

North Slope Subsistence Study Wainwright, 1988 and 1989

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WAINWRIGHT, 1988 and 1989

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Prepared By

Stephen R. Braund & Associates

with

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Alaska OCS Environmental Studies Program

North Slope Subsistence Study - Wainwright, 1988 and 1989

Principal Authors:

**Stephen R. Braund
Eric Loring
Lisa Moorehead
David C. Burnham
John A. Kruse**

Other Contributors:

**Sam Stoker
Monica Glen
Eve Witten
Timothy P. Holmes**

**Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510**

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I. INTRODUCTION

The North Slope Subsistence Study, sponsored by the Minerals Management Service (MMS), was a three year study of Barrow and Wainwright residents' subsistence harvests. The major focus of the study was to collect harvest and location data for species used in these communities. This report is the second of two annual reports on the findings of the Wainwright research. The first year of Wainwright data collection began on April 1, 1988 and continued through March 31, 1989. Throughout this report, this time period is referred to as "Year One." The second and final year, Year Two, continued from April 1, 1989 through March 31, 1990. In addition to presenting the Year Two data for the first time, this report contains the Year One data. The current presentation of Year One data contains some revisions to the data published in the previous report (S.R. Braund & Associates [SRB&A] and Institute of Social and Economic Research [ISER] 1989b) based on new or corrected information gathered in the course of Year Two data collection.

PURPOSE OF THE PROJECT

As conceived by the MMS, this study had two objectives. "First, to collect, analyze, and report harvest data by species for the North Slope communities of Barrow and Wainwright. A second objective is to provide comprehensive and accurate mapped subsistence ranges for these communities" during the study period (three years in Barrow and two years in Wainwright). The MMS's data collection goal was to gather "a reliable and accurate measure of yearly and seasonal subsistence harvests for each community by species and location." And, finally, the MMS envisioned "general use area" maps for each community. Thus, the MMS conceived of the mapping portion of this project as having "mapped subsistence ranges," subsistence harvest "locations," and mapped "general use areas."

Both of the terms "general use areas" and "subsistence ranges," used in their broader sense, could include the entire area hunted both successfully and unsuccessfully whereas subsistence harvest "location" refers to the more specific area of a successful harvest. Although the most comprehensive mapping

of Barrow and Wainwright subsistence would include general use areas/subsistence ranges (entire hunting/gathering area) and harvest locations, the study team did not have the resources to collect, digitize, and analyze both kinds of harvest data and had to focus on the geographic component that best fit into the overall study objectives (see Methodology in Appendix C for a more detailed discussion).

Thus, the study team, in concert with the MMS, chose "successful harvest locations" as the geographic unit of measurement for this study. As hunting and fishing activities that did not result in a harvest were not recorded, this study did not record "subsistence ranges" used in a broader sense to include the entire area hunted either successfully or unsuccessfully. This report presents the findings of the Wainwright study covering the two year period from April 1, 1988 through March 31, 1990.

OVERVIEW OF WAINWRIGHT REPORT

Rather than summarize the study findings, the purpose of this overview is to explain briefly the key topics that are addressed in this report and clarify what this report does not address. Many of these points are discussed more fully in appropriate sections of the report. The study did not attempt to measure hunting effort; only information on successful harvests was recorded. In this report, the term "harvest" refers to a successful harvest.

This study: (1) collected, analyzed and reported harvest data by species for Barrow and Wainwright; and (2) provided mapped subsistence harvest sites for Barrow and Wainwright. This report presents the findings of the Wainwright study covering the two year period from April 1, 1988 through March 31, 1990.

The community of Wainwright was small enough that the study team decided to attempt to include all households in the study, i.e., conducting a census rather than a sample. Of the 124 households in the study in Year One and 119 households in Year Two, 100 households were present in the community for the full two study years. Throughout the report, these 100 households were referred to as the core study households. Data on total community harvests included the harvests of all 124 Year One and 119 Year Two households whereas data on house-

hold and per capita means and percentage of households harvesting were based on only the 100 core study households. To include households present for only part of the year in the household and per capita means would have skewed the data, and therefore the part-year households were excluded from these analyses.

Data were collected on subsistence harvests, including the species harvested, quantity harvested, location and date of harvest. (Additional information was collected about each harvest if available, such as the sex of the animal and the number of household members and non-household members participating in the harvest.) Harvest data were statistically processed to produce numeric output on several aspects of subsistence such as average household and per capita harvests per year and monthly harvests by species. These data are presented in tables and charts.

The mapped data were digitized and processed through the North Slope Borough's Geographic Information Systems (GIS) to produce harvest maps. These mapped data represent successful harvest sites only, not the total area hunted.

The study presents data for two years only. Within the two year period, the study examines average harvests for the two years as well as variability between the two years. Although the study provides thorough and representative data on harvests for those two years, longer term trends are not captured. Environmental and/or economic factors can be major influences on the level of subsistence harvests in any given year. Harvest quantities and mapped harvests for these two years reflect environmental constraints on hunting that occurred during this period and thus may underrepresent some species with respect to their importance to Wainwright residents in a broader time perspective. For example, had this study been conducted during a different two year period when sea ice conditions were more (or, alternatively, less) favorable for marine mammal hunting, the findings may have been quite different. Fluctuations in the populations of certain species, variations in their seasonal migrations, ice and storm conditions at sea, summer rainfall and winter snow cover on land are just a few examples of the kinds of environmental conditions that can influence significantly animal population levels, hunters' access to them, and consequently, the subsistence harvest levels of various species.

Constraints of employment and unemployment on hunters also can influence subsistence harvest levels. Modern Wainwright subsistence hunters require some cash for subsistence equipment as well as time for pursuing subsistence activities. Thus, employment/unemployment is a variable in households' subsistence strategies and in their harvest levels. However, this study did not analyze the nature of the relationship between economics and subsistence.

Similarly, there are many sociocultural aspects of subsistence, such as the role of kinship in subsistence and the sharing of subsistence foods, that are culturally very important to the people of Wainwright. However, the study's focus was on quantifiable harvest data and did not address the sociocultural aspects of subsistence in depth.

Although the data on number of animals harvested is presented, the study team also converted the harvests to pounds for the purpose of having a common unit of measurement by which harvest levels of multiple species can be compared and combined. The pounds data represent "usable" weight (rather than the "round" weight of the entire animal) and are based on standardized estimates of usable weight developed for each species by the Alaska Department of Fish and Game (ADF&G). The ADF&G Community Profile Database Catalog (1991:xxii) refers to this variable as "edible pounds" and defines it as follows:

Edible Pounds is a measure of the portion of the kill brought into a household's kitchen for use, representing the usable pounds of the wild resources harvested (sometimes referred to as "usable weight" or "dressed weight"). In general, "edible pounds" is about 70-75 percent of round weight for fish, 60-65 percent of round weight for game, and 20-60 percent of round weight for marine mammals, and it includes bones for particular species. It is equivalent to the weights of domestic meat, fish, and poultry when purchased in a store.

The study team chose to use the same conversion weights as ADF&G where possible to achieve a high level of consistency between the large body of ADF&G research on community subsistence harvests (based on pounds of edible weight harvested) and this study. This study was not designed as a study of consumption, i.e., household reports of how much subsistence food they ate. However, in some cases a discrepancy exists between the amount of an animal that is edible and that which is actually eaten by the typical Wainwright household. For example, the estimates of edible weight for bowhead whale and walrus include all the

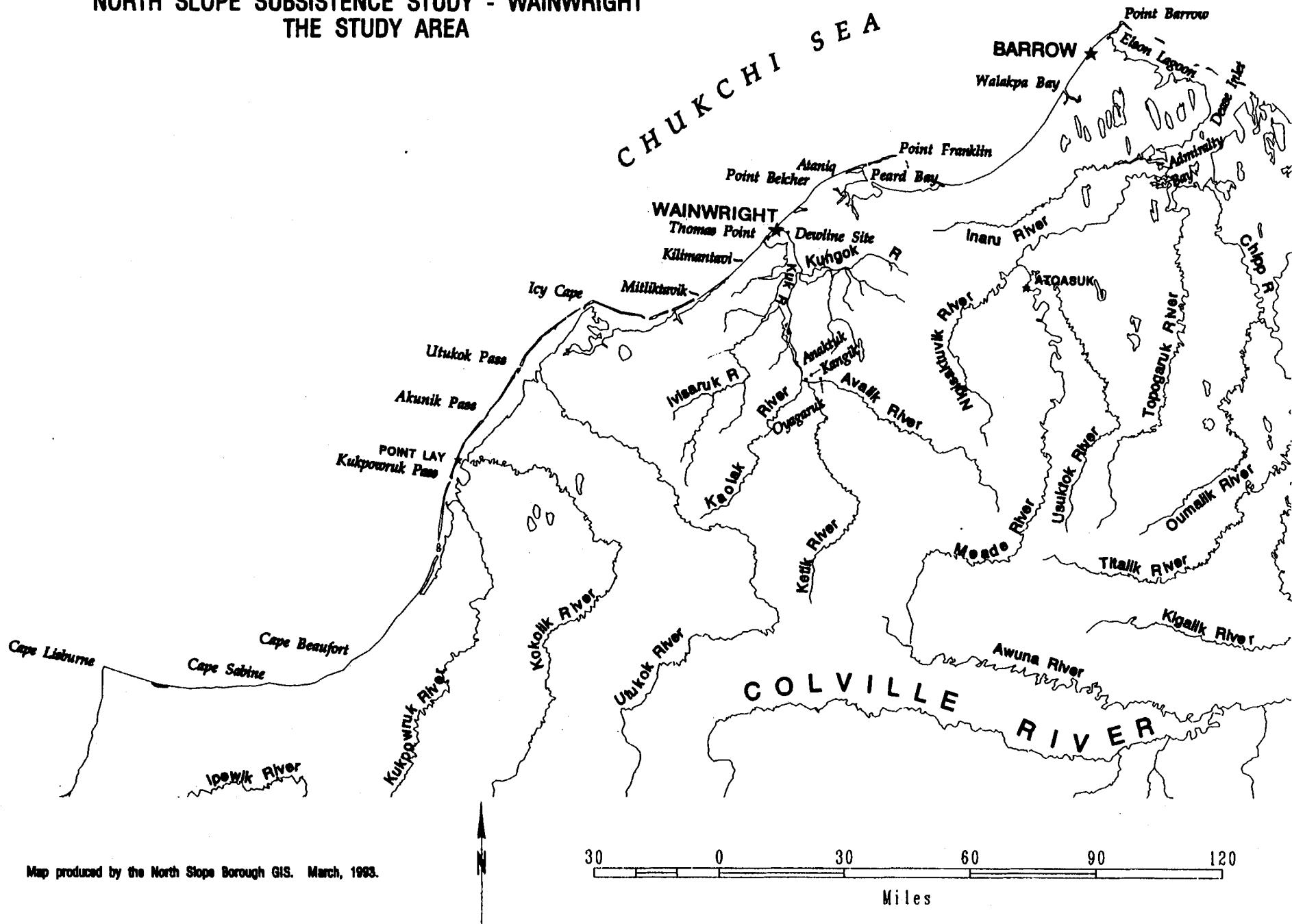
meat, tongue, *maktak* (skin plus the attached one to two inches of blubber), all the blubber and some of the organs from these animals. Although the blubber is used in a variety of ways, it may not all be eaten by Wainwright residents. Some of the blubber might be trimmed away on the ice. Additionally, in a successful whaling season, large quantities of blubber are sent by successful whaling captains and their crew members to Anaktuvuk Pass, Atkasuk, and other whaling communities on the North Slope that may not have had a successful whaling season. Also, Wainwright residents share large amounts of blubber, meat and *maktak* by sending it to friends and relatives in many different communities, including Fairbanks and Anchorage.

Hence, although our harvest data estimate the total amount of animal product potentially available to eat, in fact not all the product is eaten by Wainwright residents. In the case of these large animals that are widely shared beyond the community, the inclusion of all potentially usable weight has implications for the relative proportions they represent in the overall harvest, particularly when compared to the proportion that smaller species represent (e.g., fish and caribou) for which the usable weight more directly represents the amount actually eaten by Wainwright residents (according to field discussions and observations). Had this study had as its focus Wainwright consumption of subsistence foods, marine mammals (particularly bowhead and walrus) would represent a relatively smaller proportion of the total than is now the case, and terrestrial mammals, birds and fish would represent larger proportions of the total. Therefore, the reader must bear in mind that the harvest quantities presented in this report as usable pounds may not represent the quantities actually consumed by Wainwright residents (mainly in the case of bowhead whale and walrus). This project collected harvest data, not consumption data.

SETTING

The community of Wainwright is situated on the Chukchi Sea coast approximately 100 miles southwest of Point Barrow, the most northerly point in the United States, and 300 miles north of the Arctic Circle (Map 1). The community of Barrow, about 90 miles to the northeast, is both the economic and transportation hub for most North Slope villages, including Wainwright. Wainwright is

MAP 1
NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT
THE STUDY AREA



Map produced by the North Slope Borough GIS. March, 1983.

one of eight communities within the North Slope Borough. A North Slope Borough census conducted in Wainwright in 1988 enumerated a population of 502 people living in 127 households (NSB Department of Planning & Community Services 1989).

Wainwright is located at the base of a small peninsula between the Chukchi Sea and the mouth of the Kuk River lagoon system. The Kuk River extends 50 miles inland from Wainwright and, along with its tributaries, provides a travel corridor for Wainwright residents into inland hunting areas. During the summer and fall, the rivers permit boat travel deep into the interior for fishing and hunting the migrating caribou; in the winter and spring months, the frozen rivers provide a trail network and important navigational landmarks for travel by snow-machine in pursuit of furbearing animals, caribou, ptarmigan, and spring geese.

Being situated on the coast allows Wainwright hunters to also exploit the marine environment. Residents hunt marine mammals in the open leads (sections of open water in the otherwise frozen ocean) that form offshore from Wainwright, particularly in the spring when the bowhead whales migrate along the lead system. They also hunt the returning ducks and geese along the leads and the thawing coastline in the spring. When the ocean ice breaks up, hunters drive their boats to the drifting ice floes where the walrus and bearded seals can be found. Thus, Wainwright's location provides local residents with coastal and marine harvest opportunities on the Chukchi Sea, provides access to the unique lagoon habitat adjacent to the townsite, and access to the riparian habitat of the Kuk River and its tributaries as well as the inland tundra, tundra lakes, and mountain foothills for the mammals, birds, and fish that inhabit or migrate through those areas.

STUDY APPROACH

A full-time, on-site field coordinator organized the collection of comprehensive subsistence data through repeated contacts with study households over the study period. Essential to the study approach were at least two consecutive years of data collection. The variability inherent in subsistence harvest patterns, both seasonally and annually, underscores the importance of this long-term approach. The areas used by Inupiat hunters vary seasonally

according to resource distribution patterns and hunter access. Harvest patterns vary from year to year due to environmental conditions, the population status of the targeted resources, as well as social, economic, and cultural influences. Two years of data collection represent a minimum length for this type of study. In two years, one can get a sense of some general patterns and year to year variations. However, two years is too short a period to capture the longer cycles associated with some animal populations and environmental conditions that can and do profoundly affect subsistence harvests. A longer study period would be more desirable in order to capture the variation over time that is inherent in subsistence.

A second essential element of the study approach in Wainwright was the inclusion of all households willing to participate in the study, in contrast with the stratified sampling approach implemented in Barrow (SRB&A and ISER 1993 - Appendix D). In Barrow, the study team foresaw the impossibility of contacting 937 households periodically throughout each study year and therefore applied stratified sampling techniques to obtain a sample of over 100 households to represent the community as a whole. On the other hand, the study team considered Wainwright's estimated 120 to 130 households to be a manageable number to include in the study. The implications of including all Wainwright households in the study, i.e., conducting a census rather than a sample, are discussed in detail in the Methodology (see Appendix C).

During the first year of data collection, the North Slope Borough provided both technical (e.g., Geographic Information Systems mapping) and financial (e.g., local research assistants [RAs] hired through the NSB Mayor's Job Program) support for this project. During Year Two, the NSB continued this support (except for the Mayor's Job Program which was phased out) and also provided supplemental funding for data collection and analysis. This additional funding made possible the continuous field presence in both Wainwright and Barrow, added to the scope of work SRB&A personnel were able to accomplish, and facilitated the data collection and analysis.

DIFFERENCES BETWEEN ANNUAL PROJECT REPORTS

The Wainwright Year One report (SRB&A and ISER 1989b) presented interim results of the first year of data collection in the form of tables, figures, maps and accompanying discussions. The report also described the methods used in this study to collect and process the data. As the final product in this two year study of Wainwright, this report does not focus only on presenting the Year Two data as a sequel to the Year One report, but rather presents Wainwright subsistence in broader terms by emphasizing two year average annual harvests and variability in harvests between the two study years. Extensive use is made of maps, tables and graphics to supplement the discussion of the data. Since publication of the Year One interim report (SRB&A & ISER 1989b), the Year One data have been updated and revised. The correct data are presented in this report, and the data presented in the Year One interim report are no longer valid. The Year One (revised) and Year Two data are appended separately to this report in the form of tables, graphs and maps. Also included in each year's appendix is a narrative report (the Seasonal Round) describing the sequence of harvest activities and related environmental, cultural, and economic events for that year. A third appendix presents the methodology used to conduct this study. Thus, the body of the report concentrates on Wainwright subsistence from a two year perspective, while data on the individual years and methodological documentation are presented in the appendices.

FORMAT OF THIS REPORT

Following this introduction, the second section of the report (Overview of Wainwright Subsistence) describes the study area and summarizes demographic characteristics of the community, the general annual cycle of harvest activities, a geographic overview of subsistence, as well as community and household harvest levels for the major resource categories. The third section (Wainwright Subsistence Harvests) presents average annual harvest data as well as an examination of year to year variability based on the Year One and Two harvest data. These discussions are organized by major resource group and are species-specific. In the fourth section (Household Variation in Harvest Levels), harvest levels are discussed with regard to socioeconomic characteristics of households. Next, Barrow and Wainwright harvests are

briefly compared. In the last chapter of the report, Dr. Sam Stoker presents an analysis of the study's harvest levels with regard to the sustainable yield of the major subsistence species populations. Finally, as stated previously, Appendix A contains Year One data, Appendix B contains Year Two data, and Appendix C contains the methodology.

II. OVERVIEW OF WAINWRIGHT SUBSISTENCE

The study findings for Wainwright (April 1, 1988 through March 31, 1990) are summarized in this section. The basis for the harvest estimates and Wainwright demographic information are discussed below, followed by a listing of species harvested in the Wainwright area and a general description of the seasonal harvest patterns (Seasonal Round). The areal extent of Wainwright hunting and fishing activities is presented, including a discussion of the use of cabins and traditional camps. Finally, summary harvest data are presented for the major subsistence resource groups (in tabular, figure and map form).

