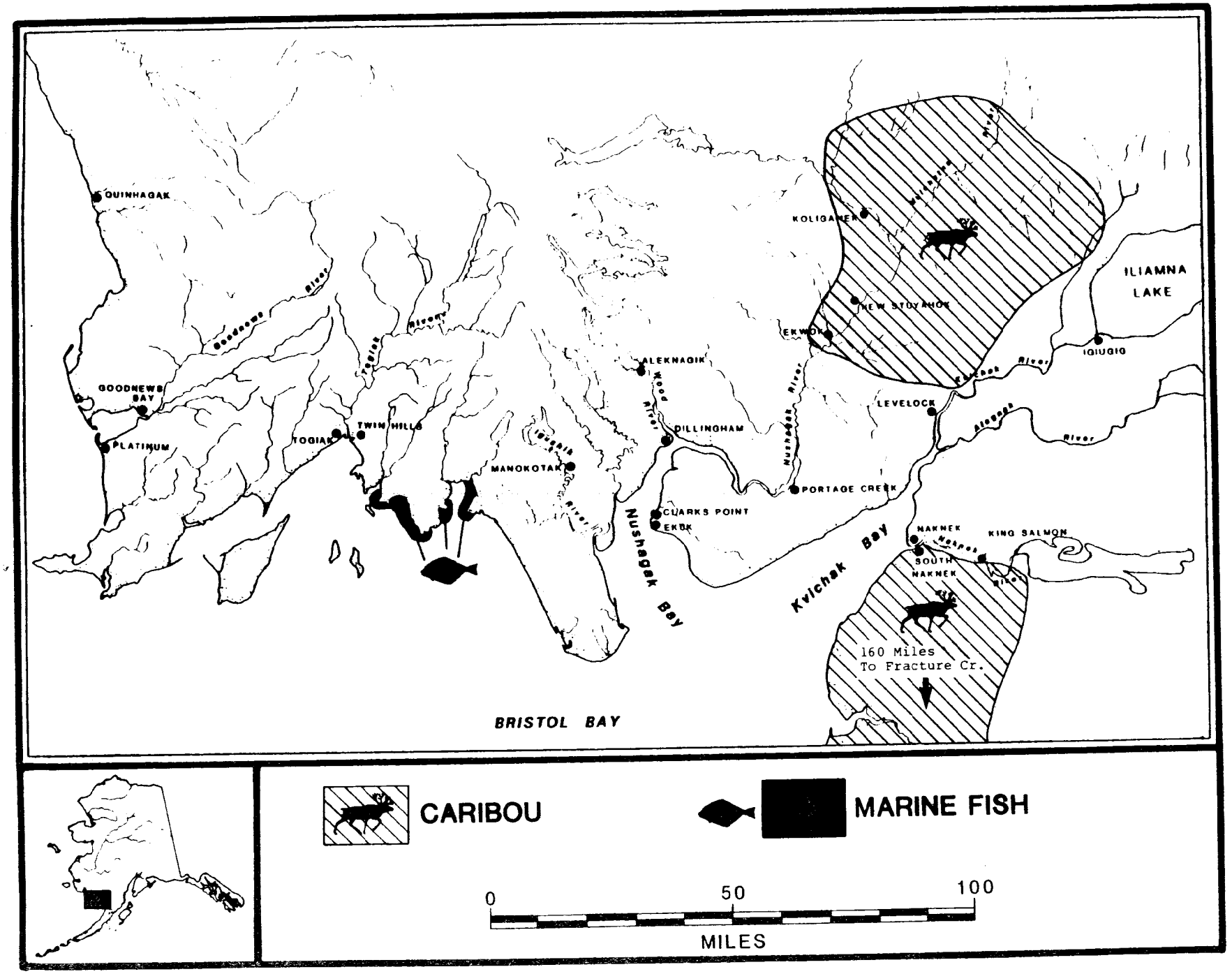

Figure 7. Areas Used to Harvest Marine Fish and Hunt Caribou by Manokotak Residents, 1960-1982.

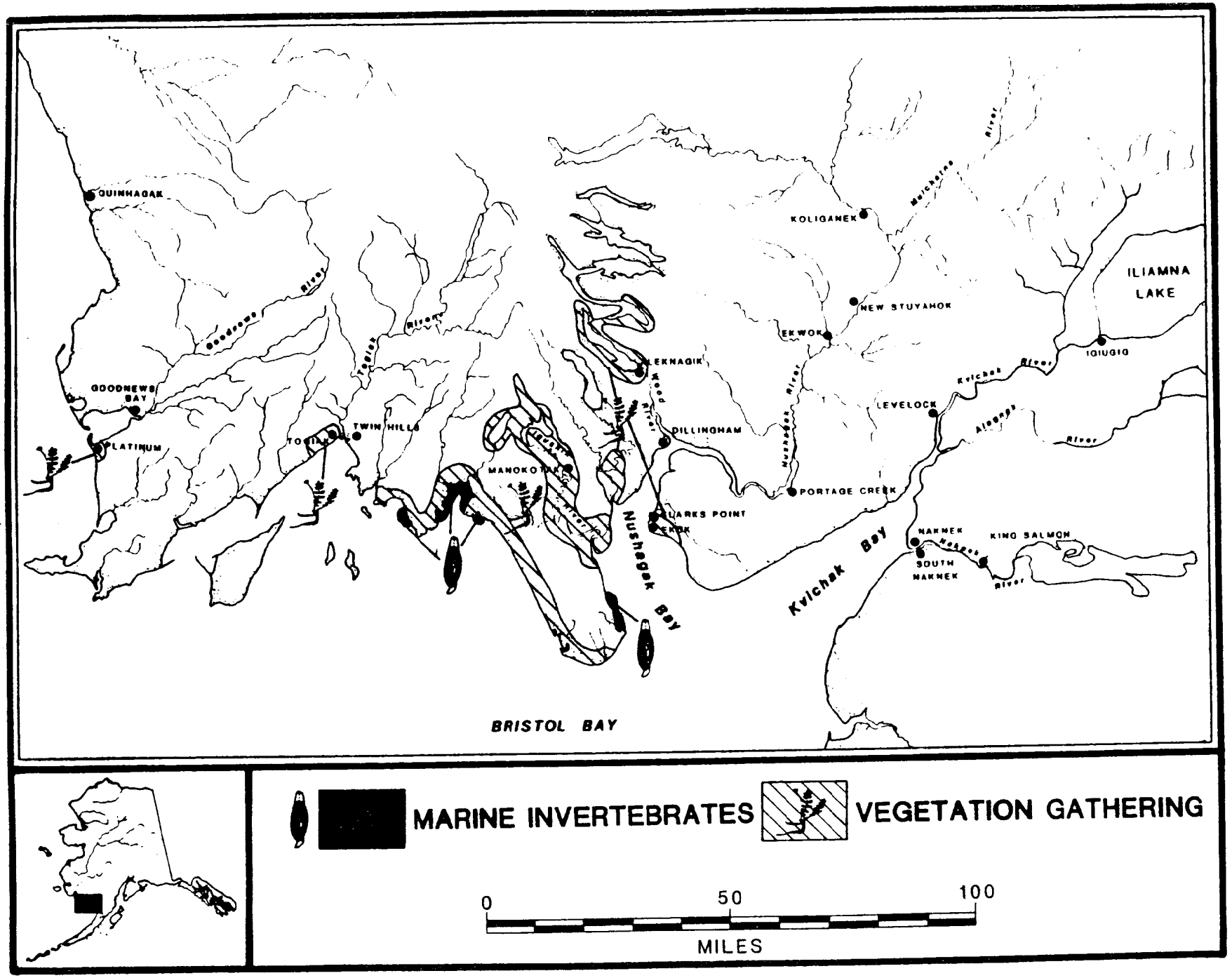

Figure 8. Areas Used to Harvest Marine Invertebrates and Gather Vegetation by Manokotak Residents, 1960-1982.

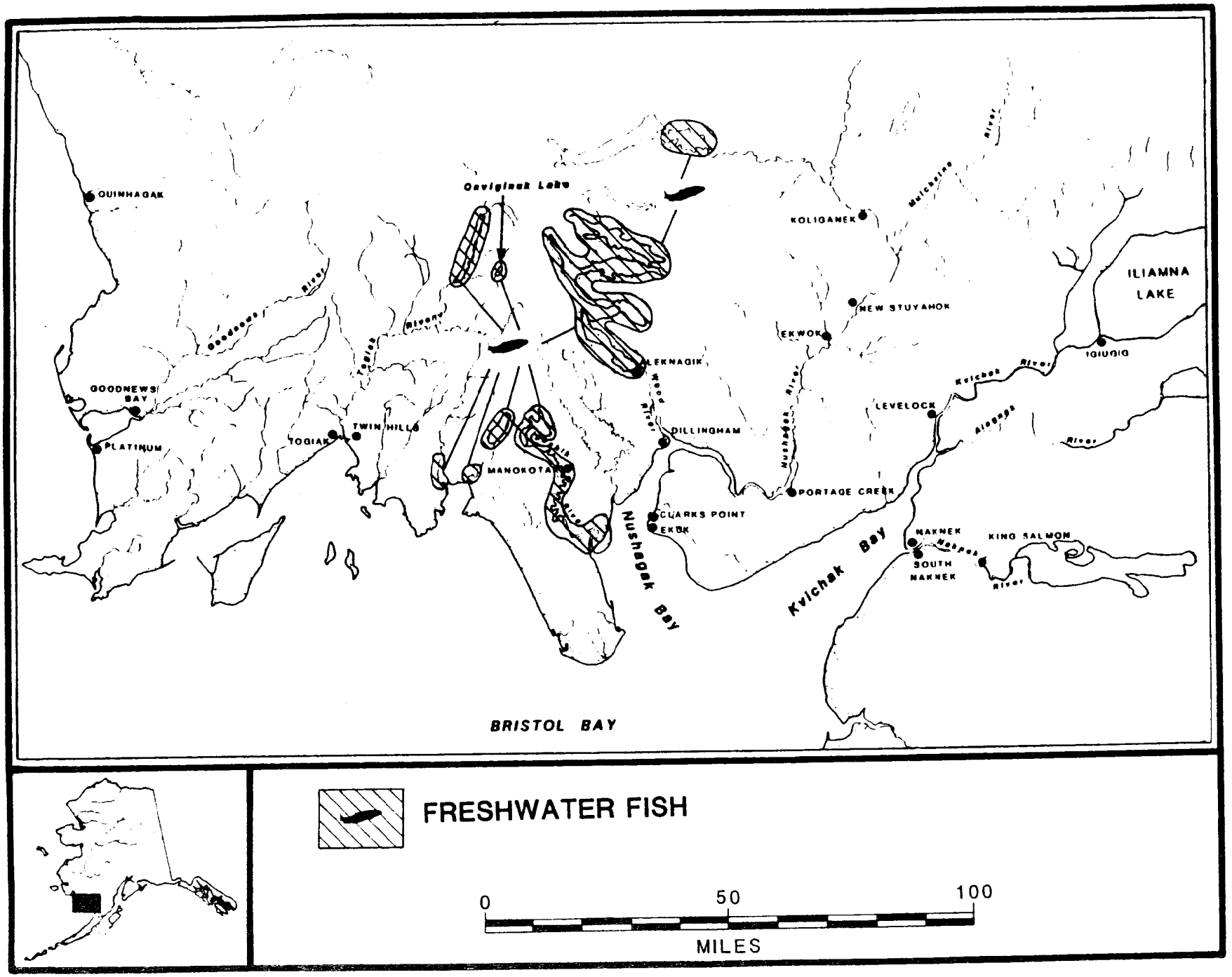

Figure 9. Areas Used to Harvest Freshwater Fish by Manokotak Residents, 1960-1982.

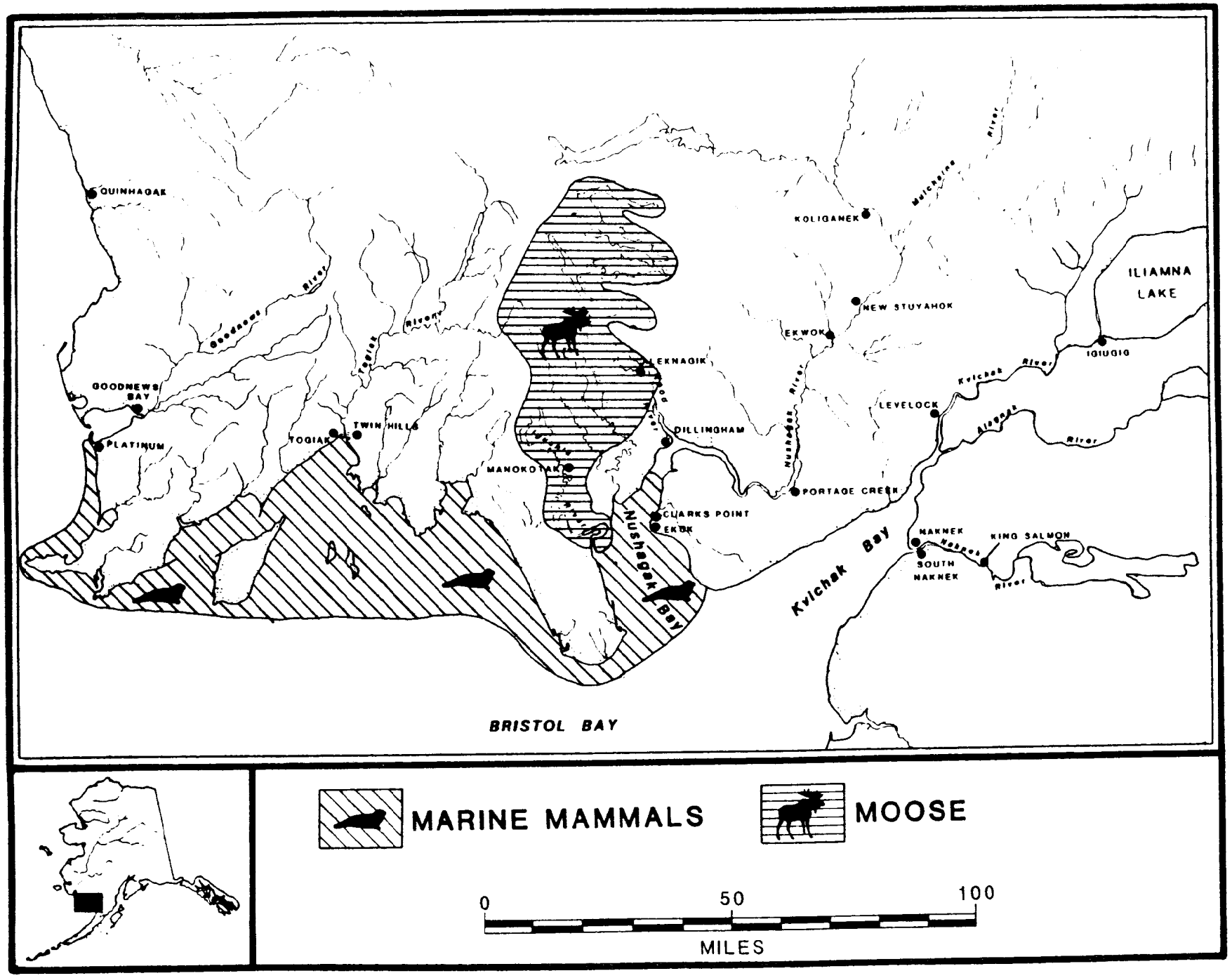

Figure 10. Areas Used to Harvest Marine Mammals and Moose by Manokotak Residents, 1960-1982.

Platinum. Furbearers were trapped in all directions from Manokotak and included the entire Nushagak Peninsula, and the area as far northwest to Togiak Lake and the Ongivinuk Lake; in the eastward direction, trapping activity ceased just a few miles west of Dillingham. The western portion of Nushagak Bay and especially Kulukak Bay were used for waterfowl hunting (Figure 11).

Plants and berries were gathered along the Igushik River and lakes system, the lower portions of Snake River, Lake Aleknagik, and Lake Nerka. Coastal areas beginning along the western side of the Nushagak Peninsula and continuing along Kulukak Bay and the eastern side of the Togiak Bay were used for plant gathering. In addition, discrete areas around Togiak and Platinum were identified as harvest areas for vegetation.

SPECIES USED AND LEVELS OF PARTICIPATION

According to the results of the survey of 54 households (a 91.5 percent sample of all households), Manokotak residents used 53 kinds of fish, game, and plant resources in 1985 (see Table 10). Table 11 lists the common English, Yup'ik, and scientific names for these species. The mean number of resources used per household was 27.3 and the range of resources used was a low of 8 to a high of 46. The mean number of resources harvested per household was 19.0. One household with a single member reported harvesting no resources and the highest number reported was 40.

The most commonly used resources were red salmon (100 percent), berries (98.1 percent), moose and beaver (each 94.4 percent), pike (90.7

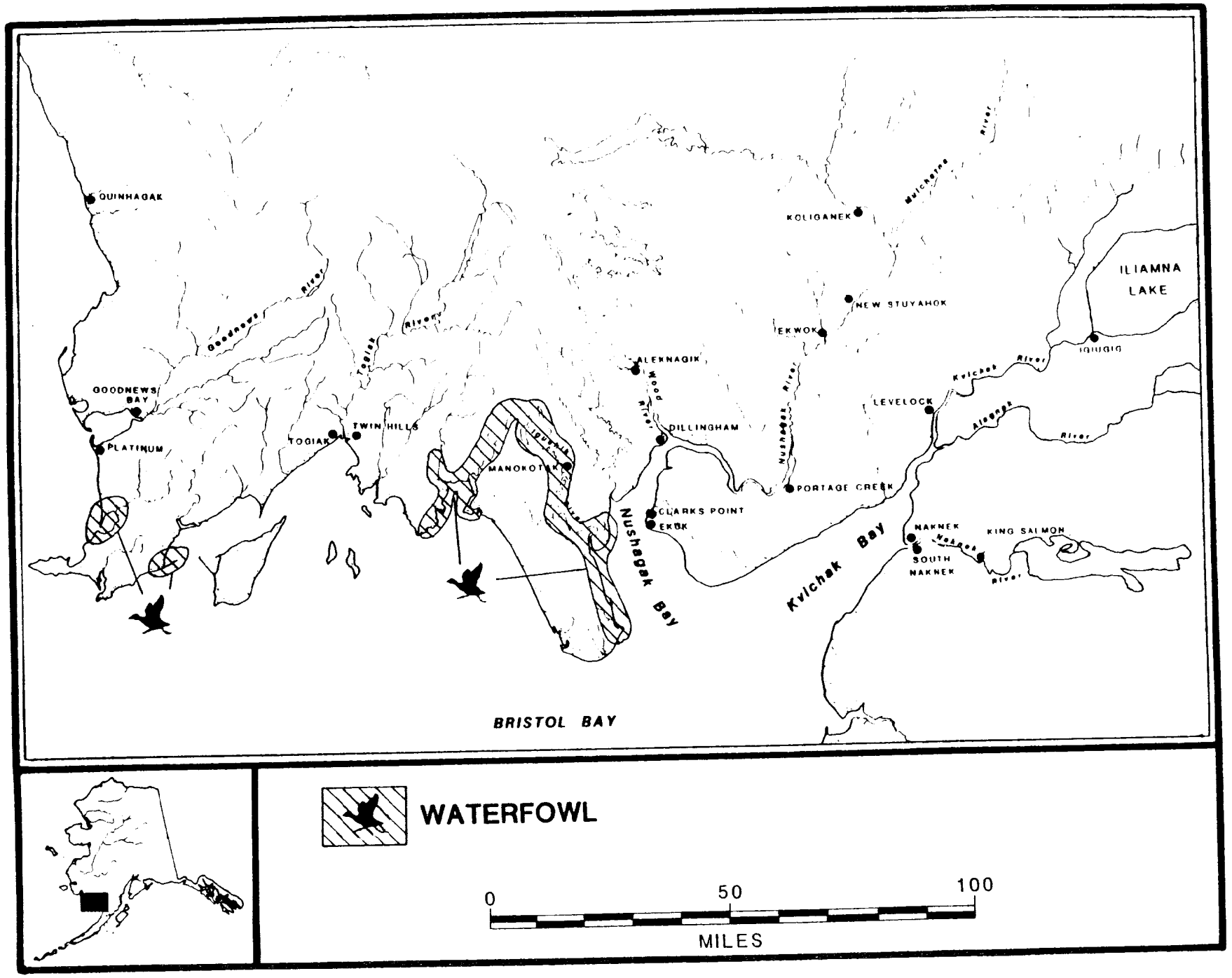

Figure 11. Areas Used to Harvest Waterfowl by Manokotak Residents, 1960-1982.

TABLE 10. LEVELS OF HOUSEHOLD HARVEST AND USE OF FISH, GAME, AND PLANT RESOURCES, MANOKOKTAK, JANUARY - DECEMBER 1985. (N = 54 HOUSEHOLDS)

Resource	% used	% attempt	% success	% received	% gave away	mean hh harvest, lbs	per capita harvest	total sample harvest numbers*
SALMON	100.0	92.6	88.9	57.4	63.0	706.3	135.3	N/A
King Salmon	87.0	81.5	75.9	35.2	44.4	157.6	30.2	692.0
Red Salmon	100.0	90.7	83.3	44.4	51.9	430.4	82.5	5053.0
Chum Salmon	57.4	55.6	38.9	24.1	27.8	31.4	6.0	369.0
Pink Salmon	46.3	46.3	24.1	20.4	18.5	5.3	1.0	64.0
Coho Salmon	79.6	77.8	59.3	33.3	37.0	81.5	15.6	800.0
OTHER FISH	100.0	100.0	90.7	87.0	66.7	447.5	85.7	N/A
Rainbow Trout	53.7	48.1	37.0	22.2	22.2	4.6	.9	178.0
Lake Trout	64.8	40.7	29.6	50.0	31.5	26.3	5.0	525.0
Grayling	51.9	44.4	37.0	35.2	25.9	4.5	.9	349.0
Dolly Varden	87.0	79.6	72.2	50.0	40.7	35.9	6.9	1384.0
Burbot	53.7	42.6	35.2	38.9	22.2	5.9	1.1	319.0
Pike	90.7	81.5	75.9	40.7	44.4	83.9	16.1	1618.0
Whitefish	64.8	50.0	38.9	48.1	40.7	18.8	3.6	1015.0
Blackfish	63.0	27.8	16.7	46.3	25.9	14.3	2.7	25.8 b
Flounder	38.9	33.3	20.4	16.7	11.1	2.7	.5	145.0
Smelt	83.3	50.0	50.0	51.9	33.3	72.1	13.8	129.8 b
Herring	70.4	57.4	57.4	38.9	25.9	89.0	17.0	160.2 b
Herring Roe	46.3	31.5	31.5	25.9	20.4	26.7	5.1	36.0 b
Roe-on-Kelp	79.6	70.4	63.0	48.1	35.2	62.9	12.1	135.9 b
MARINE INVERTEBRATES	88.9	66.7	64.8	46.3	55.6	23.6	4.5	N/A
Butter Clams	87.0	63.0	61.1	46.3	53.7	21.7	4.2	78.0 b
Razor Clams	29.6	20.4	14.8	18.5	16.7	1.9	.4	6.9 b
LAND MAMMALS	96.3	87.0	81.5	83.3	68.5	342.1	65.5	N/A
Caribou	88.9	42.6	31.5	64.8	46.3	112.5	21.6	40.5
Moose	94.4	66.7	33.3	79.6	50.0	200.0	38.3	20.0
Brown Bear	5.6	5.6	1.9	3.7	3.7	1.9	.4	1.0
Black Bear	3.7	3.7	1.9	1.9	3.7	1.1	.2	1.0
Porcupine	70.4	66.7	63.0	29.6	35.2	20.2	3.9	136.0
Hare	48.1	42.6	37.0	24.1	25.9	6.6	1.3	177.0

TABLE 10. (Continued) LEVELS OF HOUSEHOLD HARVEST AND USE OF FISH, GAME, AND PLANT RESOURCES, MANOKOTAK, JANUARY - DECEMBER, 1985. (N = 54 HOUSEHOLDS)

Resource	% used	% attempt	% success	% received	% gave away	mean hh harvest, lbs	per capita harvest	total sample harvest numbers*
MARINE MAMMALS	83.3	57.4	50.0	66.7	51.9	170.4	32.6	N/A
Harbor Seal	72.2	42.6	37.0	51.9	37.0	43.6	8.3	42.0
Other Seal	13.0	7.4	3.7	13.0	5.6	3.1	.6	3.0
Walrus	35.2	9.3	1.9	33.3	14.8	5.2	1.0	0.5
Sea Lion	35.2	27.8	20.4	20.4	22.2	27.8	5.3	15.0
Belukha	50.0	25.9	22.2	31.5	31.5	90.7	17.4	7.0
Sea Otter	1.9	1.9	1.9	0.0	0.0	n/a	n/a	1.0
FURBEARERS	96.3	83.3	77.8	50.0	59.3	154.0**	29.5	N/A
Beaver	94.4	77.8	72.2	50.0	57.4	151.5	29.0	425.0
Mink	16.7	20.4	14.8	0.0	1.9	n/a	n/a	53.0
Land Otter	44.4	42.6	37.0	13.0	9.3	0.6	.1	75.0
Red Fox	38.9	48.1	38.9	1.9	0.0	n/a	n/a	117.0
Muskrat	14.8	20.4	14.8	3.7	1.9	0.5	.1	54.0
Lynx	3.7	18.5	3.7	0.0	0.0	0.0	n/a	2.0
Wolf	3.7	5.6	1.9	0.0	0.0	n/a	n/a	1.0
Wolverine	3.7	9.3	3.7	0.0	0.0	n/a	n/a	2.0
Arctic Ground Squirrel	27.8	24.1	24.1	5.6	9.3	1.4	.3	225.0
BIRDS AND EGGS	98.1	94.4	94.4	68.5	70.4	88.1	16.9	N/A
Spruce Grouse	37.0	35.2	31.5	16.7	22.2	2.7	.5	145.0
Ptarmigan	74.1	72.2	68.5	25.9	46.3	18.3	3.5	1408.0
Sea Ducks	70.4	59.3	57.4	33.3	44.4	11.8	2.3	454.0
Other Ducks	35.2	31.5	31.5	13.0	22.2	6.6	1.3	253.0
Geese	59.3	57.4	51.9	24.1	27.8	24.2	4.6	327.0
Sandhill Crane	44.4	50.0	42.6	13.0	18.5	10.1	1.9	91.0
Whistling Swan	38.9	40.7	31.5	11.1	14.8	7.1	1.4	38.5
Gull Eggs	79.6	66.7	64.8	38.9	40.7	6.3	1.2	50.1 b
Goose Eggs	18.5	16.7	9.3	11.1	5.6	0.2	0.0	1.3 b
Murre Eggs	18.5	11.1	9.3	16.7	7.4	0.9	.2	12.0 b
PLANTS	98.1	90.7	92.6	44.4	46.3	73.7	14.1	N/A
Berries	98.1	88.9	88.9	40.7	38.9	64.9	12.4	876.0 g
Plants	64.8	61.1	61.1	24.1	27.8	8.8	1.7	119.2 g
ALL RESOURCES	100.0	100.0	98.1	98.1	88.9	2005.7	384.2	N/A

* Harvests are reported in numbers of fish or animals, except resources marked by "b" (five gallon bucket) or "g" (gallons).

** Harvests in pounds for furbearers represent only those animals which were eaten.

Source: Division of Subsistence, ADF&G, Survey, 1986.