BASIS OF HARVEST ESTIMATES

As stated previously, the goal of this study was to obtain subsistence harvest information for harvest events that occurred over the two year study period through regular contacts with all Wainwright households. Data were collected on species harvested, harvest date, amount harvested, mapped location of the harvest, and other information (e.g., number of household participants) for each harvest event. Throughout Year One, harvest discussions were conducted with 124 households. By the end of Year One, a full year's harvest data had been collected from 107 of the 124 households. Data for the remaining 17 households did not cover the full year for various reasons (e.g., some households moved into the community mid-year, some moved away, some one-person households passed away, and some households refused). (See Methodology for detailed information on household contacts). During Year Two, 119 households were included in the study, including nine households that were present only part of the year. Thus, a full year's harvest data were collected for 110 households in Year Two.

Because the Wainwright study attempts to report on the harvest activities of the entire community (rather than on a representative sample), all harvest data collected have been included in the estimates of total community harvest for each year (and for the two years averaged), including the harvests of the households that participated for only part of the year. Calculations of average harvest amounts per household and per capita for Year One (revised) and Year Two

and the percentage of households harvesting each resource, however, are based only on data provided by the 100 households that were present in the community and participated for the full two years of data collection. Throughout this report, these 100 households are referred to as the "core study households."

The harvest estimates presented in this report may vary from actual harvest amounts due to errors in reporting, errors in recording, and errors introduced with the use of average weights in the conversion of the number harvested to the amount of usable pounds harvested. Errors in reporting were minimized through repeated contacts with respondents over the course of the two years (see Key Informant Discussions in Appendix C for further detail on the method used to conduct and determine frequency of household contacts). Errors in recording were minimized with the application of rules and definitions by those persons collecting the data (i.e., the on-site field coordinator primarily, as well as trained research assistants in Year One) and through a review of each report by the field coordinator. Additionally, data provided by one household were cross-checked with data provided by other households that participated in the same harvest event. Finally, the conversion weights applied are predominantly those produced by the Alaska Department of Fish and Game (ADF&G) Division of Subsistence from data collected in Nuiqsut and Kaktovik, both North Slope villages (ADF&G n.d.). These weights were used to aid in comparisons between the data presented in this report and other ADF&G research. The weights are useful for comparing the relative amount of food contributed to the total community harvest by the different resources. These and other methodological issues are discussed in detail in Methodology (Appendix C). Despite these caveats, the data collected in Wainwright are a comprehensive and nearly complete two-year record of harvest events for this North Slope village.

WAINWRIGHT DEMOGRAPHY AND HOUSEHOLD CHARACTERISTICS

The next few paragraphs provide a very brief overview of present day Wainwright people's background. This overview is not intended to be a detailed ethnohistory. For more complete ethnohistoric and ethnographic information on Wainwright the reader is referred to Milan (1964), Nelson (1969, 1981) and Luton (1985).

The Wainwright area was occupied traditionally by two main groups of Inupiat people, the Kuugmiut (people of the Kuk River) and the Utuqqaqmiut (people of the Utuqqaq River - presently spelled "Utukok") (Milan 1964, Ivie and Schneider 1979). As elsewhere on the North Slope, these early residents of the area traveled considerably on a seasonal basis to obtain the resources available from season to season. According to Ivie and Schneider (1979), caribou migration patterns, which vary from year to year, were the major influence over where the Utuqqaqmiut spent the winter. In the spring, bowhead whaling brought many Utuqqaqmiut to Icy Cape. Walrus hunting kept them on the coast through the summer until the time came to travel up the Utukok River for fall fishing. The year was punctuated by several festivals that brought people together from their scattered camps to visit and trade.

The Kuugmiut followed a similar cycle prior to the turn of the century, according to Ivie and Schneider (1979), with the principal difference being that the Kuugmiut generally did not travel far from the coast. They hunted whales at Ataniq (at the base of Point Franklin, Map 1) and other sites, and hunted waterfowl in the late spring and early fall throughout coastal areas. Walrus were hunted in the summer. Summer and fall fishing increased in importance in poor caribou years. Families moved to fall fish camps along the Kuk River before freeze-up. One location in particular, Kangitch (the confluence of the Kuk and Avalik rivers, Map 1), was an important gathering and trading place for Kuugmiut and Utuqqaqmiut (Spencer 1959 referenced in Ivie and Schneider 1979).

In 1904, a school was built at the present location of Wainwright and reindeer herding was introduced at the inlet (Jackson 1905). These two occurrences encouraged settlement at Wainwright of the various inland and more coastal Native peoples (among, eventually, other Inupiat and non-Inupiat peoples as well) (Milan 1964), and thus the community of Wainwright was established.

Prior to contact with non-Natives, the Inupiat of the North Slope survived entirely on a subsistence hunting and fishing economy. Trading with other Native groups to the south introduced foreign trade goods (e.g., tobacco and Russian kettles), but actual contact with non-Natives did not occur in the Wainwright area until 1826 when heavy summer ice stranded the H.M.S. *Blossom*, whose crew was searching for the Northwest Passage (Milan 1964).

In the second half of the 1800s, the bowhead rich waters of the Bering and Chukchi seas brought many Europeans and Americans to the Arctic coast. The commercial whalers enlisted Natives in commercial shore-based whaling efforts and paid them in goods or cash for their labor. This industry collapsed in 1909 (Bockstoce 1986). Commercial whalers had over-exploited the bowhead whale and walrus populations during their decades along the Arctic coast, leaving the subsistence resources of the Native populations diminished. Wainwright elder Waldo Bodfish, referring to the commercial walrus harvest, wrote:

Finding no whales, we started to hunt walrus, a regular feature of this kind of voyage when whales were scarce. Hundreds of walrus would haul out on an ice floe, and many smaller groups. It was custom to row or paddle up to the flow with a whaleboat, and the officer in charge, or some good shot, would start shooting those nearest the ice edge. A Sharps 45-70, the regular buffalo gun, was used as a weapon. Each boat carried two when walrus hunting. When one got too hot to handle it was dropped overboard on a lanyard to cool. I believe that Captain Owen killed 250 walrus on the first cake of ice. An average walrus made only about three-quarters of a barrel of oil. We took 600 that season. (Bodfish 1936:21)

A caribou shortage also existed in the late 1800s and early 1900s (Andrews 1939). Sonnenfeld (1956) attributed the shortage to commercial over harvesting related to the commercial whaling activity. Bockstoce (1986), on the other hand, attributed the caribou decline to a natural (though severe) biological cycle. Regardless of the cause, this caribou decline had severe impacts on the Inupiat (Sonnenfeld 1956, Bockstoce 1986), with many inland peoples moving to the coast where food sources were more abundant.

According to Milan (1964), the shift from a subsistence economy to a mixed economy in the Wainwright area proceeded as follows. The Bureau of Education assumed responsibility for the welfare of the Native people in Alaska, establishing the school and reindeer project in Wainwright in 1904. The reindeer project was intended to provide a means of livelihood for the Natives, and evidently lasted only into the late 1930s or early 1940s. Meanwhile, Natives also began to sell furs as a means of obtaining cash. In 1918, several residents pooled their earnings from the fur trade to establish the Wainwright Native Store so that a variety of supplies could be available locally. Wage employment became established in Wainwright with the need for a school janitor (the teachers were brought in from outside the community), a postal worker, store employees, the Presbyterian minister, and occasional temporary construc-

tion work, both in the community and in Barrow. Government subsidies such as Old Age Pensions were introduced to the community in 1935 and residents began to receive Aid for Dependent Children around 1940. The wage sector increased significantly in the 1970s when the North Slope Borough was formed, resulting in capital projects in the village that generated seasonal and permanent jobs (Alaska Consultants, Inc. [ACI] et al. 1984). In brief, contact with non-Natives introduced the Inupiat to guns and other supplies that they incorporated into their daily lives, and the various other endeavors mentioned above (e.g., the reindeer project, selling furs) further encouraged the transition from a strictly subsistence economy to a mixed subsistence and cash economy.

The population of Wainwright was estimated to be comprised of 84 Inupiat residents in 1910 (Braund et al. 1988), increasing steadily to 327 Inupiat and non-Inupiat residents in 1939 (U.S. Department of Commerce 1921, 1932, 1942). A school that had been built at Icy Cape in the 1920s was moved to Point Lay in 1930, thus accelerating settlement of the Kuugmiut and Utuqqaqmiut into these two villages, Point Lay and Wainwright (Ivie and Schneider 1979). The population decreased gradually to 227 (Inupiat and non-Inupiat) in 1950 and then began climbing again (U.S. Department of Commerce 1952, 1961, 1972). The reversal of population growth in the 1940s may be related to a decline in reindeer herding (Ivie and Schneider 1979) during that decade. By 1960 the total population was up to 253 and by 1970 the U.S. Census counted a total Wainwright population of 315 people (including eight non-Inupiat). The population grew to 405 in 1980, including 33 non-Natives (U.S. Department of Commerce 1981), and the most recent NSB census taken in 1988 showed a population of 514, including 47 non-Inupiat residents (NSB Department of Planning and Community Services 1989). Much of the growth in the last two decades can be attributed to the formation of the North Slope Borough in 1972, a local governing body with the ability to tax, and to North Slope oil development, a significant tax base. Revenues accrued to the borough were applied to developing capital projects in the villages, such as modern housing, schools, clinics and utilities, and created new seasonal as well as permanent jobs. These improvements supported growth.

Tables 1 and 2 present summary findings from the 1988 NSB census of Wainwright. This census enumerated 131 households averaging 3.9 people per household. The community population was 89 percent Inupiat.

TABLE 1: WAINWRIGHT POPULATION CHARACTERISTICS, 1988

	<u>Inupiat</u>			<u>Other</u>			<u>Total</u>	<u>%</u>
	<u>Male</u>	<u>Female</u>	<u>Both</u>	<u>Male</u>	<u>Female</u>	<u>Both</u>		
<u>Age</u>								
Under 4	23	24	47	3	1	4	51	10%
4-8	31	43	74	1	4	5	79	16%
9-15	29	30	59	3	0	3	63	12%
16-17	6	4	10	0	0	0	10	2%
18-25	34	23	57	1	0	1	58	12%
26-39	50	52	102	22	4	26	128	25%
40-59	45	26	71	7	3	10	81	16%
60-65	7	6	13	0	0	0	13	3%
66 and up	<u>13</u>	<u>8</u>	<u>21</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>21</u>	<u>4%</u>
Total	238	216	454	37	12	49	503	100%

Number of Missing Observations: 11

Total Population: 514

Source: NSB Department of Planning & Community Services 1989

Stephen R. Braund & Associates, 1993

TABLE 2: WAINWRIGHT HOUSEHOLD CHARACTERISTICS BY ETHNICITY, 1988

	<u>Number of Households</u>	<u>Mean Household Size</u>	<u>Mean Number of Months of Employment Per Individual</u>	<u>Mean Number of Months of Unemployment Per Individual</u>
Inupiat	121	3.9	5.3	6.6
Non-Inupiat	10	4.1 ¹	9.0	2.3
Overall	131	3.9	5.4	6.5

1. One of the eight non-Inupiat households included 10 construction workers and another included seven construction workers, causing the average household size for non-Inupiat households to be higher than might be expected. For example, Worl & Smythe's (1986) analysis of the 1985 NSB census of Barrow found the average non-Native household size to be 2.4 persons per household.

Source: NSB Department of Planning & Community Services, 1989

Stephen R. Braund & Associates, 1993

As mentioned previously, this study collected complete Year One subsistence data for 107 households and complete Year Two data for 110 households. Demographic data were obtained for 105 of the 107 Year One households, indicating a population of 433 in those 105 households, an average of 4.1 persons per household. Ninety-eight percent of these households were Inupiat, defined by the study team as any household in which the head of household or spouse was Inupiat Eskimo. (This definition of an Inupiat household is used throughout this report. The NSB also used this definition in its analysis of 1988 census data - NSB Department of Planning and Community Services 1989:II2.) The 110 Year Two households consisted of 435 people in 1990, an average of 4.0 people per household. Of the 110 households, 108 (98 percent) were Inupiat. The 100 core study households (i.e., those present throughout both years) averaged 4.1 people per household for a total of 411 individuals; 99 percent of these households were Inupiat.

The reason this study reported fewer households than the number identified in the NSB census is that the census likely included those households (approximately six) that refused participation in this study; additionally, the census definitely included non-Native schoolteachers and construction workers who were not included in the present study.

In 1990, Wainwright operated as a second class city with an elected city council and a mayor. Under the Alaska Native Claims Settlement Act (ANCSA), Wainwright residents had formed a village corporation, Olgoonik Corporation. In addition to local institutions, Wainwright residents are represented in a number of regional institutions such as the NSB assembly, the Arctic Slope Regional Corporation, borough, state and federal fish and wildlife advisory committees, and the Alaska Eskimo Whaling Commission, among others. Wainwright is served by Presbyterian, Assembly of God and Baptist churches. The community has a high school and an elementary school, a clinic, emergency services (e.g., fire department, search and rescue group and public safety officers), a laundromat/water plant, hotel and restaurant, a community center and three stores. A Distant Early Warning (DEW) Line site was built outside of town in the 1950s and employed some local residents until 1989 when the operation was closed down.

SPECIES HARVESTED IN THE WAINWRIGHT AREA

People lived in this area long before commercial whaling or any other cash economy came to the region. Harvesting the local resources was the sole economy at one time. The establishment of a school and other subsequent institutions encouraged people to settle into a community, although seasonal migration to whaling camps, waterfowl hunting camps, and fish camps persisted, as did other subsistence pursuits. In the two years of this study, from 1988 to 1990, Wainwright residents harvested at least 46 species of fish, birds, and marine and terrestrial mammals, as well as berries, coal and ice. While the people of Wainwright were largely integrated into a cash economy by this time, the Wainwright area offers an abundant diversity of resources and traditional subsistence activity remained a key component of the local economy and the local Inupiat culture.

All the species harvested and recorded by this study in Years One and Two are displayed in Table 3. It is possible that Wainwright residents harvested additional resources during Years One and/or Two that were not reported during harvest discussions. The study team has found in both Wainwright and Barrow that, particularly with "small" or incidental resources such as plants or bird eggs, or occasionally ducks, ptarmigan, or fish, respondents may have forgotten to report these harvests unless the interviewer asked about them specifically. A complete list of resources known to have been harvested historically by Wainwright residents is found in Table C-1 (Appendix C).

In some instances, the researchers were not able to record each successful subsistence harvest by individual species. This problem occurred most commonly for those species harvested in mixed groups (e.g., various species of birds or fish). Thus, categories are included in the data tables for these non-specified reports, e.g., "non-specified duck" and "non-specified salmon." The recording of marine and terrestrial mammals, on the other hand, likely was more accurate. The harvest of these larger animals was more memorable for most people, and respondents had no problem distinguishing one from the other. Further discussion of reporting and recording methods is found in the Methodology, Appendix C.

TABLE 3: SPECIES HARVESTED BY WAINWRIGHT RESIDENTS
APRIL 1988 - MARCH 1990

<u>Species</u>	<u>Inupiaq Name</u>	<u>Scientific Name</u>
Marine Mammals		
Bearded seal	<i>Ugruk</i>	<i>Erignathus barbatus</i>
Ringed seal	<i>Natchiq</i>	<i>Phoca hispida</i>
Spotted seal	<i>Qasigiaq</i>	<i>Phoca largha</i>
Bowhead whale	<i>Agviq</i>	<i>Balaena mysticetus</i>
Beluga whale	<i>Qilalugaq</i>	<i>Delphinapterus leucas</i>
Polar bear	<i>Nanuq</i>	<i>Ursus maritimus</i>
Walrus	<i>Aiviq</i>	<i>Odobenus rosmarus</i>
Terrestrial Mammals		
Caribou	<i>Tuttu</i>	<i>Rangifer tarandus</i>
Moose	<i>Tuttuvak</i>	<i>Alces alces</i>
Brown bear	<i>Akmaq</i>	<i>Ursus arctos</i>
Arctic fox (Blue)	<i>Tigiganniaq</i>	<i>Alopex lagopus</i>
Red fox (Cross, Silver)	<i>Kayuqtuq</i>	<i>Vulpes fulva</i>
Ground squirrel	<i>Siksrik</i>	<i>Spermophilus parryii</i>
Wolf	<i>Amaguk</i>	<i>Canis lupus</i>
Wolverine	<i>Qavvik</i>	<i>Gulo gulo</i>
Ermine	<i>Itigiaq</i>	<i>Mustela erminea</i>
River otter		
Fish		
Salmon (non-specified)		
Chum salmon	<i>Iqalugruaq</i>	<i>Oncorhynchus keta</i>
Pink (humpback) salmon	<i>Amaqtuug</i>	<i>Oncorhynchus gorbuscha</i>
Silver (coho) salmon	<i>Iqalugruaq</i>	<i>Oncorhynchus kisutch</i>
King (chinook) salmon		<i>Oncorhynchus tshawytscha</i>
Whitefish (non-specified)		
Round whitefish	<i>Aanaakliq</i>	<i>Coregoninae spp.</i>
Least cisco	<i>Iqalusaaq</i>	<i>Prosopium cylindraceum</i>
Arctic cisco	<i>Qaaktaq</i>	<i>Coregonus sardinella</i>
Arctic grayling	<i>Sulukpaugaq</i>	<i>Coregonus autumnalis</i>
Arctic cod	<i>Iqalugaq</i>	<i>Thymallus arcticus</i>
Burbot (Ling cod)	<i>Tittaaliq</i>	<i>Boreogadus saida</i>
Tomcod (Saffron cod)	<i>Uugaq</i>	<i>Lota lota</i>
Arctic flounder	<i>Nataagnaq</i>	<i>Eleginus gracilis</i>
Fourhorn sculpin	<i>Kanayuq</i>	<i>Liopsetta glacialis</i>
Rainbow smelt	<i>Ilhuagniq</i>	<i>Myoxocephalus quadricornis</i>
Lake trout	<i>Iqalukpak</i>	<i>Osmerus mordax</i>
		<i>Salvelinus namaycush</i>

TABLE 3 (cont.): SPECIES HARVESTED BY WAINWRIGHT RESIDENTS,
APRIL 1987 - MARCH 1988

<u>Species</u>	<u>Inupiaq Name</u>	<u>Scientific Name</u>
Birds		
Eider (non-specified)		
Common eider	<i>Amauligrauq</i>	<i>Somateria mollissima</i>
King eider	<i>Qinalik</i>	<i>Somateria spectabilis</i>
Spectacled eider	<i>Tuutalluk</i>	<i>Somateria fischeri</i>
Stellar's eider	<i>Igniqauqtuq</i>	<i>Polysticta stelleri</i>
Other Ducks (non-specified)		
Oldsquaw	<i>Qaugak</i>	<i>Clangula hyemalis</i>
Pintail	<i>Aahaaliq</i>	<i>Anas acuta</i>
Mallard	<i>Kurugaq</i>	<i>Anas platyrhynchos</i>
Goose (non-specified)		
Brant	<i>Kurugaktak</i>	<i>Branta bernicla n.</i>
White-fronted goose	<i>Nigliq</i>	<i>Anser albifrons</i>
Lesser snow goose	<i>Nigliviuq</i>	<i>Chen caerulescens</i>
Canada goose	<i>Kanuq</i>	<i>Branta canadensis</i>
Arctic loon	<i>Iqsragutilik</i>	<i>Gavia arctica</i>
Ptarmigan (non-specified)		
Rock ptarmigan	<i>Malgi</i>	<i>Lagopus sp.</i>
Willow ptarmigan	<i>Aqargiq</i>	<i>Lagopus mutus</i>
	<i>Niksaaktuniq</i>	<i>Lagopus lagopus</i>
	<i>Nasaullik</i>	
Other Resources		
Plants		
Cloudberry	<i>Aqpik</i>	
Crowberry	<i>Paungaq</i>	
Salmonberry	<i>Aqpik</i>	
Minerals		
Coal	<i>Aluaq</i>	
Water		
Fresh water	<i>Imiq</i>	
Fresh water ice	<i>Sikutaq</i>	
Sea ice	<i>Siku</i>	

Source: Stephen R. Braund & Associates, 1993

AREAL EXTENT OF SUBSISTENCE LAND USE

This section presents a brief introduction to the areal extent of Wainwright subsistence. An overview of the methods used to map subsistence harvests and produce the maps is presented here (and also, in more detail, in the Methodology) so that the reader may better understand the maps included in the report. This overview of mapping methods is followed by a description of the general harvest area and a discussion of the community's use of cabins and camps in pursuit of wild resources.

Review of Map Collection and Production Procedures

During harvest discussions with study households, the hunter marked on a 1:250,000 scale map the location where each harvest occurred. Later, the NSB digitized (i.e., plotted) the mapped data points into the NSB's Geographic Information System (GIS), a computerized mapping system. The NSB GIS linked descriptive data to the mapped harvest points, allowing the NSB GIS to select and map a subset of digitized points based on the descriptive variable(s) selected. For example, by selecting only the species walrus and polar bear, and assigning a different symbol to represent each of those two species, a map showing (and differentiating) all walrus and polar bear harvest locations could be produced. This brief description greatly understates the amount of detailed work performed by NSB GIS staff in producing the many individual maps included in this report.

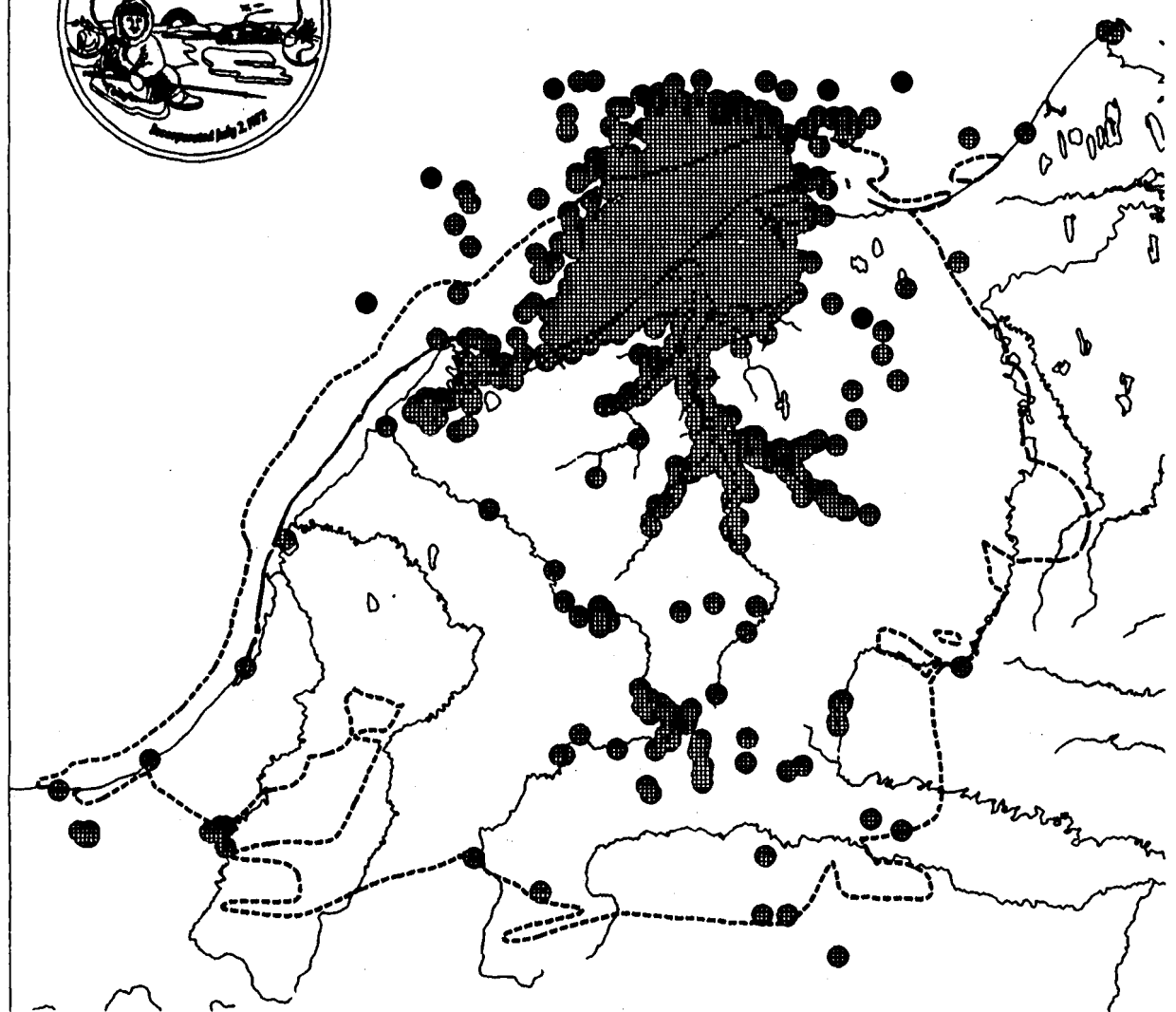
Map 2 illustrates Wainwright harvest locations for the harvest of all species (undifferentiated) during both Years One and Two combined. Wainwright residents used a number of fixed camps for their harvest activities and visited scores of other areas in pursuit of mobile resources. The data presented on the maps are limited to the locations of successful harvests during Years One and Two; the data are also limited to the households who participated in the study (including those that participated in the study for only part of either year). Thus, the maps do not illustrate the total area hunted. However, the study team's field experience indicates that the mapped harvests likely give a reasonable representation of the main harvest areas used in Years One and Two.



MAP 2 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT SUBSISTENCE HARVEST SITES, YEARS ONE AND TWO

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study. Lifetime-community harvest areas, collected in the form of map biographies from 14 households (Pedersen 1979), are also illustrated.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Brund and Associates (SR&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SR&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.



LEGEND INFORMATION



Lifetime community land use (Pedersen 1979).

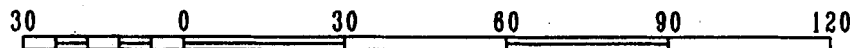


All Species Harvested

Seals, bowhead whale, beluga whale, polar bear, walrus, caribou, moose, brown bear, fox, wolverine, wolf, ermine, river otter, ground squirrel, fish, eiders, other ducks, geese, loons, cranes, ptarmigan, berries, water

Map Production: North Slope Borough GIS

Date: April 05, 1991



MILES



On most of the maps, individual harvest locations are depicted by a shaded circle. Each circle represents an actual harvest site surrounded by a two mile buffer. Overlapping circles form larger shaded areas. The two mile buffer serves three purposes. First, the depiction of harvest sites with a two mile buffer reflects an intent to include at least the immediate hunting area. Second, the use of a buffer also accounts for possible errors in reporting the exact location of harvest sites. Respondents reported the location of fish sites, for example, with certainty because those sites were identified easily by the geographic features of the lake or river. Other harvest sites with distinct geographic features were reported with a high degree of accuracy as well, evidenced by the respondent's ease and confidence in mapping the location. On the other hand, harvests of marine mammals or birds from boats offshore, for example, or of caribou out in the open tundra, were reported typically as an approximate location but recorded as one point on the map representing the respondent's best estimate of the exact harvest site. The lack of geographic landmarks reduced the precision with which the hunter could locate some harvest sites on the map. Third, the buffer is used to enhance the visual effectiveness of the data presented on the maps, particularly where distinct categories of data must be differentiated. Symbols as well as smaller buffers were tested as alternatives, but did not represent the data clearly, especially where harvests of multiple species overlapped (e.g., Map 4 on page 51).

Geographic features are not named on Maps 2 through 19 due to the need to present harvest data as clearly as possible. Geographic features can be identified by consulting Map 1 in combination with the harvest data maps.

The maps indicate where one or more harvest events occurred. A harvest site may represent one harvest event during which one animal was harvested, or it could represent any number and variety of animals harvested on different dates and by different households, all in the same location. Hence, the sites as presented do not exhibit the number of harvest events or the number or pounds of usable resource product harvested at each site. However, different species or species groups harvested in the same location would be indicated by one symbol (representing one species or species group) superimposed over another. (An example of a species group is eiders, which includes four individual species of eiders.)

In combination with the harvest locations, many of the maps show a lifetime community land use perimeter line (Map 2). This line represents the aggregation (along the outer limits reported) of map biographies collected from 14 Wainwright individuals for the University of Alaska Fairbanks Cooperative Park Studies Unit and the NSB (Pedersen 1979). Pedersen noted that because the data are from a sample of hunters, the data understate land use for Wainwright as a whole. However, he sought individuals who had been hunting a long time (i.e., older hunters) and who were known to range widely in their subsistence efforts to minimize the degree of understatement in the documentation of lifetime use areas. Although a nomadic way of life preceded the settlement of Inupiat families into villages, these maps represent village-centered use areas only; Pedersen excluded periods of nomadism from this database. These lifetime use data are included to demonstrate how the areas hunted over several decades (up to 1978) may differ from the area of successful harvests in a two year period in the late 1980s.

Overview of Current Subsistence Land Use by Wainwright Residents

As described in the Introduction, Wainwright has a very unique geographic setting which offers tremendous opportunities for local hunters. The following section discusses current geographic aspects of subsistence hunting and fishing in the Wainwright area generalized from data collection and field observations during Years One and Two of this study. This description explains areas used, the time of year when they are used, and species hunted by the people of Wainwright. The reader is referred to Maps 1 and 2 (pages 6 and 22 respectively) in conjunction with this section.

The Ocean Environment

Situated on the Chukchi Sea, Wainwright has many of the benefits that this rich marine environment offers to subsistence hunters. Whales, walrus, seals, polar bears, and ducks are plentiful and are harvested principally during the spring, summer and fall, although polar bears and ringed seals are harvested occasionally in the winter as well. In the spring (April and May), hunters make snowmachine trails across the ocean ice to the open lead to set up whaling camps. Having towed their whaling boats and gear by snowmachine to whaling

camp, they await the migrating bowhead whales. Whaling crews concentrate intensively on watching for whales; however, during a lull in the bowhead migration, or if the ice closes up, the hunters also pursue eiders, ringed seals, and the occasional bearded seal.

The majority of the walrus and seals migrate past the Wainwright area in the early part of the summer during the breakup of the ocean ice. In the first part of breakup, usually in late June or early July, the ocean ice parts at the Kuk River Inlet. This outlet allows the hunters a corridor for boat travel to the open lead and to the prime hunting grounds of the open water/drifting ice environment. This is the first opportunity that individuals have to take their own boats out, rather than hunting in the context of the whaling crew from whaling camp. On these early walrus and bearded seal hunting excursions, hunters sometimes stay out over 24 hours in their boats, letting the animals and the ice conditions dictate their travel.

Later, when the shorefast ice is gone (typically July through September), Wainwright people travel in their small boats reportedly as far as fifty miles out from shore. Out there, walrus rest on the drifting ice floes and bearded seals swim about. If the ice carrying the animals is closer to town, hunters do not have to travel so far. However, the hunters will travel great distances if necessary to hunt walrus and bearded seals. The journey out to the drifting ice in July and August in a small boat can be long and dangerous; thus, hunters more typically stay within 20 miles of shore. During the two study years, ice conditions were favorable and allowed Wainwright residents to harvest marine mammals close to home between Kilimantavi and Point Franklin within 20 miles of shore. Once the walrus and bearded seals were no longer available, or people believed they had acquired sufficient harvest of marine mammals, hunting on the open ocean typically came to an end.

In the fall and winter, use of the marine environment tapers off. However, Wainwright hunters occasionally take polar bears along the coast in front of Wainwright, mainly in the late fall, and hunt ringed seals in the open leads that form periodically in the winter sea ice.

The Coastal Environment

Considerable travel also occurs both north and south of Wainwright. Although hunters travel great distances out over the ocean in pursuit of walrus and bearded seals, they prefer to travel up and down the coast when the shoreline is free of ice rather than traveling straight out from shore. As mentioned above, the shorefast ice generally breaks away in late June or July and the coast remains fairly ice-free through September.

Wainwright hunters go north, along the shoreline or across the tundra, to Point Franklin and sometimes as far as the Peard Bay area by boat, snowmachine and all terrain vehicle (ATV). In Year Two of the study, hunters traveled by boat and snowmachine as far north as Barrow. They travel north along the coastline in search of caribou that have migrated to the coast to where the cool winds provide some relief from the insects. People also travel the coastline looking for walrus that may have washed up on shore. Some people fish the lower sections of rivers that intersect the coast, and some people hunt ducks and geese.

To the south, Wainwright hunters often travel to Icy Cape to hunt caribou and birds, occasionally encountering moose and brown bears there. Icy Cape is a traditional area for autumn brant hunting, and a local population of spotted seals resides in the area all summer. The coast between Wainwright and Icy Cape has several well-used brant hunting sites. This section of coast is also where people watch for and hunt beluga whales as they migrate north in the early summer. In the winter, hunters looking for furbearers may travel past Icy Cape and Point Lay to Cape Sabine, where they seek wolverines coming down from the mountains to prey upon seal pups on the ice. Wainwright hunters often travel down the coast to the Kukpowruk and Utukok rivers during the winter in search of game. Occasionally, people go south of Icy Cape in the summer as well, taking their boats through the Utukok River delta and up the river.

Finally, Wainwright's location on the coast affords residents access to coastal habitat without having to travel far at all. In addition to setting salmon nets off the beach, hunting eiders that migrate along the coast, harvesting polar bears and caribou that wander near town, and catching thousands of smelt in the lagoon, residents harvest various other species that appear near town.

The Inland Environment

Wainwright's location near the mouth of the Kuk River lagoon is unique and advantageous. This large lagoon behind Wainwright dominates the physical setting and provides easy access not only to the ocean but also to the riparian habitat of the interior. Residents use this waterway both in the summer, traveling by boat, and in the winter when traveling by snowmachine. Here, caribou, fish, wolves, wolverines, moose, brown bears, geese, foxes, and berries can all be found and harvested. This geographic feature is fed by five major river systems (Kungok, Ivisaruk, Kaolak, Ketik, and Avalik) which serve as an extensive network for travel into the interior.

In the summer months of July through October, Wainwright residents navigate by boat along all of these rivers plus numerous other smaller tributaries, providing hunters a rich and productive area that is easily negotiated in pursuit of animals. Individuals, hunting partners, and entire families travel upriver, usually in late summer and early fall, to fish, hunt caribou, and pick berries. Depending on the tides and summer rainfall, the extent of upriver travel varies. In Year Two of this study, heavy rains in late summer raised the river levels, allowing people to navigate their boats farther upriver than usual.

In the winter, the range of land that can be accessed increases greatly. All the rivers turn into frozen highways, giving hunters many options for accessing various species and providing recognizable features for winter navigation. The small tributary rivers, which are too shallow in the summer, become highly utilized during the winter as hunters search for elusive inland furbearers. Snowmachine travel starts in October and runs until June. During the dead of winter, from November through March, hunters follow the Kaolak and Ketik rivers to reach the foothills of the Brooks Range. Hunters travel deep into the Brooks Range, past the Colville River. They sometimes travel over 1,500 to 2,000 miles in just a few days for the sole purpose of hunting the prized wolves and wolverines that inhabit the mountains.

In the springtime, when weather and ice conditions prohibit whaling, people go inland by snowmachine to hunt the returning geese along interior flyways known to Wainwright hunters. In June, breakup jeopardizes snowmachine travel and

sometimes causes flooding in the upper river, forcing geese hunters at their camps to return home to Wainwright.