TABLE 11. SELECTED RESOURCES USED BY MANOKOTAK RESIDENTS, COMMON, YUP'IK, AND SCIENTIFIC NAMES

Common	Yup'ik	Scientific
Fish		
King (chinook) salmon	*Taryaqvak*	Onchorhynchus tshawytscha
Red (sockeye) salmon	*Sayak*	O. nerka
Chum (dog) salmon	*Kangitneq*	O. keta
Pink (humpy) salmon	*Amaqaayak*	O. gorbuscha
Coho (silver) salmon	*Qakiiyaq*	O. kisutch
Herring	*Iqalluarpak*	Clupea harengus pallasi
Herring Roe	*Meluk*	
Herring roe-on-kelp	*Melucuaq*	
Starry flounder	*Uraluq*	Platichtys stellatus
Smelt	*Iqalluaq*	family Osmeridae
Rainbow trout	*Talaariq*	Salmo gairdneri
Lake (Togiak) trout*	*Anerrluaq*	Salvelinus namaycush
Grayling	*Nakrulugpak*	Thymallus arcticus
Dolly Varden (includes Arctic char)	*Yugyaq*	Salvelinus spp.
Burbot	*Atgiaq*	Lota lota
Pike	*Cuukvak*	Esox lucius
Least cisco whitefish	*Cavirrutnaq*	Coregonus sardinella
Round whitefish	*Uraruq*	Prosopium cylindraceum
Broad whitefish	*Akakiik*	Coregonnus nasus
Blackfish	*Can'giiq*	Dallia pectoralis
Butter clams	*Tavtaaq*	class Bivalvia
Razor clams	*Aliruaq*	Siliqua patula
Sea anemones	*Terr'et*	
Game		
Caribou	*Tuntuq*	Rangifer tarandus
Moose	*Tuntuvak*	Alces alces
Brown bear	*Taqukaq*	Ursus arctos
Black bear	*Tan'gerliq*	Ursus americanus
Porcupine	*Issaluuq*	Erethizon dorsatum
Snowshoe hare	*Nullutuuyak*	Lepus americus
Arctic hare	*Qayuqeggliq*	Lepus othus
Marine Mammals		
Harbor seal	*Issuriq*	Phoca vitulina
Ringed seal	*Nayiq*	Pusa hispida
Bearded seal	*Maklak*	Erignathus barbatus
Walrus	*Asveq*	Odebenus rosmarus
Sea lion	*Uginaq*	Eumatopias jubatus
Belukha	*Cetuaq*	Delphinapterus leucus
Sea Otter	*Arrnaq*	Enhydra lutris

TABLE 11. (Continued) SELECTED RESOURCES USED BY MANOKOTAK RESIDENTS, COMMON, YUP'IK, AND SCIENTIFIC NAMES

Common	Yup'ik	Scientific
Furbearers		
Beaver	*Paluqtaq*	Castor canadensis
Mink	*Imarmiutaq*	Mustela vison
Red fox	*Kaviaq*	Vulpes vulpes
Wolf	*Kegluneq*	Canis lupus
Wolverine	*Terikaniaq*	Gulo gulo
Land otter	*Cuignilnguq*	Lutra canadensis
Muskrat	*Kanaqlak*	Ondatra zibethicus
Lynx	*Tertuli*	Felis lynx
Arctic ground squirrel	*Qanganaq*	Spermophilus parryii
Birds		
Spruce grouse	*Egtuk*	Canachites canadensis
Willow Ptarmigan	*Aqesgiq*	Lagopus spp.
Duck	*Yaqulek*	sub families Anatinae and Arythyinae
Sea Ducks		
King eider	*Qengallek*	Somateria spectabilis
Common eider	*Metraq*	Somateria mollissima
Merganser	*Payiq*	Mergus spp.
Goldeneye	*Anarnissakaq*	Buchephala spp.
Other Ducks		
Mallard	*Uqulkatagpak*	Anas platyrhynchus
Pintail	*Uqulkatak*	Anas acuta
Green-winged teal	*Tengesqaar*	Anas crecca
Widgeon	*Qatkeggliq*	Anas americana
Geese	*Neqleq*	
Canada	*Neqlernaq*	Branta canadensis
Emperor	*Nacaullek*	Philacte canagica
White-fronted	*Neqlepik*	Anser albifrons
Black Brant	*Neqlernaq*	Branta nigricans
Sandhill crane	*Qucillgaq*	Grus canadensis
Whistling (tundra) swan	*Qugyuk*	Olus columbianus
Bird eggs	*Kayanguq*	
Seagull	*Naruyaq*	
Geese	*Neqleq*	
Murre	*Alpak*	

TABLE 11. (Continued) SELECTED RESOURCES USED BY MANOKOTAK RESIDENTS, COMMON, YUP'IK, AND SCIENTIFIC NAMES

Common	Yup'ik	Scientific
Berries		
Crowberry (moss, black)	*Tan'gerpak*	Empetrumnigrum
Blueberry	*Suraq*	Vaccinium uliginosum
Huckleberry	*Surauvak*	Vaccinium ovalifolium
Lowbush cranberry	*Tumagliq*	Vaccinium vitisidaea
Highbush cranberry	*Kitnigpak*	Viburnum edule
Salmonberry (cloud)	*Atsalugpiaq*	Rubus chamaemorus
Wild raspberry	*Puyuraaq*	Rubus arcticus
Plants		
Wild celery	*Ikiituk*	Angelica lucida
Cow parsnip	*Tarnaq*	Heracleum lanatum
Sourdock (wild rhubarb)	*Quagciq*	Rumex arcticus
Wild spinach	*Metcuqeggliq*	Rumex arcticus
Wood fern	*Ceturqaaq*	Dryopteris dilatata
Sea chickwood	*It'garralek*	Honckenya peploides
Mouse food	*Utngungssaq*	
Labrador (tundra) tea	*Ayuq*	Ledum decumbens
Stinkweed (Wormweed)	*Naunerrluk* *Caiggluk*	Artemesia tilesii
Pineappleweed	*Atsaruaq*	Matricaria matricariodes
Rye grass (basketgrass or seashore grass)	*Taperrnaq*	Elymus arenaus

* See page 133 for discussion of local use of the name "lake trout".

percent), caribou (88.9 percent), Dolly Varden, butter clams, and king salmon (each 87 percent), and smelt (83.3 percent).

Table 10 and Figure 12 depict the levels of use and harvest of eight major resource categories: salmon, other fish, marine invertebrates, land mammals, marine mammals, furbearers, birds and bird eggs, and plants. Resource use was extremely high for all resource categories. Salmon and other fish species were reportedly used by every household in the sample. Resources used by nearly every household included birds and bird eggs, plants and berries, land mammals, and furbearers. Use of marine mammals and marine invertebrates were also quite significant, used by 83.3 percent and 88.9 percent of the sample, respectively. These figures indicate that all major categories of wild foods were very widely used in Manokotak during the study year.

Table 10 also reports the percentage of the sample that attempted to harvest each resource during 1985. In total, respondents attempted to harvest 53 resources. The most commonly sought resources were red salmon (90.7 percent), berries (88.9 percent), pike and king salmon (81.5 percent each), Dolly Varden (79.6 percent), beaver (77.8 percent), coho salmon (77.8 percent), ptarmigan (72.2 percent), roe-on-kelp (70.4 percent), moose, porcupine, and sea gull eggs (66.7 percent each). These resources, besides being frequently sought, were also frequently used. Each of these twelve resources was used by 70 percent to 100 percent of the sample. They were generally preferred foods. Some, such as king salmon, red salmon, berries, and moose were considered staple foods and very important to have on hand. Others, such as pike, Dolly Varden, ptarmigan, and sea gull eggs could be harvested fairly easily with little special equipment and without

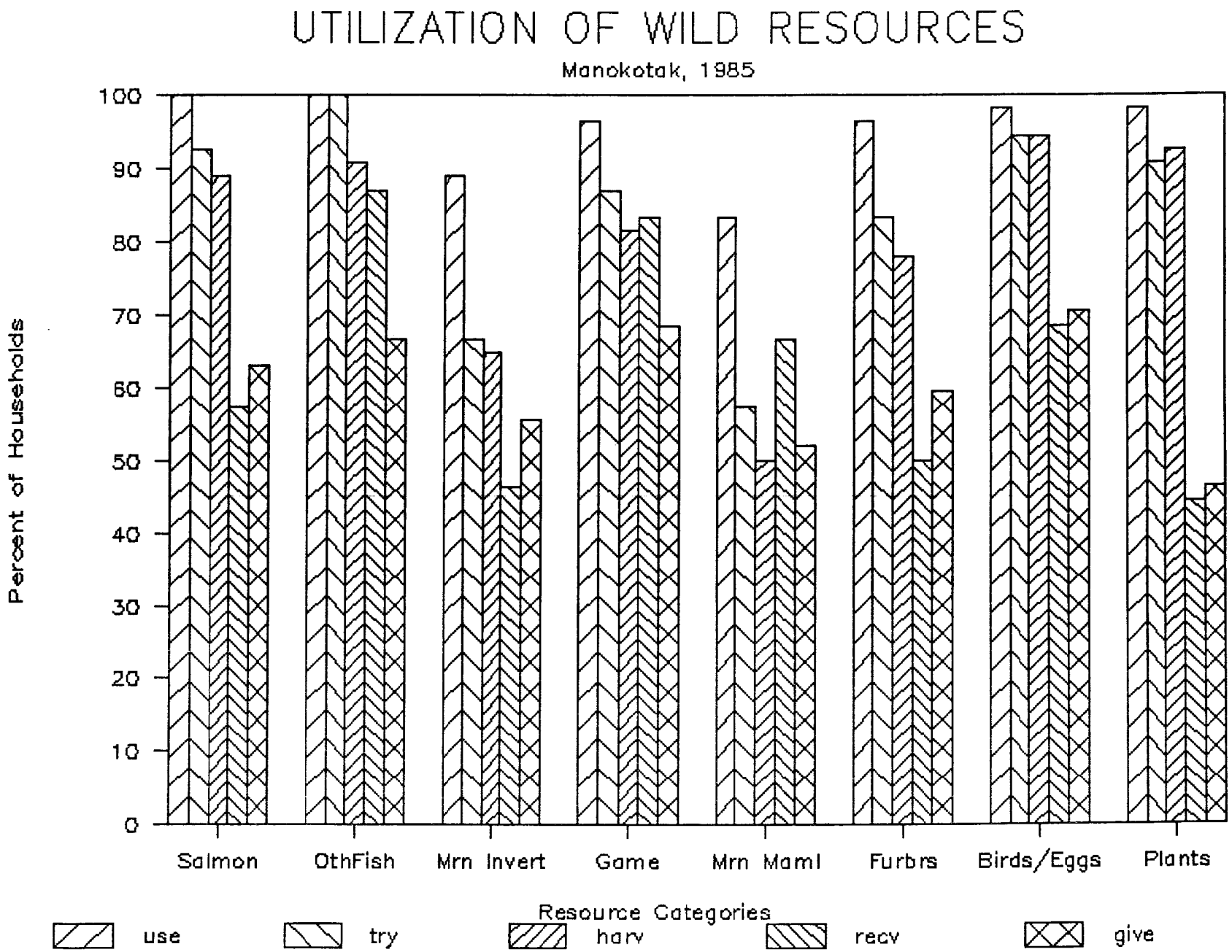

Figure 12. Levels of Harvest, Use, and Sharing of Eight Major Resource Categories, Manokotak 1985. (N = 54 Households)

traveling great distances. Beaver was important for both its cash and food value.

Table 10 also indicates which species were most frequently harvested on a community-wide basis. These resources were: berries (88.9 percent), red salmon (83.3 percent), king salmon and pike (75.9 percent), Dolly Varden and beaver (72.2 percent each), ptarmigan (68.5 percent), sea gull eggs (64.8 percent), and porcupine and roe-on-kelp (63.0 percent each). Interestingly, every resource sought was harvested successfully by some portion of the sample. The resources which were most frequently harvested were nearly the same as those most frequently sought. Moose was the major exception, sought by twice the number as those who harvested it. Most likely, this is indicative of the relatively low density of moose in the area. Hunters had more success when they sought caribou (75 percent of those attempting were successful) but less people attempted to hunt caribou, probably because of the distance to the herds.

HARVEST QUANTITIES

The mean household harvest of wild resources in 1985 for the 54 sampled households was 2,006 pounds usable weight. The per capita harvest was 384 pounds (Table 12). The entire community produced an estimated total of 118,656 pounds of wild foods in 1985. These are substantial quantities. As a comparison, about 220 pounds of meat, fish, and poultry are purchased and brought into the family kitchen for each person each year in the western United States (U.S. Department of

TABLE 12. MEAN PER HOUSEHOLD AND PER CAPITA HARVEST BY RESOURCE CATEGORY, MANOKOTAK, 1985

Resource Category	Mean lbs. per.HH	Per Capita lbs.	Percentage of Total Harvest
Salmon	706.3	135.2	35.2
Non-Salmon fish	447.5	85.7	22.3
Marine invertebrates	23.6	4.5	1.2
Game	342.1	65.5	17.1
Marine mammals	170.4	32.6	8.5
Birds	88.1	16.9	4.4
Furbearers	154.0	29.5	7.7
Plants	73.7	14.1	3.7
Total	2005.7	384.1	100.1[a]

[a] Numbers rounded out, do not add up to 100 percent.

Agriculture 1983). Thus Manokotak's resource harvest is 73 percent greater than the western U.S. average of meat, fish, and poultry use.

Nine resources made up 70 percent of the mean household harvest by weight. They were, in descending order: red salmon, 430.4 pounds (21.5 percent); moose, 200.0 pounds (10.0 percent); king salmon, 157.6 pounds (7.9 percent), beaver, 151.5 pounds (7.6 percent); caribou, 112.5 pounds (5.6 percent); belukha, 90.7 pounds (4.5 percent); herring, 89.0 pounds (4.4 percent); pike, 83.9 pounds (4.2 percent); and coho salmon, 81.5 pounds (4.1 percent). (See also Table 12).

Figure 13 depicts the portion of the edible resource harvest contributed by eight major categories. As depicted, salmon comprised the largest portion of the mean household harvest, 706.3 pounds (35.2 percent), followed by other fish species, 447.5 pounds (22.3 percent); land mammals 342.1 pounds (17.1 percent); marine mammals, 170.4 pounds (8.5 percent); furbearers 154.0 pounds (7.7 percent); birds and eggs, 88.1 pounds (4.4 percent); plants, 73.7 pounds (3.7 percent) and marine invertebrates, 23.6 pounds (1.2 percent).

Nearly all households participated in some type of resource harvesting; only one household harvested no resources. That household was composed of a single resident who held a full-time wage job. The range of participation and success in resource harvesting is further illustrated by Figure 14. The pattern is varied. Seventeen percent of the households harvested less than 500 pounds. Five households harvested more than 4,000 pounds, with the largest reported household harvest being 6,308 pounds.

Figures 15 thru 18 depict the cumulative household harvests for big game, marine mammals, salmon, and all resources, to illustrate the

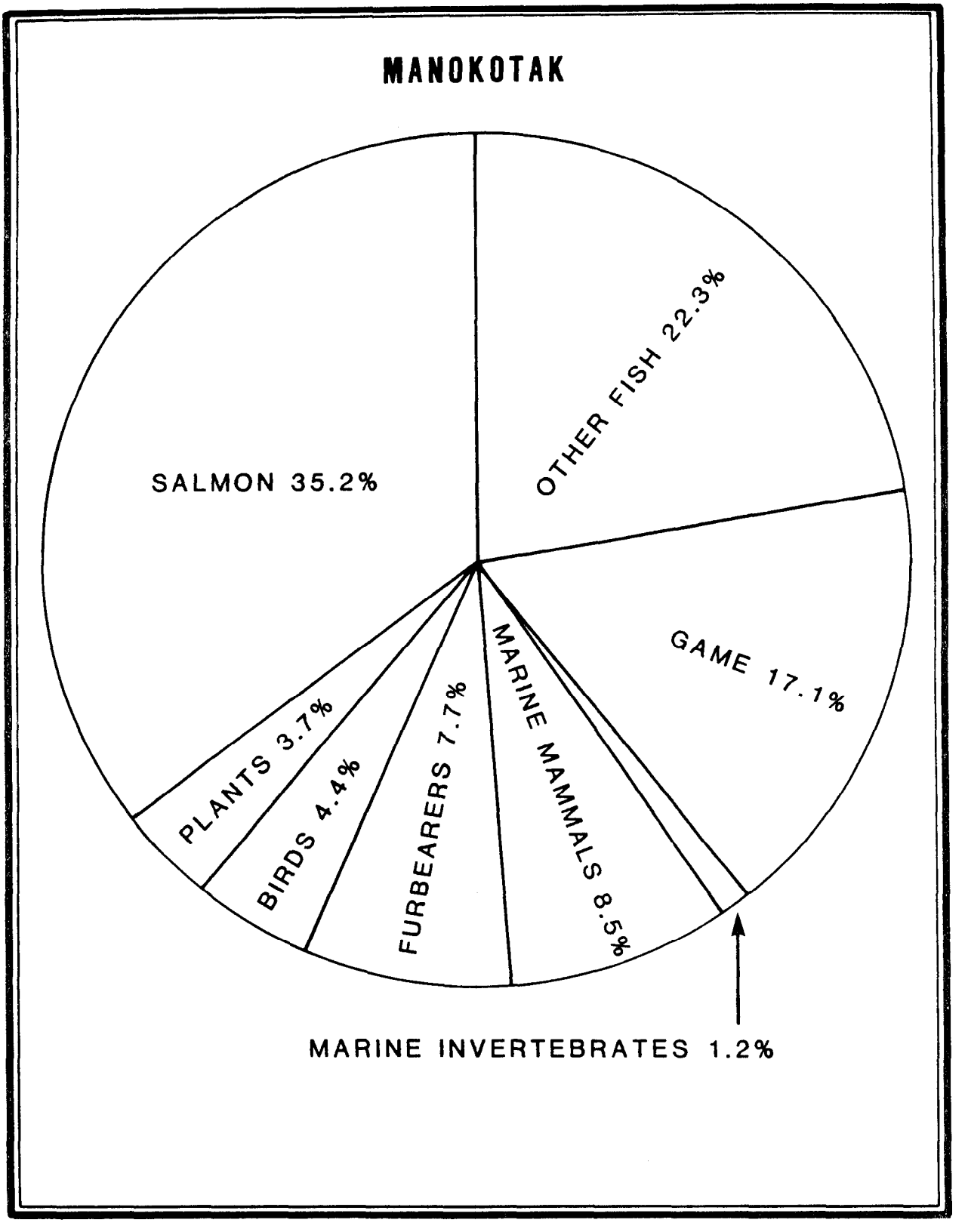

Figure 13. Mean Household Harvest of Edible Pounds by Resource Category, Manokotak, 1985.

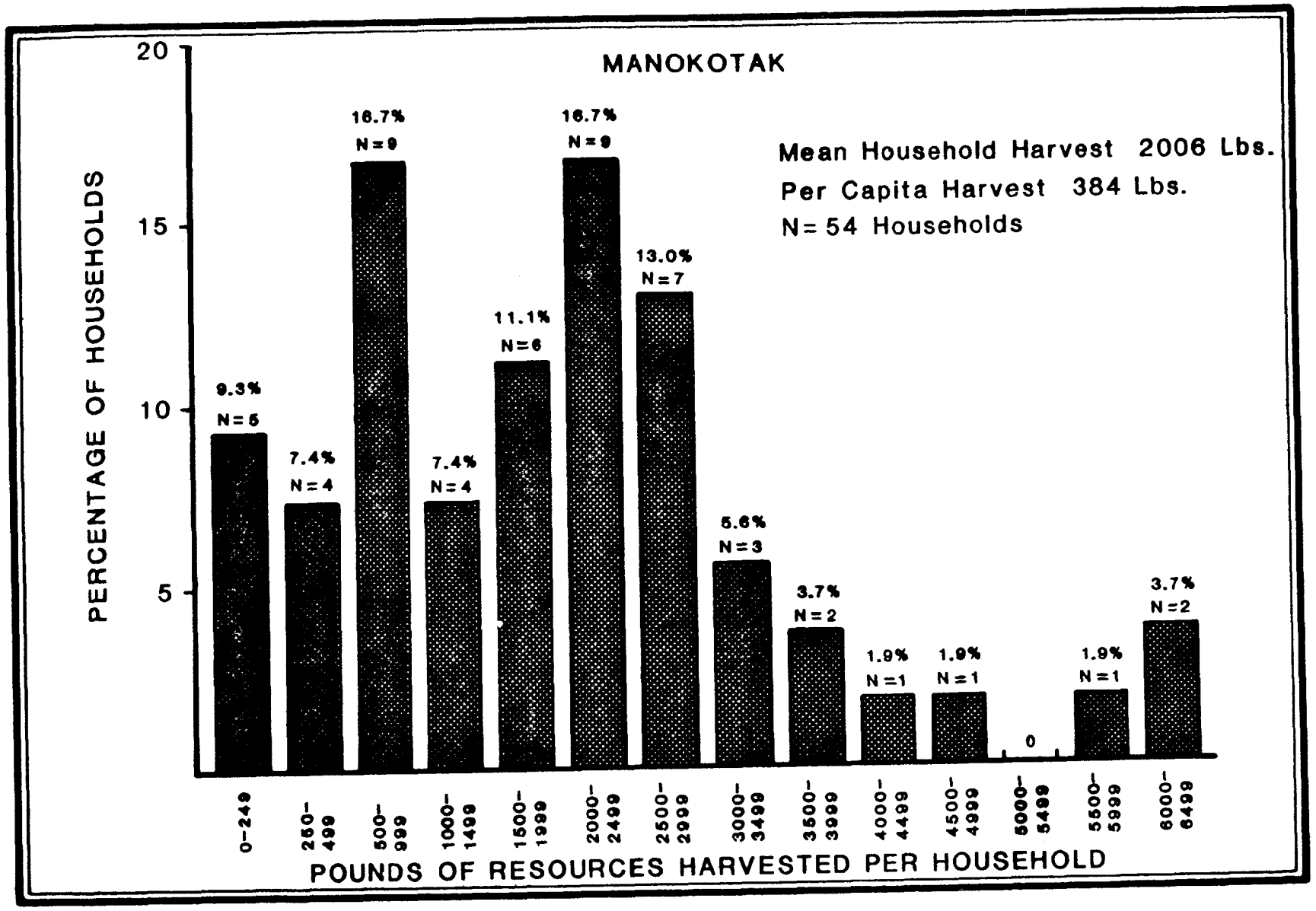

Figure 14. Pounds of Resources Harvested Per Household, Manokotak, 1985.

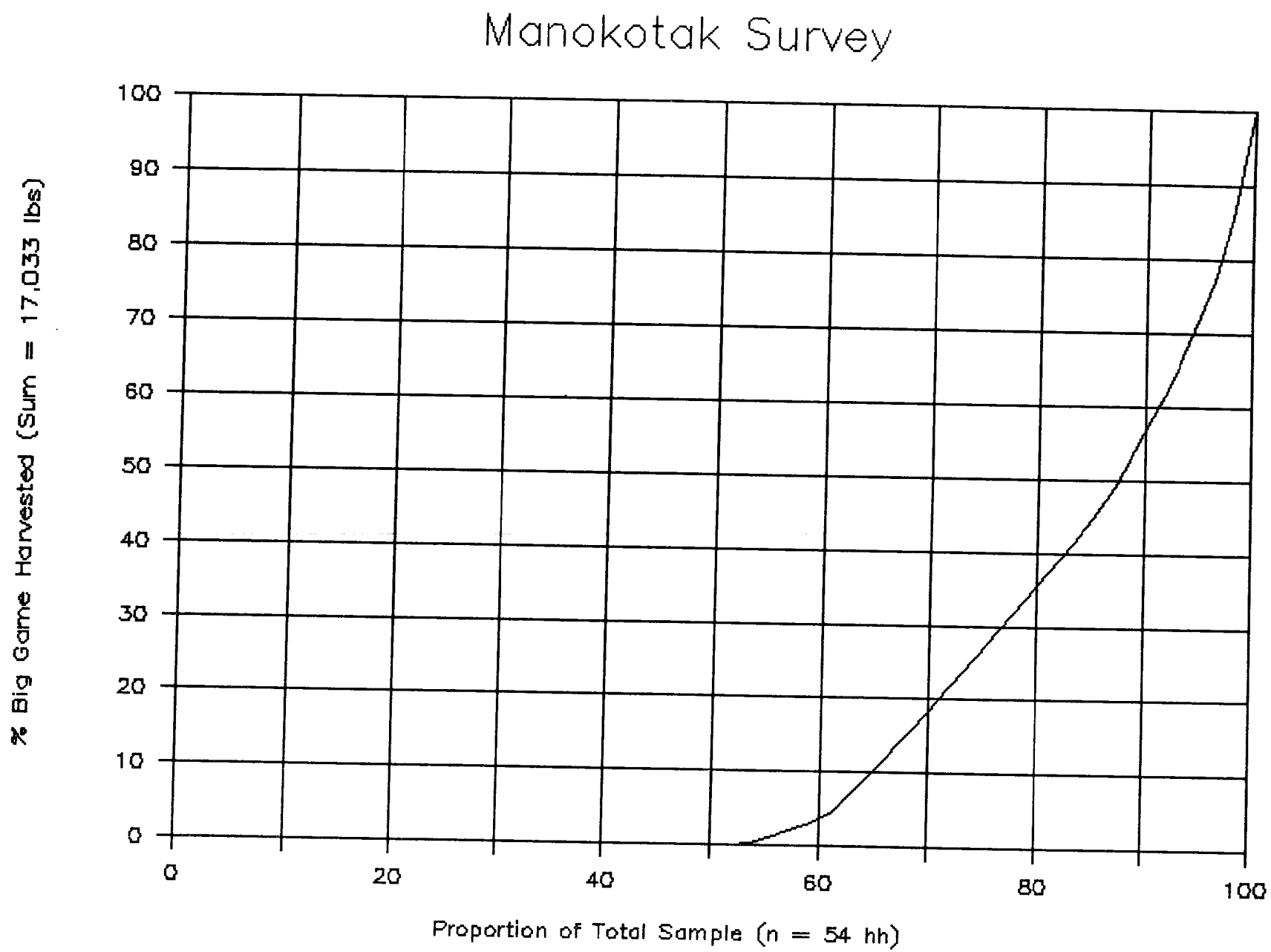

Figure 15. Cumulative Household Harvests of Big Game, Manokotak, 1985.

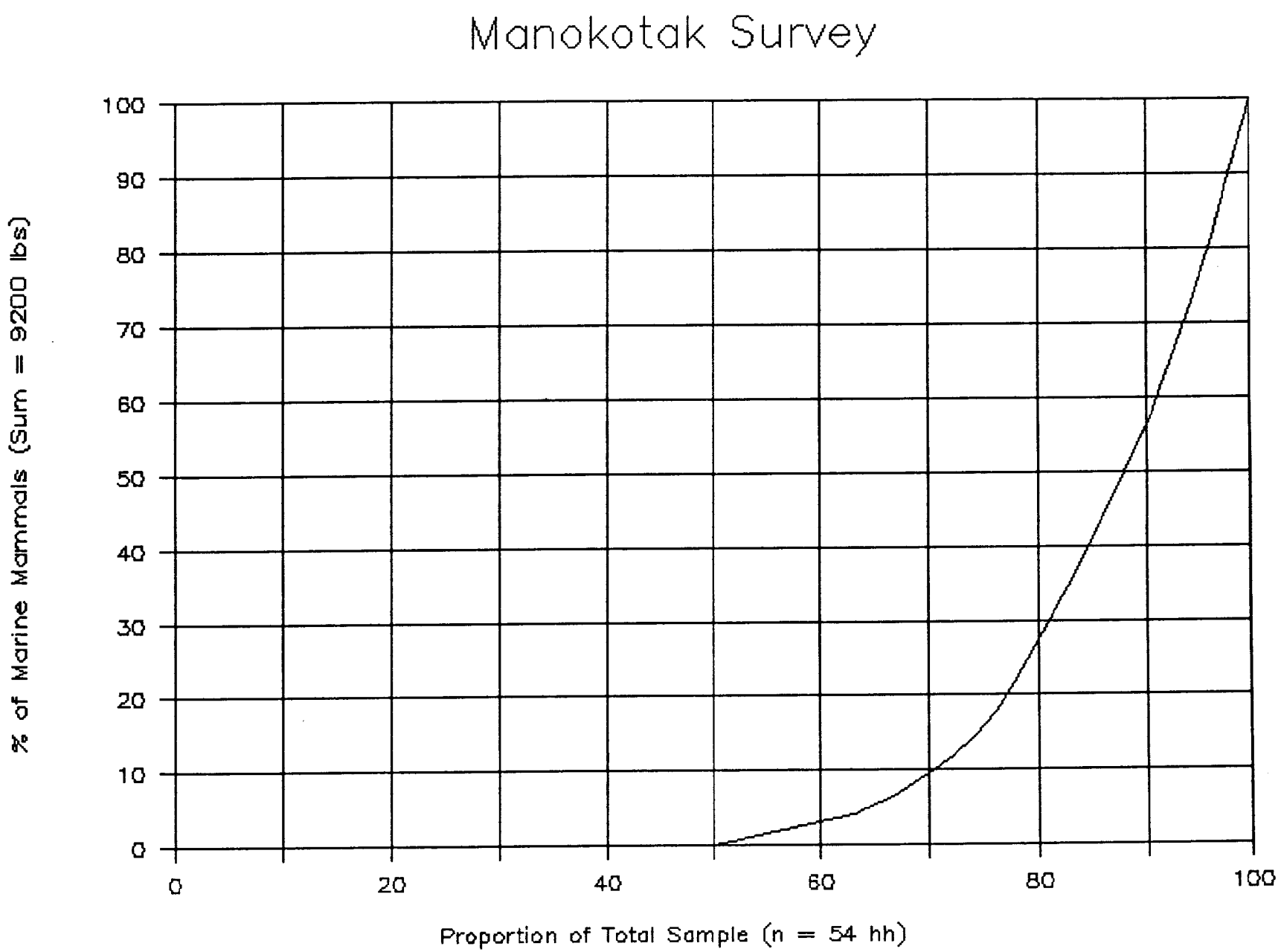

Figure 16. Cumulative Household Harvests of Marine Mammals, Manokotak, 1985.

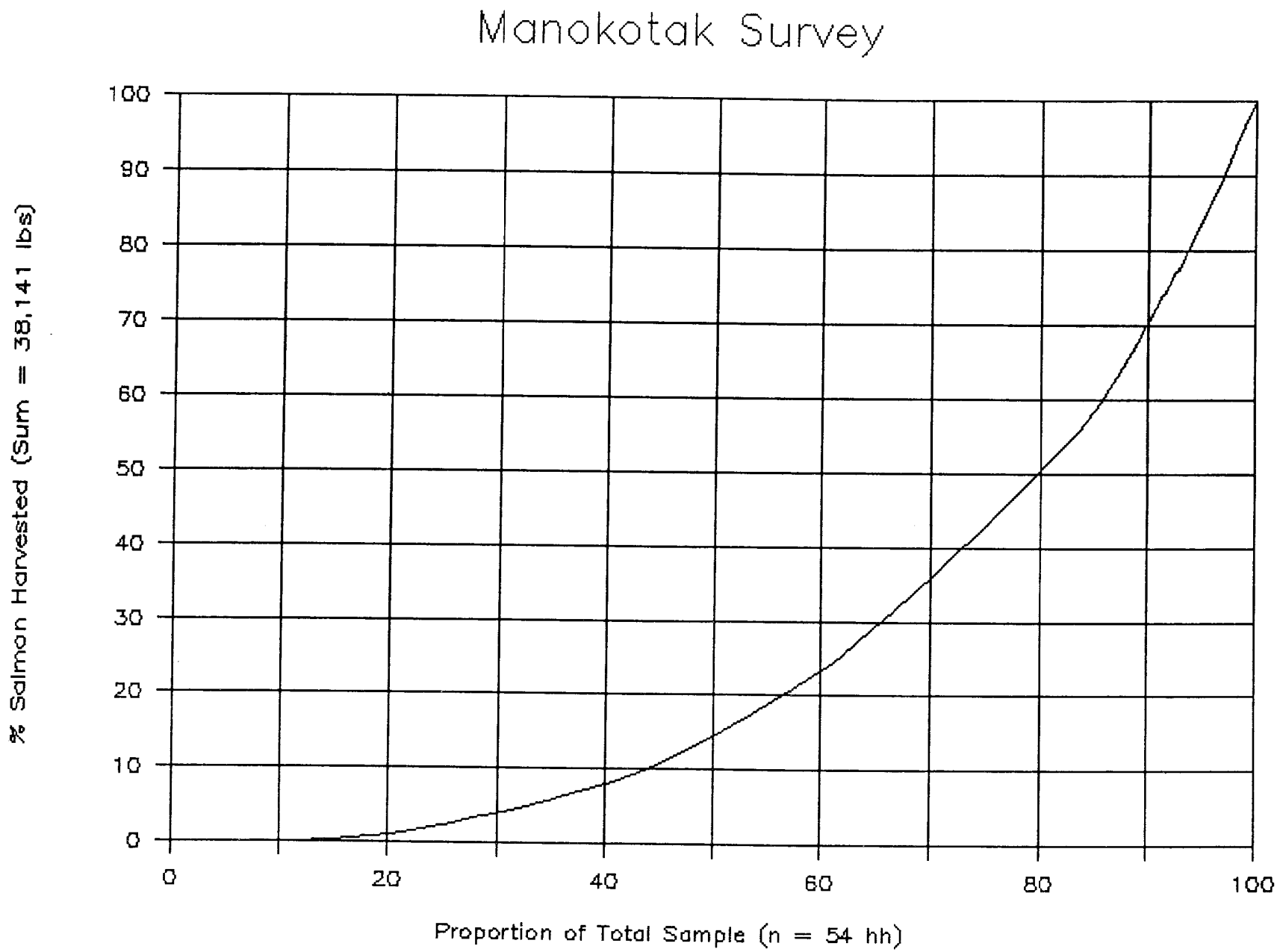

Figure 17. Cumulative Household Harvests of Salmon, Manokotak, 1985.

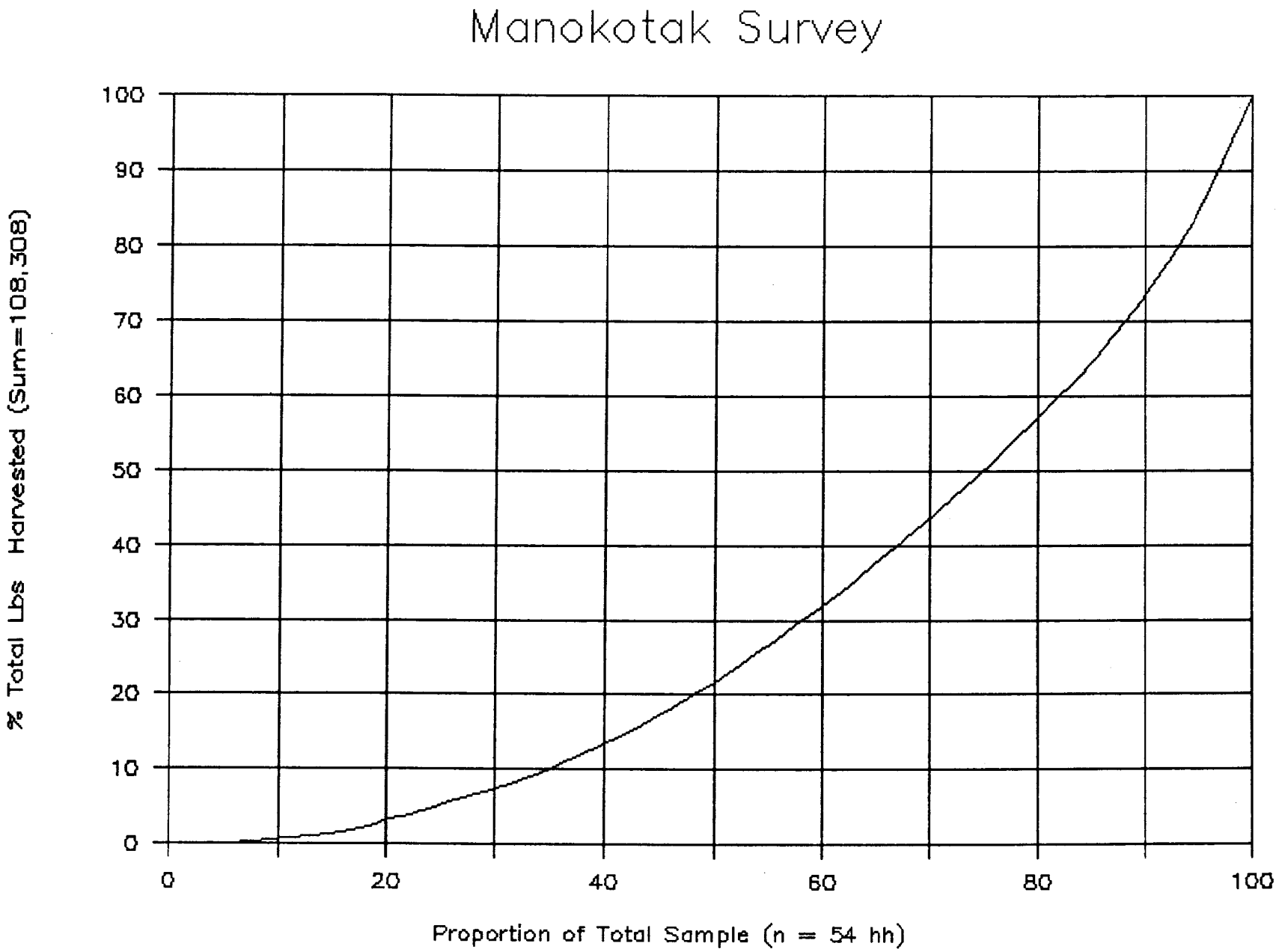

Figure 18. Cumulative Harvests of all Wild Resources, Manokotak, 1985.

degree to which harvests are specialized between households. The harvest of big game (Fig. 15) and marine mammals (Fig. 16) show a sharp measure of specialization. About 50 percent of the households harvested all the big game and marine mammals used by the community, and fewer accounted for the largest proportion of the harvest. In the case of big game, 17 households (31.5 percent), harvested 84.1 percent of the animals by weight. For marine mammals the curve is even sharper. Only 12 households (22.2 percent), were responsible for 78.4 percent of the harvest by weight. The salmon harvest (Fig. 17) and total harvest (Fig. 18) per household indicated less specialization between households with most households producing some salmon and wild food. Although not shown, this latter pattern was also evident for small land mammals (including furbearers), birds, plants and non-salmon fish (including marine invertebrates). Thirty-five percent of the households harvested 62.5 percent of all resources in 1985. Similar patterns of specialization have been documented for other rural Alaskan communities (Wolfe 1987).

RESOURCE SHARING AND RECEIVING

The researchers were frequently told by Manokotak residents that "Sharing is our way" and as Table 10 depicts, resource sharing occurred on a frequent basis both between households in Manokotak and with households in other communities. Nearly all resources were reported as either given or received by some portion of the sample. The major exceptions were those furbearers which were harvested exclusively for

the cash value of their furs. As has already been mentioned, several resources were used by a far larger number of households than actually harvested them. Moose was the most striking example. Harvested by one-third of the households, nearly every household (94.4 percent) reported using moose meat. Moose was received during 1985 by 79.6 percent of the households. Another big game species, caribou, showed a similar pattern. While eighty-nine percent of the sample used caribou, it was harvested by just 31.5 percent of the households. Sixty-five percent of the sample reported receiving caribou. Roe-on-kelp provides another good example. It was used by 79.6 percent of the sample but harvested by only 63.0 percent and also received by 48.1 percent of the households.

The most commonly received resources were moose (79.6 percent of households), caribou (64.8 percent), harbor seal and smelt (51.9 percent each), beaver, Dolly Varden and lake trout (50 percent each), whitefish and roe-on-kelp (48.1 percent each), and black fish and butter clams (46.3 percent each). The list includes species in which individual animals provide a large amount of meat or oil, such as moose, caribou, and seal. In these cases, it is fairly easy to distribute shares of such a large catch. One respondent also told the researchers that sharing moose was a conscious method of guarding against overharvesting by ensuring each family had at least some moose. Freshwater fish caught in large numbers were also frequently shared as were resources which could not be obtained close to the village, such as roe-on-kelp and clams. In those cases, a smaller number of individuals

made the journey to secure those resources and upon their return, widely shared them with families who had remained behind.

Another common pattern of resource sharing occurred through feasts which were given to recognize birthdays and weddings. It was not uncommon for the host to invite and serve a meal to everyone in the village. Religious gatherings demonstrated a similar pattern. Relatives and friends from other villages visited Manokotak to participate in church song fests. During the several day duration of the event, the hosts were expected to house and feed visitors, with frequent feasting between church services. The hospitality was reciprocated when the event was held in a different village. At these times, wild foods were preferred and served in large quantities. Special hunting or fishing trips might be undertaken in preparation for the event. Another form of sharing in the village was simply inviting people over to share a meal. One respondent reported that he especially tried to share preferred foods which were not harvested in large quantities in this manner, such as geese, by inviting others over "for a taste."

To collect information on patterns of exchange with other communities, respondents were asked to identify with which communities they had exchanged 17 specific resources. These questions elicited conservative estimates of the frequency of food exchanges between communities, because families typically do not keep track of all the foods that come into and leave a household during the course of the year. Nevertheless, they are useful for depicting overall trends in the types of food given and their destinations. A summary of the results is depicted in Table 13 and 14. The destinations of resources most

TABLE 13. COMMUNITIES GIVEN WILD RESOURCES BY SURVEYED MANOKOTAK RESIDENTS, 1985.
(N = 54 HOUSEHOLDS).

Communities Given To	Beaver Meat	Moose Meat	Caribou Meat	Seal Meat	Seal Oil	Sea lion Flippers	Blkha	Herr.	Herr. Roe	Roe On Kelp	Slm	Sltd Slmn Hds.	Smlt	Berr.	Frshwtr Fish	Ptrmgn	Clams	# of Times That This Community Was Given To
ANCHORAGE	3	4	3		1			3	1		5	3	1	3	1	2		30
DILLINGHAM	1	2	2		1			2	2	1	3	1	3	2	2	3		25
TWIN HILLS	2	4				1	1	1	1	1			2	1	3		1	18
TOGIAK	3	3					1				4		2	3	1			17
ALEKNAGIK					1			1	1	1	1		1	1		2	1	10
AKIACHAK	1	1	1	1	1									1	1			7
KWETHLUK		2	2								1							5
BETHEL AREA	1	1									1						1	4
KIPNUK		1													1	1		3
KONGIGANAK												1	1					2
QUINHAGAK	1						1											2
PORTAGE CREEK				1			1											2
NUSHAGAK POINT*							1											1
CLARKS POINT									1									1
TULUKSAK			1															1
# of Times This Resource was Given Away	12	18	9	2	4	1	5	7	6	3	15	5	10	11	9	8	3	128 Total Number of Giving Events HH/Species Pairs)
# HH That Gave This Resource Away	11	16	7	2	3	1	4	5	5	3	10	4	7	7	8	5	3	

* Summer fish camp.

TABLE 14. COMMUNITIES FROM WHICH SURVEYED MANOKOTAK RESIDENTS RECIEVED WILD RESOURCES, 1985.
(N = 54 HOUSEHOLDS).

	Beaver Meat	Moose Meat	Caribou Meat	Seal Meat	Seal Oil	Walrus	Sea lion Flippers	Herr.	Herr. Roe	Roe On Kelp	Slmn	Sltd Slmn Hds.	Smelt	Berr.	Frshwtr Fish	Ptrmgn	Clams	# of Times That This Community Was Received From
TOGIAK	1	1	3	16	22	16	2	3	2	8	3	2	13	2	12	3	2	111
TWIN HILLS				3	2	1	1			1	2		6	2	1			19
NEW STUYAHOK		2	8											1				11
ALEKNAGIK	3	2	1								1			1				8
QUINHAGAK											2	1	1	2	1			7
KONGIGANAK					1	2					1		1	1				6
DILLINGHAM	1		1								1	1		1				5
PORTAGE CREEK	2	1	1															4
BETHEL AREA/KUSKOKWIM				1	1	1								1				4
ATMAUTHLAUK											1		1	2				4
ANCHORAGE											1	1		1				3
KWETHLUK														2				3
PILOT POINT			2															2
EKUK												2						2
KOLIGANEK			1															1
KIPNUK	1																	1
KUSKOKWIM		1																1
NIGHTMUTE															1			1
# of Times This Resource Was Received	8	7	17	20	26	20	3	3	2	9	13	7	22	16	15	3	2	193 Total Number Of Receiving Events (HH/Species Pairs)
# of HH That Received This Resource	7	7	17	20	26	20	3	3	2	9	11	6	20	13	15	3	2	

frequently sent out from Manokotak were named as Anchorage and Dillingham (Table 13). In all likelihood, these were gifts to kin who had moved to an urban or regional center and were unable to secure their "Native foods" in those locations. The next most frequent destinations were the communities of Twin Hills, Togiak, and Aleknagik. These are all within the region, and are the villages in closest proximity to Manokotak, where Manokotak residents are known to have strong kinship ties. Similar to Manokotak, all are predominantly Yup'ik Eskimo communities where the Moravian church plays a significant role. Research in other rural Alaskan communities (Morris 1986) also identified cultural and religious ties as important factors in distribution and exchange patterns. These four villages often host each other for Moravian events. Other communities named, particularly those in the Kuskokwim area, included several where Manokotak residents were known to have relatives, although the relationship of the giver was not specified in the survey. The resources which were sent out of Manokotak most frequently were moose, salmon, beaver, berries, smelt, caribou, and freshwater fish.

When analyzing the communities which sent resources to Manokotak (Table 14), Togiak stands out as the single largest contributor. In fact, food was reported received more often from Togiak than all other locations combined. Twin Hills, a much smaller community located only a few miles from Togiak, was named as the second most frequent sender. The resources which were sent most often included seal oil and meat, walrus, smelt, freshwater fish, and roe-on-kelp. Togiak and Twin Hills' location on the resource-rich Togiak Bay put them in a good position for hunting marine species. As indicated in Chapter 2, most Manokotak

residents had previously lived in coastal communities and enjoyed eating marine species. Their present inland location may prevent them from harvesting the amount of marine products to which they have been accustomed. Close kinship and friendship ties in Togiak and Twin Hills may have helped in supplementing their own harvests. Exchanges with other villages were less frequent and the resources were more diverse. Most communities named were also ones in which Manokotak residents were known to have kinship ties.

COMPARISON LEVELS OF 1973 AND 1985 HARVESTS

The final section of this chapter will give some historical perspective on Manokotak's harvesting patterns by comparing available harvest data from two study years, 1973 and 1985. Table 15 presents the results of a resource harvest survey of 19 households (51.4 percent) in Manokotak in 1973 (Gasbarro and Utermohle 1974). In this study, sampled Manokotak households took a mean household harvest of 2,357.1 pounds and a per capita harvest of 399.7 pounds. The resources which contributed the most to the mean household harvest were salmon (888.1 pounds or 37.7 percent); moose (483.2 pounds or 20.5 percent); caribou (157.9 pounds or 6.7 percent); and belukha (147.4 pounds or 6.3 percent). In comparison, the major resources by mean weight in 1985 were salmon 706.3 pounds, (35.2 percent of the total harvest); moose 200.0 pounds (10.0 percent), beaver 151.5 pounds (7.6 percent), caribou 112 pounds (5.6 percent), and belukha 90.7 pounds (4.5 percent). These figures indicate a continued reliance on the same resources which form the basis of the community's diet, namely, salmon, moose, caribou, and belukha.

TABLE 15. RESOURCE HARVESTS, MANOKOTAK, 1973.

Resource[a]	Percentage Harvesting	Mean Household Harvest, Pounds[b]	Total Sample Harvest, Numbers
SALMON[c]	95.0	888.1	3,009
OTHER FISH	89.0	393.0	10,863
Whitefish	NA	40.7	773
Pike	NA	124.2	843
Char, Dolly Varden	NA	38.4	521
Grayling	NA	18.9	513
Rainbow	NA	10.9	148
Lake Trout	NA	30.6	215
Smelt	NA	108.0	6,840
Herring	NA	21.3	1,010
MARINE INVERTEBRATES[d]	42.0	NA	NA
MARINE MAMMALS	58.0	43.3	--
Seals	NA	38.3	13
Sea Lion	NA	10.5	1
Walrus	NA	58.9	2
Belukha	NA	147.4	4
LAND MAMMALS	NA	---	--
Moose	42.0	483.2	17
Caribou	26.0	157.9	20
Brown Bear	NA	5.3	1
Black Bear	NA	0	0
Hare	NA	4.1	39
Porcupine	NA	1.7	4
BIRDS	NA	---	--
Waterfowl	79.0	85.1	683
Ducks[e]	NA	32.6	443
Geese[e]	NA	49.3	234
Swans	NA	3.2	6
Ptarmigan and Grouse	NA	5.7	108

N = 19 households with 112 people = 51 percent of village households

TABLE 15. (Continued) RESOURCE HARVESTS, MANOKOTAK, 1973.

Resource[a]	Percentage Harvesting	Mean Household Harvest, Pounds[b]	Total Sample Harvest, Numbers
FURBEARERS	NA	---	--
Beaver	37.0	77.9	74.0
Fox	NA	---	299.0
PLANTS[f]	84.0	NA	NA
ALL RESOURCES	NA	2,357.1	--

PER CAPITA HARVEST: 399.7 pounds

a. Only those resources for which data were collected during the survey are listed.

b. Factors used to convert numbers of animals or fish into pounds edible weight are, except where noted, the same as those used to convert the 1985 data. See Appendix

c. Reported as "salmon". Catch broken down by species proportional to the reported 1973 subsistence catch for the Nushagak district; sockey (red) salmon, 63%; chinook (king) salmon, 14.9%; chum (dog) salmon, 17.1%; pink salmon, 0%; coho (silver) salmon, 5% (Wright et al. 1985: 95).

d. Reported as "clams".

e. Harvest by species not reported.

f. Berries only.

The increased take of beaver may be due to the resurgence of the beaver population in Unit 17 which was very low in the early 1970s due to overharvesting. These figures also demonstrate that the per capita harvests for 1973 (399.7 pounds) and 1985 (365.4), when adjusted to include comparable resources (i.e when plants and marine invertebrates are removed from the 1985 data) are within thirty-five pounds of each other (Table 16). The larger household harvests reported for 1973 are due to slightly larger mean household size at that time (5.9 in 1973 and 5.2 in 1985).

Table 16 and Figure 19 illustrate a comparison of the 1973 and 1985 harvests by resource categories. Again, many of the resource categories are remarkably similar. The per capita harvests for salmon, birds, and marine mammals are nearly the same. Land mammals reflect the largest decline in per capita harvest from 110.6 pounds in 1973 to 65.5 pounds in 1985. It is possible that the lower harvest in 1985 was due to poor snow cover and travelling conditions that winter. A number of hunters told the researchers they did not hunt for those reasons. Another explanation may be the more liberal hunting seasons in the early 1970s (See Tables 23 and 24 discussed in Chapter 6), which gave people more time to harvest both moose and caribou.

Resources whose harvest increased were non-salmon fish species and furbearers (Fig. 19). Recent research (Fall et al. n.d.) suggests that freshwater fishing activity fluctuates from year to year depending on such factors as ice conditions, species abundance, and water levels. One resource whose use appears to have increased substantially was herring and herring products, specifically roe and roe-on-kelp. There are two possible explanations for this. The 1973 survey did not include

TABLE 16. COMPARISON OF FISH AND GAME HARVESTS OF MANOKOTAK RESIDENTS, 1973 AND 1985

	1973 (N = 19 Households)			1985 (N = 54 Households)		
	% of sample harvesting	Per Capita harvesting pounds	% of total harvest	% of sample harvesting	Per Capita harvesting pounds	% of total harvest
Salmon	95.0	150.6	37.7	88.9	135.2	37.0
Other fish	89.0	66.7	16.7	90.7	85.7	23.4
Marine Mammals	58.0	43.3	10.8	50.0	32.6	8.9
Land Mammals	42.0[a]	110.6	27.7	81.5	65.5	17.9
Furbearers	37.0[b]	13.2[b]	3.3	77.8	29.5	8.1
Birds	79.0[c]	15.3	3.8	94.4	16.9	4.6
Plants	84.0	NA	NA	92.6	d	d
Clams	42.0	NA	NA	64.8	d	d
TOTAL	----	399.7	----	98.1	365.4	---

a = Reflects percentage of sample harvesting moose. All other figures on this line reflect harvest of all land mammals.
b = Beaver
c = Waterfowl
d = Clams and plants have been excluded to make cross-year data comparable.
NA = Not available

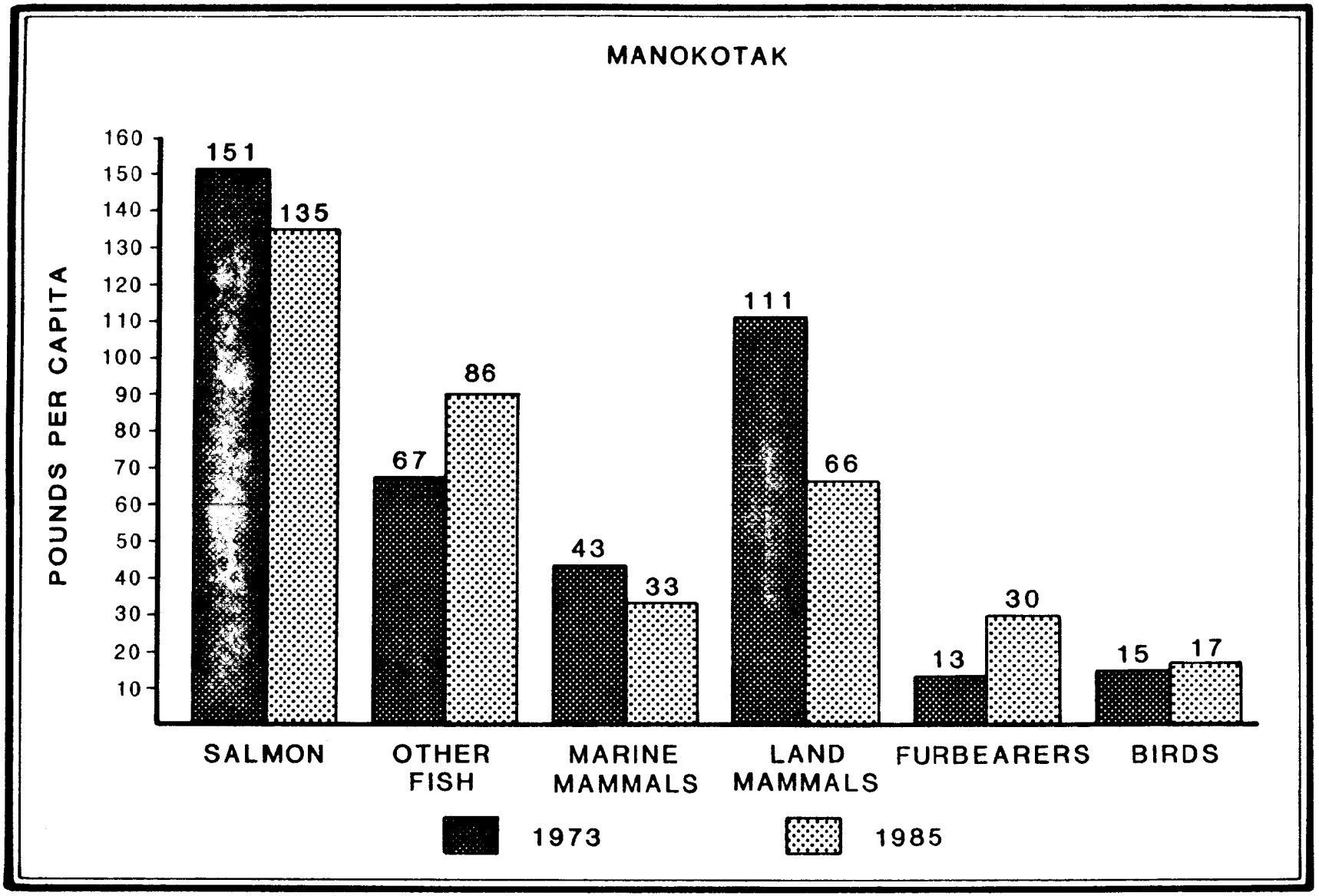

Figure 19. Comparison of Mean Per Capita Harvest by Weight, 1973 and 1985.

herring roe and roe-on-kelp, as only "herring" was reported (Gasbarro, personal communication, 1987). Nonetheless, even omitting both roe and roe-on-kelp, the mean herring harvest itself increased substantially from 21.3 pounds per household in 1973 to 89 pounds in 1985. Most likely, this is due to the establishment of the commercial herring fishery in the Togiak District and increased travel to the harvest grounds. As indicated above, Manokotak fishermen are active participants in that fishery and most combine commercial and subsistence activities. The increased harvest of furbearers may be related to the resurgence of the beaver population in GMU 17.

Another interesting comparison relates to the proportion of the sample harvesting various resource categories (Fig. 20). There were no substantial differences between the two years in the categories of salmon, other fish, marine mammals, or plants although the figure demonstrates a small increase in the number of households hunting birds or collecting eggs. This may be due to the fact that the 1973 survey does not appear to have included eggs. Since women are typically included in egg gathering, the addition of these female harvesters could account for the additional participation. The increase in beaver harvesting has already been discussed. The increase in households harvesting land mammals may be due to inconsistencies in the two sets of data. It was not possible to determine from the 1973 data the number of households which harvested both moose and caribou. Therefore, the 1973 participation rate only includes moose harvesters.

In sum, the comparative data from the two study years indicate a fairly stable harvest pattern between 1973 and 1985 with very similar per capita harvest figures. The composition of the harvest has also

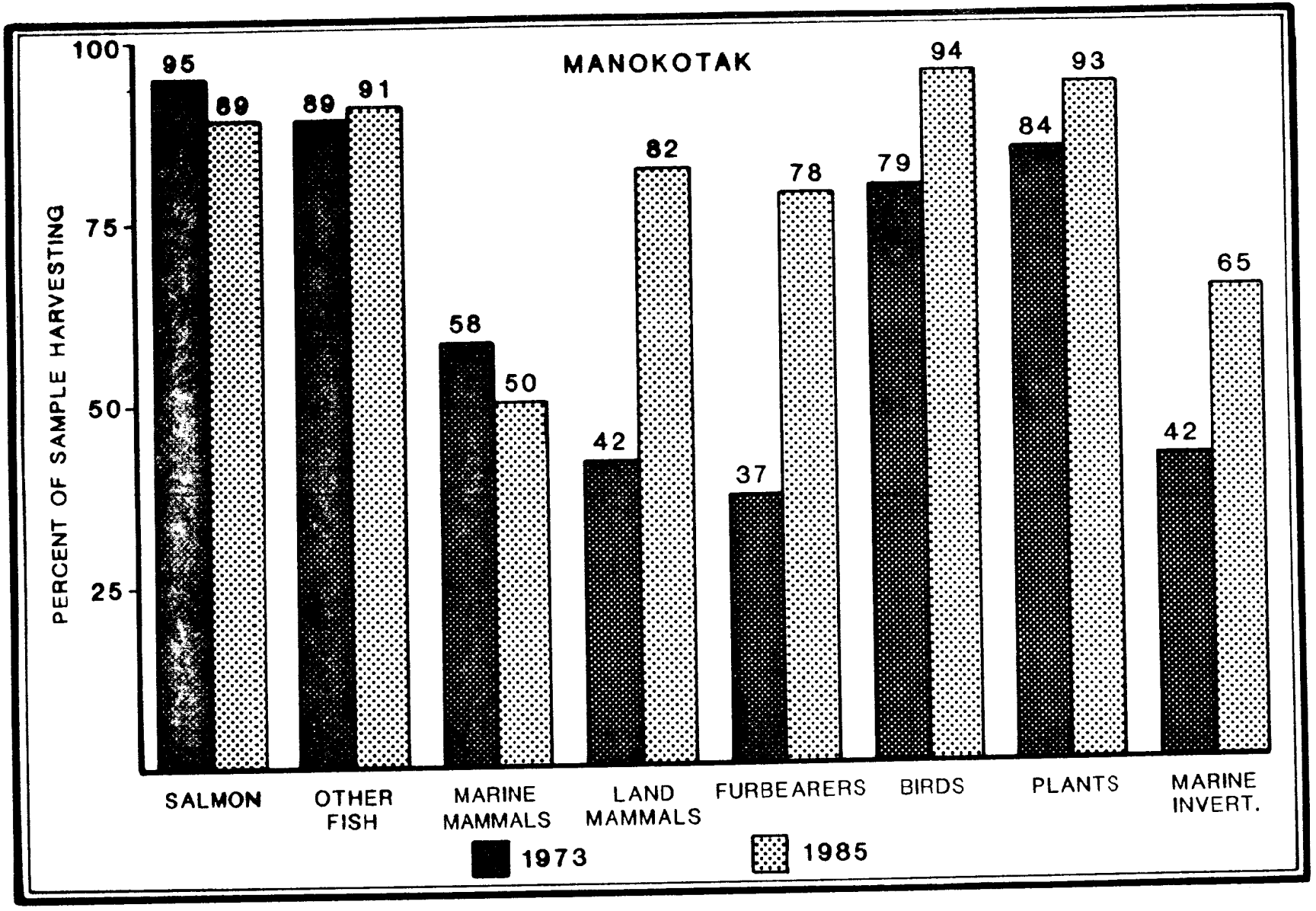

Figure 20. Comparison of Households Harvesting Major Resource Categories 1973-1985, Manokotak. (1973, N = 19 Households; 1985, N = 54 Households)

been fairly stable with heavy reliance on salmon, moose, caribou, and belukha. The percentage of active harvesters also demonstrates remarkable consistency with two exceptions: big game, where differences may be due to changes in moose hunting regulations, and birds, where differences may related to inconsistencies in the data themselves.