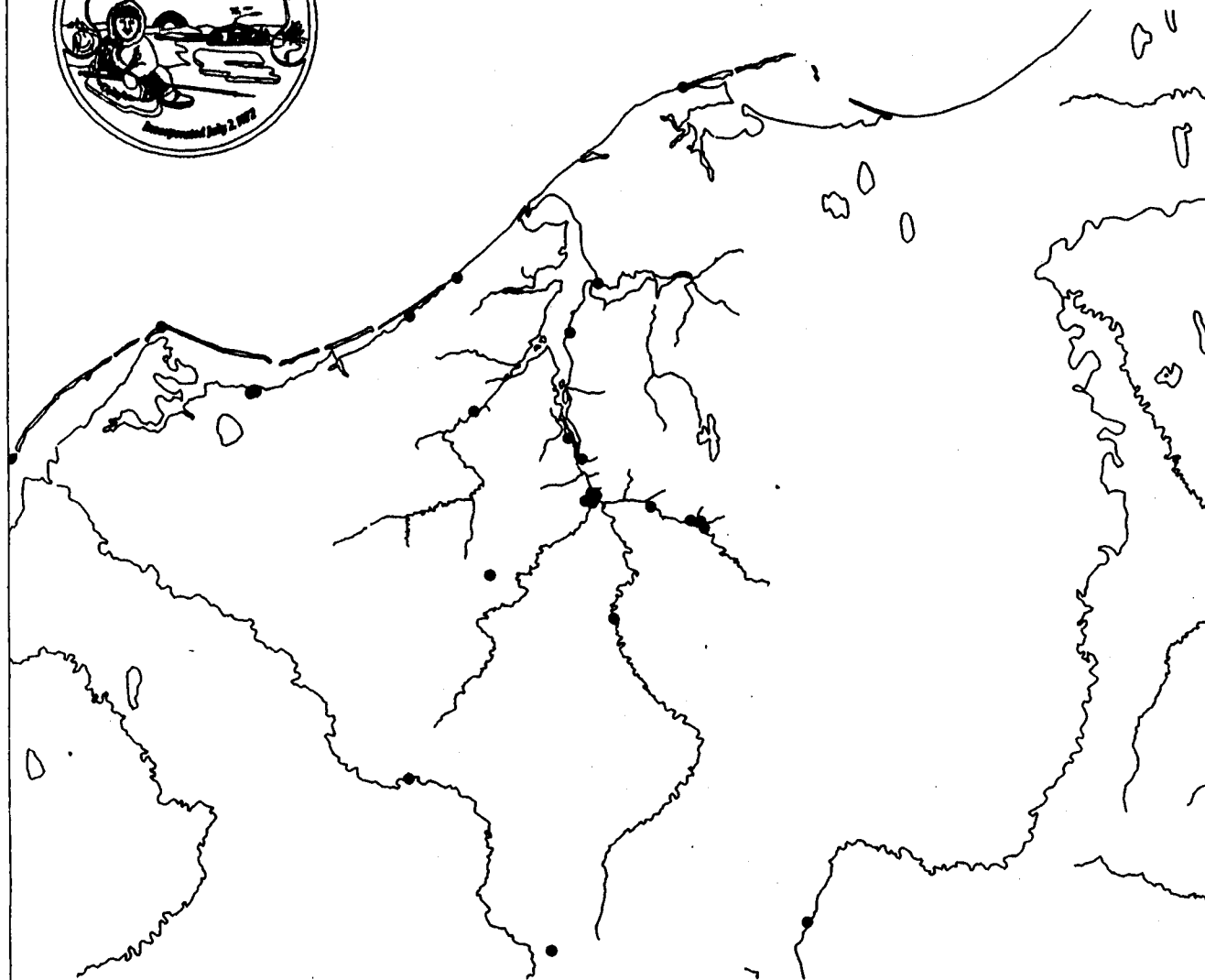
In summary, hunters begin their pursuit of marine species with spring whaling, traveling by snowmachine over the ocean ice to open leads where they camp and wait for whales. In late June, the inlet breaks up allowing boat travel to the broadening leads of open water for hunting walrus and bearded seals. Later, when the shore ice goes out, hunters can travel with the ice pack looking for marine mammals, and along the coast in pursuit of caribou. The coastal habitat can also be accessed by ATV in the summer and fall, and by snowmachine in the winter and spring. Wainwright hunters tend to concentrate most of their inland hunting along the river systems both during the summer and winter months, pursuing terrestrial mammals, birds and fish up the Kuk, Kungok, Ivisaruk, Kaolak, Ketik, Avalik, and Avaliktok rivers. Caribou hunting takes place over the broad area from Peard Bay to Point Lay to the Brooks Range. However, the activity that takes hunters the farthest from home is wolf and wolverine hunting. From deep in the Brooks Range, as far south as Cape Sabine and east to Atqasuk, furbearer hunters search the winter landscape for these elusive animals.

Fixed Cabins and Camps

The locations of most of the cabins owned by Wainwright residents are shown on Map 3: Cabin and Fixed Camp Locations. Since traditional times Wainwright residents have traveled throughout the tundra, along the coastal shoreline, on the ice, and up in the mountains, moving constantly to keep pace with the migratory animals they depended upon. Animal movement as well as environmental conditions dictated where and when the people went. Shallow depressions in the tundra are records of past human occupation where Inupiat families once lived and hunted. These signs of old dwellings can be seen far upriver and along the coast, where the parents and grandparents of present-day Wainwright residents waited for caribou, bowhead whales, and other important resources.

Despite changes over the years, many subsistence patterns have remained the same. During this study, hunters in Wainwright still traveled across the tundra, ocean, and mountains in search of animals. Subsistence was still a way of life for them as it was for their parents, and consequently the same hunting

MAP 3 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT CABIN AND FIXED CAMP LOCATIONS



This map displays the locations of fixed hunting and fishing camps used by Wainwright residents. The locations of many temporary subsistence camps are not shown.

Source: Stephen R. Braund & Associates (1990).

 Cabins and Fixed Camps

Map Production: North Slope Borough GIS

Date: April 11, 1991

20 0 20 40 60 80

MILES



areas were still utilized. Where people once camped with tents and sod houses, now a more modern plywood cabin may stand, sometimes directly on top of the old dwelling. Most of these newer structures were built in the last 25 years by the older generation of Wainwright who traveled out to this land as children and later as adults driving dogsleds. As Nelson (1981:112) observed,

Activities associated with resource harvesting are also subject to change over time. Especially notable is summer and fall camping along the coast and rivers, which had diminished to a low point 20 years ago and has increased considerably since. Families now occupy traditional camp sites regularly throughout the warmer months, for periods ranging from a few days at a time up to a month or more.

During the study period, more new cabins were being constructed by a younger generation. The cabins were used by immediate families and occasionally extended families. Local residents understood that anyone could use the cabins in times of emergency.

The cabins typically were small plywood structures situated singly at a particular site. Some locations, however, like the traditional site of Oyagaruk on the Avalik River, had over six cabins and on many occasions numerous wall tents. Cabins located along the rivers were used heavily during the summer months when families filled their boats with supplies and traveled upriver. Coastal camps were used mostly during the months of May through August when marine animals and waterfowl were at their peak. Mountain camps could be reached when the snow fell and the rivers froze, allowing inland travel by snowmachine.

The people of Wainwright had many cabins from Peard Bay to Icy Cape to the foothills of the Brooks Range. Harvest activities in the two study years tended to be clustered around these cabins, especially terrestrial animal harvests, most notably caribou. The majority of the cabins utilized during the two study years were located on the Ivisaruk, Kaolak, Ketik, Kuk, Oyagaruk, Avalik, and Avalitkok rivers, as well as a coastal cabin at Kilimantavi and cabins in the foothills. Wainwright families owned approximately 32 cabins, most of which were used regularly. Additionally, NSB Search and Rescue built cabins for emergency shelter, one located on the Kuk River and the other on the Kungok.

The three different geographic settings in which Wainwright cabins were located - along the inland rivers, along the coast, and in the mountains - offered

access to a unique variety of animals. Of the three, the most heavily utilized habitat was that along the rivers. A wide array of resources was available here including caribou, moose, brown bear, furbearers, ptarmigan, waterfowl, fish, and berries. In contrast to the constant use of the river cabins, the cabins along the coastline currently were rarely used. During the study period, most marine mammal harvest activities began and ended in Wainwright. With faster boats and motors, people were able to do most of their marine mammal hunting in day trips from Wainwright, and hence did not need the coastal cabins as much as in past years. Cabins in the mountains were utilized only in the winter and only for hunting furbearing animals.

Inland River Cabins and Camps

The inland river cabins were situated at various locations. These cabins offered excellent hunting grounds for the fall caribou migration, prime fishing throughout the summer and fall, vast rich acres of berries, flyways of geese in the spring, and good wolf and wolverine hunting in the winter. Some families spent many months at their camp hunting caribou, fishing and picking berries. To many, their cabin represented a second home. Those who were busy with employment in town would visit their camp on the weekends. During the summer months it served as a vacation area and a place to teach the children about subsistence. Residents indicated that time at camp was not only enjoyable but also important for it brought the children out of Wainwright and into the tundra to learn traditional subsistence skills and values from their parents.

Coastal Cabins and Camps

Both north and south of Wainwright on the coastline lay scattered coastal cabins. For the most part coastal cabins were infrequently used during the study period due to the high mobility of boats and snowmachines that allowed residents to base hunting operations out of Wainwright.

During this study, the most productive and active cabin on the coast was the cabin at Kilimantavi. Like most of the other camps, this cabin was situated near the remains of old dwellings and prehistoric sites, again emphasizing the traditional productivity of this area. The Kilimantavi camp was active in the

spring as it is located in the middle of a migratory waterfowl flight path. It was also used during breakup for walrus and bearded seal hunting. The family also hunted caribou and ducks while based at this cabin. The Kilimantavi cabin was used year-round but predominantly in the summer, June through August.

Other coastal camps at Atanik and Icy Cape were once very important camps where Wainwright whalers lived 80 years ago. Although some cabins still stood at these ancient sites, they were rarely used. The Icy Cape region is rich in history as remnants of scattered cabins and houses dot the tundra. Evidence of settlements was not surprising considering the region was full of game. Each spring and fall during this study, brants visited the area in great numbers, especially in the fall. Icy Cape also supported a spotted seal population and various terrestrial animals. However, during the study period, this camp was utilized little even though the cabins were in relatively good shape. The cabin belongs to an older hunter who does not travel as much anymore. The fall brants, abundant at Icy Cape, are less desirable when other resources are abundant, and spotted seals (the other resource that is unique to the Icy Cape area) are no longer needed for dogfood.

Mountain Cabins and Camps

In addition to the coastal and river cabins, during this study Wainwright residents maintained cabins in one other environment that they utilized, namely the foothills and mountains of the Brooks Range. Unlike the other cabins which support a wide range of resource utilization, cabins in this area were used specifically for hunting wolves and wolverines in the winter. Other animals such as fox, caribou and geese may be harvested opportunistically; however a hunter's goal when using these cabins was to harvest wolves and wolverines. Unlike the other cabins which can be reached either by boat or snowmachine, these mountain cabins can be reached only by snowmachine during the winter.

In summary, cabins were an important element of the subsistence lifestyle for Wainwright residents during this study. Cabins provided a base for better access to resources. Additionally, the act of leaving town and staying out on the land for several days or weeks allowed for uninterrupted concentration on subsistence harvests only. The use of cabins in productive habitats was a

strong tradition stemming from the predominant lifestyle prior to the establishment of the town of Wainwright, and continued to provide an important opportunity for children to learn and begin using subsistence skills.

THE SEASONAL ROUND

The following section presents a month by month description of a typical year's subsistence activities in Wainwright, based on field observations during Years One and Two of this study. Descriptions of the Year One and Year Two seasonal rounds can be found in the respective appendices and include detail on the various conditions that affected hunting and fishing throughout that particular year. The general description that follows serves simply to introduce the contemporary Wainwright subsistence cycle; detail on harvest amounts by month is presented in subsequent discussions of major resource groups and of individual resources.

APRIL

April on the North Slope is when Wainwright and other whaling communities are involved in serious preparations for the upcoming bowhead whaling season. Whaling crews are organized, ice cellars are cleaned out, and old gear is pulled out of storage and repaired. Whaling crews venture out onto the ocean ice to begin cutting a snowmachine trail to the open lead of water. With trails in place, supplies are hauled out to the whaling camps. Usually all crews move out to their camps sometime in April. There, weather permitting, crews watch for migrating bowhead whales and pursue them when possible. While waiting, crew members usually harvest seals, waterfowl, and an occasional polar bear.

Back in town, rainbow smelt fishing on the Wainwright Inlet continues, although usually by April smelt fishing is diminishing. A few ptarmigan and a few caribou are likely to be harvested in April.

MAY

With all the preparations out of the way, the entire month of May is devoted to whaling, as weather allows. Of the six whales harvested by Wainwright crews in

Years One and Two combined, two were harvested in April and four in May. In 1987 (prior to this study), three bowheads were landed in May and one in June. May appears to be the most productive whaling month. Polar bears and seals continue to be hunted by whalers during this month.

The spring migration of eiders and geese increases in May, and consequently the harvests of these birds also increase. May is typically the highest month for bird harvests. Two kinds of bird harvests occur in the spring months (generally April through June). Harvests of eiders and brants take place on the coast, usually associated with whaling activity. Meanwhile, many of the hunters not involved in whaling, or taking advantage of lulls in whaling activity due to bad ice and weather conditions on the coast, travel inland to camps and cabins to harvest geese (mainly white-fronted geese). Ptarmigan harvests are usually higher in May than any other month, largely because they are incidental to the inland geese hunting trips.

JUNE

The last remaining whaling crews usually pack up their camps and return to town sometime in the first two weeks of June. Not only does the bowhead migration wane, but the ice conditions become less stable on the ocean and virtually impassable for snowmachines on land. The end of whaling is celebrated with a community feast called *Kakruuk* which translates as "when the whaling boat reaches the land." Later in June, the community celebrates its whale harvests with *Nalukataq*, the blanket toss festival. The entire community gathers for *Nalukataq* during which large quantities of the whale(s) are distributed to each household (including visitors from out of town) while feasting together on soup, whale, bread, fruit, and pies prepared by the whaling crews and their families.

Hunters travel south along the coast to hunt brants and eiders, while geese hunting continues inland. However, ice and snow conditions are rapidly deteriorating. For a period of time, the snow and ice are too rotten for snowmachine travel and/or the ground is still too muddy and soft for travel by all terrain vehicle (ATV). At some point in June, the transition is made between the two modes of travel, and boats become usable as the lagoon and

river ice break up. Despite the shifting conditions, June is the second highest month for bird harvests.

The warmer days bring ringed seals and a few bearded seals out onto the ice to sun themselves. If hunters can get to them, a few of these animals are harvested near town before the ice goes out.

JULY

One of the most important and anticipated environmental events of the year usually occurs in early July, and that is the breakup of the ocean ice. This event signals the beginning of the brief but intense summer walrus and bearded seal hunt. Hunters finally can launch their boats from the lagoon and travel through open water to the floating pack ice where walrus and bearded seal are found. The walrus and bearded seal season is very unpredictable. Some years the floating pack ice is too far off shore to be accessed safely; other years the ice is in close and teeming with walrus and seals. Additionally, ocean travel conditions can be calm and smooth or choppy and dangerous. The ice may be accessible for several weeks or only for a few days. Given these many unknowns, hunters tend to hunt intensively as soon as conditions allow, and travel to wherever the animals are. This marine mammal hunt is usually the main subsistence effort in July.

Another marine mammal sought in July is the beluga whale. These small whales generally migrate by Wainwright in the first half of the month. However, the opportunity to harvest them is very brief, and a single bad weather system (or other factors) can preclude harvests completely.

If marine mammal hunting tapers off in July, hunters turn their attention to caribou. At this time of year, caribou are still on the coast and usually are ragged and thin from constantly moving in an effort to escape the summer insects. As the caribou head inland late in the month, hunters tend to follow.

Some waterfowl hunting occurs in July but only to a limited degree. July is usually the lull in waterfowl hunting between the higher spring (May and June) and fall (August and September) harvests.

Salmon may begin to appear along the shore in front of Wainwright in July, and a few households put nets out to catch the beginning of the year's salmon run.

AUGUST

Marine mammal hunting may continue into August, depending on ice conditions. If so, hunters continue to hunt walrus and bearded seal until they have the desired quantity. When marine mammal hunting ends (i.e., ice conditions change), hunters turn upriver in pursuit of caribou and fish. In the last few weeks before school starts, families spend as much time as possible upriver at their cabins or camps hunting caribou, fishing, and picking berries. Fishing yields mainly arctic grayling and least cisco. Brown bears may be encountered inland, fattening up on berries, caribou, ground squirrels, and fish. Wainwright residents do not actively hunt brown bears but may take them if encountered.

On the coast, the brant hunting continues while eider hunting tapers to a close, and the majority of the year's salmon are caught.

SEPTEMBER

The intensive fall caribou, fish, and berry harvesting continues upriver, with an occasional ptarmigan taken incidentally. By now, the insects have died down and the caribou can graze inland, fattening up for the winter. September is a prime caribou hunting month and the most important month for fishing. Families with children in school or with formal employment may come upriver on weekends. Labor Day weekend is a particularly busy weekend, with many families camped together at traditionally favored locations, and the town nearly deserted. Upriver activity continues until freeze-up begins, when all but a few families head back to Wainwright until the rivers are completely frozen and the transition to snowmachine travel is complete. A few families stay at camp throughout the change of seasons.

Brant harvesting comes to a close in the first half of September.

OCTOBER

October is the last chance for Wainwright hunters to get fat bull caribou before the rut begins mid-month. Once in rut, caribou meat acquires an unpleasant flavor; consequently, hunters try to avoid harvesting caribou that are in rut. A few people set nets under the ice upriver or jig through the ice to catch grayling, least cisco and arctic cisco. The winter rainbow smelt fishing season may begin on the lagoon in October, if the lagoon ice is a safe thickness. With freeze-up underway, snowmachine travel usually begins in October.

Wainwright is not generally a fall whaling community because usually they have used their allotted strikes successfully in the spring hunt. Nevertheless, if Wainwright whalers still have any strikes remaining, they are likely to at least go out to check for whales. This activity occurs mainly on weekends.

October is an important month for collecting ice for winter drinking water. Although water is delivered to all the houses in town, people prefer fresh water ice cut from one of the "ice ponds" near town for tea and coffee. Ice is best cut early in the fall freeze-up before the ice gets too thick. People cut large blocks and stack them along shore to be picked up later in the winter, as needed.

Fall storms tend to break coal loose from the exposed seams along the river and lagoon, depositing it along the high water mark. Consequently, October is usually a good month to collect coal for use at home or at cabins.

NOVEMBER

Subsistence activity tends to decline in November. Days grow colder and shorter, and storms are prevalent. Shorefast ice begins to form, but may be blown loose by high winds. Boat travel comes to an end, and the main means of travel at this point is snowmachine. However, cold temperatures and high winds often render outings dangerous. November tends to be a time to rest up from the big summer and fall push to harvest the majority of the year's supply of caribou, fish, and marine mammals. Generally only about one percent of the

year's total harvests is obtained in November, and this one percent consists of a few caribou, ringed seals, whitefish, grayling, smelt, and ptarmigan. Furbearer hunting begins around November, depending on conditions such as snow cover and weather.

November is also a time to get ready for the big Thanksgiving feast. As with *Nalukataq*, the successful whaling crews are the main providers at Thanksgiving, preparing dishes made from whale, caribou, waterfowl and fish for the entire community.

DECEMBER

Subsistence activities in December are scant. A few people hunt caribou for fresh meat, and some smelt fishing usually takes place but has not yet gotten fully underway. Furbearer hunters are the only people taking any major hunting trips, and are likely to harvest fox, wolverine, and possibly wolf. If the ice gets blown offshore, as happened in December of Year Two, residents may encounter polar bears near town and shoot them. Otherwise, December is a cold, dark month that is spent mostly indoors focused on the holiday celebrations.

JANUARY

The NSB hosted a *Kivgiq* or "Messenger Feast" in Barrow in early January 1989 in an effort to revitalize this traditional winter gathering of people from across the region. Consequently, in the last two years many Wainwright residents have gone to Barrow for a week or more to participate in the *Kivgiq* and visit with friends and relatives. The last two years have also seen a flu bug sweep through Wainwright. Between the celebrations and the illnesses, in addition to the general lack of available subsistence resources, very little harvesting occurred.

The sun does not rise at all in Wainwright until January 20, and then the days are very brief. Smelt fishing, some caribou hunting, and furbearer hunting are the main subsistence activities that regularly occur in January. Throughout the winter, hunters are watchful for leads to open in the ocean ice near town;

usually this happens at least once per winter. When open water is found, a few people hunt and harvest the ringed seals that surface in the open water.

FEBRUARY

As the days grow longer, subsistence activities tend to increase. People spend more time at the lagoon fishing for smelt. January, February, and March tend to be the months in which the majority of the smelt are harvested for the year. Caribou are taken near town when ice cellar supplies get low or a family simply wants fresh meat. Furbearer hunting continues in the foothills and mountains of the Brooks Range.

MARCH

March is the month in which residents begin to prepare for whaling. Crew members work on their boats, harpoons and darting guns, sleds, snowmachines, ice cellars, and camp supplies, and also begin the difficult task of cutting trails through the winter storm ice. Trail-breaking activity occasionally results in seal and/or polar bear harvests.

Meanwhile, the longer, warmer days are utilized by furbearer hunters to take their longest trips into the mountains in search of wolves and wolverines. Caribou harvests and smelt fishing continue, with smelt fishing being the main subsistence activity. March is the last of the winter months characterized by very low subsistence activity; in April, whales are just the first of the migratory species to begin their return to the Wainwright area for the summer season, signalling a major shift from the quiet winter months into high levels of subsistence activity.

In summary, with employment a factor for many households, subsistence activities were often coordinated to coincide with weekends, annual leave and holidays. Other local celebrations such as *Nalukataq*, also affected subsistence activities. Successful whaling crews were especially active after spring whaling, expending extra effort hunting caribou, eiders, and geese to serve at the feast. By the week prior to *Nalukataq*, however, the crews and their families were no longer hunting but were occupied preparing food and

dividing the whale for distribution at the celebration. Barrow families would also adjust their harvest patterns (e.g., return from their camps or delay departure) so that they might participate in events and holidays such as *Nalukataq*, Fourth of July games, and Thanksgiving.

In Wainwright, environmental conditions are probably the most significant influence on subsistence activity. Ice conditions can greatly affect the success of marine mammal hunting, as can fog and bad weather. In turn, the length of the marine mammal hunting season can influence when people turn inland to begin their late summer caribou hunting and fishing. Fall freeze-up influences access to the inland fall hunting and fishing areas, and the timing of fall ice fishing. Snow cover and weather influence the success of furbearer hunting in the winter, and breakup conditions affect access to spring geese hunting locations inland. A multitude of environmental variables can affect the subsistence harvest both negatively and positively.

HARVEST ESTIMATES FOR MAJOR RESOURCE CATEGORIES

This final component of the subsistence overview presents harvest estimates for the major resource categories and for all species combined. The major resource categories are marine mammals, terrestrial mammals, fish and birds. Discussion of these summary level data first addresses the harvest averages for the two years followed by a comparison of the two years' harvests. The purpose of this section is to present data at the major resource category level as such data offers a useful "snapshot" overview. However, little explanatory discussion of trends accompanies this overview of the major resource categories; such trends usually are linked to one or two individual species and therefore are discussed more meaningfully in the subsequent sections that address individual species or species subgroups: Marine Mammals, Terrestrial Mammals, Fish and Birds.

The data are presented in various analytical categories, e.g., total harvests, household means and harvests by month, to name a few, appearing mainly in tables and figures. Each of these data categories represents some level of synthesis of the raw data. To familiarize the reader with the data categories used repeatedly throughout the report, each category is introduced and explained as necessary in this section.

Average Harvests by Major Resource Category

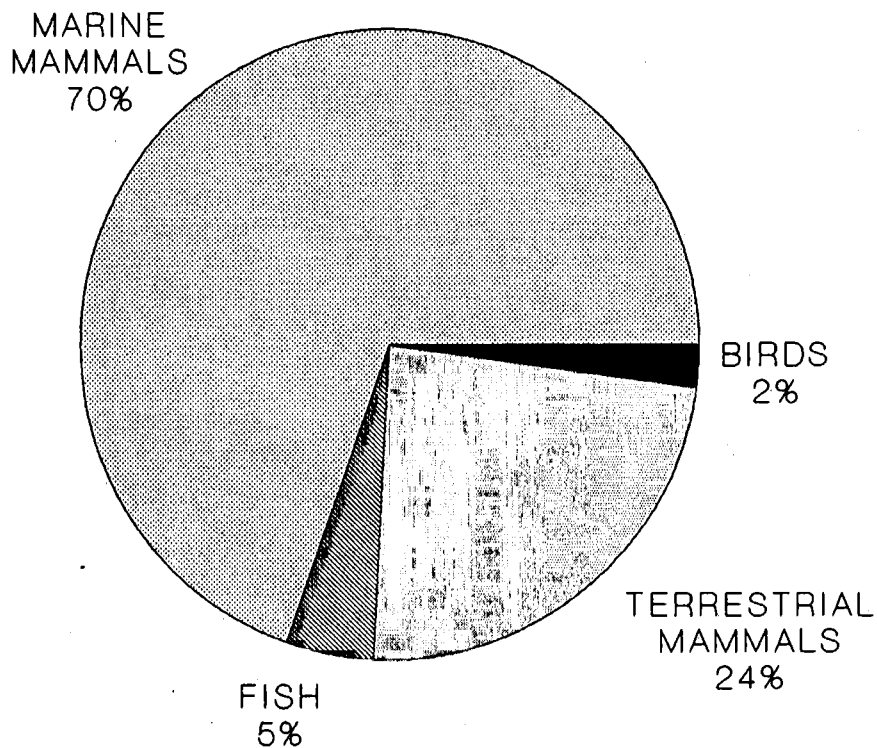
As Figure 1 indicates, between 1988 and 1990, Wainwright residents drew approximately 70 percent (by usable weight) of their subsistence foods from the sea in the form of marine mammals. The second most important resource group was terrestrial mammals, accounting for 24 percent of the total usable pounds harvested in Wainwright over two years. Fish and birds constituted relatively small proportions of the total harvest at five and two percent respectively. The predominance of marine mammals stems primarily from the successful bowhead whale and walrus harvests in the two study years, and the large volume of usable product available from each of these animals. As discussed previously (Overview of Wainwright Report), "usable" refers to those parts of the animal that are usable for food without reference to how much of the animal was actually consumed. (This study collected data on harvests, not consumption.)

Table 4 presents average subsistence resource harvest estimates for the community of Wainwright. Neither the "conversion factor" nor "number harvested" apply in Table 4 as each resource category includes more than one dissimilar species (e.g., marine mammals includes bowhead and beluga whales, walrus, various seals, and polar bear).

The first category of data presented is the estimated total usable pounds of each major resource category harvested by Wainwright residents. These estimates are calculated by multiplying the number of animals harvested by the usable weight conversion for each individual species and adding the resulting total pounds per species together to get the total pounds per major resource category. All data reported by both part-year and full-year households were included in this calculation (i.e., 124 Year One and 119 Year Two households). Wainwright residents harvested approximately 304,047 pounds of wild foods each year.

The average household harvest was derived by adding together the harvests from the 100 core study households and dividing the total by 100. (This average for the 100 core households was not derived from the total shown in the "Usable Pounds Harvested" column. The total in that column was based on all data reported by all households present any time in the study [i.e., 124 Year One

**Figure 1: Harvest Percentages by
Major Resource Category
Wainwright, Years One & Two Averaged
(Usable Pounds Harvested)**



Based on 124 Year One and 119 Year Two households, including partial year households.
Two years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

TABLE 4: HARVEST ESTIMATES BY MAJOR RESOURCE CATEGORY - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1)

RESOURCE	CONVERSION FACTOR (2) (Usable Weight Per Resource in lbs)	COMMUNITY TOTALS (3)		AVERAGE POUNDS HARVESTED (4)		PERCENT OF TOTAL USABLE POUNDS HARVESTED (3)	PERCENT OF WAINWRIGHT HOUSEHOLDS HARVESTING RESOURCE (4)
		NUMBER HARVESTED	USABLE POUNDS HARVESTED	PER HOUSEHOLD	PER CAPITA		
Marine Mammals (5)	n/a	n/a	211,588	1,795	437	70%	82%
Terrestrial Mammals	n/a	n/a	72,043	648	158	24%	62%
Fish	n/a	n/a	13,735	121	29	5%	66%
Birds	n/a	n/a	6,682	61	15	2%	56%
Total	n/a	n/a	304,047	2,624	638	100%	88%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) See Table C-3 for sources of conversion factors.

(3) Community totals and percent of total usable pounds harvested are based on harvest amounts reported by all 124 Year One households and 119 Year Two households for all species except bowhead (see note 5).

(4) Per household and per capita means and percent of households harvesting a resource are based only on the 100 core households in the study for the full two years for all species except bowhead (see note 5).

(5) Usable pounds harvested for bowhead whale were derived from a pounds-per-foot-length ratio, which includes all usable portions of the whale (see Appendix C). Average pounds per household and per capita were derived from the total usable whale amount (divided by 100 core households and 411 persons respectively) rather than from the number of shares households reported receiving.

n/a means not applicable

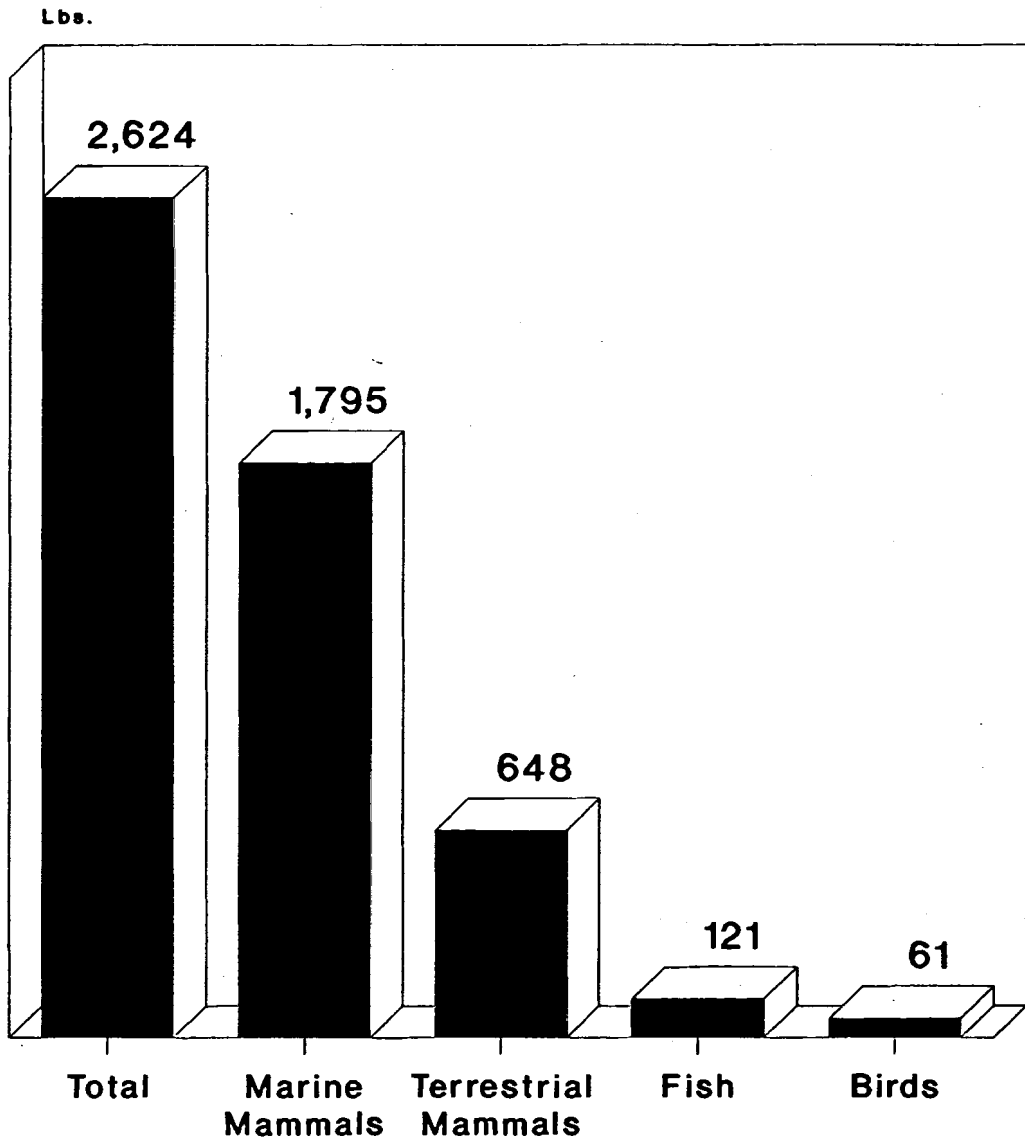
and 119 Year Two households], whereas the household mean is based only on the 100 core study households present for the entire two study years. The use of different base populations for different calculations was explained in Basis of Harvest Estimates.) The average household harvested about 2,624 usable pounds of subsistence resources. The next column presents the average pounds harvested per capita for the entire community; this figure is also based on the total harvest of the 411 people living in the 100 core study households. Annual harvests averaged approximately 638 pounds per person, including 437 pounds of marine mammals, 158 pounds of terrestrial mammals, 29 pounds of fish and 15 pounds of birds.

The relative contribution of each major harvest category to the total Wainwright harvest of subsistence resources is shown in the next column and is based on the total usable pounds harvested. (These data are the basis for Figure 1, summarized previously.) Next, the percentage of Wainwright core study households that harvested each major resource category is shown. For example, an average of 82 percent of the 100 core study households participated in the harvest of marine mammals during the two study years. Eighty-eight percent participated in the harvest of at least one resource. (The percent participation presented on the two year tables represents the total for the two years rather than an annual average. For example, a household participated in the activity sometime in the two years of study.)

Figure 2 is a bar chart showing the two year average usable pounds of resource product harvested per Wainwright household for each of the major resource categories. (The data in Figure 2 are based on the 100 core households in the study for the full two years). Marine mammals accounted for 1,795 pounds of the 2,624 usable pounds of subsistence resources harvested per household. (Quantities may vary slightly from one table or figure to the next due to software rounding.) Terrestrial mammals were the second largest category of subsistence foods (648 usable pounds per household) followed by fish and birds (121 and 61 pounds per household respectively).

While the above estimates represent the mean annual harvest by Wainwright households, four cautions are noteworthy. First, the actual harvest in any given household varied depending on the level of harvest activity of household

Figure 2: Harvest Amounts by Major Resource Category - Wainwright, Years One & Two Averaged (Mean Usable Pounds Per Household)



Based on 100 core households in the study for both years.
Two years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

members, their hunting success, and their species preferences. Few households may actually harvest the amount exactly equal to the community mean, or harvest a particular resource at all.

Second, Figure 2 presents the relative importance of the major species categories in terms of usable pounds harvested per household. This figure (and the data presented in other tables and figures) do not necessarily indicate the relative cultural and nutritional importance of the resource categories, nor do they indicate what proportion of the amount shown is actually consumed or what proportion is given to other households or to people in other communities.

Third, household means for bowhead whale were calculated from the entire estimated usable weight of the whales harvested, rather than from the weight of the shares the households reported receiving. Thus, household means for bowhead (and marine mammals as an aggregate category including bowhead whale) subsume all usable portions of the whale, including: portions distributed at the community level at feasts and celebrations; the amount shared with other communities; and all the blubber.

Finally, these data pertain to just two years of harvest activity. While the relative importance of the resource categories may not change, the absolute harvest levels may vary more widely from year to year over a period of several years than these two years of data reflect, due to biological trends within the harvest species, environmental shifts (e.g., weather and ice conditions) and socioeconomic and cultural shifts in Wainwright.

Average Monthly Harvests by Major Resource Category

In the Wainwright seasonal cycle over the two study years, 92 percent of the harvesting occurred in the seven month period from April through October (Table 5). Only eight percent of the total harvest was taken from November through March. Table 5 shows average monthly harvests by major resource group in usable pounds and the monthly percentage of the total yearly harvest for that resource category. May was the average high month in terms of usable pounds harvested, when 32 percent of the annual total was obtained (an average of 97,780 pounds). July was the second highest month on average, yielding 24

TABLE 5: MONTHLY HARVESTS BY MAJOR RESOURCE CATEGORY - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Pounds of Usable Resource Product)

TOTALS

MAJOR RESOURCE CATEGORY	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Marine Mammals	13,944	94,006	23,420	64,701	11,608	579	1,289	210	496	319	0	1,013
Terrestrial Mammals	518	411	176	8,546	16,567	17,772	11,232	2,633	1,697	2,298	5,398	4,797
Fish	170	0	0	280	1,428	4,952	2,137	299	48	2,272	1,460	690
Birds	69	3,363	1,781	329	707	410	5	1	2	6	2	9
Total	14,700	97,780	25,377	73,855	30,310	23,713	14,662	3,143	2,242	4,894	6,860	6,509

PERCENTS

MAJOR RESOURCE CATEGORY	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Marine Mammals	7%	44%	11%	31%	5%	0%	1%	0%	0%	0%	0%	0% = 100%
Terrestrial Mammals	1%	1%	0%	12%	23%	25%	16%	4%	2%	3%	7%	7% = 100%
Fish	1%	0%	0%	2%	10%	36%	16%	2%	0%	17%	11%	5% = 100%
Birds	1%	50%	27%	5%	11%	6%	0%	0%	0%	0%	0%	0% = 100%
All Resources Combined	5%	32%	8%	24%	10%	8%	5%	1%	1%	2%	2%	2% = 100%

(1) Two years of study: April 1, 1988 - March 31, 1990.