CHAPTER 4

SALMON

Five species of salmon enter Nushagak Bay and associated drainages, primarily the Nushagak, Igushik, and Snake rivers. Each species arrives at a different time and in different run strengths. Runs of king salmon appear first, beginning in late May, and usually peak by the end of June. Kings are highly prized by commercial, subsistence, and sport fishermen. Sockeye (red) salmon are the most abundant species and the next to arrive after the kings. The peak of the sockeye run usually occurs in early July. Sockeyes are important to commercial and subsistence users. Chums, locally known as dog salmon, begin returning to the Bay in late June along with the sockeyes. They are usually caught incidentally with the targeted kings and sockeyes. Pinks salmon return strongly to Nushagak Bay in even-numbered years in the latter part of July. Due to their soft flesh they are not targeted by subsistence fishermen, nor are pinks a prized commercial species, but they are harvested by some when an acceptable price is offered. The last salmon to arrive are the cohos, or silver salmon, in early August. This species is sought by all user groups.

SUBSISTENCE SALMON METHODS

As noted previously, salmon were harvested by 88.9 percent of sampled households in 1985 and used by 100 percent. Salmon comprised 35.2 percent of the resource harvest, the largest portion of any single

resource category. Table 17 shows salmon harvest by gear type. The vast majority of numbers of salmon for home use were harvested in subsistence gill nets (83.5 percent). Salmon retained for home use from commercial catches provided 15.1 percent; but only 1.3 percent was taken with rod and reel (less than 100 fish total) by the sample.

As detailed in Chapter 3, the commercial salmon industry is the mainstay of the monetary sector of Bristol Bay's economy. The commercial salmon season runs from June through September, with the major effort taking place from mid-June to mid-July during the king and sockeye runs. Coho salmon are fished in August and into September. Ninety-one percent of the sampled households had at least one household member engaged in commercial salmon fishing during the study year.

SUBSISTENCE FISHING LOCATION - IGUSHIK (*Iyussiiq*) FISH CAMP

For most residents of Manokotak, the salmon fishing season and Igushik (*Iyussiq*) were nearly synonymous. "Igushik" in this sense refers not to the river along which the village sits, but to a fish camp 25 miles downriver from the winter village (Figure 21) where nearly the whole village moved for commercial and subsistence fishing in early June through mid-July. In 1986, one family stayed behind to keep the post office open, and sometimes an elderly person in frail health or a mother with a newborn child remained as well. But for all practical purposes, the village shut down. Even electrical power and phone service were turned off and any one who remained used their own household generators for power.

TABLE 17: SUBSISTENCE SALMON HARVEST IN NUMBERS OF FISH BY GEAR TYPE, MANOKOTAK, 1985a

	Number removed from commercial catch		Number, subsistence set net		Number, rod and reel		Number, other		Totals	
King	248	(35.8%)	439	(63.4%)	1	(0.1%)	4	(0.6%)	692	(9.9%)
Red	489	(9.7%)	4527	(89.6%)	37	(0.7%)	0	(0.0%)	5053	(72.4%)
Chum	108	(29.3%)	251	(68.0%)	10	(2.7%)	0	(0.0%)	369	(5.3%)
Pink	32	(50.0%)	32	(50.0%)	0	(0.0%)	0	(0.0%)	64	(.9%)
Coho	175	(21.9%)	580	(72.5%)	45	(5.6%)	0	(0.0%)	800	(11.5%)
TOTAL	1052		5829		93		4		6978	
PERCENTAGE		(15.1%)		(83.5%)		(1.3%)		(0.05%)		

a N = 54 households included in 1985 Division of Subsistence survey.

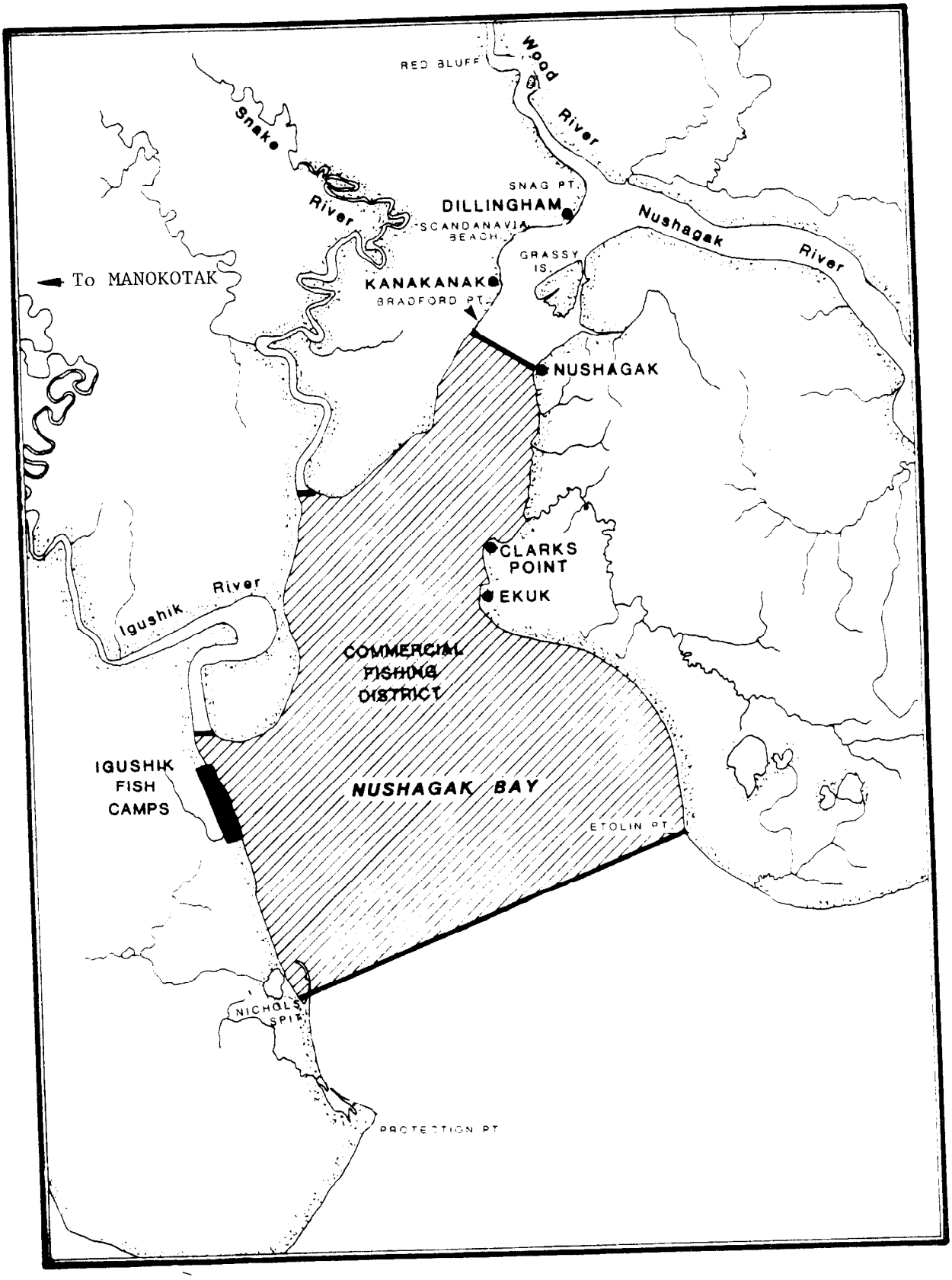

Figure 21. Igushik Fish Camp along Nushagak Bay.

Most families packed up and headed for fish camps about the first week of June. Travel was usually in commercial fishing boats, especially useful for transporting the large amount of goods and supplies that were needed. Some family members also arrived in skiffs or by commercial air taxi. Although there was no air strip at Igushik, small planes were able to land in good weather on the gravel beach at low tide. The few families who owned planes also brought them to the fish camp.

The families who camped at Igushik were mostly, although not exclusively, from Manokotak. There were also a few families from Dillingham and Aleknagik, as well as one group of fishermen from the lower 48 who recently purchased a cabin there. All families had permanent wooden cabins at the fish camp. The structures stretched for approximately two miles along the beach. Some younger couples lived in wall tents while building their own cabins. Cutting tables, drying racks, smokehouses, steam baths, and caches were also present.

There was no running water, plumbing, or sewage system at Igushik. Outhouses or honeybuckets were used for human waste. Other trash was dumped in pits which were covered when full. Washing water was obtained from surface water such as ponds and streams close to the cabins. A few old wells also were used for this purpose. Drinking water was more problematic. Most people obtained it by packing water from a stream about 5 miles below the mouth of the river. However, the presence of giardia and other bacteria was a problem. Younger children in particular were susceptible to frequent bouts of diarrhea. Therefore, some families preferred to pack drinking water from Manokotak or

Dillingham. Steambaths were considered a necessary "luxury" where people washed, visited, and relaxed at the end of the day.

There was no central power and a number of families had their own small generators for running electric appliances such as lights and wringer-type washing machines. It was not uncommon for several households to share a freezer, although caches were also used for storing food. Cabins were heated with small oil or woodstoves. Oil was purchased at the Ekuk cannery and brought over by fishing boat. Since the area is treeless, driftwood was collected or expeditions for wood were made in skiffs. Communications between houses and with family members on fishing boats was with VHF or CB radios. Nearly every house had an AM radio which was essential for keeping track of ADF&G commercial fishing announcements. Travel within the fish camp was most frequently by all terrain vehicles which were also essential to the commercial fishing operation.

There has never been a cannery at Igushik, although there was a saltery before canneries took their place along Nushagak Bay (Michael Nelson, pers. comm. 1986). Consequently, the fish camp lacked amenities usually available at cannery sites. There was no health clinic, although there was a health aide available in emergencies and the public health nurse visited at least once in 1986. No groceries or other supplies were available but the co-op did stock a small supply of soda-pop, candy, and pilot bread. There was no telephone or laundromat. For all these services, a trip to Ekuk or Dillingham was necessary. Residents had, however, built a Moravian church and services were held on Sundays.

Household Groupings

Dwellings stretched along the beach at Igushik for approximately two miles. These houses tended to be clustered into family constellations. Most frequently, parents and children lived in adjacent cabins and they shared fish processing equipment such as racks, smokehouses and cutting tables. Although there were some exceptions, this was the major pattern. These parent-children groupings of houses will be referred to as "family compounds." The major exception to this pattern was a close cluster of houses situated on a bluff which gave the appearance of a little village. Four extended families and three nuclear families shared this area.

Many grown children who no longer resided in Manokotak in the winter continued to return to Igushik in the summer to participate in the fishery. When younger children lived in a different part of the fish camp from the rest of their family, it was often because a cabin had become available to them in a different part of the camp, and they chose to live in it rather than invest in building a new one.

SUBSISTENCE FISHING REGULATIONS

Table 18 outlines the regulations which have governed the subsistence salmon fishery for the Nushagak District from 1960 to 1986. Permits have been required for nearly all subsistence fishing since statehood. The only exception was subsistence fishing between 1960 and 1964 which took place at least twelve miles upstream of a commercial district. Prior to 1971, applicants were required to show cause for the

TABLE 18. SUBSISTENCE SALMON REGULATIONS NUSHAGAK DISTRICT, 1960-1986.

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

TABLE 18. (Continued) SUBSISTENCE SALMON REGULATIONS NUSHAGAK DISTRICT, 1960-1986.

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

TABLE 18. (Continued) SUBSISTENCE SALMON REGULATIONS NUSHAGAK DISTRICT, 1960-1986

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

permits (1960-63) or demonstrate that the use of the fish was compatible with proper utilization of the stocks. After 1971 permits were to be issued upon request and the only additional change occurred in 1980 when it was stated only one permit would be issued per household.

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

From 1963-1979, there were provisions in the regulations to impose quotas through the permitting process. However, no quotas have ever been imposed for the Nushagak District in the regulations themselves. Over the years a number of other restrictions were added to the regulations, all of which have stayed in place. In sum, these changes closed to subsistence fishing all waters within 300 feet of any stream utilized by salmon (1965); forbid nets to obstruct more than one-half the width of a stream (1965); established the minimum distance between nets in a stream to be 300 feet (1965), and later this distance applied to nets in any location (1971). In 1974, the area between the markers at Bradford Point and Red Bluff was put on a three day per week fishing period for one month during the peak of the king and sockeye runs (Fig. 21). The final restriction occurred in 1978 when no person was allowed to operate or assist in operating commercial and subsistence gear simultaneously.

During the study year, 1985, any state resident was allowed to obtain salmon for subsistence purposes in the Nushagak District provided they obtained a permit without charge from the Alaska Department of Fish and Game. Only one permit was issued per household and each permit holder was required to report their daily harvests at the end of the season. In the Nushagak District, no harvest limits were imposed on any species. Forty-six percent (25 households) of Manokotak's households obtained a subsistence fishing permit in 1985 (Table 19).

Within the commercial district, salmon could only be taken during open weekly commercial salmon fishing periods or by regulated openings during the emergency order period (Fig. 21). The commercial district ended approximately one mile above the last house at the river's mouth. The area in the river above the marker was open to subsistence fishing seven days per week throughout the year. There was a third section of the Nushagak District, primarily the Dillingham area, which was regulated on a three day per week schedule during the emergency order period but this section was not generally used by Manokotak residents.

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

A number of Igushik fishermen considered these regulations troublesome. In general, residents preferred to separate their labor

TABLE 19. SUBSISTENCE SALMON HARVEST BY SPECIES, MANOKOTAK, 1966 - 1986.

Village	Years	Percent Returned	Permits Issued	Permits Returned	Sockeyes	Kings	Chums	Pinks	Cohos	Actual Totals
Manokotak	1966	100%	24	24	5,711	180	119	106	994	7,110
	67	70%	30	21	9,120	91	39	77	1,556	10,883
	68	58%	12	7	3,226	137	5	-0-	351	3,719
	69	100%	24	24	5,137	114	110	30	861	6,252
	1970	96%	26	25	7,415	103	208	24	358	8,108
	71	63%	32	20	4,128	76	-0-	5	771	4,980
	72	50%	34	17	1,677	24	6	12	194	1,913
	73	71%	34	24	2,797	72	27	4	365	3,265
	74	74%	34	25	6,974	46	89	531	679	8,319
	1975	73%	30	22	4,190	190	244	160	325	5,212
	76	86%	36	31	5,808	221	565	336	272	7,202
	77	68%	37	25	4,473	96	215	34	657	5,475
	78	58%	26	15	2,054	99	14	269	721	3,157
	79	80%	30	24	5,310	172	56	10	367	5,915
	1980	88%	26	23	5,762	124	38	274	722	6,920
	81	73%	30	22	4,232	185	13	123	399	4,952
	82	90%	20	18	1,689	62	78	116	673	2,618
	83	100%	20	20	4,688	220	153	-0-	262	5,323
	84	78%	23	18	2,427	358	13	13	418	3,229
	1985	100%	25	25	3,123	409	17	-0-	52	3,601
	86	86%	29	25	4,244	583	16	8	106	4,957
21 Year Averages		79%	28	22	4,485	170	96	102	529	5,386

Source: Office Files, ADF&G, Division of Subsistence, Dillingham.

between commercial and subsistence efforts. During a commercial closure, women were eager to put up fish when the weather was good and fish were running. However, they could only do so legally by harvesting them outside the commercial district. Since the women were usually not the skiff operators, they were dependent on the presence of their male relatives, who were often away from the camp awaiting fishing announcements or working on their boats. During commercial openings, women had the option to remove fish from their commercial set net catches, but the local preference was to sell all the fish caught with set net gear. For many people, the fishing season was the only opportunity of the year to earn money. There was also confusion about which times residents were allowed to put out subsistence nets. Some were under the mistaken impression that they were on the same three day per week subsistence fishing schedule as Dillingham.

HARVESTING PATTERN

The primary salmon species harvested at Igushik were kings, reds, and chums. Table 19 shows the reported subsistence salmon harvest for Manokotak by species from 1966-86. Sockeyes have consistenly been the fish caught in the largest numbers, greatly exceeding the harvest of other available species, including kings, chums, pinks, and cohos. Harvesting strategies varied and were strongly influenced by the regulations as indicated above. This occurred because Igushik's location within a commercial fishing district only permitted subsistence fishing during commercial openings, either regular weekly openings or during the emergency order period.

Table 20 summarizes four different harvesting strategies. Each had its own constellation of targeted species, predominant harvesters, gear types, and location and will be discussed here. As reported in Table 17, the largest number (83.3 percent) of subsistence salmon, primarily sockeye, were harvested in subsistence nets in 1985. Nets were set in the Igushik River or at the beach in front of the fish camp. Although the river was just a short distance from the fish camp, access required a skiff, consequently, men were the predominant harvesters since operating a skiff was generally considered a male role. Other family members might also accompany them for the outing. Subsistence nets could be set legally in the river at any time, and could therefore be harvested whenever the men had time and the tide was high enough to launch a skiff. When nets were set for subsistence purposes in front of the fish camp, they might be set by either men or women, but they were more frequently set by women. This was because women wished to take advantage of good drying weather when they had time to process fish, most frequently when commercial fishing was closed.

Some fish were removed from commercial catches as well, most frequently king salmon caught by drifters in Nushagak Bay. This was because the Igushik River does not have a strong king run. Subsistence fish taken from commercial set net catches were predominantly sockeye and usually harvested by women at Igushik Beach. However, this did not occur ordinarily since residents preferred to sell all fish caught commericially.

TABLE 20. HARVEST STRATEGIES - KING, RED, AND CHUM SALMON AT IGUSHIK FISH CAMP

Strategy	Method	Location	Predominant Harvesters
Remove from commercial catch	Drift	Nushagak Bay	Male relatives
Remove from commercial catch	Set net	Igushik Beach	Female relatives
Harvest by skiff with subsistence net	Set net	Igushik River	Male relatives Husband and wife Families
Harvest without skiff with subsistence net	Set net	Igushik Beach	Female relatives Husband and wife

SOCIAL ORGANIZATION OF PROCESSING GROUPS

Processing salmon is a time-consuming endeavor and involves numerous stages of preparation. Once the net has been set and picked, the fish are washed and gutted, then brined and split, hung to dry and, finally, smoked. Depending on the weather, the process took approximately two weeks per rack of fish.

Processing groups which were observed were composed exclusively of related kin drawn from one or several households. That is, processing groups were extended family groups, drawing labor from several related households. During field work in 1986, information was collected through observations and informal interviews on 19 work groups at Igushik. Although observations of all work groups at Igushik were not made, these examples do indicate the general patterns of processing groups there. Eight of the groups were composed of mother-daughter combinations; three were made up of mother-daughter-daughter-in-law combinations; two included mother-daughter-son; one was composed of sisters; one of sisters-in-law; three were husband and wife teams; and two included female relatives whose exact relationship was unknown to the researcher (Table 21). These results indicate that the mother at the center of an intergenerational family group characterized most work groups (16 of 19, or 84.2 percent).

Within these groups, the mother played the strongest role. This was evident in a number of ways. As stated previously, the parents' house was central and largest in the compound, and usually referred to as "mom's." In a number of compounds, it was the central eating place as well, with other cabins primarily used for sleeping. Many married

TABLE 21. COMPOSITION OF SUBSISTENCE SALMON PROCESSING GROUPS, IGUSHIK BEACH

Relationship	Number
Mother-daughter(s)	8
Mother-daughter-daughter-in-law	3
Husband-wife	3
Mother-daughter-son	2
Female relatives (relationship unidentified)	2
Sisters	1
Sisters-in-law	1
TOTAL	19

children who no longer lived in the winter village returned to the extended family compound during the summer fishing season.

When it came to the tasks involved in subsistence fishing, the mother was clearly recognized as the leader of the work group. Not only was the mother's commercial set net site used for harvesting, but the fish were processed using her facilities, namely, her racks and smokehouse. She decided when to fish, the quantity to be processed, and what products would be made. Most importantly, she oversaw the smoking process, a skill acquired only through years of experience. Even a few middle-aged women admitted to having never smoked their own fish and not being sure they could do it as well as "mom."

After the processing was complete, the mother filled another important role by being in charge of distribution. At the end of the summer each household within the extended family network received a box of fish to take with them, but the bulk of the fish was stored in the mother's cache or freezer and distributed to the children as it was needed.

To illustrate these points, case studies of several extended families and the work groups involved will be presented. Kinship diagrams of the cases are presented in Fig. 22-24.

Case 1. This is a case illustrating a working group centered around a mother and several daughters, residing in seven households in Manokotak and two in other locations. In this particular case, the mother was a widow with eight daughters (three of them married), six of whom stayed at Igushik for the entire fishing season and two of whom were there intermittently (Fig. 22). She also had four sons who resided at the fish camp. Neither of the two daughters-in-law were present at

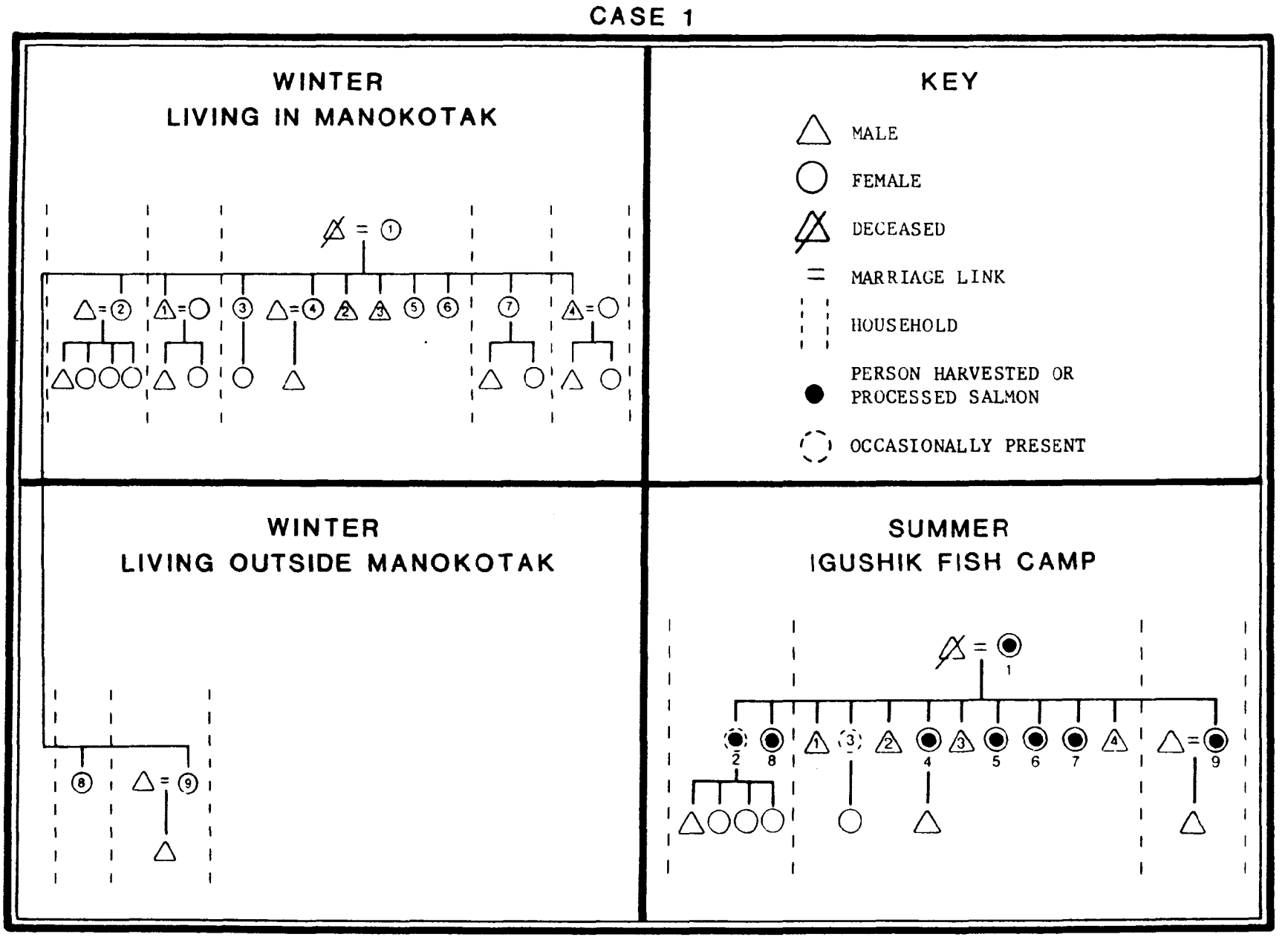

Figure 22. Salmon Processing Group, Case 1.

the fish camp, fishing instead at their mothers' villages. Rather than use their own houses that particular summer, the sons lived in their mother's cabin when not on their fishing boats. This group had sufficient female labor that women handled all subsistence fishing tasks, including harvesting. For instance, on one occasion, the women set a net for salmon while the men were nearby on the beach. When the women determined the net had been in long enough and began to pull it by hand the men assisted with that task, but then left the women to complete the rest of work. The women picked the net, hauled the fish to the work area, packed water, and proceeded to clean and split the fish. One respondent matter-of-factly summed it up for the researcher as, "Putting up fish is basically women's work."

Case 2. This case illustrates a workgroup drawing labor from nine separate households, linked by kinship (Fig. 23). This extended family in the compound was also headed by a widow; the adult members consisted of 6 daughters, 3 sons, and 8 spouses. One married son and his family lived elsewhere in the fish camp, his wife usually putting up fish with members of her own extended family, but during the study year, illness prevented her from putting up fish. Five married daughters and two married sons had their own cabins within the compound. The childless families used "mom's" as the central eating and meeting place.

Although the mother was elderly and could no longer do the physical work involved with fishing, she was clearly the director and authority. One morning a daughter invited one of the researchers to observe the smoking process, but on arrival the daughter explained the smoking had been postponed because "Mom said it is too hot and the fish might burn." The six daughters and one daughter-in-law in this group

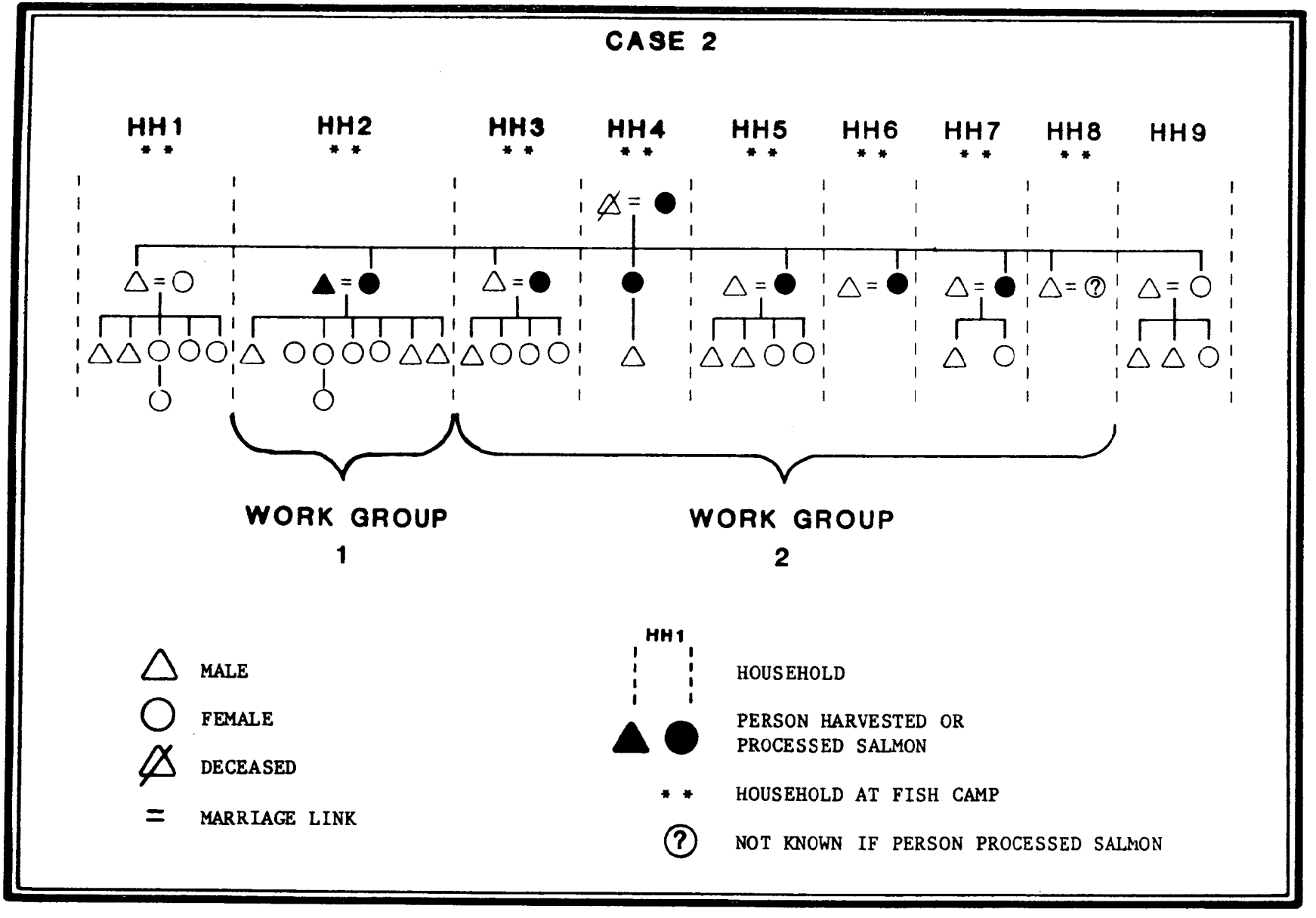

Figure 23. Salmon Processing Group, Case 2.

formed the actual labor force. The fish were harvested at their mother's commercial site with her equipment and under her direction.