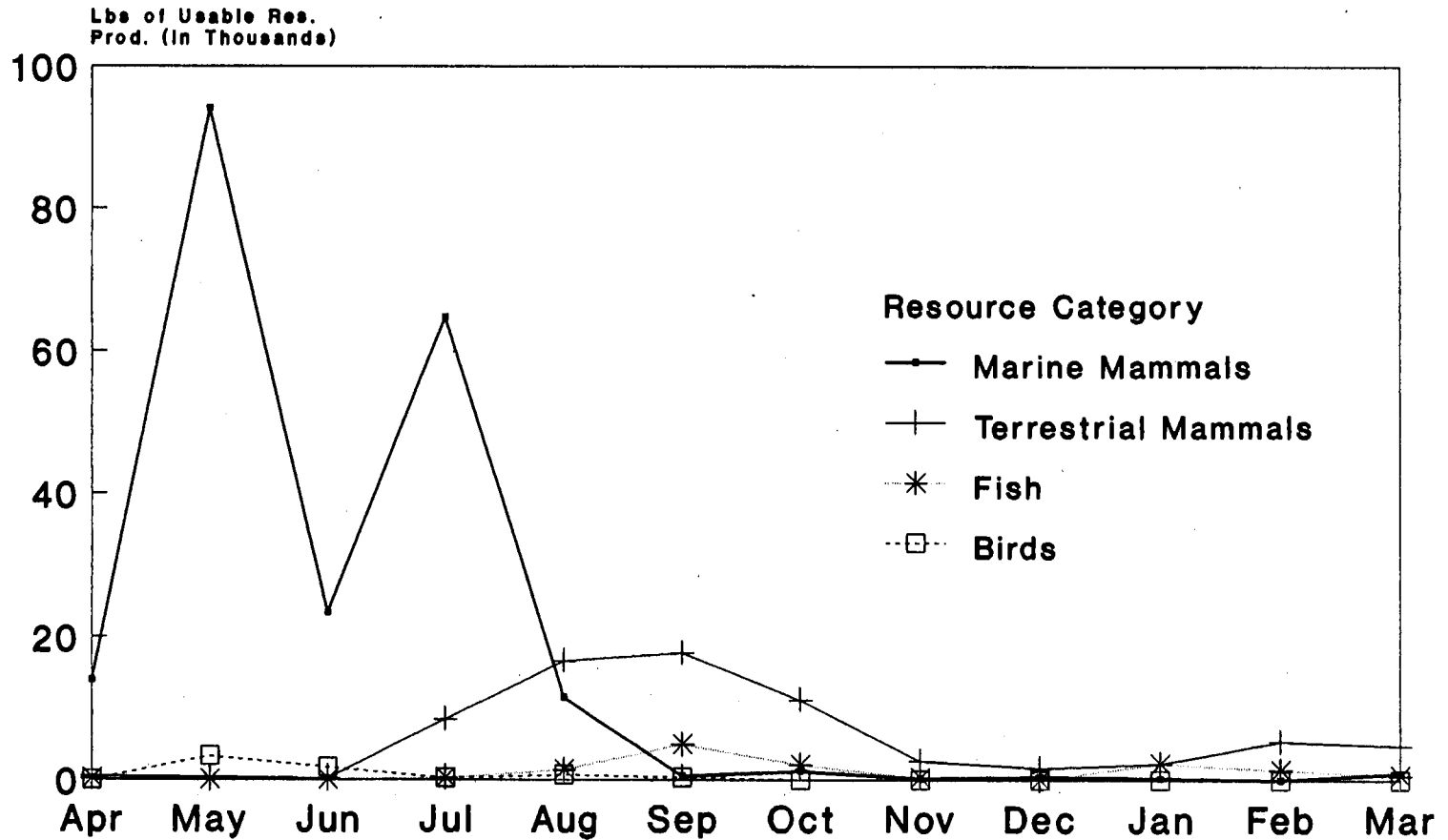
(2) Based on 124 Year One and 119 Year Two households, including partial year households.

Source: Stephen R. Braund & Associates, 1993

percent of the annual harvest (73,855 pounds). Thus, 56 percent of the total harvest typically was taken in May and July combined. These two months were high because they were the months in which the majority (75 percent) of the average year's marine mammals were taken, principally bowhead whale (May) and walrus (July). Figure 3 is a line graph showing monthly harvests for each major resource group, with the May and July marine mammal harvests standing out as the most significant harvest peaks of the year. Although this figure is somewhat difficult to interpret for detail, its purpose and value lie in illustrating general trends in seasonal harvests, and the relative contribution of different resource groups at different times of the year.

Marine mammal harvests occurred almost exclusively in the five month period from April through August. Most of the marine mammal species are highly migratory and therefore are available only during the more temperate months. Terrestrial mammals, on the other hand, were harvested steadily throughout the year, gradually peaking in August and September when nearly half (48 percent) of the average year's harvests occurred. Terrestrial mammals had a slight second peak in February and March. The terrestrial mammal harvests consist predominantly of caribou, which, during the two study years, were available to Wainwright residents throughout the year. Fish harvests were similar, peaking in September with 62 percent of the average year's harvests occurring in August, September and October combined. The autumn period of heavy fish and terrestrial mammal harvests corresponds with the time when people traditionally went upriver to fish camp to hunt caribou and fish, as described previously in the Seasonal Round. January and February showed another surge, though slighter, in fish harvests. This surge represents smelt fishing season, a significant winter harvest for Wainwright residents. Finally, bird harvests occurred primarily in the spring, with 50 percent of the average year's total taken in just one month: May. June was also a heavy month; May and June combined yielded 77 percent of the year's total bird harvest. The significant bird species harvested by Wainwright residents are highly migratory waterfowl. Consequently, this seasonal peak corresponds to bird migration patterns and residents' ability to intercept the migration either from whaling camps on the ice or from inland and coastal camps.

Figure 3: Monthly Harvest by Major Resource Category Wainwright, Years One & Two Averaged



Based on 124 Year One and 119 Year Two household, including partial year households.
 Two years of study: 4/1/88 - 3/31/90
 Source: Stephen R. Braund & Assoc., 1993

Harvest Locations over Two Years

Almost all harvests mapped during the two study years are presented on Maps 2 and 4. (A few very remote sites are not represented within the bounds of these maps.) Map 4 shows the same harvest sites as Map 2 with the sites differentiated by major resource group. Generally, harvests over the two study years extended from Barrow to Cape Sabine along the coast with offshore harvests of birds and marine mammals concentrated between Point Franklin and Icy Cape. Inland harvests occurred along the entire Kuk River system as well as the Kukpowruk, Utukok, Colville and Meade rivers, with scattered terrestrial mammal, fish and bird harvests throughout the inland region.

As Map 2 illustrates, Wainwright harvest sites during this two year study coincide well with the lifetime community land use area documented by Pedersen (1979). Although most harvests in the present study were concentrated close to town or along the river systems, some harvest sites reached the outer limits of Pedersen's lifetime area (e.g., terrestrial mammals to the south) and some harvest sites extended beyond the lifetime area (e.g., marine mammals to the north). As residents indicated to the field coordinator, hunters will harvest close to town when the animals are available; if the desired species, whether walrus or furbearer, is not available in the local area, hunters will travel considerable distance to obtain the resource. Map 2 shows that hunters traveled well beyond the lifetime use area line to harvest marine mammals amid the pack ice during the study period. (The lifetime use area line is explained in Areal Extent of Subsistence Land Use on page 24 and also in the text on the map.) In other years, if the caribou, birds, furbearers or marine mammals are scarce in the Wainwright area, people may travel even farther than this map indicates.

Year to Year Variability Among Major Resource Categories

As can be seen in comparing Table A-1 with Table B-1 (in the Year One and Year Two appendices, respectively) total Wainwright harvests increased from an estimated 256,500 usable pounds in Year One to 351,584 pounds in Year Two, a 37 percent increase. A comparison of the two years by major resource group reveals that the increase from Year One to Year Two was consistent across all







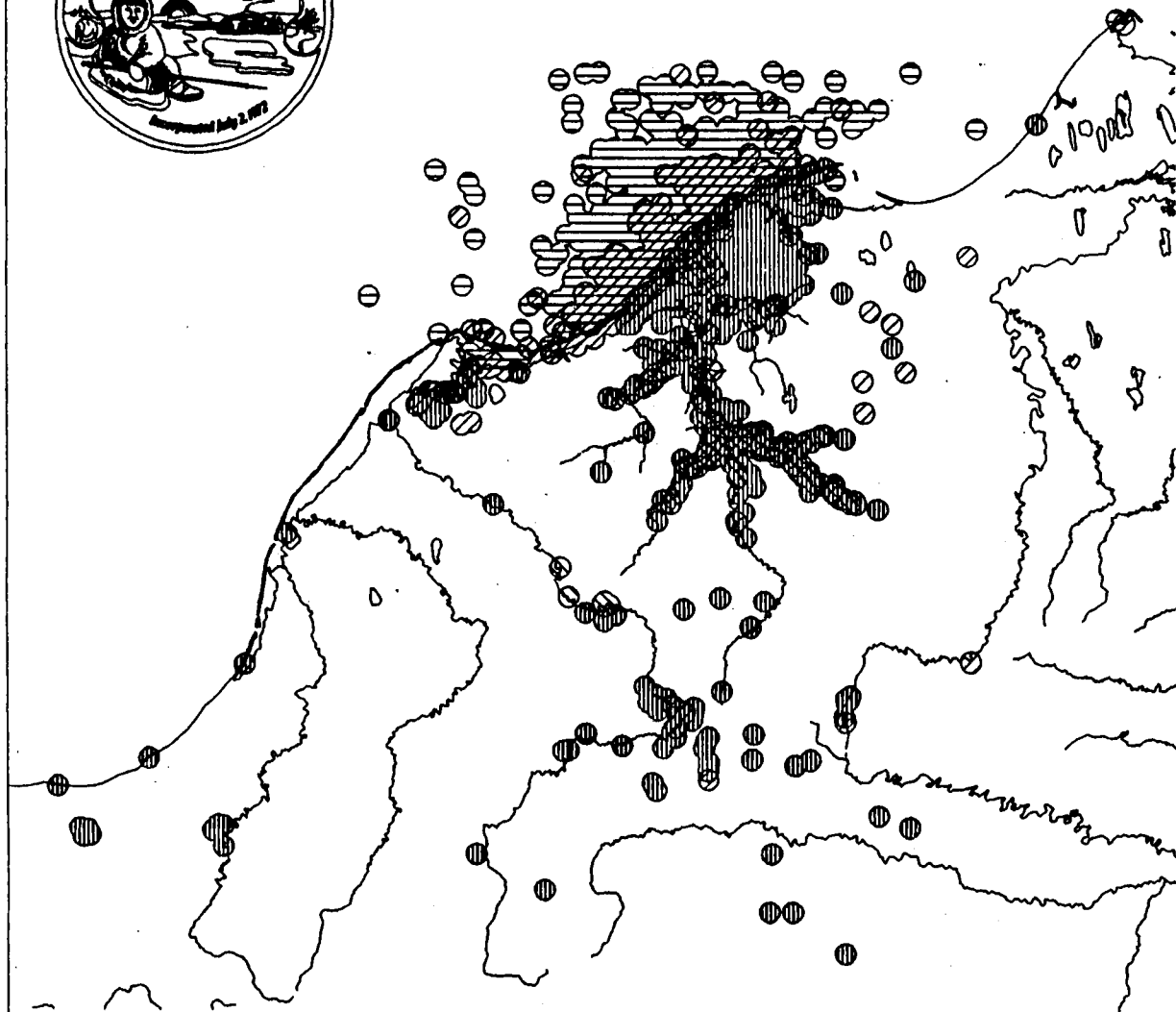
MAP 4 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT SUBSISTENCE HARVEST SITES BY MAJOR RESOURCE CATEGORY: YEARS ONE AND TWO

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Bround and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.

LEGEND INFORMATION

- 
Marine Mammals
 Bowhead whale, beluga whale, walrus, polar bear, seals
- 
Terrestrial Mammals
 Caribou, moose, brown bear, wolverine, fox, wolf, river otter, ermine, ground squirrel
- 
Fish
 Whitefish, other freshwater fish, salmon, other coastal fish
- 
Birds
 Eiders, other ducks, geese, ptarmigan, loons



Map Production: North Slope Borough GIS

Date: April 15, 1991

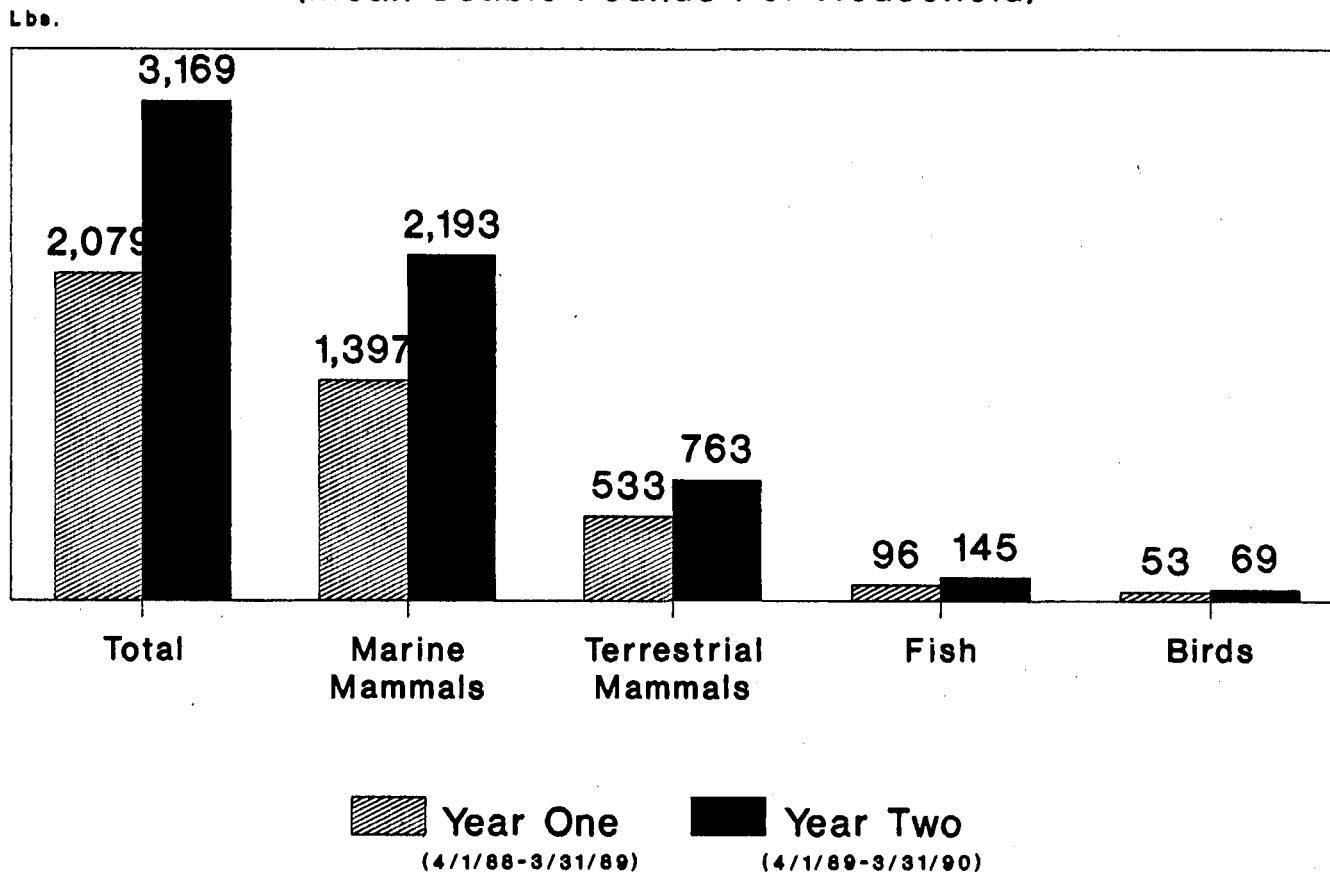


resource groups. This consistency is reinforced by comparing the percentage of total usable pounds harvested; the proportion represented by each group remained constant (within one percent) over the two years. Figure 4 compares the household means by major resource group for each year, also showing a consistent increase in Year Two. The reasons for the higher productivity in Year Two are varied. For example, walrus harvests, representing a large proportion of the total usable pounds harvested, increased due to excellent hunting conditions in Year Two. Similarly, caribou remained near Wainwright all year long, enabling more people to harvest more animals. The bowhead whaling season was much worse in Year Two than Year One; however, the two whales landed in Year Two were large and weighed nearly as much as the four smaller whales harvested in Year One. These and other reasons for the increased harvests in Year Two will be addressed in subsequent sections.

Less consistent was the percentage of households harvesting each major resource category. Despite the large increase in pounds of marine mammals harvested from Year One to Year Two, the percentage of households participating in marine mammal harvests actually decreased in Year Two (from 85 percent to 78 percent). Similarly, the harvested pounds of fish increased while the number of households catching fish decreased (from 69 percent to 62 percent). As will be seen in the discussion of individual species, the decrease in marine mammal participation is a reflection mainly of a decrease in bowhead whaling effort caused largely by poor whaling conditions. The decline in households harvesting fish in Year Two is not as easily explained, but will be explored in discussions of the individual species or species groups. Participation in terrestrial mammals increased from 58 percent in Year One to 66 percent in Year Two due mainly to the relatively easy hunting access to caribou throughout Year Two. The percentage of households harvesting birds increased only slightly from 55 percent in Year One to 57 percent in Year Two.

Two years of data offer some idea of how harvests can shift from year to year; however, longer term trends cannot be captured in just two years. Where possible, data from earlier studies are incorporated into subsequent species-level discussions in an effort to provide a broader time perspective on Wainwright subsistence harvests.

**Figure 4: Harvest Amounts By
Major Resource Category
Wainwright, Years One & Two
(Mean Usable Pounds Per Household)**



- 53 -

Based on 100 core households in the study for both years.

Source: Stephen R. Braund & Assoc., 1993

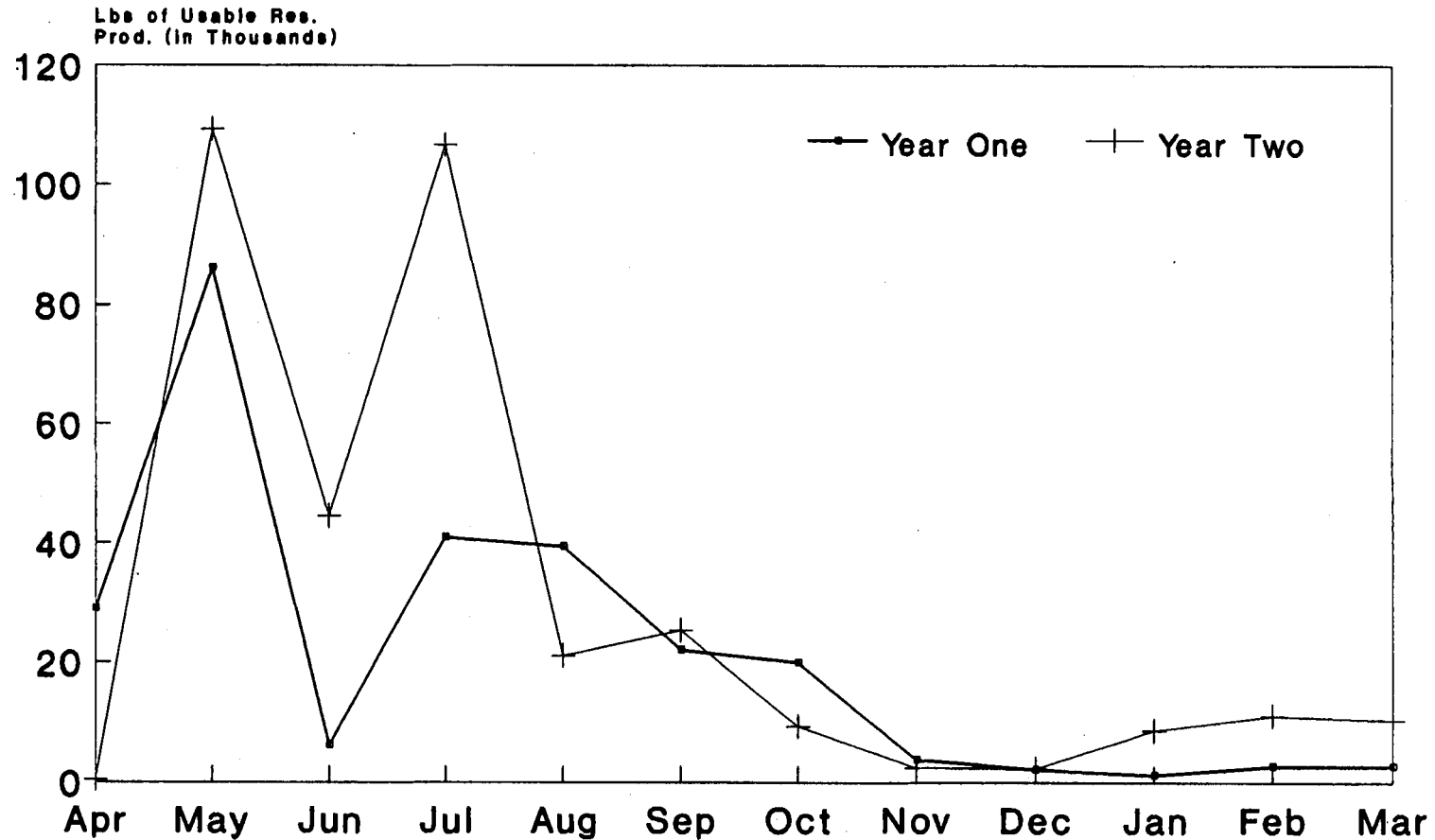
Seasonal Variability from Year to Year among Major Resource Categories

Seasonal harvest patterns overall were quite consistent from Year One to Year Two, as Figure 5 shows. The two peak months in both years were May and July; after July, harvests tapered off gradually to the slow five month period from November through March. Figures 6 through 9 compare the harvests by month for each of the four major resource categories. The overall impression these graphs give is one of consistency in the seasonal harvest patterns from Year One to Year Two, despite some differences.