This group also offers a good example of the process by which daughters come to head their own work groups. Although one daughter lived in the family compound, her family had matured to the point where there were ten members and included three generations. That daughter had her own equipment, including a smokehouse and worked with her husband to put up fish for her own family. Her eldest daughter had a small child and was consequently excused from splitting fish.

Case 3. The final example illustrates an extended family network that had matured to divide into three separate salmon working groups (Fig. 24). The elderly mother (Household 3) was no longer vigorous enough to camp at Igushik in 1986. Her two sons' wives (Household 1 and Household 5) put up their own fish at Igushik. Their households had matured enough (become large enough) to become independent working groups. One daughter (Household 2) and another daughter lived and commercial fished in another commercial fishing district in Bristol Bay. The remaining daughter (Household 4) did not move to fish camp this particular summer due to a sick baby. The remaining daughter was a young woman with three children under the age of five. Although women with small children are often excused from work in the processing group, this woman had little choice except to work if she were to obtain fish. There were no other direct female kin linked by blood to her who were processing fish. She did not receive her dried fish from the processing groups of her sisters-in-law (Household 1 and Household 5), illustrating that affinal ties at the same generation are insufficiently strong to be a basis for obtaining salmon. She explained that, "Last year I didn't

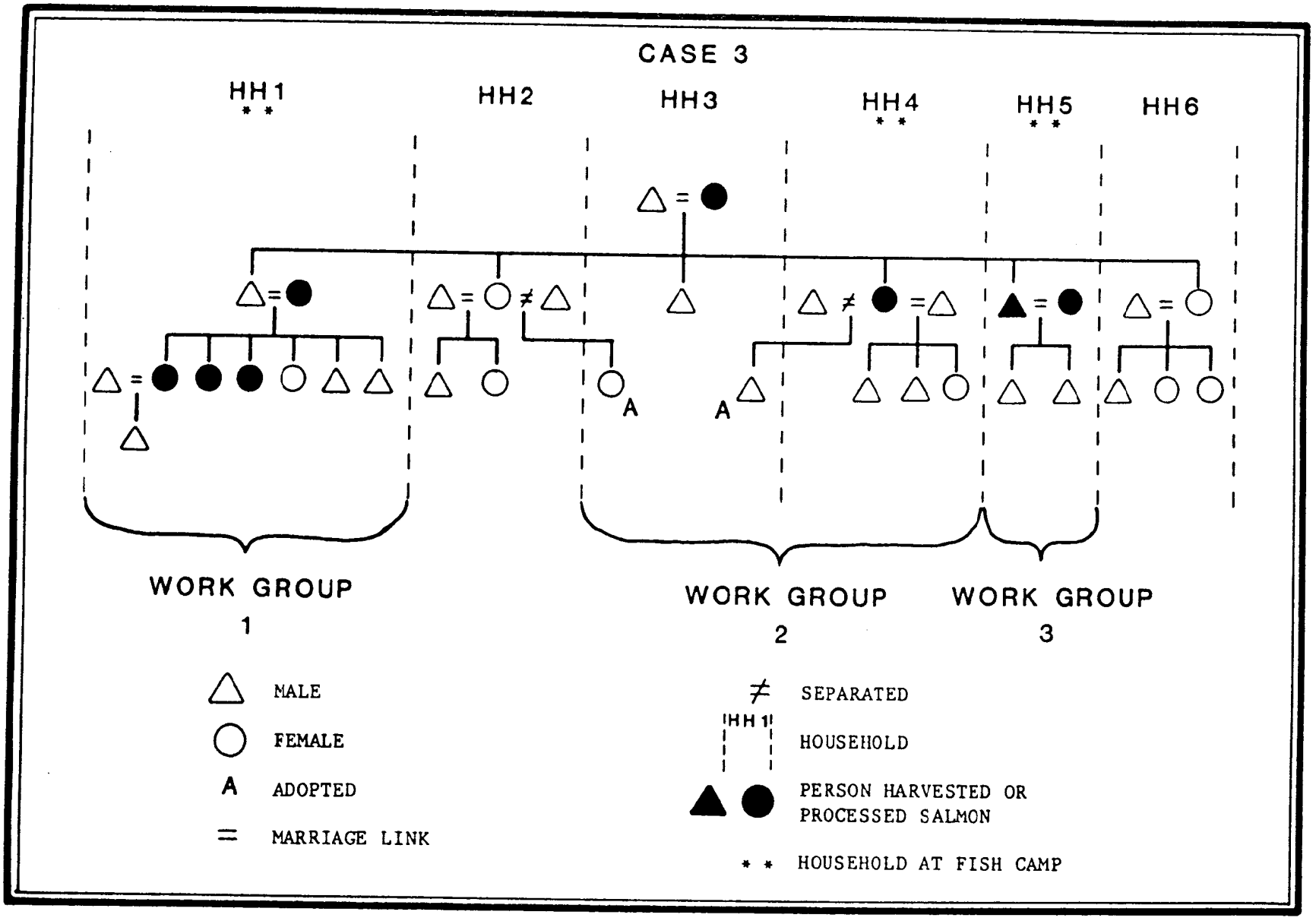

Figure 24. Salmon Processing Group, Case 3.

come because I was pregnant, but I had no strips in the winter and I felt terrible so I figured this year I better come down..." Her husband harvested the fish she needed in his skiff. She engaged her nephews to babysit while she split and dried the fish herself. When they were ready to be smoked she sent them back to her mother in the winter village for smoking. In this instance, the mother was still an important member of the work group although not present at the fish camp.

Although the data indicate that mothers and daughters form the basis of most work groups, there were also exceptions. Members were recruited from various categories of kinship when needed and some of these patterns will also be examined. The role of the daughter-in-law was not always clear cut. It is important to note here that there is no single residence pattern in Manokotak. Spouses of both sexes are brought into the community, and there are a number of marriages in which both spouses are from Manokotak. This meant a woman could be at fish camp with her mother, her mother-in-law, neither, or both. In general, daughters-in-law who resided in their husband's fish camp worked with their mothers-in-law but a few had their own equipment and processed fish for their own household separately. In a case where both mother and mother-in-law resided in the same fish camp, the daughter was likely to work with both but feel like a "member" of her mother's work group and a "helper" to her mother-in-law. As stated previously, some women who were married into the village returned to their own home villages in the summer to work with their own mothers.

Although sisters worked closely together when their mother was functioning as the head of the work group, they did not generally

continue to do so when she ceased performing that role. Only one instance was observed of sisters working together when the mother was no longer functioning as head of the work group. Even in this group, at least one of the sisters also had her own rack and smokehouse and put up fish independently as well. It appears that in the developmental cycle of subsistence salmon working groups, a daughter generally works with her own mother until she has enough older children to establish an independent work group. These findings are consistent with work that has been done in other villages in southwest Alaska (Wolfe et al 1984). In the case of sisters-in-law working together, only one example of this type of work group was observed. It is likely that these groups are formed on the basis of compatibility.

Thus far, the female composition of the work group has been examined with special attention paid to the role of the mother. However, there are five work groups with men working in them, notably husbands helping their wives and sons helping their mothers. In every one of these instances, these groups lacked sufficient older female members to perform the work. In a few cases, there was a daughter available but she had at least one very young child to care for. As previously stated, young mothers are usually excused from full participation in the processing stage due to their childcare responsibilities.

Although men were not commonly part of the salmon processing groups, they made important contributions to the supply of fish which were put up for the summer by harvesting fish, building racks and smokehouses, and mending nets. They also made frequent trips with

skiffs to secure cottonwood, the preferred species, for the smoking process.

Men were present intermittently at Igushik throughout the fishing season. Since most were involved with drift net fishing, the amount of time spent in the fish camp varied from season to season. The amount of commercial fishing time allowed in a particular year was the single most important determining factor. During the sockeye run, commercial fishing in Bristol Bay is regulated by emergency order and the amount of fishing time can vary enormously. When not actually fishing, men worked on their boats and engines, mended nets, and changed gear. As previously mentioned, much of that work was done at the Ekuk cannery where mechanics, facilities, and tools were available. Due to winds and tides, fishing boats and skiffs needed to be monitored constantly. Other tasks which often took the men away from the camp included obtaining wood for wood stoves, steambaths, and smokehouses and hauling stove oil and gas for ATVs. Sometimes trips were made by boat or skiff to Dillingham, Manokotak, or Ekuk to secure supplies.

In sum, the mother-daughter pattern appeared to be consistent when a number of factors were present. Usually, the mother had to be healthy enough to be present at fish camp and vigorous enough to at least oversee the activities, if not actually participate. If she was present, even if not strong enough to do the work herself, she directed the effort. Another important consideration was the size and maturity of the daughter's or daughters' family. When the daughter's family grew large enough, she became the leader of her own work group and ceased working with her mother. Within these parameters, every daughter at Igushik worked with her mother. One woman who had no female kin at the

fish camp even found a way to collaborate with her mother who remained in the winter village.

Groups who did not fit the mother-daughter pattern seemed to be influenced by other factors. Daughters-in-law sometimes participated in the work groups, but often saw themselves as "helpers" and not members. When possible, they put up fish independently for their own nuclear families. Work groups composed of sisters or sisters-in-law, although present, were exceptions. Finally, men, most commonly husbands or sons, were recruited into the work group when the female members of the work group were insufficient for the tasks involved.

OTHER FISHING LOCATIONS

As indicted, Igushik was the major fish camp for Manokotak residents for kings, reds, and chums during the study period. However, several other locations were used for harvesting salmon and will be mentioned. A few families fished kings, reds, and chums in the winter village and set out nets along the banks of the river directly in front of the village. Upon their return from Manokotak, other families continued to put out nets for red salmon. The village was also the spot where most people fished for cohos. Finally, there were a few families with kin in Togiak or Twin Hills who returned to that area for subsistence and commercial fishing activities.

Amanka and Ualik Lakes were favored spots in the fall for harvesting "spawned-out" sockeye salmon. A trip to the lakes for this purpose was often the occasion for a family outing. Men sometimes

hunted for moose along the shores of the lakes and river while women harvested spawned-outs and berries.

PREFERRED SPECIES, PROCESSING, AND PRESERVATION METHODS

As noted above, kings, sockeyes, and cohos were the most frequently targeted species for subsistence and commercial users. Chums and pinks were usually caught incidentally and were considered less desirable. Figure 25 depicts the 1985 salmon harvest composition by edible weight.

King Salmon

Kings were the first fresh salmon of the season and their arrival was eagerly anticipated both to confirm the start of the salmon season and for the king's highly prized flavor. Eighty-seven percent of the sample used king salmon and they were successfully harvested by 75.9 percent. By weight, kings comprised 22.3 percent of the community's salmon harvest in 1985. Since kings do not run in the Igushik River in large numbers, the catch in subsistence nets was often augmented by fish removed from the commercial drift catch (see Table 17). The first kings of the season were eaten fresh and widely shared. However, most kings were preserved in a variety of traditional ways which are described below.

There were several popular methods of drying and smoking king salmon. The preparation of "strips" (*palak'aaq*) was the most time-consuming, but the most preferred method. The fish were first filleted

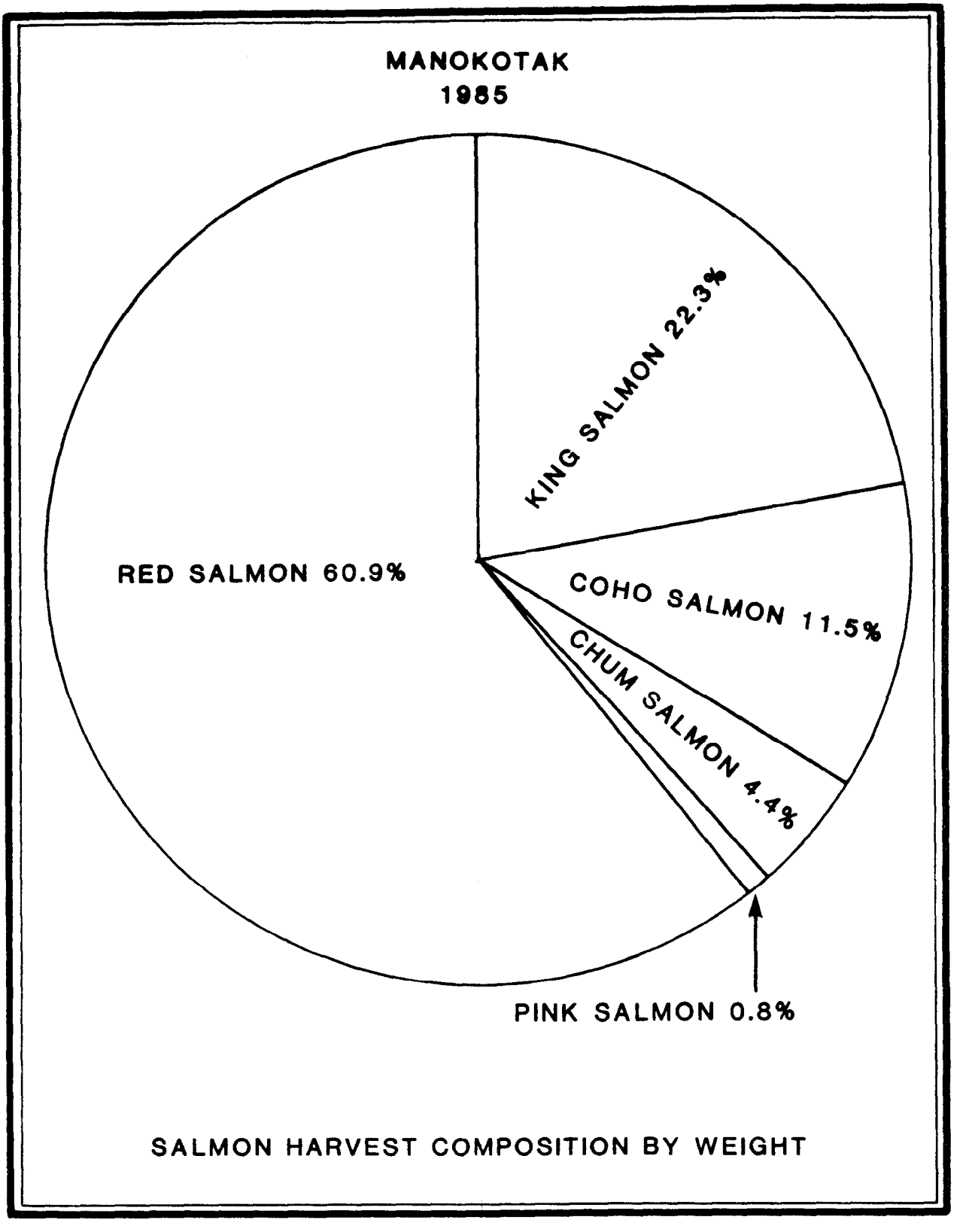

Figure 25. Salmon Harvest Composition by Edible Weight, Manokotak, 1985. (Sum = 38,141 lbs.)

and cut into thin strips, then soaked in a brine solution and hung to dry. When the strips were well-dried, they were hung in the smokehouse to be smoked by a smoldering fire until the skins turned golden. Damp or green cottonwood was favored for smoking. The cottonwood imparted a distinctive flavor and the damp wood prevented the fire from burning too hot and scorching the fish. Smoking and drying time varied depending on the weather and taste preferences. When finished, the pieces were cut into smaller strips and stored by the bagful in caches or freezers.

A second method of smoking and drying kings, *egamaarrluk*, involved a similar process but the fish were kept as fillets rather than sliced into strips. The fish were also cleaned, brined, partially dried and then smoked while the filleted sections were still connected by the tail. They were eaten dried or boiled. Either way, seal oil was the preferred condiment. Heads and tails were also sometimes split, dried, smoked and then boiled.

Salting (*sulunaq*) was another method for preserving king salmon. King heads were favored for this purpose. In fact, on a trip to the cannery, heads were often secured for this purpose. Occasionally, tails were also salted. Either were layered with salt in plastic buckets and left for two to three months. To prepare for eating, they were soaked in clear water for about three days, with the water being changed frequently.

"Stinky" or fermented fish heads (*tepa*) were considered a special delicacy. One resident told the researchers, "To the Native it's like candy or bubblegum, sweet and sour, in between the two." The traditional way to prepare *tepa* was to bury the heads in the ground along with most of the fish guts in a wooden barrel covered with burlap

material. The product was allowed to ferment for seven to ten days depending on weather conditions. Most people continued to make "stinky heads" in this manner. However, with the introduction of plastic buckets, the danger of botulism has surfaced and informants stressed the importance of avoiding these types of modern containers since the "old-fashioned" methods allowed oxygen to circulate and prevented the growth of bacteria which causes botulism.

Sockeye Salmon

Sockeye salmon were used by 100 percent of the sample and comprised an important part of the salmon catch. Eighty-three percent of the sample harvested sockeyes. By weight, sockeyes comprised 60.9 percent of the community's salmon harvest in 1985. Because they arrived in such large concentrations, sockeye salmon was a dependable resource and could be obtained in large quantities.

Most commonly, sockeyes were split, dried and smoked. The head was removed, the fish gutted, and split down the backbone on each side leaving the fish joined at the tail. Slits were made vertically along the length of the meat about one inch apart to promote drying. Eaten with seal oil, "dry fish" (*neqerrluk*) was considered an important winter staple, and was often served with *akutaq*.

Sockeyes were also salted. In this case, the fish were beheaded and gutted, then the remaining bodies minus backbones were placed in a plastic bucket with alternating layers of salt. Fish were usually salted for two to three months then soaked out for several days with frequent changes of water when wanted for eating.

Spawned-out sockeye salmon, *sayalleq*, were also popular and usually put up in large quantities. Unfortunately, information about quantities of spawned outs harvested was not collected systematically. *Sayalleq* was especially valued for its low oil content. When dried, it was known as *tamaunaq* and usually eaten with seal oil. Spawned outs were salted, fermented, or frozen. Although no longer a common practice, they were occasionally eaten frozen (*kumlaneq*) with seal oil.

Coho Salmon

Cohos were harvested by 59.3 percent of the sample and used by 79.6 percent. By weight, cohos comprised 11.5 percent of the community's salmon harvest in 1985. Cohos were eaten fresh, dried, and frozen for the winter. They were the fish most often frozen for the winter since people were back at their winter village and able to make use of their freezers by the time the cohos appeared. Cohos were also processed with all the methods described for red salmon.

Other Species

As reported earlier, pinks and chums were most frequently caught incidentally. Chums were taken by 38.9 percent of the sample and comprised 4.4 percent of the total salmon harvest by weight. Pinks were harvested by 24.1 per cent of the households and comprised a little less than one percent (0.8 percent) of the community's salmon harvest by weight. Caught incidentally with reds, chums and spawned-out chums were split and dried the same way as sockeyes. Chums were sometimes used for

dog food, earning them the nickname of "dog salmon." Pinks were difficult to work with because of their soft flesh, but spawned-outs were sometimes dried in the fall.

It is also important to note that very little of any species was wasted. Carcasses were dried and fed to the dogs. Eggs were sometimes dried and used in *akutaq*. One woman told the researcher, "We give the eggs to the gulls so they can have a meal too."

CHAPTER 5

NON-SALMON FISH SPECIES

MARINE FISH

Herring

In 1985, herring and roe-on-kelp were harvested for commercial and subsistence purposes by Manokotak residents. The Bering Sea seasonally support the world's largest herring population, which returns each spring to spawn along the western Alaska coast. The spawning area near Manokotak lies approximately 20 miles to the west at Kulukak and Metervik bays in the Togiak fishery district. Spawning fish usually deposit their eggs on rockweed and eelgrass in intertidal and shallow subtidal waters.

Sixty-nine percent of sampled Manokotak households participated in the commercial herring or roe-on-kelp fisheries in 1985. Fishermen traveled to the fishing grounds in 28' and 32' gillnet boats which were adapted from salmon to herring gear. Depending on where their boats were stored, they either started at Manokotak or the Ekuk cannery where many boats were stored for the winter. Each boat usually towed a skiff which was necessary for commercial kelping. The trip around Cape Constantine was often rough, even in calm weather. Local legend recalls that during the days of the sail boat fishery in Bristol Bay, the local natives named one area of the cape *qamiquiriyuli* ("one that discards heads") named mainly because the bodies found after a boat accident in

this area never had heads. Most Manokotak fishermen fished in Kulukak and Metervik Bays, in the Togiak District.

Manokotak spring camps were scattered in small groups around Kulukak and Metervik Bays, particularly at *Macivik* and *Qaneq* (See Fig. 26). People lived in cabins, tents, or camped on their boats. Many of the older residents originally from Kulukak felt a deep emotional attachment to that area and eagerly anticipated the trip each spring. In addition to the cabins and wall tents, there were drying racks, steambaths, caches, and outhouses. Fresh drinking water often had to be transported some distance, however.

Typically, the men went over first to set up the camps and wait for the herring to arrive. Commercial crews were most commonly composed of male relatives but some wives and female relatives also assisted as crew members. Some men were later joined by their wives and children for several days or weekends. On low tide, small aircraft were able to land on the beach. While waiting for the announcement of a commercial fishing opening, people engaged in a number of other subsistence activities, such as putting up herring, hunting for waterfowl and marine mammals, or digging for clams (Wright and Chythlook 1985).

The first herring to arrive were known as *aciirturtet* ("ones that go under or come before"). They were larger than the later runs with a larger proportion of meat and fat and consequently favored for splitting for subsistence. Herring were harvested for subsistence in staked gill nets, beach seines, or more occasionally dip nets when the herring were "boiling", that is swimming in such large concentrations that the water was churned up.

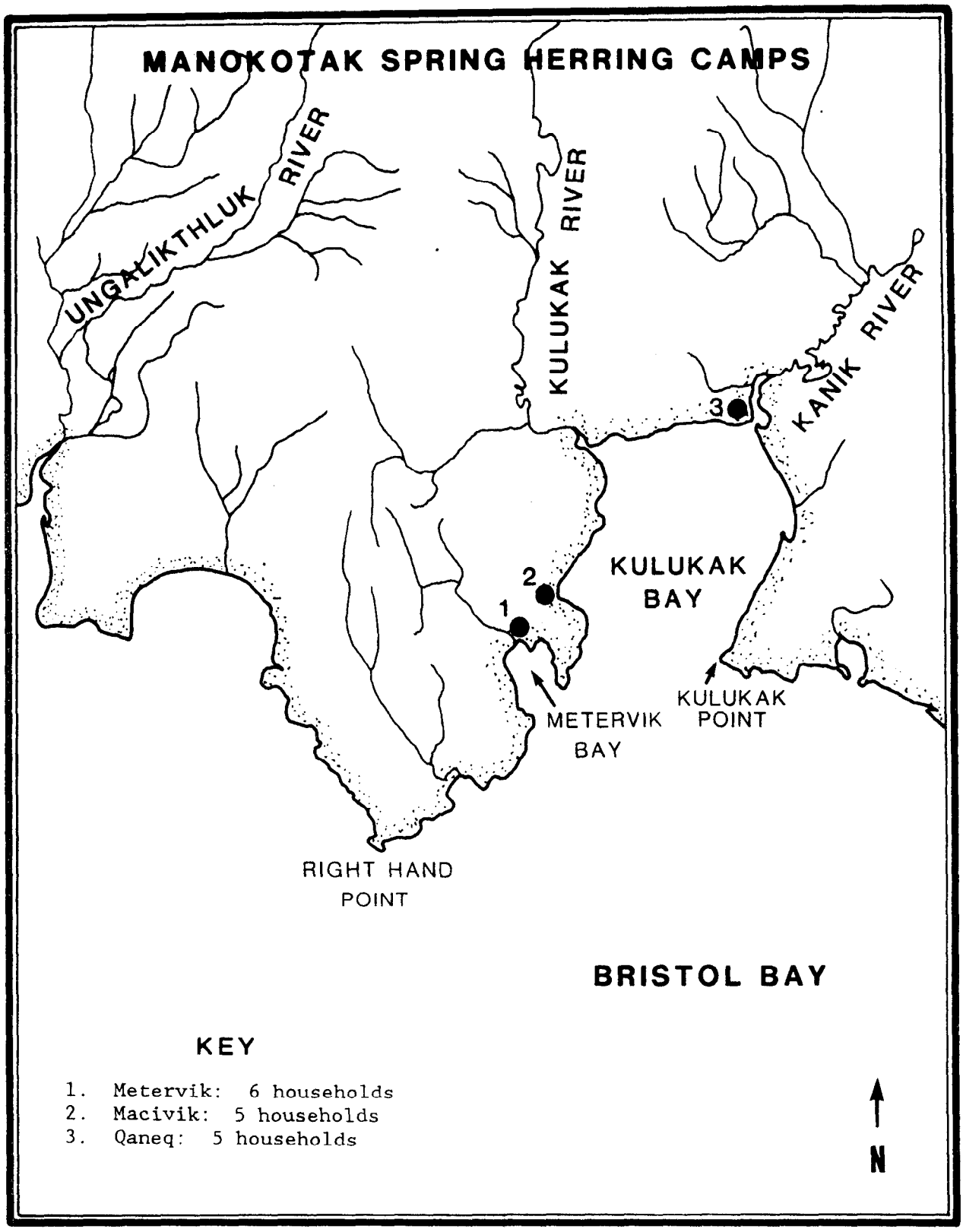

Figure 26. Areas Used for Spring Herring Camps by Manokotak Residents, 1985.

On the researcher's field visit, only men were involved in the harvesting, but both men and women participated in the processing. This may have been due to the fact that there was only one adult woman in that particular group.

Herring were prepared in several ways. In the first method they were salted (*sulunaq*). To salt herring, fish were beheaded and gutted. If they were female and the roe (*meluk*) was ripe, the roe was left intact still attached to the fish. Plastic buckets were filled with alternating layers of salt and fish until the bucket was full. They were then covered and left in the brine for at least two months, after which they were preserved for up to two years.

Another favored way to prepare herring was to split, dry and smoke it (*neqerrluk* or *seggayaat*). In this process, the fish was beheaded and gutted, a 2" slit was made from the anal opening back through the tail. The fish was then split along the backbone and the tail pulled through the anal hole to help keep it flat during the drying process. A piece of twine was put through the same hole when the fish were hung to dry. The split fish were laid in the grass or on rocks to dry for a short time. Then twine was used to string together about a dozen fish which were draped over the drying rack. In earlier times, grass was braided for this purpose. In good drying weather, the herring were left for about a week and then smoked at the fish camp or the winter village. Some were also half-dried and boiled, then eaten with seal oil.

Tamalkuryak are herring which have been dried whole for *egamaarrluk* (partially dried fish boiled for eating). In this method, fish were gutted, and the head was either left on or removed, depending on the preference of the woman processing it. If the head was not left

on, a slit was made near the tail. The fish were strung together by the dozen either tied by their gills, or the slit near the tail and hung to half-dry. To serve, they were boiled and eaten with seal oil.

Herring were used by 70.4 percent of the sample and harvested by 57.4 percent. In total, 31 households harvested 160.2 five-gallon buckets in 1985 (Table 22), or about 89 pounds of herring per household (Table 10). In addition, herring with the roe intact, known as *meluk* and referred to in this survey as "herring roe" was harvested by 31.5 percent of the sample and used by 46.3 percent. Thirty-six five-gallon buckets were harvested in 1985 for about 26.7 pounds of herring roe per household (Tables 10 and 22).

Herring-Roe-on-Kelp

The harvest of roe-on-kelp (*melucuaq*) occurs within a week after spawning. A detailed description of the Togiak District herring spawn-on-kelp subsistence fishery appears in Wright and Chythlook 1985. Roe-on-kelp was usually picked by hand although rakes, knives, and uluaqs (a traditional Eskimo-style womans' knife, shaped like an arc) were occasionally used. It was preserved by salting and freezing and generally served with seal oil as a condiment. Roe-on-kelp was used by 79.6 percent of the sample and harvested by 63.0 percent. The sample harvested 135.9 five gallon buckets during the study year, for about 62.9 pounds of herring roe per household (Tables 10 and 22).

No permits were required for the subsistence harvest of herring or roe-on-kelp. Herring could be legally harvested with set gill nets only. No limits were imposed on the harvest.

TABLE 22. MARINE AND FRESHWATER FISH HARVEST BY SPECIES, MANOKOTAK, 1985
(N = 54 HOUSEHOLDS)

Species	Percentage Households Harvesting	Number HH Harvesting	Total Number Fish Caught	Mean Number Harvested Per Sampled Household	Mean Number Harvested Per Harvesting Household
Marine					
Herring	57.4	31	160.2b	3.0b	5.2b
Herring Roe	31.5	17	36.0b	.7b	2.1b
Roe-on-Kelp	63.0	34	135.9b	2.5b	4.0b
Smelt	50.0	27	129.8b	2.4b	4.8b
Flounder	20.4	11	145.0	2.7	13.2
Freshwater					
Pike	75.9	41	1618.0	30.0	39.5
Dolly Varden	72.2	39	1384.0	25.6	35.5
Whitefish	38.9	21	1015.0	18.8	48.3
Lake trout	29.6	16	525.0	9.7	32.8
Grayling	37.0	20	349.0	6.5	17.5
Burbot	35.2	19	319.0	5.9	16.8
Rainbow Trout	37.0	20	178.0	3.3	8.9
Blackfish	16.7	9	25.8b	.5b	2.9b

b - Five gallon buckets.

Smelt

Boreal smelt are an anadromous species that migrate inshore and congregate near the mouths of rivers and streams during the winter (Russell *in* Peters et al. 1984:17). Many people enjoyed jigging for smelt through the ice. Small smelt could be caught in the Igushik River directly in front of the village. For larger smelt, people headed toward the mouth of the river. Some families originally from Twin Hills or Togiak also traveled to those villages to combine smelting and visiting. No permit or sport fishing license was required to fish for smelt and no limits were imposed on the catch.

Smelt was one of the most widely used resources in the study year; 83.3 percent of the sample used smelt, and 50 percent reported harvesting it. A total of 129.8 five-gallon buckets of smelt were harvested in 1985 by 27 households. Smelt were prepared in a variety of ways including fried, boiled, dried, or eaten frozen with seal oil.

Flounder

Starry flounder were not a targeted species, but were caught incidentally in salmon nets at Igushik. Many people regarded them as a nuisance and most were thrown back in the water since the skin was considered rough and tough to handle with bare hands. However, a few were kept for eating and were particularly enjoyed by older persons. They were usually boiled fresh and eaten with seal oil. One middle-aged resident recalled flounders being dried in large quantities when she was younger, but during the study year, very few were preserved that way.

However, when they were dried, they were served with seal oil or, occasionally, with soy sauce. Eleven households reported harvesting 145 flounders, while 38.9 percent of the sampled households reported using them.

Shellfish

Both butter clams and razor clams were harvested by Manokotak residents during the study year, usually in conjunction with spring herring camp activities in Kulukak Bay. *Qaneq* in Kulukak Bay was a favored spot for obtaining butter clams. Eighty-seven percent of the sample used butter clams and 33 households harvested a total of 78 five gallon buckets. Razor clams were less accessible since one had to travel to Protection Point from Igushik to harvest them. Consequently they were harvested in smaller quantities by fewer households. Razor clams were used by 29.6 percent of the sample during the study year. A total of 6.9 five-gallon buckets were harvested by eight households. Clams were eaten raw or boiled in chowders.

At least one respondent also reported that sea anemones (*terr'et*) were occasionally harvested in Kulukak Bay and eaten. However, data on this and other intertidal species were not systematically collected, so the levels of use are unknown at present.

FRESHWATER FISH

Bristol Bay drainages are productive breeding grounds for a variety of freshwater fish species. Rainbow trout, Arctic char and

Dolly Varden (these two closely related species will be collectively referred to as Dolly Varden, cf. ADF&G 1985a: 239), Arctic grayling, and northern pike are found in all major Bristol Bay drainages. Bristol Bay rainbow trout are world renowned for their size. Lake trout are abundant in many of the region's cold, clear, deep lakes as well as in some of the large clear rivers, glacial lakes, and tundra pools including the Tikchik drainage. Round, broad, and least cisco whitefish are common in the Bristol Bay drainages as far south as Ugashik Lakes. Burbot are moderately abundant in the cool, deep lakes north of the Ugashik River. Blackfish live in small ponds and quiet streams with abundant vegetation.

Freshwater fish were an important food source to Manokotak residents in 1985. They were relatively easy to harvest and provided variety in the diet. Respondents reported harvesting eight different species of freshwater fish, which comprised 9.7 percent (10,485.5 pounds) of the total subsistence harvest (Table 22).

Regulations

The harvesting of char and other trout with nets required a freshwater subsistence permit. Fishermen were required to report their daily catch at the end of the season but no limits were imposed. The local ADF&G offices have not put a high priority on issuance of these permits. Consequently, few Bristol Bay residents are even aware of these requirements. In the Bristol Bay area, fishing through the ice with jigging gear was recognized as a subsistence activity by regulation. No permits or licenses were required for jigging and no

limits were imposed. All rod and reel fishing required a sport fishing license and compliance with the appropriate seasons and limits for individual species. Rainbow trout legally could only be taken under sport fish regulations. That is, by regulation rainbow trout taken by any other means than rod and reel had to be returned to the water.

Harvest and Use Patterns

Pike was used by 90.7 percent of the Manokotak sample, and harvested by 41 households. A total of 1,618 pike were harvested. Of that number, 683 were caught in nets, and the remaining 935 by other means, mostly on hook and line through the ice. Pike were caught in nets in the early fall and late spring when nets were put out for pike, Dolly Varden, and other freshwater species in the mouths of small creeks and sloughs that feed into the Igushik River. Mid-February through early March was the most popular time for jigging. Jigging through the ice of local ponds was considered an enjoyable activity by men, women, and children in the warmer and brighter days of a rapidly approaching spring. Pike were dried in large numbers in the spring because they made excellent and easily transportable food to take to spring camp and on commercial fishing boats. They were also eaten fresh, frozen, half-dried, and boiled. They were often accompanied by seal oil. Some were preserved by freezing.

Dolly Varden were common in Manokotak's lakes and rivers and their abundance ensured that they comprised a substantial portion of the freshwater fish harvest. They were often harvested to provide variety in the diet from salmon or meat. As with pike, they were harvested in the late spring and fall when they were netted near the mouths of local

creeks and sloughs. A few were also caught by hook and line while traveling by skiff. On camping and hunting trips, Dolly Varden were frequently caught with rod and reel and consumed immediately. Youngsters also enjoyed fishing with rod and reel in front of the village or when they accompanied their parents on skiff outings. This was viewed as a way children could contribute to the food supply and again, the fish were usually for immediate consumption. "Dollies" were eaten fresh, or half-dried and boiled or smoked. One thousand three hundred and eighty four Dolly Varden were harvested by 39 households.

Another freshwater species used by Manokotak residents was whitefish. Pink salmon nets, 4 1/2 inch mesh size, were set in the fall before freeze-up and in the spring after break-up in sloughs and creeks along the Igushik River for several miles below the village and above it up to Amanka Lake. Twenty-one households harvested whitefish and they were used by 64.8 percent of the sample. The total harvest was reported at 1,015 fish. This number may be a low estimate, since on the survey "whitefish" was translated as *uraruq* or round whitefish, a species which is present but not abundant in the Manokotak area. A more common species in the Igushik drainage is the least cisco, for which the correct translation would have been *cavirrutnaq*. Whitefish were eaten fresh, dried, frozen with seal oil, smoked, boiled, or fermented and then frozen. Seal oil was the usual condiment. Some were also preserved by freezing.

Respondents also reported using lake trout, known locally as "Togiak trout". However, there was some ambiguity about this term and "lake trout" were probably a combination of lake trout and Dolly Varden/arctic char. They were used by 64.8 percent of the sample and

harvested by 16 households. In total, 525 lake trout were harvested, and the largest proportion (415 fish) were caught in nets set out in the spring and the fall for Dolly Varden, pike, and other species. The remainder (110 fish) was caught with rod and reel or occasionally, by jigging. Lake trout were eaten fresh, frozen, dried, smoked, boiled, and fermented, and often accompanied with seal oil.

Arctic grayling were usually caught incidentally in spring and fall nets described above. Twenty households reported harvesting 349 fish. Of that total, 260 fish were caught in nets and 89 were caught with rod and reel on fall hunting trips or by youngsters. Slightly over half the sample (51.9 percent) used grayling in 1985. They were eaten fresh, frozen, and boiled. As with many other freshwater species, seal oil was a popular condiment.

The majority of burbot was caught incidentally in nets in the spring and fall. Of the 319 harvested during the study year, 268 were reportedly caught in nets, and 51 by other methods, including traps and jigging. Traps of wood or chicken wire, approximately three or four feet long, were used for harvesting both burbot and blackfish. When set for burbot, they were located at the outlets of tundra ponds. Burbot were sometimes snagged while people jigged for pike from mid-February through March. Burbot were used by 53.7 percent of the sample and harvested by 19 households. They were eaten fresh and boiled with seal oil. Some were also preserved by freezing and half-drying.

Although the Igushik drainage does not support a strong resident population of rainbow trout, they are present in small numbers and utilized by Manokotak residents. In 1985, 53.7 percent of the sample used rainbow trout and just under half the sample, or 20 households

harvested them. They were most commonly eaten fresh. The catch was reported at 178 fish of which 94 were harvested in nets, usually incidentally in the fall while nets were put out for other targeted species. The remaining 84 were caught with rod and reel in the same manner as described above.

Blackfish were usually harvested by a few older men with fish traps, and set in tundra ponds or creeks during the coldest part of the winter, usually late January and February when blackfish were concentrated in the nearby frozen ponds. Only nine households harvested blackfish in 1985, taking 129 gallons. But these were widely shared throughout the village as 63 percent of all households reported using them. Although not taken in large quantities, they were viewed as a welcome variety in the diet, particularly by older residents. They were most frequently boiled whole with the entrails intact, and everything was eaten except the bones.

CHAPTER 6

GAME, MARINE MAMMALS, AND BIRDS,

MOOSE

Moose is the most important big game resource for Manokotak residents. Concern over state land disposals in their traditional moose hunting territory was, in fact, one impetus for this study. In the fall, most moose hunting takes place by skiff, particularly along the Igushik River and Amanka and Ualik lakes. In the winter season hunting is usually by snowmachine, with the greatest effort concentrated around the Weary River drainage. These areas are included in GMU 17C (See Fig. 27).

In GMU 17, moose populations were relatively scarce during the 1970s. This was attested to by long-term local residents and by ADF&G staff observations. A severe winter in 1974-75, along with a reportedly high rate of moose predation, depressed those populations still further. However, moose populations are now generally increasing in GMU 17B and 17C, although populations in 17A remain severely depressed (Townsend 1987a:68). During 1983, the Division of Game, ADF&G, conducted a winter moose census in portions of GMU 17C. The results indicated approximately 1,212 moose with an overall low to moderate density of about .7 moose per square mile (ADF&G Habitat Guide 1985a:135).

Table 23 depicts a history of moose hunting regulations from 1961 to 1985. The bag limit of one bull has not changed at all during that period but the time allowed for harvesting the limit has been shortened. Until 1975, moose hunting was allowed for approximately four continuous

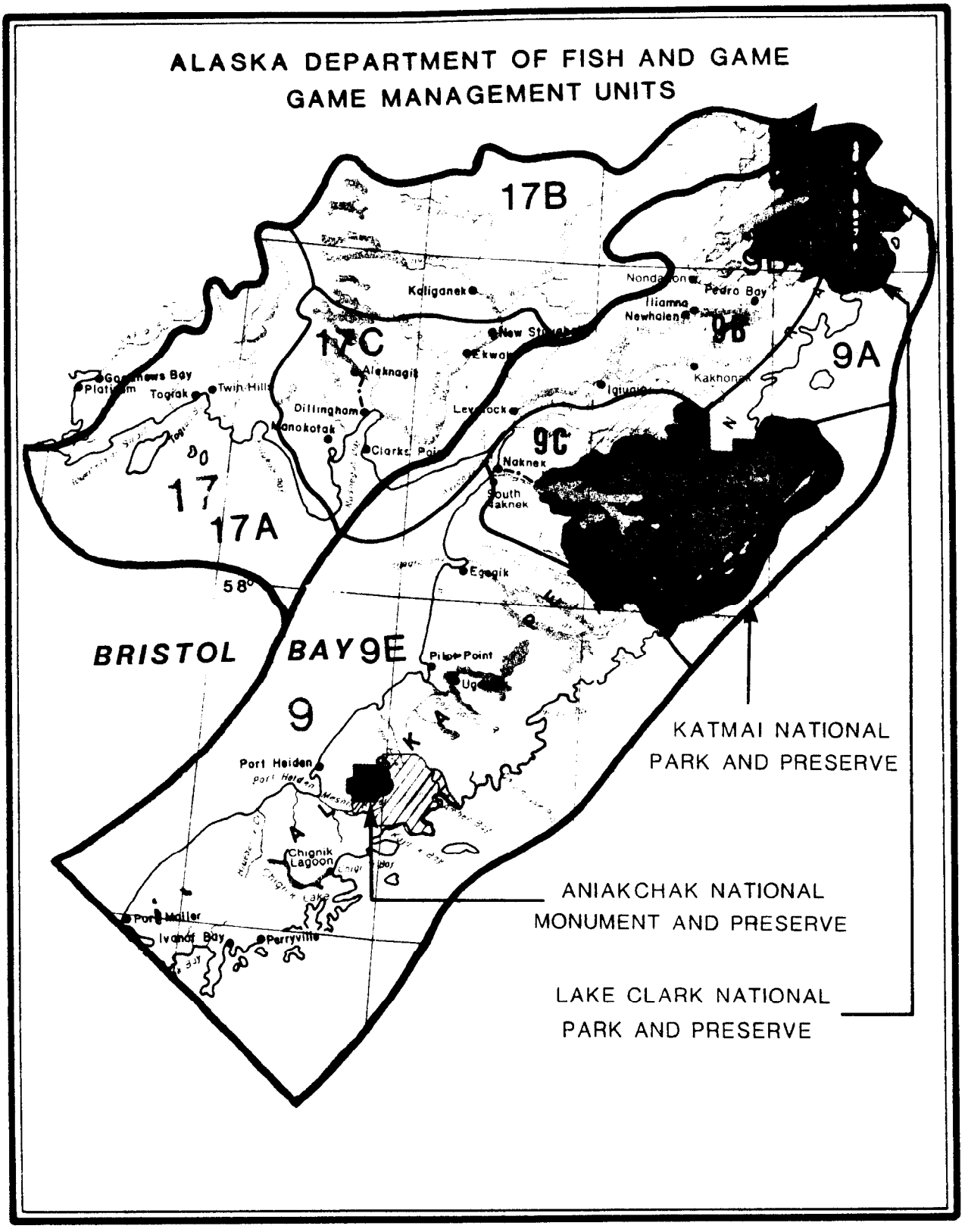

Figure 27. Game Management Units 17 and 9 (A,B,C,E).

TABLE 23. MOOSE HUNTING REGULATIONS, GMU 17, 1961-1986

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

TABLE 23. (Continued) MOOSE HUNTING REGULATIONS, GMU 17, 1961-1986.

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

TABLE 23. (Continued) MOOSE HUNTING REGULATIONS, GMU 17, 1961-1986

Year	Subunit	Season	Bag Limit	Restrictions
1984 (con't)	17C, that portion including Iowithla drainage and Sunshine Valley.	Aug. 20 - Sept. 4 Sept. 5 - 15	1 Bull	Same as above.
	Remainder of 17C	Aug. 20 - Sept. 4 Sept. 5 - 15 Dec. 10 - 31	1 Bull	Same as above.
1985	Subsistence Regulations			
to	17A	No open season		
1986	17B, the Mulchatna River upstream from, and including the Chilchitna River drainage.	Sept. 1 - 20	1 Bull	
	Remainder of Unit 17(B) and Unit 17(C)	Aug. 20 - Sept. 15 Dec. 10 - 31	1 Bull	During the period Aug. 20-Sept. 4, moose may be taken by registration permit only.
	17C, that portion including Iowithla drainage and Sunshine Valley.	Aug. 20 - Sept. 15	1 Bull	Same as above.
	Remainder of 17C	Aug. 20 - Sept. 15 Dec. 10 - 31	1 Bull	Same as above.

TABLE 23. (Continued) MOOSE HUNTING REGULATIONS, GMU 17, 1961-1986.

Year	Subunit	Season	Bag Limit	Restrictions
1985	General Hunt			
to	17A	No open season		
1986	17B, the Mulchatna River upstream from and including the Chilchitna River drainage.	Sept. 1 - 20	1 Bull	
	Remainder of Unit 17(B) and Unit 17(C)	Sept. 5 - Sept 15	1 Bull	

months in the fall and early winter. But in 1976, the season was divided into separate fall and winter seasons and shortened considerably to only 41 days. Throughout the late 1970s and early 1980s, the season was shortened still further by cutting approximately 10 days off each of the two seasons. In addition, certain portions of the unit became recognized as winter moose sanctuaries and off limits to any winter hunting. Beginning in 1981, all moose hunting in Unit 17A was prohibited.

In the early 1980s, several changes occurred which had the effect of liberalizing regulations for local hunters. In 1983, a pre-season permit registration hunt was established. Although all state residents were eligible, permits were only available at the Dillingham office of ADF&G. This registration requirement tended to make this early season hunt for local residents only. The upper portion of Unit 17B has generally been viewed as a recreational hunting area utilized by nonlocal hunters (that is, hunters from outside the region) and was not included in the early permit hunt. The final significant event occurred in 1986 when a new state subsistence law required separate regulations for subsistence hunting which was defined as customary and traditional uses by residents of rural areas.

In the study year 1985, state hunting regulations permitted fall (August 20 to September 15) and winter (December 10 to December 31) hunting seasons for moose in portions of GMU 17B and 17C. A hunting license was required. In designated areas, hunting was allowed by registration permit from Aug. 20 to Sept. 4. Permits were issued in Manokotak by ADF&G staff and at the Dillingham ADF&G office. Hunting for the remainder of the season required that the hunter obtain a

harvest ticket at an ADF&G office. In all seasons, only bulls could be taken, and each hunter was limited to a season limit of one bull.

As a rule, moose hunting parties from Manokotak were composed of male relatives or friends. Women sometimes accompanied the men in the fall on trips to Amanka or Ualik lakes when moose hunting, berry picking, and harvesting spawned-out salmon were combined. In the fall, many of the men from the village were on the river at the same time, hunting in the same general vicinity and might join efforts. In that case, all hunters in the area shared their catch in the field. The researchers were told that on one occasion, a moose was divided in the field between 23 men. It was stressed that the moose was shared with everyone, no matter how large a number of people, "It's not his moose just because he shot it." Men also hunted in smaller parties of two or three. In either case, the moose was shared in the field and again at home.

It is considered the role of a woman, usually a wife or mother, to butcher and distribute the meat once it is brought into the house. Although this custom is generally followed in Manokotak today, some men did help with the butchering, particularly in households where women held jobs outside the home. The meat was most commonly preserved by freezing although some is also dried. Nearly all parts of the animal were used, including the organs (the liver and stomach eaten raw shortly after the harvest), the hoofs, and even the nose.

Almost all of the households reported using moose; it was tied with beaver as the third most widely used resource of all, with only red salmon and berries reportedly used more widely. Two thirds of the households (66.7 percent) attempted to harvest moose and exactly one-

third of all households (or one half of those who tried) were successful. In total, 20 moose were reportedly taken by the sample in 1985 and the mean harvest per household was 200 pounds; only red salmon made up a larger portion of the average household harvest. As reported above, moose was widely shared and was received by more households (79.6 percent) than any other single resource.

CARIBOU

During the study year, caribou was another important big game resource, used by 88.9 percent of the sample and harvested by 31.5 percent. Manokotak residents hunted caribou in portions of GMU 9 and 17, where two major caribou herds, the Mulchatna and Northern Peninsula, reside. The Mulchatna herd roams the area generally west of the Alaska Range and north of Iliamna Lake, as far north as the Taylor Mountains and the Stony River (ADF&G 1985a:117) in GMUs 9A, 9B, 16, 17, and 19. The size of the Mulchatna herd has fluctuated in the past, and historical data on the herd are limited. In the mid 1960s the herd was estimated at 3,000 to 5,000 animals (ADF&G 1985a:118-119). Census information for 1985 indicated a herd size of 42,900 animals. Since 1981, population growth of this herd has been exceptionally rapid, estimated at 20 percent per year (Townsend 1987b:3-4). Manokotak hunters take animals from this herd in GMU 17C, 17B, and 9B.

The northern Alaska Peninsula herd ranges from the Naknek River south to Port Moller and numbered 15,274 animals in 1986 (Townsend 1987b:6). There has been a relatively steady growth in this herd since the 1930s, although the most recent census data indicate that the

gradual growth of this herd may have ceased and that the population may even be declining slightly (Townsend 1987:6-7). Hunting of this herd by Manokotak residents takes place in GMUs 9C and 9E.

The health of these two herds has allowed liberal seasons and bag limits. Table 24 displays the history of caribou regulations in GMUs 9 and 17 since statehood. In Units 9C and 9E, the season has been fairly stable. Except for a few years in the early 1970s when hunting was permitted throughout the year, the season has generally occurred from mid-August to the end of March. Bag limits have ranged between three and five animals.

The season in Unit 17 has been slightly more varied. There was no closed season from 1973 - 1975 and the traditional season was generally from late August to the end of March. From 1978 through 1984, the season was closed in early September and reopened for winter hunting in December. However, in 1985, the season was again established from mid-August to the end of March. Bag limits have ranged from a low of two in the late 1970s to three or four throughout the 1980s. In all the units described, not more than one caribou could be harvested during the early part of the season. This is because until 1985 the Game Board made no distinction in the regulations between sport and subsistence hunters. Instead, adjustments in seasons, bag limits, or transportation were made to accommodate local hunting needs. It was believed that limiting the fall harvest to one caribou would be an effective means of curbing the pressure from sport hunters.

Regulations for the 1984-85 season authorized hunting in GMUs 9 and 17 from August 10 to March 31 with a season limit of three animals in GMU 17 and four animals in 9C and 9E. In both units, only one

TABLE 24. CARIBOU HUNTING REGULATIONS, GMU 17 AND 9 (C and E), 1961-1986.

Year	Unit	Season	Bag Limit
1961 to 1962	9	Aug. 20 - March 31	3
	17	Aug. 20 - Dec. 31	3
1963	9 & 17	Aug. 20 - March 31	3
1964	9	Aug. 10 - March 31	4
	17	Aug. 10 - March 31	3
1965 to 1971	9 & 17	Aug. 10 - March 31	3
1972	9	July 1 - June 30	3
	17	Aug. 10 - March 31	3
1973 to	9	July 1 - June 30	5, provided that not more than 3 caribou may be taken from Aug. 10 - Nov. 10.
1975	17	July 1 - June 30	3
1976	9	Aug. 10 - Oct. 15	3 antlered caribou, provided not more than one may be taken from Aug. 10 - Oct. 15.
	17	Aug. 10 - March 31	2 caribou, provided that not more than one caribou may be taken per day nor may more than one be taken from Aug. 10 - Oct. 31.

TABLE 24. (Continued) CARIBOU HUNTING REGULATIONS, GMU 17, 9 (C and E), 1961-1986.

Year	Unit	Season	Bag Limit
1977	9	Aug. 10 - March 31	4 antlered caribou, provided that not more than one caribou be taken from Aug. 10 - Oct. 31.
	17	Aug. 10 - March 31	2 caribou provided that not more than one be taken per day, nor more than one be taken from Aug. 10 - Oct. 31.
1978	9C&E	Aug. 10 - March 31	4 antlered caribou, provided that not more than one caribou may be taken from Aug. 10 - Oct. 31.
	17	Aug. 10 - Sept. 10 Jan. 1 - Feb. 28	2 caribou, provided that not more than one may be taken per day, nor may more than one be taken from Aug. 10 - Sept. 10.
1979	9C&E	Aug. 10 - March 31	4 antlered caribou, provided that not more than one may be taken from Aug. 10 - Oct. 31.
to			
1980	17	Aug. 10 - Sept. 10 Dec. 1 - Feb. 28	2 caribou, provided that not more than one may be taken per day, nor more than one caribou be taken from Aug. 10 - Sept. 10.
1981	9C&E	Aug. 10 - March 31	4 caribou, provided that not more than one caribou may be taken Aug. 10 - Oct. 31.
	17	Aug. 10 - Sept. 5 Dec. 1 - Feb. 28	2 caribou, provided that no more than one may be taken per day, nor may more than one caribou be taken from Aug. 10 - Sept. 5.

TABLE 24. (Continued) CARIBOU HUNTING REGULATIONS, GMU 17, (C and E), 1961-1986

Year	Unit	Season	Bag Limit
1982 to	9C&E	Aug. 10 - March 31	4 caribou, however not more than one caribou may be taken from Aug. 10 - Oct. 31.
1983	17	Aug. 10 - Sept. 5 Dec. 1 - March 31	3 caribou, however, not more than one may be taken per day, nor may more than one caribou be taken from Aug. 10 - Sept. 5.
1983 to	9C&E	Aug. 10 - March 31	4 caribou, however, not more than one caribou may be taken from Aug. 10 - Oct. 31.
1984	17	Aug. 10 - Sept. 4 Sept. 16 - Sept. 30 Dec. 1 - March 31	3 caribou, however, not more than one may be transported from this unit per regulatory year, nor may more than one caribou be taken from Aug. 10 - Sept. 4.
1984 to	9C&E	Aug. 10 - March 31	4 caribou, however, not more than one caribou may be taken from Sept. 1 - Oct. 31.
1985	17	Aug. 10 - March 31	3 caribou, however, not more than one caribou may be taken before Nov. 1.
	Subsistence Hunt		
1985 to	9C&E	Aug. 10 - March 31	4 caribou, however, not more than 2 may be taken from Aug. 10 - 31, and not more than one may be taken from Sept. 1 - Oct. 31.
1986	17	Aug. 10 - March 31	3 caribou, however, not more than one may be taken before Nov. 1.

No Open Season - Unit 17(A) and that portion of 17(C) west of the Nushagak River.

TABLE 24. (Continued) CARIBOU HUNTING REGULATIONS, GMU 17, 9 (C and E), 1961-1986.

Year	Unit	Season	Bag Limit
	General		
1985	9C&E	Aug. 10 - Oct. 31	2 caribou; however, not more than 1 may be taken from Sept. 1 - Oct. 31.
to			
1986	17	Aug. 10 - Oct. 31	1 caribou.

caribou could be taken before November 1, however for the reasons explained above.

Since no caribou were located along the Igushik River, no hunting took place by skiff. Therefore, the most active caribou hunting took place after freeze-up, usually between January and March. Access to the herds was by snowmachine or airplane "depending on the trail" and which herd was to be hunted. According to one respondent, chartered aircraft have been used since the early 1970s. During the study year, three Manokotak residents owned their own planes and these were also employed for hunting. Manokotak hunters sometimes flew to the Alaska Peninsula area, particularly Pilot Point or Jensen's airstrip. (Located in the tundra about 45 minutes by air south of King Salmon, Jensen's airstrip was constructed in the mid-60s for oil exploration.) More recently, Manokotak hunters prefer to hunt from the Mulchatna herd for several reasons. In years with good snow cover, snowmachine access entailed substantially lower costs for transportation. The phenomenal growth of the Mulchatna herd has also made hunting increasingly productive. Finally, at least one respondent noted he began to feel like an intruder near Jensen's airport after a hunting lodge was constructed there in the mid-70s.

When either herd is reached by airplane, parties of three to five hunters share the expense. Round-trip costs averaged about $250 per hunter, depending on the size of the plane and number in the party (Mike Harder, pers. comm. 1988). Hunters were dropped off in the area of the caribou, set up tents, and hunted on foot for the next one to three days. For reasons of safety as well as companionship, snowmachine hunters also travelled in groups, usually in parties of five to eight.

The hunter with the most experience on the trail led the way along the route from Manokotak via Dillingham and up the Nushagak River, a trip of five to seven hours. Approximately 30 gallons of gas were used, for a cost of about $60 per machine. Frequently, hunters stopped at one of the upriver villages, most commonly New Stuyahok, where they rested and spent the night in the homes of kinsmen or friends. Weather permitting, they left to hunt the next morning, often accompanied by local villagers who showed them where they animals might be. If the caribou were close, the hunters returned to New Stuyahok the same night. Otherwise, they set up camps composed of tents and tarps and hunted for another day or two.

The meat was usually divided between partners in the field and then redistributed at home by the female head of the house. It was widely shared; 64.8 percent of the households reported receiving caribou. The only resource shared more widely was moose. Caribou meat was usually frozen. It was occasionally dried in the spring, but dried caribou was considered inferior to either moose or seal because of its tendency to become brittle.

BEAR

Brown bears are found throughout the mainland portions of Unit 17 and population density is generally considered high (Townsend 1986a:32). Black bears exist at low densities in Subunit 17C (Townsend 1986b:30). Although both species of bears are present in Unit 17, they were not hunted widely by Manokotak residents. One of each species was taken during the study year. When harvested, the skins were prized for

sleeping mats. Although meat from black bear was eaten, brown bear meat was not generally thought fit for human consumption since one informant reported that the bears were coming closer to the village in recent years and feeding on garbage. Bear meat was usually fed to dogs.

To hunt bear, a hunting license was required and for brown bear a $25 bear tag was required as well. There was no closed season on black bears in GMU 17 and the limit was three per year. Brown bears could be hunted in GMUs 17A and 17C, from Sept. 20 - Oct. 20 and May 10 - 25. Under 1985/86 subsistence hunting regulations, one bear could be taken each year. However, bear hunters, bear parts, and bears taken from April 10-May 9 could not be transported within or out of the area by aircraft. At least one hunter was concerned that brown bear attracted to summer and fall fish camps posed a safety threat to residents and suggested that more Manokotak hunters would hunt brown bear if the spring season began earlier when it was still possible to hunt by snowmachine.