As can be seen in Figure 6, marine mammal harvests varied somewhat between the two years although the overall pattern of peak harvests in May and July was similar in both years. The harvest of two bowhead whales in April of Year One contrasted with ice conditions preventing the harvest of any marine mammal harvests in April of Year Two. August harvests in Year One also were much higher than in Year Two because the ice where walrus and bearded seals are hunted stayed in the Wainwright waters longer than in Year Two. Moreover, marine mammal harvests were so good in July of Year Two that people obtained the desired amounts in July, turning their attention inland in August. The subsequent months' harvests, September through November, were also higher in Year One. However, in Year Two, marine mammals were harvested from open leads that appeared near Wainwright in December and January, which did not occur in Year One.

As in Year One, terrestrial mammal harvests occurred in every month of the year, being the only resource group consistently harvested year-round. Figure 7 shows that terrestrial mammal harvests began to increase about a month earlier in Year Two than in Year One. This pattern is related to the ice conditions mentioned above. The ice stayed in the Wainwright area longer in Year One and people kept hunting marine mammals throughout August before turning inland for fall caribou hunting. In contrast, good access to the drifting ice for walrus and bearded seal in July allowed people to finish their marine harvests that month and go inland for caribou in August. The most notable difference between Years One and Two terrestrial mammal harvests, however, is in the much higher late winter harvests that occurred in Year Two. January, February and March combined yielded 27 percent of the Year Two harvest, compared to only three percent for the same months in Year One. This

**Figure 5: Comparison of Total Monthly Harvests for all Resource Categories
Wainwright, Years One and Two**

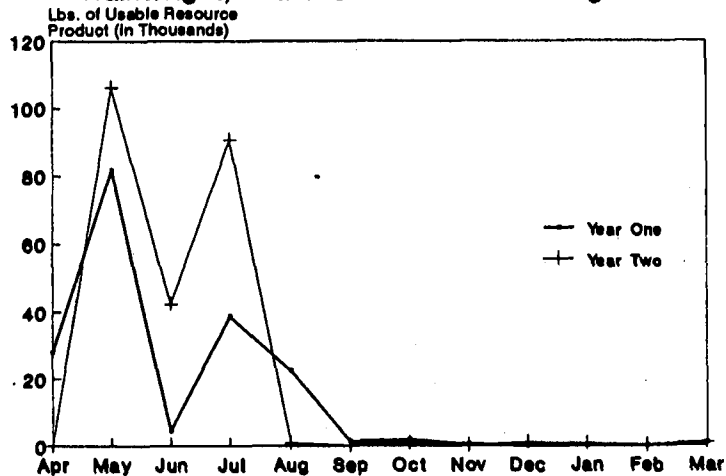


Based on 124 Year One and 119 Year Two households, including partial year households.

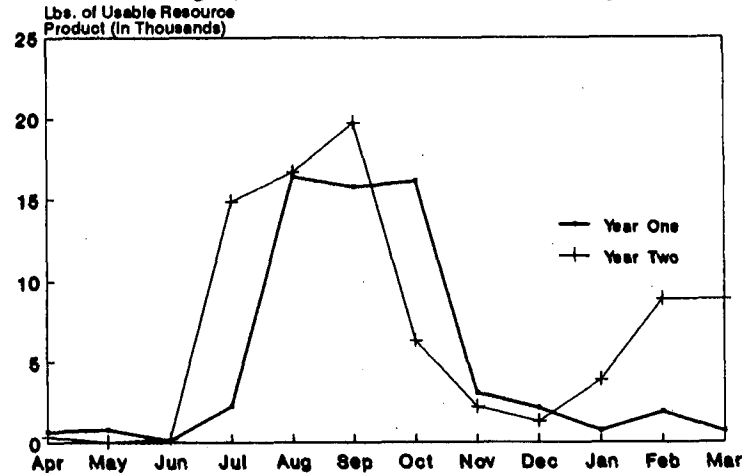
Year One: 4/1/88 - 3/31/89; Year Two: 4/1/89 - 3/31/90

Source: Stephen R. Braund & Assoc., 1993

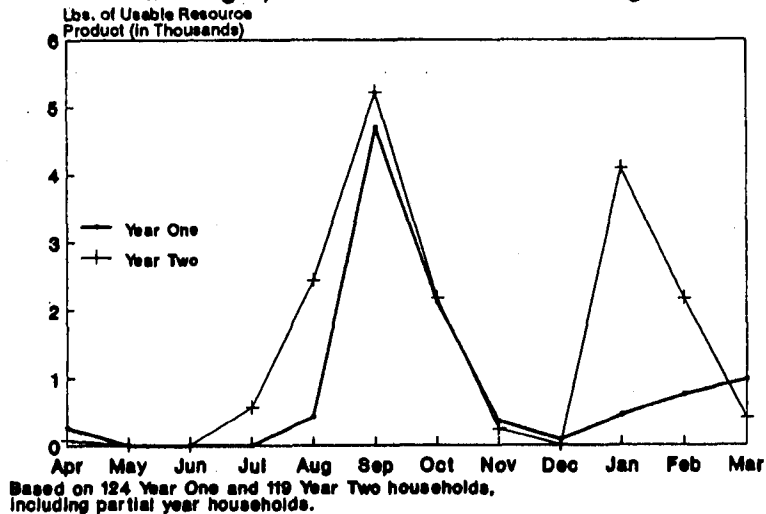
**Figure 6: Comparison of Monthly Marine Mammal Harvests
Wainwright, Years One and Two Averaged**



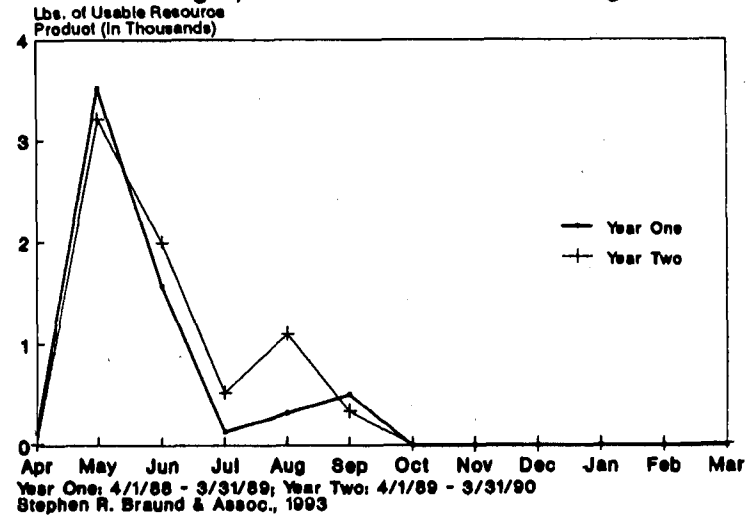
**Figure 7: Comparison of Monthly Terrestrial Mammal Harvests
Wainwright, Years One and Two Averaged**



**Figure 8: Comparison of Monthly Fish Harvests
Wainwright, Years One and Two Averaged**



**Figure 9: Comparison of Monthly Bird Harvests
Wainwright, Years One and Two Averaged**



difference was due primarily to the continuous presence of caribou near town throughout the winter of Year Two, which was not the case in Year One.

As with terrestrial mammals, Year Two summer fish harvests began to increase a month earlier than in Year One, beginning in July compared to an August onset in Year One (Figure 8). This earlier start in Year Two is linked to ice conditions and successful marine harvests allowing people to go inland earlier, as described in the previous paragraph. Although the major harvest of Year Two fish began a month earlier than the main fishing season in Year One, Year Two's harvests were spread across three months, tapering off in November; Year One's major harvests began a month later but lasted only two months, also ending in November. Mid-winter fish harvests, almost exclusively rainbow smelt caught in the inlet, were much higher in Year Two than in Year One. In Year One, the winter fishing occurred mainly in January through April, peaking in March. Most of Year Two's winter fishing took place from January through March, peaking in January. Both the summer and winter fish harvests were higher in Year Two than in Year One. Reasons for these differences are addressed in more detail in Comparison of Year One and Year Two Fish Harvests by Season.

Figure 9 indicates that May and June were the main months in which birds were harvested in both years, and the levels of the spring bird harvest in the two years were comparable. The harvests from July and August were considerably higher in Year Two than in Year One, due mainly to the efforts of one or two individuals in town who were highly successful during those months.

Variability from Year to Year in Harvest Sites of Major Resource Categories

Environmental and social factors, in addition to biological factors, play a major role in dictating what areas and what animals were hunted in any given year and can differ greatly over a two year period. Ice conditions on the rivers and ocean, snow conditions on the tundra, day to day weather, community events, and employment all influence where people go to hunt. During the two study years, small factors influenced geographic use, and consequently hunting locations varied even over a two year period.

Comparing Map A-2 with Map B-2 reveals that the concentrated area of Year Two marine mammal harvests was much larger and extended farther offshore than in Year One. This major difference between the two years can be summed up in one word: ice. In Year One, ice stayed within sight of the community and marine mammal hunting took place near town. Year Two ice conditions were such that marine hunters had to travel considerable distance to reach the ice where walrus and seals could be found. The weather, although very rainy and wet, proved to be calm and still for many days, making travel far offshore possible. In both years the majority of the marine mammals were harvested between Point Belcher and Kilimantavi.

Terrestrial mammal harvests appear quite similar in Years One and Two, with a few exceptions. The majority of the terrestrial mammal harvests took place along the Kuk River and its tributaries in both years. In Year Two, however, the map shows that harvests extended higher up each of the tributaries than in Year One. This difference is attributable to the heavy rains in July and August of Year Two, raising the river levels and enabling caribou hunters to travel much farther upriver in Year Two than they were capable of doing in Year One. In contrast, Year One terrestrial mammal harvests extended into the southwest area of the map around Cape Sabine and the Kukpowruk River, where no Year Two harvests are shown. Hunters traveled to this area in search of furbearers (wolves and wolverines). Year Two was a poor year for furbearer hunting due to inadequate snow cover both for tracking and snowmachine travel; consequently, no harvests are shown where hunters had been successful the previous year.

Fishing sites remained fairly consistent throughout the two years, being concentrated in the inlet and up the Kuk River and its tributaries. The main difference between the two years is that the higher water levels in Year Two allowed people to travel farther upriver.

Year Two bird harvests extended farther out on the ocean than in Year One. This shift is related to the marine mammal harvest and ice conditions, as many of the bird harvests occur during marine mammal hunting. As mentioned above, ice conditions in Year Two allowed marine mammal hunters to travel farther out

in the ocean than in Year One; while waiting for walrus and bearded seals, the hunters opportunistically harvested ducks.

In conclusion, certain environmental conditions contributed to increasing the area of successful harvests from Year One to Year Two. Favorable ice conditions and good weather combined to allow hunters to range farther than in Year One in their pursuit of marine mammals and, consequently, of waterfowl. Heavy summer rains raised the river levels, allowing more extensive boat travel for fishing and hunting caribou in Year Two than in Year One. Poor snow conditions in Year Two resulted in less success at harvesting furbearers in areas where hunters had been successful in Year One. These are the main differences that contributed to a generally broader harvest area in Year Two compared to Year One. Additional differences in harvest areas are discussed in subsequent sections addressing the harvests of individual species and species groups. Overall, the main hunting areas (near town, along the coast, and upriver around traditional camps and cabins), remained the focus of the majority of successful harvests.

SUMMARY

This subsistence overview has addressed, in general terms, demographic characteristics of Wainwright, the hunting area, and the typical cycle of seasonal subsistence activities. Additionally, summary level data have been presented for Years One and Two, showing that the average annual harvest for the two years was approximately 304,047 pounds of usable subsistence resources, or 2,624 pounds per household, 638 pounds per capita. However, this average blends two years during which harvests increased by 37 percent, due at least in part to more favorable environmental conditions in the second year and generally better harvesting success. The distribution of the harvest across the four major resource categories was consistent from year to year, with marine mammals contributing 69 to 70 percent of the total harvest. Terrestrial mammals were the second largest share, representing 24 percent, followed by fish (four to five percent) and birds (two percent). On average, 88 percent of Wainwright households participated in the harvest of at least one resource.

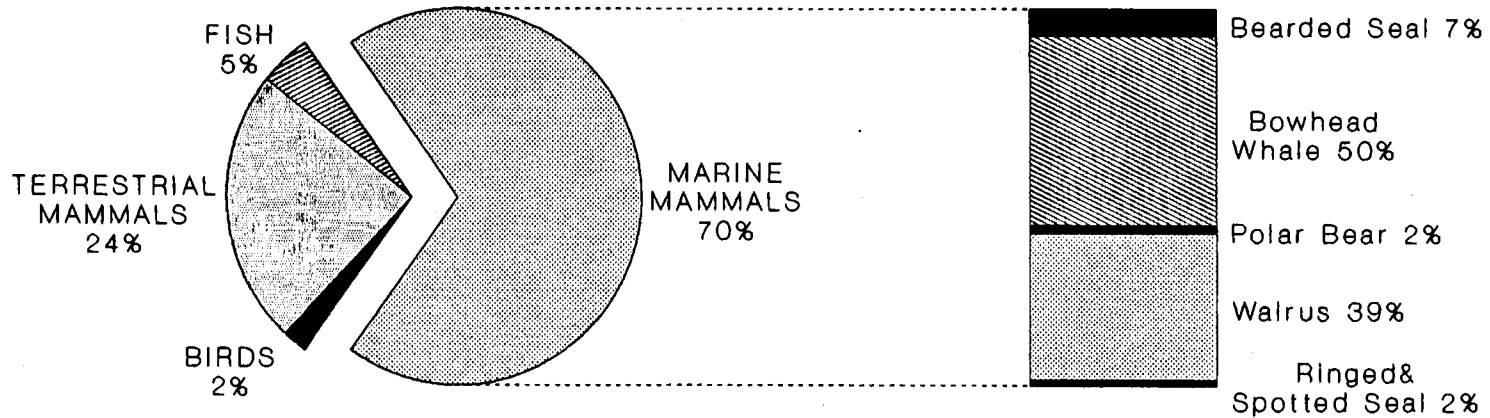
III. WAINWRIGHT SUBSISTENCE HARVESTS BY SPECIES

Following a similar sequence as the previous section, this portion of the report examines average harvests over the two study years and variability from year to year at the level of individual species or species groups (e.g., four species of eiders comprise a species group). Total harvests, average household and per capita harvests, percentage of the total harvest, participation, seasonal trends, and harvest locations are discussed first in terms of averages for the two years and then in terms of differences between the two years. The data are presented in tables, figures and maps comparable to those introduced in the previous section but with more detail at the species level. Because these sections of the report are organized to examine the two year averages followed by a comparison of the two years, material on any given resource (e.g., bowhead whale) is found in several different sections: Marine Mammals: Two Year Averages; Seasonal Harvest Patterns: Two Year Averages; Marine Mammal Harvest Locations Over Two Years; and in Marine Mammals: Variation from Year to Year.

MARINE MAMMALS: TWO YEAR AVERAGES

As a coastal community, Wainwright gets much of its livelihood in the form of subsistence foods from the marine environment. The people of Wainwright consider the ocean their "refrigerator," a place to go for food. As one older man stated to Nelson (1981:109), "That ocean out there is a good cold storage for our way of life. Whenever the time comes for getting something, you can always get them fresh." This notion is supported by the finding that in both study years the total pounds of marine mammals harvested was greater than all the other major resource categories combined (Figure 10), providing an average of 70 percent of the total harvest by weight each year. The expertise required to extract marine mammals from the harsh Chukchi Sea environment has been passed from generation to generation of Wainwright hunters; over the two study years, an average of 82 percent of the households participated successfully in marine hunting (Table 6). (Most of this participation was in whaling which involved 75 percent of Wainwright households.) Marine mammals harvested by

**Figure 10: Harvest Percentages
of Marine Mammals
Wainwright, Years One & Two Averaged
(Usable Pounds Harvested)**



- 19 -

Based on 124 Year One and 119 Year Two households, including partial year households.

Two years of study: 4/1/88 - 3/31/90

Source: Stephen R. Braund & Assoc., 1993

TABLE 6: HARVEST ESTIMATES FOR MARINE MAMMALS - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1)

RESOURCE	CONVERSION	COMMUNITY TOTALS (3)		AVERAGE POUNDS		PERCENT OF TOTAL USABLE POUNDS HARVESTED (3)	PERCENT OF WAINWRIGHT HOUSEHOLDS HARVESTING RESOURCE (4)
	FACTOR (2) Usable Weight Per Resource in pounds	NUMBER HARVESTED	USABLE POUNDS HARVESTED	PER HOUSEHOLD	PER CAPITA		
Total Marine Mammals	n/a	n/a	211,588	1,794.8	436.7	69.6%	82%
Bowhead (5)	35,091	3	105,274	866.3	210.8	34.6%	75%
Walrus	772	106	81,708	712.2	173.3	26.9%	28%
Bearded Seal	176	85	15,008	127.6	31.1	4.9%	35%
Polar Bear	496	10	4,712	44.6	10.9	1.5%	7%
Total Ringed & Spotted Seal	42	83	3,486	30.0	7.3	1.1%	26%
Ringed Seal	42	75	3,129	26.7	6.5	1.0%	25%
Spotted Seal	42	9	357	3.4	0.8	0.1%	6%
Beluga whale	1,400	1	1,400	14.0	3.4	0.5%	1%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) See Table C-3 for sources of conversion factors.