SMALL GAME

The two important small game species used by Manokotak residents for food and other products were porcupine and hares. Both were usually harvested incidentally during other subsistence activities. There were no closed seasons or bag limits on either animal. Porcupines were harvested throughout the year, but were particularly favored in the early winter. Slow moving animals, they were easily clubbed or shot with .22 caliber rifles. Quills were often used in jewelry, especially earring and necklaces, which were sold in the local co-op or in

Dillingham businesses. Thirty four households harvested 136 porcupines in 1985.

Snowshoe or Arctic hare were harvested from November to April with snares or .22s. The hare population is cyclic, so harvests have varied greatly in size from year to year. Twenty households took 177 hares in 1985. Both porcupine and hares were usually stewed, but hares were also salted. Hare fur was used for skin-sewing such items as parkas, hats, and mukluks.

FURBEARERS

A variety of furbearers are present in the Bristol Bay area. Beavers are common throughout the region. The beaver population in GMU 17 has increased steadily in the 1970s and 1980s, reversing an earlier decline that was attributed to overharvesting (ADFG 1985a:90). Other common furbearers include land otter, mink, short tailed and least weasel, and red fox. Wolverine, lynx, and marten are widespread but less common. A few packs of wolves roam throughout the region (Peters et al. 1984:20). Muskrats and arctic ground squirrels, locally called "parky squirrels," also inhabit the area.

Table 25 summarizes trapping and hunting regulations for these species. Seasons were timed to coincide with pelt primeness. Although no systematic data were collected on means of harvest (i.e. hunting and trapping) during the survey, it is likely that the vast majority of the furbearers taken by the sample were trapped since bullet holes decrease the value of the fur.

TABLE 25. FURBEARER TRAPPING REGULATIONS, GMU 17, 1985.

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

* Sealing required.

Trapping was an important activity for many households in Manokotak, and relied upon as a significant supplemental winter income for some. Seventy-eight percent of the households trapped at least one species during the study year. Nine species were harvested in total: beaver, mink, land otter, fox, muskrat, lynx, wolf, wolverine, and arctic ground squirrel. The most common method of transportation was by snowmachine but all terrain vehicles were also used during periods of poor snow cover.

Most furs were sold during the annual Beaver Round-Up in Dillingham in early March to local or Seattle buyers. Very few furs were sold through the mail or at auctions. Some households kept some furs to make clothing or craft items. Squirrels were not sold commercially but used to make parkas which were valued as gifts or sold for an average cost of over $1,000. Manokotak has a number of excellent skin-sewers. Other items made included beaver hats, mukluks, slippers, and mittens. Generally, women tan fox, squirrel, and rabbit skins themselves but it is becoming more common to send beaver skins to professionals for tanning.

During 1985, successful trappers harvested 425 beavers, 53 mink, 75 land otters, 117 foxes, 54 muskrats, 2 lynx, 1 wolf, 2 wolverines, and 225 ground squirrels. All species were harvested for their fur but beavers, land otters, muskrats, and squirrels were also used for food. Respondents reported that of all animals harvested, the following number were used for food: 409 beavers, 11 land otters, 38 muskrats, and 147 squirrels. The number of land otters used for food represents a minimum estimate since the question was not asked systematically. Beaver meat was especially important since it was used by 94.4 percent of the sample

and contributed 151.5 pounds to the mean household harvest. It was also widely shared, reportedly received by 50.0 percent of the sample and given by 57.4 percent. Beaver meat was boiled, half-dried, salted, and the tail and feet fermented. Muskrats were significant not so much for their numbers as for the fact that they were often hunted by young boys, this activity being an important step in the socialization process of learning to become a hunter.

BIRDS

In 1985, 98 percent of the Manokotak sampled households used birds and bird eggs, including willow ptarmigan, spruce grouse, sandhill cranes, whistling swans, and numerous species of ducks and geese. Sea gull, murre, and goose eggs were also harvested in the spring.

The willow ptarmigan is a common year-round resident of the region, inhabiting scrub thickets; spruce grouse prefer the coniferous forests found in the northeast part of the region (Peters et al. 1984:19). Spruce grouse were hunted primarily in September and October; ptarmigan were hunted when they formed large flocks in late winter and early spring. In the spring and fall, waterfowl were hunted in conjunction with seal hunting in Kulukak and Nushagak bays. Waterfowl were also hunted in the fall along the Igushik River and lakes while moose hunting.

A hunting license was required for hunting all these bird species. In addition, a federal and state duck stamp were needed to harvest waterfowl. Table 26 summarizes hunting regulations for these species during the study year.

TABLE 26. SUBSISTENCE HUNTING REGULATIONS FOR SELECTED SPECIES OF BIRDS, GMU 17 1985 - 1986.

Species	Open Season	Daily Bag Limits	Possession Limits
Ducks (except sea ducks)	Sept. 1 - Dec. 16	10	30
Sea Ducks[a]	Sept. 1 - Dec. 16	15	30
Canada Geese	Sept. 1 - Dec. 16	4[b]	8[b]
White-Fronted Geese	Sept. 1 - Dec. 16	4[b]	8[b]
Snow Geese	Sept. 1 - Dec. 16	6[b]	12[b]
Brant	Sept. 1 - Dec. 16	2	4
Snipe	Sept. 1 - Dec. 16	8	16
Emperor Geese	Sept. 1 - Dec. 16	2	4
Cranes	Sept. 1 - Dec. 16	2	4
Grouse	Aug. 10 - April 30	15	30
Ptarmigan	Aug. 10 - April 30	15	30

[a] Eiders, Scoters, Old Squaw, Harlequin and Mergansers.

[b] No more than 4 a day or 8 in possession may be any combination of Canada or White-Fronted Geese. The combined limit of Canada, White-Fronted, and Snow Geese is 6 a day, 12 in possession.

Source: ADF&G

Birds comprised 4.4 percent of the total community's subsistence harvest by weight (Fig. 13). Ptarmigan was especially important: 74.1 percent of the sample used and 68.5 percent harvested that species. A total of 1,408 ptarmigan was taken in 1985. Less of the sample (37.0 percent) reported using spruce grouse, which was harvested by 17 households who took a total of 145 birds.

A variety of ducks were harvested by the sample. These included sea ducks, particularly eiders, but also mergansers and goldeneyes, as well as puddle ducks including mallards, pin-tails, green-winged teal, and widgeons. The later group were reported as "other" ducks. In total, 31 households harvested 454 sea ducks while 253 "other" ducks were harvested by 17 households. Sea ducks were used by 70.4 percent of the sample while other ducks were used by 35.2 percent.

Brant, Canada, emperor, and white-fronted were the geese most commonly hunted. Nearly 60 percent of the sample used geese, and 51.9 percent harvested them. The total number of geese harvested was 327 in 1985. Sandhill cranes and whistling swans were used as well. Almost half the sample (44.4 percent) used cranes and 91 cranes were harvested by 23 households during the study year while 39 swans were harvested by 17 households. In 1985, 38.9 percent of the households reported using swans. Harvest data by season were not collected.

Bird eggs were collected in the spring and summer, particularly sea gull eggs which were used by 79.6 percent of the sample. Thirty-five households collected a total of 250 gallons of gull eggs. Goose and murre eggs were collected in much smaller numbers. To harvest murre eggs, it was necessary to travel westward toward Togiak at a time when most Manokotak residents were busy fishing in the Nushagak area. Geese

do not nest in large numbers in the vicinity of Manokotak or Igushik. Sixty gallons of murre eggs and 6 gallons of goose eggs were harvested by the sample during the study year.

MARINE MAMMALS

The coastal waters of Bristol Bay host a wide array of sea mammals. Of particular importance to Manokotak residents were belukhas, harbor (spotted) seals, stellar sea lions, and walrus. From May until freeze-up, belukhas feed on numerous species of anadromous fish, bottom fish, and shellfish at the mouth of the Igushik, Snake, Wood, and Nushagak rivers (Peters et al. 1984:20). Belukhas which summer in Bristol Bay are part of the Bering Sea stock and number from 1,000 - 1,500 animals (ADF&G 1985a:23). In recent years, Bristol Bay fishermen have reported a sharp increase in the number of belukhas present, but no studies have been undertaken to confirm this. Harbor seals are a common year-round resident of coastal areas throughout the North Pacific. Although primarily a coastal inhabitant, harbor seals enter rivers seasonally. Ringed and bearded seals are also present in the area. Walrus and stellar sea lions inhabit portions of northern Bristol Bay. Stellar sea lions are year-round residents of Bristol Bay where they feed on large concentrations of herring and capelin. Walrus live along the ice edge in Bristol Bay in the winter and haul out on land in specific locations in the spring.

Since the passage of the Marine Mammal Protection Act in 1972, the federal government has held management authority over most marine mammals. Under the provisions of that law in effect in 1985, only

Alaska Natives living on the coast of the North Pacific and Arctic Oceans were permitted to harvest marine mammals for food or handicrafts. No permits were required for subsistence hunting and no quotas have been imposed on species hunted by Manokotak residents.

During the study year, marine mammals were an important resource to Manokotak residents. By weight, they made up 8.5 percent of the community's subsistence harvest (Fig. 13). Marine mammals were hunted most intensively in the spring and the fall. In the spring marine mammal hunting was in conjunction with commercial and subsistence herring activities in Kulukak Bay. Some men also camped at Igushik specifically to hunt seals and waterfowl in the spring. In addition to spring and fall, belukhas were sometimes hunted during the summer during a lull in commercial fishing activity. Most commonly belukhas were hunted by younger men although one particular highly skilled elder often accompanied them.

The most commonly used marine mammal was harbor seal. It was used by 72.2 percent of the sample and harvested by 20 households, with a take of 42 harbor seals in 1985. In addition, two ringed and one unidentified seal were harvested. Seal meat and oil were widely shared. While 38.9 percent of the sample harvested seals, nearly twice as many households reported using them (75.9 percent). Seal hunting took place most commonly in the spring in conjunction with duck hunting and herring fishing in Kulukak Bay. They were shot from skiffs in open water with .22 caliber rifles and were occasionally salvaged from fishing nets. All parts of the seal (except the entrails) were used including meat, blubber, and skin. The meat was eaten fresh or dried. Seal oil was the most important local condiment for boiled and dried fish or meat and was

rendered by placing a jar filled with strips of blubber in a cool, dark place. Seal blubber was also eaten. In addition, the skin was used for producing waterproof garments and craft items. Increasingly, women are sending the skins out to be professionally tanned.

Another important marine mammal was belukha. By weight, belukha contributed 4.5 percent of the community's subsistence harvest in 1985. Fifty percent of the sample reported using belukha and 12 households harvested a total of 7 animals. Belukhas were shot with high powered rifles, then retrieved with a harpoon and dragged or allowed to drift to the beach. Usually, the hunters butchered a sufficient quantity of the animal to meet their household's needs, and perhaps to share with a few close relatives or elders. Then, an announcement was made over the CB or VHF radio that anyone who wanted belukha meat could take what they needed. Within two or three days, the whale was completely distributed. All parts of the belukha were eaten, except for the entrails. The meat was eaten fresh, salted, or frozen for later use. The skin was cut up in chunks, placed in buckets, and allowed to ferment in a dark cool place for approximately one week. Oil rendered from the blubber was used like seal oil. The flippers were fermented, salted, eaten raw, or frozen for later use.

Sea lions were also hunted in Kulukak Bay during the herring season. Fifteen sea lions were taken by 11 households in 1985. Thirty-five percent of the households reported using sea lion. When the sea lions were young and tender, all parts (except the entrails) were used, including the meat and the skin; the meat from older sea lions was considered tough. In all cases, the flippers were considered a special delicacy.

Another marine mammal used was walrus. Over one-third of the households used walrus in 1985 although it was harvested successfully by only one household (with a partner from Aleknagik) and only five households attempted to harvest it. Many people received walrus from relatives and friends in Togiak and Twin Hills. Walrus meat, skin, and blubber were all eaten.

Additionally, one household harvested a sea otter during the study year, but this was extremely unusual. The fur was retained and the meat used for dog food.

CHAPTER 7

PLANTS

BERRIES

Berries were an extremely important resource at Manokotak, used by nearly every household in the sample (98.1 percent). Forty-eight households harvested a total of 876 gallons of berries in 1985. A variety of species was used. Salmonberries were the first to ripen in July and early August. These were a particular favorite and harvested enthusiastically at Igushik or Manokotak. Blackberries and cranberries were also sought in the same locations as they ripened in the late summer and early fall. Salmonberries, blackberries, and cranberries were harvested every year that they grew in abundance. For huckleberries or blueberries, travel to other areas was required. Since huckleberries did not freeze well, they were not picked in as large quantities. Berries were considered an important part of the yearly diet and women worked hard to ensure their families would have enough to last through the winter. It was not at all unusual for women to travel to other villages where berries were abundant to combine berry picking with visiting relatives and friends.

Most often, berries were collected by women working in small groups, but men also participated to a smaller degree. Many women used a berry-picking device for greater efficiency. These hand held box-like devices made of wood or metal had a number of prongs on the end. As women raked the prongs through the tundra plants, the berries snapped

off and were deposited in the box. When the box was nearly full, the picker transferred the berries to her bucket.

In the study year, the most popular method of using berries was in *akutaq*, a mixture of berries, shortening, and sugar. The many possible combinations of *akutaq* are endless, and may include different mixtures of berries, fish, plants, raisins, and applesauce, for example. Cranberries were also used to make *atsiuraq*, or cranberry sauce. To a much lesser degree, berries were also used in syrups, jellies, and for baking. Berries were stored by bagfuls in freezers and in some cases a freezer was reserved solely for that purpose. Table 27 depicts the variety of berries harvested by Manokotak residents as well their common usages and the locations in which they are found.

OTHER PLANTS

Plants other than berries were another resource harvested by Manokotak residents in 1985. Eight different plants were reported used by the sampled households. Fifteen households harvested wild celery; 19 households harvested cow parsnip; sourdock was gathered by 29 households; wild spinach was collected by 19 households; 17 harvested wood fern; 11 collected labrador tea; and 15 harvested wormwood (stinkweed). Sea chickweed, "mouse food," and pineapple weed were also used but no systematic data were collected on these species.

Almost two thirds of the sampled households (61.1 percent) harvested at least one of the forementioned species for a total of 119.2 gallons of plants. Plants were used as cooked greens and raw in salads

TABLE 27. COMMON USAGE OF BERRIES BY MANOKOTAK RESIDENTS, 1985.

Plant Name	Yupik Name	Usage of Plant	Location Found	Frequency of Use
Crowberry "Blackberry"	Tan'gerpak	Used in akutaq, alone or with salmonberries.	Found on mountain and hill tops.	Berries are widely used by all villagers and picked yearly.
Blueberry	Suraq	Made into akutaq, jam, blueberry sauce, and eaten fresh. Freezes well.	Found along mountain sides and in flat hilly areas.	Berries picked only when berries grow in abundance.
Huckleberry	Surauvak	Made into akutaq, sauce, jam, and eaten fresh. Does not freeze well.	Found in wooded areas among ferns.	Berries picked only when berries grow in abundance.
Cranberry	Tumagliq	Made into sauce, jam, and sometimes used in akutaq. Freezes and stores well.	Found on mountain slopes, rocky areas and on low semi-tundra fields.	Berries picked when abundant.
Highbush Cranberry	Kitnigpak	Made into sauces, jam, and juice.	Found in wooded areas, also along lakes and rivers.	Not used as frequently as other berries.
Salmonberry	Atsalugpiaq	Used in all akutaq mix, also mixed with crisco or seal oil.	Found in open tundra areas.	Berries are the most prized and sought after next to blackberries.
Wild Raspberry	Puyuraaq	Used in akutaq. Eaten fresh.	Found among grassy areas along some coastal beaches.	Berries are scarce and picked occasionally.

as well as in *akutaq*. Several were also used in teas and for their medicinal properties. Table 28 summarizes the various plants used by Manokotak residents and illustrates the most popular uses.

Finally, wild rye grass (Cherry 1983) was collected by a number of Manokotak women for basket-making. Manokotak has a number of active weavers. To obtain grass of good strength, women traveled to Togiak or Platinum in the fall, usually after the first frost. The grass which grows around Manokotak was considered of poor quality although some was used for "filler". Colors were obtained by use of commercial dyes. Baskets were sold in the local coop, Dillingham shops, or crafts fairs.

TABLE 28. COMMON USAGE OF PLANTS BY MANOKOTAK RESIDENTS, 1985.

Plant Name	Yupik Name	Usage of Plant	Location Found	Other
Wild Celery (*Angelica lucida*)	*Ikiituk*	Stem peeled and eaten fresh with seal oil; also used in making fresh salad.	Found along coastal beaches.	Used in similar ways by older and younger generations.
Cow Parsnip (*Heracleum lanatum*)	*Tarnaq*	Stem peeled and eaten fresh with seal oil; also used in making salad.	Found along marshy hill and mountain slopes.	Sought more frequently than wild celery.
Sourdock (*Rumex arcticus*)	*Quagciq*	Leaves cooked until tender cooled, chopped, and made into *akutaq*.	Found along river and creek beds.	Plant used most frequently with shortening but sometimes with fish eggs.
Wild Spinach (*Chenopodium album L.*)	*Metcuqeggliq*	Leaves and stalks cooked and eaten with seal oil; boiled with fresh salmon.	Found along coastal beaches.	Used in similar way older and younger generations.
Wood Fern (*Dryopteris austriaca*)	*Ceturqaaq*	Young or new fern shoots are cooked until tender, cooled, cleaned, mashed, and made into *akutaq*.	Found under alder bushes along hill and mountain sides and moist woodlands.	Used in similar ways by older and younger generations.
Sea Chickweed (*Honckenya peploides*)	*It'garralek*	Young leaves are cooked until tender, cooled, chopped, and used for *akutak*, also cooked and eaten with seal oil.	Found along sandy coastal beaches.	Used infrequently.

TABLE 28. (Continued) COMMON USAGES OF PLANTS BY MANOKOTAK RESIDENTS, 1985.

Plant Name	Yupik Name	Usage of Plant	Location Found	Other
"Mouse Food"	Utngungssaq	Roots are cooked until tender, cooled, chopped and made into akutaq or eaten fresh.	Tundra	Roots of tundra grasses and plants, cached by mice. Crunchy and sweet.
Labrador Tea (Ledum palustre)	Ayuq	Leaves steeped until water turns dark and drunk as tea.	Found on mountain and hill tops in same areas where crowberries are found.	Used in similar ways by older and younger generations.
Stinkweed or Wormwood (Artemisia Tilesii)	Naunerrluk Caiggluk	Leaves brewed in boiling water and used as general medicine, also used for maqi switches for sore muscles.	Found along coastal areas and around old village and fishing sites.	Plants still used often where plants are abundant. Coastal plants are more potent for use.
Chamomile or Pineapple or Weed (Matricaria Matricarioides)	Atsaruaq	Yellow flower center brewed by boiling water and used for tea and medicinal tea.	Found on old trails, open fields and garden plots.	Plants are still used by both generations. Not as popular as stinkweed.
Rye Grass or Sea Shore Grass (Elymus mollis)	Taperrnaq	Woven use for grass baskets, mats and other crafts.	Found along coastal beaches.	Picked after the first heavy frost.

CHAPTER 8

DISCUSSION AND CONCLUSIONS

REGULATORY ISSUES

Several regulatory issues were of concern to Manokotak residents during the study period pertaining to moose and salmon, each of which will be discussed below. As shown in previous chapters, moose was the most important big game resource for Manokotak residents during the survey year. It was used by almost every household, making up ten percent by weight of the community's resource harvest and was more widely shared than any other resource. In terms of accessibility, moose were hunted much nearer to the village than the more distantly located caribou. Because of its importance, it is apparent why issues relating to moose hunting would be of special concern to Manokotak residents. They were greatly alarmed that part of their traditional moose hunting territory was being "disposed" through various state programs.

State Land Disposals

In 1984, the State of Alaska adopted regional land use designations and management guidelines for state lands in the Bristol Bay Area Plan. One particularly thorny issue addressed by the plan was "settlement" of state lands, more commonly referred to as land disposals. The state disposal programs are designed to transfer state

(public) lands to private ownership. The program typically stimulates changes in an area's demography, for it encourages people to migrate into a rural area to build on private lands, usually recreational cabins or homesites. Before the plan's adoption, only parcels near Warehouse Mountain, just outside Dillingham, had been offered for remote settlement. Villagers throughout the region were unanimously opposed to the creation of any new settlements because it was thought the new immigrants would create competition for limited subsistence resources with local communities. For its part, the Department of Natural Resources' policy was that some amount of land in the Bristol Bay region be made available to the public as private lands. In the end, the Bristol Bay Area Plan drastically reduced the number of acres for sale on a region-wide basis.

However, several areas which were proposed for sale under the heading "Dillingham Area," included the lands along Weary River, Snake River, and Snake Lake. Most important of all to Manokotak hunters and trappers was the Weary River, used for moose hunting and trapping. Unfortunately for them, this was the first land put up for public offering in 1985. Village leaders did not become aware of the adoption of the plan and the consequent sales on Weary River until the very morning of the lottery awards. Although the mayor tried to stop the process by contacting various state officials, he was informed it was "too late" since nine entries were already recorded by then.

Manokotak residents were extremely discouraged by this process. About the public hearings in the village, the then-mayor described the

village's sentiments:

> We as residents of this village were opposed to such action since this is an area where we hunt for the purpose of subsistence; as subsistence users we are not recognized by whom ever was responsible in getting the area in question to be lotteryed out to be staked out as homesites. (Letter to Representative Adelheid Herrmann 12/9/85).

Reiterating his own strong feelings about the gravity of this issue he also stated, "I have been involved in Village Government for the last ten years and this is among the most distasteful actions I am being faced with, having to ask again to be recognized as Subsistence Users" (Ibid).

To date, 25 homesteads (the maximum allowable number) of 20 to 40 acres each have been staked. In an effort to halt further land disposals, Manokotak hunters agreed to provide detailed information about the areas where they hunted and harvested moose during the course of the present study. Maps of subsistence hunting areas were compiled by the Subsistence Division and supplied to the Division of Habitat before additional land disposals were to take place. The maps clearly illustrated and confirmed that the areas selected for land disposals near Weary River, Snake River, and Snake Lake were within Manokotak's traditional moose hunting area. Of the three, Weary River was the area used most intensively. However, DNR recommended that land disposals go

ahead as planned. In 1986, 65 Snake Lake Subdivision parcels, from 7-23 acres, were put up for public offering. As this report went to press, 21 of the parcels had sold. In spite of a preliminary determination to go ahead with the Snake River project, no offerings have been made to date, partly due to agency budget constraints.

Moose Harvest Tickets

A second issue related to moose was the moose harvest ticket system enforcing a limit of one bull per year per hunter. Moose hunting regulations in GMU 17 required that each hunter carry a harvest ticket on his person. After the hunt, the ticket had to be returned to ADF&G. Since a hunter was only allowed to harvest one bull per year, many Manokotak hunters considered this problematic. In fact, the Dillingham office of ADF&G had records for only a few Manokotak hunters returning harvest tickets. The harvest ticket system was not working. Several hunters explained to the researchers why this was so.

Much of the problem revolved around conflicts with Yup'ik values related to sharing and providing meat to those unable to hunt for themselves, especially elders. Moose hunting commonly was conducted as a group activity, with multiple hunters involved in the stalk and kill and social rules that the harvested moose be divided first among hunters in the field, and then divided again among households upon return to the village. One extreme case of a hunting trip was previously discussed where a moose was divided in the field between 23 hunters. Because of these social conventions, moose was the most widely shared of all

resources during the study year. Although only one-third of the households harvested moose, 94 percent used it.

The problem with the current game regulations was that they restricted a hunter to a single moose killed. In Manokotak, this meant that the hunter who kept only a small portion of the kill could not go out again to take another moose. In the Manokotak pattern, a good hunter was expected to go out multiple times, in hopes of taking several moose, which were then shared out to the entire community. That is, good hunters were expected to feed more people than just their own households. Manokotak residents complained that productive hunters were put in a double bind. On the one hand, they were fulfilling cultural role expectations by providing for other households which depended on them, but in order to do so, they were in direct violation with fish and game regulations. Based on research in other parts of rural Alaska, this is not an uncommon common pattern (Wolfe 1987). It is typical for approximately one-third of the households to be the primary producers of subsistence foods for the entire community, giving them out to others who were not able to fish or hunt. The current research documents that this pattern is present in Manokotak as well. A transferable harvest ticket is one possible solution to this dilemma (Wolfe 1987). For instance, an elderly father could transfer his harvest ticket to a more agile son. In this manner, the system for attributing a moose to a single person for accounting purposes could be maintained, while allowing flexibility to the village for obtaining food in a more culturally appropriate manner.

Subsistence Salmon Fishing Time

The final issue which was brought to the researchers' attention was related to salmon. Salmon was another critical resource for Manokotak residents, comprising 35.2 percent of the mean per household harvest by weight of which sockeye and king salmon comprised the largest portion. Salmon was used by every household and harvested by 88.9 percent. Sockeye and kings were primarily harvested while residents were at Igushik fish camp and the regulations which governed subsistence fishing periods at that location were considered troublesome by most residents. The previous section on subsistence salmon fishing regulations explained that Igushik is located within the commercial fishing district and regulations only allowed subsistence fishing during commercial openings. Fishing was permitted in the Igushik River at any time.

Although the Igushik River was only a short distance from the fish camp, a skiff was required to reach the fishing location. Since women rarely operated skiffs and the men were often gone from the camp, women harvesters had trouble getting to a legal subsistence harvesting area. The options were as follows: during a commercial opening, the women could remove subsistence fish from their commercial catches; they could wait until the men returned to harvest subsistence fish; or they could ignore the regulation. None of these solutions were considered satisfactory. Removing fish from commercial set nets meant decreased winter income; waiting for the men's return meant gambling on good drying weather; and ignoring the regulations meant risking a citation.

Managers cited the reason for this regulation as a way to prevent subsistence harvests being held over and sold to commercial buyers. However, people at Igushik noted that there was no cannery there and it would be difficult to sell fish when there was no resident buyer. Buyers were only present at the close of a commercial fishing periods when scows from the Ekok cannery or cash buyers for the fresh frozen market would arrive to purchase fish. Once the scows had completed their buying, they returned to the cannery or a tender to deliver the fish for processing. In December 1987, the Board of Fisheries adopted a proposal which would allow subsistence openings by emergency order in the Nushagak District on a limited basis and the problem may be alleviated in future seasons.

CARIBOU TRANSPLANT TO TOGIAK WILDLIFE REFUGE

Previous discussion has highlighted the importance of caribou to Manokotak residents as well as the time and expense involved in reaching the caribou herds. Caribou are known to have been abundant in the Togiak Wildlife Refuge, including the Nushagak Peninsula, until the late 1870s after which there was a crash in the population. Domesticated reindeer were herded in the area up until the 1930s, after which, the domesticated herds crashed. Few caribou were present on the refuge in the mid-1980s in spite of what were considered by mangers to be good forage conditions (USFWS 1986:164). To take advantage of this suitable habitat, US Fish and Wildlife Service and the Alaska Department of Fish

and Game proposed to develop a herd within the refuge by transplanting caribou from the Alaska Peninsula.

In 1986, the two agencies conducted a meeting with Manokotak hunters to assess their views toward such a proposal. Attendance at the meeting was high, three generations of hunters were represented, and all were equally enthusiastic about the project. Several of the elders present had herded reindeer on the Nushagak Peninsula and believed caribou would survive there. In addition, no one expressed reservations about refraining from hunting until the herd could sustain a harvest.

Although several areas of the refuge offered acceptable habitat, the strong support of Manokotak residents was one factor which ultimately led to the selection of the Nushagak Peninsula as the release site. Manokotak and the community of Togiak signed a cooperative agreement with United States Fish and Wild Service and Alaska Department of Fish and Game. In February 1988, 154 caribou were transplanted from the North Alaska Peninsula Herd with volunteers from Manokotak playing an active role. If the herd increases at expected rates, Manokotak hunters hope to begin harvesting from this new herd by 1993.

CONCLUSIONS

In conclusion, this study has documented that wild resources were an important part of the economy and sociocultural system of Manokotak in 1985. The results of the survey of 54 households in Manokotak (91.5 percent) demonstrated that 53 kinds of fish, game and plant resources were used by respondents, including at least 80 species. On average, a

household used 27 different resources with a range of 8 to 46. The mean number of resources harvested was 19 per household. Further, resource use was extremely high for all major resource categories. Salmon and other fish species were used by every household. Birds and bird eggs, plants and berries, land mammals and furbearers were each used by nearly every household (over 96.3 percent). Use of marine mammals and marine invertebrates was also quite significant, 83.3 percent and 88.9 percent respectively.

Harvest levels were also relatively high compared with other areas of the state. The mean community per capita harvest was 384 pounds usable weight. Table 29 compares Manokotak's 1985 per capita harvest with other Alaskan communities and Table 30 compares it specifically with other communities in Bristol Bay. On a statewide basis, Manokotak's harvest was substantially higher than urban communities such as Kenai and well within the range of many other rural communities throughout the state. In Bristol Bay, its harvest was similar to the communities of Egegik, Pilot Point, Port Heiden, Ivanof Bay, King Cove, Perryville, and Iliamna but notably lower than several other villages such as Ugashik, New Stuyahok, Kokhanok, and Pedro Bay. However, Manokotak's per capita harvest of 384 pounds of wild foods was well above the 222 pounds of domestic fish, meat, and poultry consumed annually by the average American (U.S. Department of Agriculture 1983), indicating the vital role which local resources played in the diet of Manokotak residents.

Salmon and other fish composed 58 percent of the mean household harvest with land mammals (including furbearers) contributing 24.8

TABLE 29. HARVEST QUANTITIES FROM SELECTED ALASKA COMMUNITIES.

Community	Region*	Pop.	Mean HH Harvest in Lbs.	HH Size	Per Capita Harvest in Lbs.
Sheldon Point	Y-K	102	9,784.0	7.0	1,397.0
Nondalton	S.W.	224	6,098.0	5.7	1,217.0
Stebbins	Y-K	331	6,375.0	6.3	1,006.0
New Stuyahok	S.W.	331	5,538.0	5.9	939.0
Pedro Bay	S.W.	60	2,545.0	3.0	866.0
Karluk	Kod.	102	3,296.3	4.0	834.5
Newhalen	S.W.	124	3,696.0	4.8	765.0
Quinhagak	Y-K	427	3,656.0	4.8	756.0
Kokhanok	S.W.	123	3,704.0	5.3	697.0
Igiugig	S.W.	32	3,911.0	3.7	618.0
Emmonak	Y-K	567	2,759.0	4.5	612.0
Akhiok	Kod	103	1,975.2	3.8	518.4
Kotlik	Y-K	293	342.0	6.7	510.0
Old Harbor	Kod	355	1,758.3	3.8	463.9
Ivanof Bay	S.W.	40	1,633.0	3.7	445.0
Iliamna	S.W.	129	1,622.0	3.9	416.0
Perryville	S.W.	111	1,659.6	4.3	390.0
Egegik	S.W.	75	893.0	2.3	385.0
MANOKOTAK	S.W.	309	2,006.0	5.2	384.0
Larsen Bay	Kod.	180	1,558.0	4.2	374.7
Lake Clark-Port Alsworth	S.W.	NA	1,306.0	3.7	361.0
Ouzinkie	Kod.	233	1,196.3	3.3	352.2
Chignik Lake	S.W.	138	1,424.7	5.0	282.5
South Naknek	S.W .	136	753.0	2.8	278.0
Tyonek	S.C.	273	964.0	3.5	272.0
Nabesna Road	C.B.	50	1,104.5	4.1	269.4
Port Lions	Kod.	291	865.9	3.3	262.4
Chiknik Lagoon	S.W.	48	768.0	3.4	229.0
King Salmon	S.W.	374	666.0	3.0	227.0
Naknek	S.W.	369	586.0	3.0	212.0
Gakona	C.B.	87	644.0	3.1	201.7
Chignik	S.W.	178	839.1	4.3	194.4
Chickaloon	M.V.	69	443.7	2.3	190.1
Kodiak City	Kod.	5,873	588.7	3.3	177.3
Chitina	C.B.	42	295.1	1.8	165.5
Cantwell	C.B.	136	335.2	2.5	135.0
Mentasta	C.B.	59	442.0	3.4	129.2
Gulkana	C.B.	104	313.4	2.8	114.0
Homer City	K.P.	2,588	287.1	2.8	102.6
Copper Center	C.B.	213	344.7	3.4	102.6
Homer Area	K.P.	2,069	294.2	3.3	98.1
Ninilchik	K.P.	341	262.0	3.0	87.3
Glennallen	C.B.	511	228.3	3.4	67.3
Seldovia	K.P.	505	190.5	3.5	54.4
Kenai	K.P.	4,558	122.1	3.2	38.2

*Regions abbreviated as noted: Y-K=Yukon Kuskokwim; S.W.=Southwest; Kod.=Kodiak; S.C.=Southcentral; C.B.=Copper Basin; M.V.=Matanuska Valley; and K.P.=Kenai Penisula.
Source: Wolfe 1984. Updated 1986.

TABLE 30: COMPARISON OF PER CAPITA WILD RESOURCE HARVESTS AND THE COMPOSITION OF WILD RESOURCE HARVESTS BY RESOURCE CATEGORY, MANOKOTAK AND OTHER BRISTOL BAY COMMUNITIES

		Composition of harvest (percent)						
	Per Capita Harvest lbs[a]	Salmon	Other Fish	Marine Invert.	Land Mammals[b]	Marine Mammals	Birds and Eggs	Plants
Manokotak	384	35.2	22.3	1.2	24.8	8.5	4.4	3.7
Dillingham	242	58.4	7.2	0.5	27.2	1.2	2.2	3.3
New Stuyahok	896	50.0	10.0	NA	32.0	0.0	8.0[d]	NA
Egegik	385	24.4	4.1	3.5	63.8	0.0	4.2	NA
King Salmon	227	46.6	7.3	NA	46.1	0.0	NA	NA
Naknek	212	54.4	9.9	NA	35.6	0.1	NA	NA
Pilot Point	384	24.7	4.1	1.6	62.5	1.2	4.4	1.5
Port Heiden	408	20.8	2.9	4.3	61.5	3.7	3.3	3.4
South Naknek	278	31.2	6.4	NA	62.2	0.0	NA	NA
Ugashik	814	39.3	4.5	0.0	50.6	0.0	3.1	2.3
Chignik	194	74.4	10.5	3.8	7.3	2.7	1.4	NA
Chignik Lagoon	229	55.3	8.2	6.5	25.9	1.0	3.2	NA
Chignik Lake	282	52.1	5.1	1.2	38.8	1.2	1.7	NA
Ivanoff Bay	445	61.6	3.4	5.9	21.6	4.8	2.7	NA
King Cove	412	36.0	8.8	6.2	37.2	5.3	6.5	NA
Perryville	391	58.5	10.8	2.8	21.7	4.6	1.6	NA
Igiugig	618	71.5	13.1	0.0	10.1	0.4	1.1	3.8
Iliamna	416	79.6	7.4	[c]	8.0	0.5	0.6	3.9
Kokhanok	697	72.7	14.3	NA	9.8	0.0	0.8	2.4
Lake Clark	361	65.0	4.6	0.3	26.8	0.0	1.2	2.1
Newhalen	767	88.1	4.0	0.0	5.1	0.7	0.7	1.3
Nondalton	1175	65.3	15.0	0.0	17.0	0.0	0.7	2.0
Pedro Bay	865	82.8	8.6	0.4	6.3	0.0	0.5	1.4

a The harvest year for Manokotak was 1985. Harvest for Dillingham was 1984 (Fall et al. 1986), and for New Stuyahok, 1983 (Wolfe et al. 1984). Pilot Point, Port Heiden, and Ugashik was June 1986 - May 1987 (Fall and Morris 1987). Harvests for Egegik, Chignik, Chignik Lagoon, Chignik Lake, Ivanof Bay, and Perryville, pertain to 1984 (Morris 1987). For King Salmon, Naknek, and South Naknek, the harvest year was 1983 (Morris 1985), and for King Cove it was a 12 month period in 1984-1985 (Braund et al. 1986:7-19). The harvest year for the Iliamna Lake Lake communities was 1983 (Morris 1986).

b Includes edible furbearers.

c Less than .1 percent.

d "Other," including small game, birds, and brown bear.

percent and marine mammals 8.5 percent. The remainder was made up of a variety of birds and bird eggs, plants and berries, and clams. Per capita harvest levels have not changed significantly from 1973 when they were measured by Gasbarro (1974). When adjusted to represent similar resources, the per capita harvests are very similar, differing only by thirty-five pounds. Salmon, moose, caribou, and belukha were the major resources harvested in both periods.

Research also indicted that sharing was widespread both within the community and with relatives and friends in other communities. All resource categories were shared to some extent, with the exception of furbearers harvested strictly for commercial sale. Sharing was particularly frequent between residents of Manokotak and the communities of Aleknagik, Togiak, and Twin Hills. Gifts of marine mammals and other marine resources which were difficult to harvest from Manokotak's inland location were often received from the coastal communities of Togiak and Twin Hills.

In 1985 the economy of Manokotak is best described as a mixed subsistence and market economy. Nearly all Manokotak households depended on commercial salmon fishing, a highly variable industry, as the major source of cash income. Consequently, incomes fluctuated widely from year to year due to run strengths, market conditions, and health of the stocks. In 1985, 91.0 percent of the households had at least one member who participated in commercial salmon fishing. Manokotak permit holders for both set gill net and drift gill net were shown to earn substantially less than other Bristol Bay permit holders. Sixty-nine percent of Manokotak households also had at least one member

who participated in the Togiak commercial herring sac roe or spawn-on-kelp fisheries in 1985. The largest public sector employers in Manokotak were the regional school district and the city government. A smaller number of jobs were also available in the services, transportation and utilities, and retail sectors. Two-thirds of all jobs were held by either male or female heads of households. Most jobs were of a seasonal and part-time nature, and the average number of weeks worked per year, including estimated time spent in commercial fishing was 10.1 weeks per year.

In sum, in the mid 1980's Manokotak residents continued to depend upon a wide variety of wild resources in their daily lives for nutritional sustenance and to fulfill important social and cultural functions. The village's close proximity to the regional center of Dillingham and its long history of participating in the commercial salmon fishery might be expected to negatively influence Manokotak's subsistence patterns. However, study findings did not support these hypotheses.

Instead, Manokotak's economy and culture continued to exhibit a marked number of traditional features. The first language of the village was Yup'ik for all age groups in spite of the fact that in most Bristol Bay villages, English has already become or is in the process of becoming the dominant language (Esther Ilutsik, pers. comm. 1988). Another interesting fact is that Manokotak had no permanent non-Native residents during the study year, continuing to be a Yup'ik community.

An annual cycle of subsistence activities persists. Integrating subsistence and commercial activities, residents migrated to summer fish

camps, very much organized along traditional lines of kinship with the division of labor reflecting culturally appropriate roles of one's age and sex. A smaller number of people moved to spring camps as well.

Residents also continued to harvest substantially high quantities of wild foods and utilized a wide number of different species, enjoying many traditional foods such as seal oil, belukha, fermented salmon heads, blackfish, and sea lion flippers. Wild foods were generally preferred to store bought goods. Respondents emphasized that even if they could afford to purchase all their food, they would not do so for such a diet was considered inferior in taste, texture, and nutrition. Furthermore, the harvesting and processing activities were considered satisfying ends in themselves and would be sorely missed. Many harvesting activities continued to be conducted in a traditional manner, such as group hunting for moose and caribou and the use of fish traps for blackfish and burbot. Widespread sharing of wild foods, heavily emphasized by respondents, was another important traditional characteristic exhibited in the community.

Like other rural Alaskan villages, Manokotak has experienced rapid technological changes. A few examples are in the area of transportation, such as the acquisition of snowmachines, all terrain vehicles, aluminum skiffs, large commercial fishing boats, and even a few airplanes. The new technology was utilized for subsistence harvesting and emphasized the important role of customary and traditional subsistence patterns in the community. In the mid-1980s, subsistence continued to be a pervasive way of life for Manokotak residents.

REFERENCES

Alaska Commercial Fish Entry Commission

1986a Special data run prepared for Bristol Bay Native Association. Office Files, Division of Subsistence, Dillingham.

1986b Permits Year to Date By Permit Holders with Manokotak Address. Office Files, Division of Subsistence, Dillingham.

1986c Changes in the Distribution of Permit Ownership in Alaska's Limited Fisheries. CFEC Report No. 86-6. Juneau.

1986d Commercial Fishing Catch Data Aggregated by Alaska Census Division and City for 1984. Juneau.

Alaska Department of Community and Regional Affairs

1982 Community Planning Profile for Manokotak. Prepared by DOWL Engineers, with North Pacific Aerial Surveys and Bristol Bay Native Association.

Alaska Department of Fish and Game

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

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

1986 Annual Management Report 1985, Bristol Bay Area. Division of Commercial Fisheries. Anchorage.

1987 Annual Management Report 1986, Bristol Bay Area. Division of Commercial Fisheries. Anchorage.

Alaska Department of Labor

1985 Alaska Population Overview. Administrative Services Division. Juneau.

Braund, Steven R., David C. Burnham, Lisa Morehead, and Lynne Hale

1986 Effects of Renewable Resource Harvest Disruption on Community Socioeconomic and Sociocultural Systems: King Cove. U. S. Minerals Managment Service Social and Economic Studies Program, Technical Report 123. Anchorage.

Cherry, June

1984 Southwest Eskimo Basketry and Other Grass Uses. Dillingham Heritage Museum. Dillingham.

Coffing, Michael and Sverre Pedersen
1985 Caribou Hunting: Land Use Dimensions, Harvest Level, and Selected Aspects of the Hunt During Regulatory Year 1983-1984 in Kaktovik, Alaska. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 120. Juneau.

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

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

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

Focht, Rick
1987 Effort, Landing, Gross Earnings and Cross-Fishery Participation in Selected Western Alaska Commercial Herring Fisheries. Commercial Fisheries Entry Committee. Special Report 87-3. Juneau.

Gasbarro, Anthony
1987 Personal Communication, University of Alaska, Fairbanks.

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

Golia, Andrew
1980 Bristol Bay: The Herring Fishery - 1980. Bristol Bay Native Association, Dillingham.

Harder, Mike
1988 Personal Communication. Manokotak Airways, Dillingham.

Harrison, Barbara with Patricia Billingsley, Marilyn Crace, Anecia Lomack, Mary Ann Mochin and Molly Pauk
1985 Manokotak: A Case Study of Rural School Development in Alaska. Center for Cross-Cultural Studies. University of Alaska, Fairbanks.

Ilutsik, Esther
1988 Personal Communication. Southwest Region Schools, Dillingham.

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

Kodiak Area Native Association
1983 Kodiak Island Area Local Fish and Game Resource Guide. Kodiak.

Langdon, Steven
1983 Bristol Bay Village Household and Fishing Income Survey: Final Report. Prepared for State of Alaska Department of Community and Regional Affairs, Division of Management Assistance, May 1985. Anchorage.

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

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

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

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

Nelson, Michael
1986 Personal Communication, Division of Commercial Fisheries, Alaska Department of Fish & Game, Dillingham.

Oswalt, Wendell H.
1967 Alaskan Eskimos. Scranton, Pa.: Chandler Publishing Company.

Peters, Greg, Tim Hostetler, and Patricia Roullier
1984 Bristol Bay Coastal Management Program. Volume I:Resource Inventory, Dillingham.

Petterson, John S., Lawrence A. Palinkas, Bruce M. Harris, Kathleen B.Barlow, and Michael Downs
1984 Sociocultural/Socioecomic Organization of Bristol Bay: Regional and Subregional Analyses. Minerals Management Service, Social and Economic Study Program, Technical Report No. 103. Anchorage.

Petroff, I.
1881 Population and Resources of Alaska. 1880 U.S. Census, Department of the Interior. Washington.

Reed, Carolyn E.
1985 The Role of wild Resource Use in Communities of the Central Kenai Peninsula and Kachemak Bay, Alaska. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 106. Juneau.

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

Shields, Harvey M.
1977 Report on the Historic Use of Amanka and Ualik Lakes. Unpublished Manuscript National Park Service. On File, University of Alaska, Fairbanks.

1978 Field Notes. Prepared for National Park Service. On file, University of Alaska Museum, Fairbanks.

Stratton, Lee and Susan Georgette
1984 The Use of Fish and Game by Communities in the Copper River Basin, Alaska: A Report on a 1983 Household Survey. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 107. Juneau.

Stratton, Lee and Evelyn B. Chisum
1986 Resource Use Patterns in Chenega, Western Prince William Sound: Chenega in the 1960s and Chenega Bay 1984-1986. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 139. Juneau.

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

1987a Annual Report of Survey - Inventory Activities. Moose. Alaska Department of Fish and Game, Divison of Game. Volume XVII, Part VIII. Juneau.

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

Tryck, Nyman, and Hayes
1985 City of Dillingham Comprehensive Plan. Dillingham.

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

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

Wolfe, Robert J.
1981 Norton Sound/Yukon Delta Sociocultural Systems Baseline Analysis. Bureau of Land Management, Alaska OCS /Socioeconomic Studies Program Technical Report No. 72; Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 59. Anchorage and Juneau.

1987 The Super-Household: Specialization in Subsistence Economics (Draft). Presented at 14th Annual Meeting of the Alaska Anthropological Association, Anchorage.

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

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

Wright, John M. and Molly B. Chythlook.
1985 Subsistence Harvests of Herring Spawn-on-Kelp in the Togiak District of Bristol Bay. Alaska Department of Fish & Game, Division of Subsistence Technical Paper No. 116. Juneau.

APPENDIX A:
SURVEY INSTRUMENT

MANOKOTAK RESOURCE USE STUDY

Interviewer _____

HOUSEHOLD ID# _____ Date _____

The purpose of this survey is to gather information about the fish and game resource activities of your household from January to December 1985. When we ask "Did you use a resource?" we mean did your family eat it, serve it, or otherwise use it in your home.

1. HOUSEHOLD INFORMATION

(* = Respondent)

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

2. Using Person's I.D. #'s from the table above, indicate which household members participated in harvesting activities during 1985.

Hunting ____ ____ ____ ____ ____ ____ ____

Fishing (include clams, etc) ____ ____ ____ ____ ____ ____ ____

Plant gathering ____ ____ ____ ____ ____ ____ ____

** 1 = less than high school 3 = some college
2 = high school or G.E.D. 4 = college or more

3. COMMERCIAL FISHING

Did members of your household participate in commercial fishing during 1985?

YES _____ NO _____

If YES, please complete the following table:

SPECIES	FISHED YES	FISHED NO	LOCATION	SET NET	DRIFT	NUMBER REMOVD FOR HOME USE	I.D. #'s OF FISHERMEN
KING SALMON Taryaqvak							
RED SALMON Sayak							
CHUM SALMON Kangitneq							
PINK SALMON Amaqaayak							
SILVER SALMN Qakiiyaq							
HERRING Iqalluarpak						5 gal bkts.	
ROE ON KELP Melucuaq				XXXXXX		5 gal bkts.	
ROE Meluk				XXXXXX		5 gal bkts.	
OTHER				XXXXXX			

4. NON-COMMERCIAL FISHING

A. Did your household have a subsistence salmon fishing permit in 1985?
YES ____ NO ____ ID# of Permit holder ____ ____ ____ ____

B. Did your household harvest or use any type of fish or marine invertebrate in 1985?
YES ____ NO ____ If YES, please complete the following table:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NO. HARVESTED BY GEAR TYPE SUBS. NET	ROD & REEL	OTHER	RECEIVED YES	RECEIVED NO	GAVE AWAY? YES	GAVE AWAY? NO
KING SLM-Taryaqvak											
RED SLM - Sayak											
CHUM SLM-Kangitneq											
PINK SLM-Amaqaayak											
SLVR SLM- Qakiiyaq											
RAINBOW-Talarik											
TOGIAK TROUT (LAKE TROUT)											
GRAYLING-Nakrullugpak											
DOLLY - Yuqyaq VARDEN											
BURBOT - Atgiaq											
PIKE - Cuukvak											
WHITEFFISH-Uraruq											
BLK FISH -Canigiiq											
FLOUNDER-Naternaq											
SMELT-Iqalluaq					bkts.(5 gal)						
HERRING-Iqalluarpak					bkts.(5 gal)						
HRRNGROE-Meluk					bkts.(5 gal)						
ROE-ON-KELP-Melucuaq					bkts.(5 gal)						
BUTTER - Tavtaaq CLAMS					bkts.(5 gal)						
RAZOR CLAM-Aliruaq OTHER					bkts.(5 gal)						

5. GAME

Did your household try to harvest or use game in 1985?

YES _____ NO _____

If YES, please complete the table below:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NUMBER HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY? YES	GAVE AWAY? NO
CARIBOU - Tuntuk									
MOOSE -Tuntuvak									
BROWN BEAR -Taqukaq									
BLACK BEAR-Tanqerliq									
PORCUPINE - Issaluq									
RABBIT-Qayuqegglig									
OTHER									

6. MARINE MAMMALS

Did your household try to harvest or use marine mammals or marine mammal products during 1985?

YES _____ NO _____

If YES, please complete the table below:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NUMBER HARVESTED	AMOUNT AND PARTS USED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
HARBOR SEAL Issuriq										
OTHER SEAL										
WALRUS- Asveq										
SEA LION-Uginaq										
BELUKHA-Cetuaq										
OTHER										

7. FURBEARERS

Did anyone in your household try to harvest or use furbearers during 1985?
YES _____ NO _____

If YES, please complete the following table:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NUMBER HARVESTED	#HARVESTED USED FOR FOOD	#HARVESTED USED FOR FUR	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
BEAVER-Paluqtaq											
MINK - Imarmiutaq						XXXX					
FOX - Kaviaq						XXXX					
WOLF - Kevluneq						XXXX					
WOLVERINE-Terikaniaq						XXXX					
LAND OTTER-Cuiqnilnquq						XXXX					
MUSKRAT-Kanaqlak											
LYNX - Tertuli											
PARKA SQURRL-Qanganaq											
OTHER											

8. BIRDS
Did your household try to harvest or use birds during 1985?
YES _____ NO _____

If YES, please complete the table below:

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NUMBER HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
SPRUCE GROUSE - Egtuk									
PTARMIGAN - Qangiiq									
SEA DUCKS - Yaqulek									
OTHER DUCKS									

-continued-

BIRDS, continued

SPECIES	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NUMBER HARVESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
GEESE: SPECY Neqleq									
CRANES-Qucillgaq									
SWANS-Qugyuk									
EGGS-Kayaguq Sea gull (Naruyaq)					5 gal bkts.				
EGGS-geese(Neqleq)					"				
EGGS-Murre(Alpak)					"				
OTHER									

9. PLANTS/BERRIES

Did your household harvest or use wild plants or berries in 1985?

YES _____ NO _____

If YES, please complete the table below:

	USED YES	USED NO	TRIED TO HARVEST YES	TRIED TO HARVEST NO	NUMBER HAR-VESTED	RECEIVED YES	RECEIVED NO	GAVE AWAY YES	GAVE AWAY NO
BERRIES (Atsat)					gal				
PLANTS (Naunraat)					gal				

Check the plants harvested. (only need total gal. for all plants harvested)

Wild Celery (Ikiituk)	____	Wild Spinach (Metcurkirliq)	____	Stinkweed (caribou leaves) (Naunrakaiyak)(medicine)	_____
Cow Parsnip (Tarnaq)	____	Wood Fern (Ceturkaq)	____		
Sour Dock (Quarciq)	____	Labrador Tea Ayuq	____		

10. Does your household give, share, or trade any of the following items to people <u>in other villages</u> ?

	Send to Others		Receive from Others	
	Place	No	Place	No
BEAVER MEAT - Paluqtaq				
MOOSE MEAT - Tuntuvak				
CARIBOU MEAT - Tuntuk				
BROWN BEAR - Taqukaq				
SEAL MEAT				
SEAL OIL - Uquq				
WALRUS - Asveq				
SEA LION FLIPPERS - Uginam Itegai				
BELUKHA - Cetuaq				
HERRING - Iqalluarpak				
HERRING ROE - Meluk				
ROE-ON-KELP-Melucuaq				
SALMON - Sayak				
SALTED SALMON HEADS - Sulunaq				
SMELT - Iqalluaq				
BERRIES - Atsat				
FRESHWATER FISH -Nunvarmiutat Neyet				
PTARMIGAN - Qangiiq				
CLAMS - Tavtaaq				

12. EQUIPMENT

A. Please indicate the number of each type of equipment that you own or regularly use:

	OWN	USE		OWN	USE		OWN	USE
ATV	____	____	Fishcamp	____	____	Freezer	____	____
Airplane	____	____	Drying rack	____	____	Steam bath	____	____
Snowmachine	____	____	Smokehouse	____	____	Skiff 18 ft.or less)	____	____
Car or Truck	____	____	Other camp	____	____	Commercial boat	____	____
			Dog Teams	____	____			
			Dogs	____	____			

If you own dogs, is any of your fish or game harvested to feed them?
Yes ____ No ____

If yes, how many of the fish you harvested were put up for dog food.
Species _____ Amount _____

Did you feed them any other wild foods? (i.e. moose, caribou, beaver, etc.)

Were these amounts included on pages 3 - 5?

13. In your own words, what is the importance of fishing, hunting, and gathering to you and your family?

_____

_____

_____

_____

_____

_____

_____

_____

_____

14. EMPLOYMENT HISTORY

Please complete one line in the table below for each job held by a household member during 1985.

ID # FROM QUESTION 1	JOB TITLE	# OF WEEKS WORKED P/YEAR	# HOURS WORKED/WEEK

15. Please estimate you household's cash income in 1985.

less than $10,000 _____

$10,001 - $20,000 _____

$20,001 - $30,000 _____

$30,001 - $40,000 _____

$40,001 - $50,000 _____

$50,001 - $60,000 _____

$60,001 - $70,000 _____

$70,001 - $80,000 _____

$80,001 - $90,000 _____

$90,001 - 100,000 _____

$100,001 or over _____

SUPPLEMENTAL QUESTIONS - MANOKOTAK SURVEY

I. Moose

A. Ask the following questions for those who said they got a moose in 1985.

1. Who caught the moose?

2. Who did you hunt with?

3. How many total moose were caught on the trip?

4. Among whom was the moose divided? Which of them were on the trip (*)?

5. Where did you bring the moose?

6. Where was it stored?

II. Caribou - Ask these questions to those who said they got a caribou in 1985.

1. Who got the caribou?

2. Who did you hunt with?

3. How many total caribou did you get on the trip?

4. Among whom was the caribou divided?

5. Where did you bring it?

6. Where did you store it?

III. Salmon

Where do you subsistence fish?

Summer _____

Spawned-outs _____

Who shares the site?

Who's net? Rack? Smokehouse?

Where are the fish stored?

IV. Marine Mammals - (Seals, Sea Lions, Walrus, Beluga) Successful harvesters only
Note which animals information is for.

1. Who did you go with?

2. When? Where?

3. Did you make a special trip to hunt them?

4. Who killed it?

5. Among whom was it shared?

6. Where was it brought?

7. How was it processed?

8. Where was it stored?

V. MAPPING OF MOOSE HUNTING AREA
We are trying to learn about the area that Manokotak residents use for moose hunting. These individual maps will be put together to get a picture of land use for the whole village.

A. Questions for respondents who hunted moose in 1985:

1. Draw a circle around the area where you hunted by skiff. (orange)

2. Draw a circle around the area where you hunted by snowmachine. (green)

3. Put an x in the approximate spot where you killed a moose. (black)

B. For everybody:

1. Draw a circle around those areas where you have usually found moose over the years. (brown)

DIRECTIONS FOR INTERVIEWERS ON MAPPING QUESTIONS:

Make sure your mylar and map are lined up according to the lines on the mylar. This is very important for when we want to go back and review the markings.

Write the household ID in the upper right hand corner.

Make notes on who is giving the information. Is it one person or several? Note the name(s) of person giving the information and anyone else in the room. Do this on a separate sheet of paper since we do not want names on the surveys. Keep this information strictly confidential.

Note down any other information which might be helpful to us when interpreting the maps.

APPENDIX B

CONVERSION FACTORS FOR MANOKOTAK DATA ANALYSIS

	Weight per animal	Source
King Salmon	12.3	a
Red Salmon	4.6	a
Chum Salmon	4.6	a
Pink Salmon	4.5	a
Silver Salmon	5.5	a
Herring	30/5 gal. bkt.	Reed 1985
Roe on Kelp	25/5 gal. bkt.	Researcher estimate
Roe	40/5 gal. bkt	Researcher estimate
Rainbow Trout	1.4	Wright et al. 1985
Lake Trout	2.7	Wright et al. 1985
Grayling	.7	Wright et al. 1985
Dolly Varden	1.4	Wright et al. 1985
Burbot	1.0	Wright et al. 1985
Pike	2.8	Wright et al. 1985
Whitefish	1.0	Wright et al. 1985
Blackfish	30/5 gal. bkt.	Researcher estimate
Flounder	1.0	KANA 1983
Smelt	30/5 gal. bkt.	Reed 1985
Butter Clams	15/5 gal.bkt.	Fall et al. 1985
Razor Clams	15/5 bal.bkt.	Fall et al. 1984
Caribou	150.0	Wright et al. 1985
Moose	540.0	Wright et al. 1985
Brown Bear	100.0	Wright et al. 1985
Black Bear	58.0	Stratton and Georgette 1984
Porcupine	8.0	Wright et al. 1985
Rabbit(assumed to be snowshoe)	2.0	Wright et al. 1985
Harbor Seal	56.0	Wright et al. 1985
Other Seal	56.0	Researcher estimate
Walrus	560.0	Wolfe 1981
Sea Lion	100.0	Stratton and Chisum 1986
Belukha	700.0	Wright et al. 1985
Beaver	20.0	Wright et al. 1985
Land Otter	3.0	Wolfe 1981
Muskrat	.75	Researcher estimate
Parka Squirrel	.5	Researcher estimate
Spruce Grouse	1.0	Wright et al. 1985
Ptarmigan	.7	Wright et al. 1985
Sea Ducks	1.4	Wright et al. 1985
Other Ducks	1.4	Wright et al. 1985
Geese	4.0	Wright et al. 1985
Cranes	6.0	Wright et al. 1985
Swans	10.0	Wolfe 1981
Sea Gull Eggs	6.8/5 gal. bkt.	Researcher estimate
Geese Eggs	7.0/5 gal.bkt	Researcher estimate
Murre Eggs	4.0/5 gal. bkt.	Researcher estimate
Berries	4.0/gal	Stratton and Georgette 1984
Plants	1.0/gal	Researcher estimate

APPENDIX B (Continued)

[a] Average 1985 Round Weights of Commercial Salmon, Nushagak District,

	Weight	Conversion Factors	Usable Weight
King	16.9	.73	12.3
Red	5.88	.78	4.6
Chum	6.3	.73	4.6
Pink	5.25	.85	4.5
Silver	7.28	.76	5.5

Source: Alaska Department of Fish and Game 1986:139.