(3) Community totals and percent of total usable pounds harvested are based on harvest amounts reported by all 124 Year One households and 119 Year Two households for all species except bowhead (see note 5).

(4) Per household and per capita means and percent of households harvesting a resource are based only on the 100 core households in the study for the full two years for all species except bowhead (see note 5).

(5) Usable pounds harvested for bowhead whale were derived from a pounds-per-foot-length ratio, which includes all usable portions of the whale (see Appendix C). Average pounds per household and per capita were derived from the total usable whale amount (divided by 100 core households and 411 persons respectively) rather than from the number of shares households reported receiving.

** represents less than 1 percent

n/a means not applicable

Wainwright residents in the two study years included bowhead whale, walrus, bearded seal, polar bear, ringed seal, spotted seal, and beluga whale.

The majority of the marine mammal harvest derived from two major resources: bowhead whale, averaging 105,274 pounds per year; and walrus, 81,708 pounds per year (Table 6). These two species combined made up an average of 89 percent of the marine mammal harvests each year (Figure 10). It is important to explain that the estimate of usable weight used in this report refers to potentially usable product. Usable weight includes those parts of the animal that are usable and does not include such parts as bones. This measurement contrasts with "round" weight, which is the weight of the animal with all its parts (i.e., before butchering or processing in any way). This report deals only with usable weights, most of which were developed by ADF&G (ADF&G n.d.); other usable weights were developed by the study team or other sources. A complete list of usable weights used for the species harvested during the study period can be found in Table C-3 in Appendix C.

In the case of bowhead whale, the estimated usable portion includes the muscle or meat, tongue, the *maktak*, all the blubber and some of the organs. As discussed in the Overview of Wainwright Report, although the blubber is included in the estimates of usable pounds, half or less of the blubber was consumed in Wainwright. Some of the blubber was trimmed away at the ice, some was made into *mikigaq*, and a considerable quantity was shared with residents from other communities. A large portion of the whale was divided up at the whaling feast, *Nalukataq*, held in June following the spring whaling season and attended by families and individuals from all over Alaska. During the celebration, portions of meat and *maktak* were given away. Everybody present, whether from Wainwright or elsewhere, received a share of the meat and other parts of the whale that the successful whaling captains had set aside for distribution at *Nalukataq*. In addition, much of the blubber (and also meat and *maktak*) was sent by successful captains, crew members and other Wainwright residents to friends and relatives in other North Slope communities and beyond the North Slope, including Fairbanks and Anchorage. The field coordinator observed one visitor from Anchorage, a former North Slope resident, leaving Wainwright with over 150 pounds of whale.

This caveat is important to note in conjunction with the household and per capita means (Table 6, Figure 11), which include all usable weight regardless of whether it was trimmed at the ice, made into byproducts, or eaten, and regardless of how much was consumed outside the community. The average Wainwright household received an estimated 866 pounds of bowhead per year, or 211 pounds per person per year for the two study years. The inclusion of all potentially usable weight for bowhead has implications for the relative proportions it represents in the overall harvest, particularly when compared to the proportion that smaller species represent, such as fish, for which the usable weight is more closely equivalent to the amount actually eaten in Wainwright (field observations).

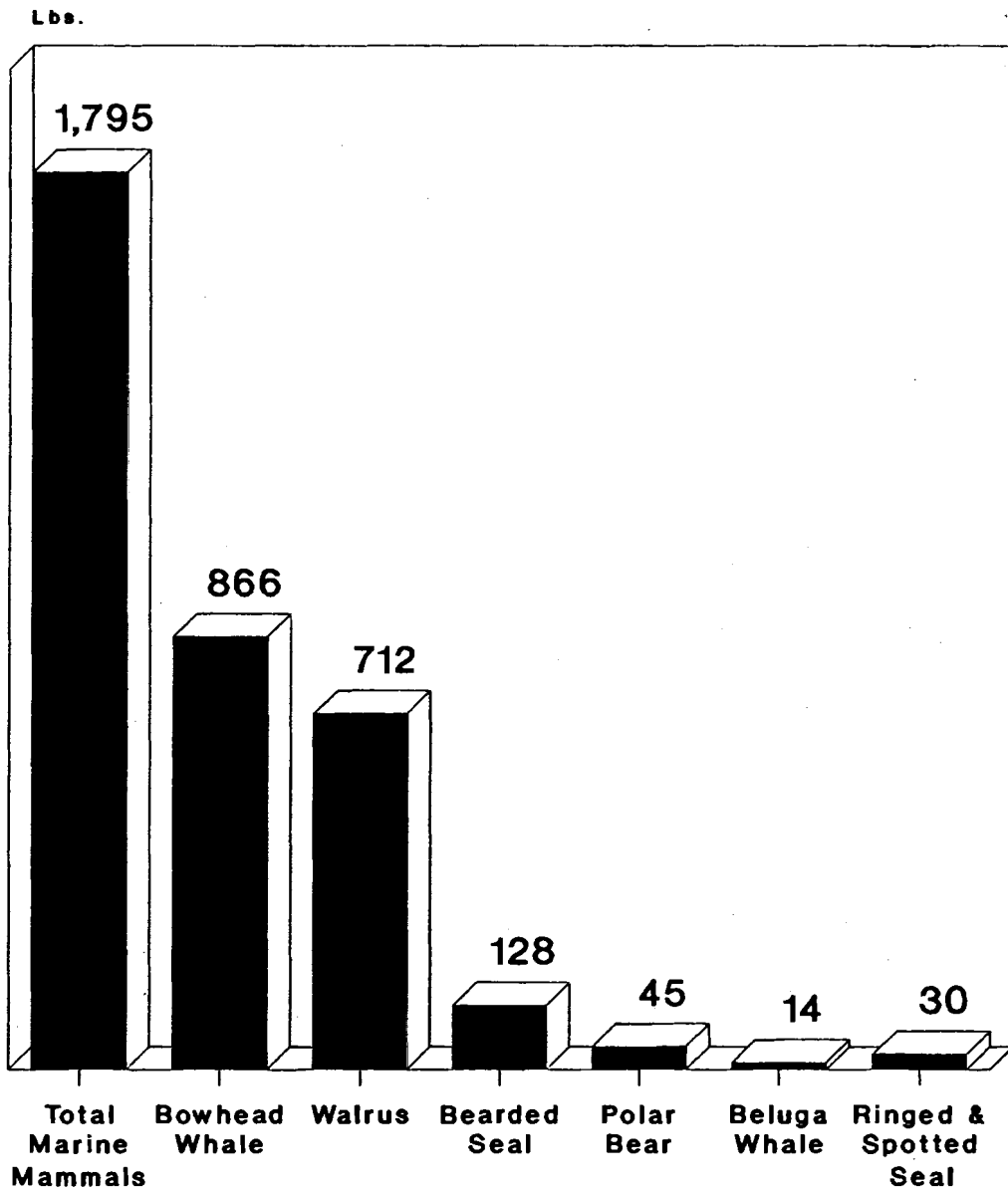
Bowhead Whale

Alaska coastal Eskimos have been hunting the bowhead whale for centuries, and bowhead whaling continues to be an integral part of the subsistence cycle and community life in Wainwright today. Alaska Eskimo bowhead whale harvests currently are regulated by the International Whaling Commission (IWC) which has determined an annual quota of strikes and landed whales that the whaling communities cannot exceed. The Alaska Eskimo Whaling Commission (AEWC), an association of the nine officially recognized Alaska Eskimo whaling communities (plus Little Diomedea, which was accepted into the AEWC in 1988 but has not yet been recognized by the IWC as a whaling community), divides the quota of strikes among the nine whaling communities each year. (For a concise history of Alaska Eskimo bowhead whaling, the reader is referred to ACI & SRB&A 1984:23-31 and Braund et al. 1988:3-9.)

Much of Wainwright's cultural identity derives from the residents' ability to harvest the bowhead whale. Nelson (1981:95) observed,

Although they have entered an era of profound change, the Wainwright Inupiat still focus their lives around the land and the hunt. And among all hunting pursuits, whaling is paramount. It dominates the ethos and orientation of these people as no other single activity does. It is a prime source of status and prestige, a matrix for social and economic networks within the village and the region as a whole, and a measure of Inupiat identity.

**Figure 11: Harvest of Marine Mammals,
Wainwright, Years One & Two Averaged
(Mean Usable Pounds Per Household)**



Based on 100 core households in the study for both years.
Two years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

In addition to untold cultural benefits, the bowhead whale provides Wainwright and other residents on the North Slope valuable supplies of food essential, in their view, for their well-being. The average of three bowhead whales per year (four in Year One and two in Year Two) was the result of considerable time, effort, risk and cost on the part of many people, and ultimately yielded the major proportion of the community's subsistence foods in terms of edible weight. Community residents value the bowhead whale in a manner distinct from other subsistence species. Harvesting the whale is a community effort to a degree surpassing any other harvest activity, and its harvest generates several community celebrations. Distribution of the whale is highly formalized and widespread.

Bowhead whale was culturally the most important species harvested by Wainwright residents (Nelson 1981, ACI and SRB&A 1984, Luton 1985). A 1984 whaling survey found that a majority of Wainwright residents (67 percent) preferred bowhead over all other subsistence foods (ACI and SRB&A 1984). Harvest data collected for this study found that Wainwright residents' average of three whales per year amounted to approximately 105,274 pounds of edible product for the community, or 866 pounds per household (Table 6, Figure 11). However, the 1984 whaling survey found that 79 percent of Wainwright residents reported eating caribou most often of all subsistence foods, in contrast to 18 percent who ate bowhead most often (ranking second as the most frequently eaten subsistence food).

Records of bowhead whales landed by Wainwright crews between 1910 and 1987 show an average of 2.2 whales per year (based on 68 years of landed bowhead data from Braund et al. 1988, appendices 1 and 2). The range of landed whales during this 78 year period was from 0 to five bowheads landed per year in Wainwright. Thus, the harvests of two and four whales in the study years appear to be consistent with historic harvest levels. During the study period, bowhead represented just over one third (35 percent) of the total community harvest (Table 6) and about half of the Wainwright marine mammal harvest (Figure 10).

An average of 75 percent of Wainwright households participated in the bowhead whale harvests each year, the highest level of participation in any harvest by

a considerable margin. (Participation in caribou harvests was second highest at 62 percent - Table 9 on page 105.) While this high participation in bowhead harvesting was at least partially a function of the large numbers of people required to hunt and land this huge animal, the high participation also reflects the tremendous importance of whaling to the community.

Walrus

Walrus hunting was once a more important activity for North Slope Inupiat than is now the case. When dog sleds were the primary means of transportation, walrus were used primarily as food for the dog teams. According to Nelson (1981), until the late 1960s, walrus provided the main source of dogfood (as well as supplementing the human diet) and therefore were a significant subsistence pursuit. Walrus are immense animals weighing up to 4,000 pounds and providing over 700 pounds of edible weight. During the two study years, Wainwright had no dogteams and a portion of the potential usable food available from the walrus was not eaten (mainly some of the blubber). However, if the whaling or caribou seasons were bad, walrus could provide a sizeable source of needed food. Thus, though not a preferred food like caribou or bowhead whale, walrus continued to provide an important source of food.

Wainwright hunters harvested an average of 106 walrus each year, equalling an estimated 81,708 edible pounds (Table 6). The harvest averaged 712 pounds per household and 173 pounds per person. Of all species in all resource groups, walrus was second (following bowhead) in terms of its contribution to the total harvest, representing 27 percent of the total edible pounds (Table 6) and 39 percent of the marine mammal harvest (Figure 10). About 29 percent of Wainwright households participated in successful walrus harvests each year, significantly lower participation than in bowhead whaling (75 percent). Stoker (1984 in ACI & SRB&A 1984) reported that walrus harvests in Wainwright between the years 1963 and 1979 averaged 91 per year. Given a range from 20 to 257 for that same period, the average harvest of 106 walrus per year during this study was well within the historic range, though a bit higher than the average harvest of 91 animals. Wainwright residents took 58 walrus in Year One and 153 walrus in Year Two (Tables A-3 and B-3 in appendices A and B).

Because the season for hunting walrus is potentially very brief, hunting was conducted opportunistically. In the summer, walrus migrate north on the moving ice and usually pass through the Wainwright area for a few weeks during July and sometimes into August. By early October, the animals typically begin to move back to their winter habitat in the Bering Sea. Walrus are found mainly along the southerly portions of the pack ice where the ice is broken up; there the animals can rest on the floes and feed in the surrounding waters (S. Stoker, personal communication). Any number of factors may inhibit hunters' ability to reach the walrus, however. Ice and weather conditions can and often do prevent hunters from seeking walrus; additionally, the ice on which the walrus are found must be within a reasonable boating range from land. Residents reported that in some years, conditions have conspired to prevent hunters from achieving desired harvest levels. Therefore, when conditions were favorable, hunters devoted considerable effort to locating and intensively harvesting walrus, realizing that the ice and/or weather could change in a matter of hours and conceivably close down the hunt for the rest of the season (i.e., until the next year).

The activity of walrus hunting (as with bowhead and, to a lesser extent, bearded seals) is inherently dangerous. Traveling across open water in open boats, working amid the ice floes, and dealing with large, powerful, and potentially dangerous animals requires a great amount of skill and knowledge and involves considerable risk. Consequently, walrus hunting generally was a cooperative effort undertaken in groups of at least two people per boat; occasionally, two or more crews in separate boats worked together. Because walrus will sink when shot in the water, hunters try to harvest walrus while the animals are resting on the ice. Animals on the ice but near the edge are avoided because they may slide off the ice once shot. In this manner, local hunters limit their loss. The ice also provides the hunters with an excellent butchering area. Nelson (1969) noted in the 1960s that many walrus hunters prefer to hunt walrus south of Wainwright because during the butchering process the northward current carries the hunters back toward the village; this strategy was practiced still during this study. Nelson (1969) also observed that when hunters did not find walrus south of town, they would travel up toward Point Franklin to hunt, which was also the case during the present study. Walrus are seen swimming south in the fall past Wainwright, but these

fall migrants are rarely harvested because the animals will sink when shot. Only when hunters see walrus resting on the shoreline do they harvest them at this time of year.

Bearded Seal

The average annual bearded seal harvest of 15,008 pounds (85 animals) represents five percent of Wainwright's total subsistence harvest (Table 6) and seven percent of the total marine mammal harvest (Figure 10). An average 35 percent of Wainwright households successfully harvested bearded seal each year, the fourth highest participation rate following whaling, caribou hunting, and smelt fishing. Bearded seal furnished approximately 128 edible pounds per household or 31 pounds per person each year.

Past estimates of Wainwright bearded seal harvests range from 250 animals taken annually (Burns 1967) to 50 per year (Patterson 1974). The present study's average of 85 animals per year over two years falls between the two earlier estimates by Burns and Patterson, and corresponds more closely with the later estimate by Patterson. As with walrus, bearded seals are hunted intensively when available since their availability occurs during a brief season that can be terminated at any time by environmental conditions. Thus, widely varying annual harvests are possible, and the earlier estimates by Burns and Patterson may reflect a series of high years on the one hand and a series of lower years on the other hand. The suggested decline in average harvests may also be a reflection of a shift in emphasis. Hunters traditionally used skin boats made from bearded seal skins. When Wainwright hunters replaced skin boats with aluminum boats, they no longer needed to harvest as many bearded seals.

Bearded seal was one of the primary marine mammals sought by Wainwright maritime hunters. Like bowhead whales and walrus, bearded seals were specifically pursued rather than being harvested incidentally. Most of the bearded seal population is migratory, coming north to the Chukchi Sea in the summer as the ice retreats and wintering in the central Bering Sea (Stoker in ACI & SRB&A 1984). Some bearded seals were seen in the Wainwright area by whaling crews (May) but the main hunting season was June and July when the ice left the Wainwright shore, allowing hunters to launch their boats from town. At that point, hun-

ters typically pursued walrus first, with bearded seal hunting occurring later. Like other marine animals, harvesting bearded seal depended on ice conditions. Bearded seal, like walrus, inhabit the environment around the drifting ice pack. As long as ice floes remained in Wainwright waters, chances of getting bearded seals were good. Thus, the timing and success of the bearded seal harvest in any given year was directly related to the ice conditions that year; a bad year of ice also meant a poor year for bearded seal harvests.

As the above paragraph implies, the main method of hunting bearded seals was from one's boat during the summer. Wainwright hunters traveled by boat to the drifting ice in June, July and August where concentrated numbers of the animals were found. Hunters shot the seals either from their boats or by landing on the ice and shooting the animal from the ice. Hunting bearded seals by boat was the main method in use during Nelson's fieldwork in the 1960s, and also in the early 1980s (Luton 1985, Nelson 1981, Braund & Burnham 1984). A second and less common method of hunting bearded seals was from the ice edge in the winter. As Stoker (in ACI and SRB&A 1984) indicated, not all bearded seals migrate in the winter; some overwinter in the Chukchi Sea. Ice edge hunting involves traveling to an open lead during the winter months and shooting seals that surface in the open water. Only a few Wainwright hunters hunted seals in the winter at open leads during this study, and only a few bearded seals were harvested in this manner.

Bearded seals were one of the favorite foods during the two study years. In addition to consuming the meat, Wainwright residents rendered the large quantity of blubber into oil and used it throughout the year as a condiment with other foods. The bearded seal hide was always stretched out and used for clothing, sold or given to relatives or friends. The current popularity of bearded seal as a subsistence food contrasts with preferences in the 1960s. Nelson (1969:350) wrote, "The meat is seldom eaten except for that which is dried...The skin, which is used for boat covers and lines, is by far the most valuable part." In addition, Nelson quoted Degerbol and Freuchen, visitors to Wainwright in the 1920s, as saying that bearded seal was likely the "poorest" food in the Arctic, and that some Eskimos would not eat it unless it was "putrefied and frozen" (Nelson 1969:350). At Wainwright, bearded seal skins are no longer used for boat covers, now that the traditional skin boat has been

replaced by modern skiffs, and the meat is not needed for feeding dogteams. Nevertheless, during the study period, bearded seals were hunted avidly for their food value and widely enjoyed by Wainwright residents.

Polar Bear

Wainwright residents harvested an average of 10 polar bears each year during the study period, yielding an estimated 4,712 edible pounds of meat, or 45 pounds per household (Table 6). This harvest represented about two percent of the total subsistence harvest (Table 6) and the same proportion of the marine mammal harvest (Figure 10). An average of seven households harvested polar bears each year.

In general, Wainwright hunters did very little polar bear hunting. Although a few people did hunt specifically for polar bears, most of these animals were harvested more or less spontaneously when a hunter encountered them incidentally (or heard of one's presence and pursued it). Polar bears were taken for their rich meat which was usually divided up and distributed throughout the community. The successful hunters announced over the citizen band (CB) radio that they had fresh polar bear meat at their homes. People came over with bags and containers for the fresh meat. Polar bear represented a secondary food source along with ringed seals and ptarmigan, for example. While use of these species may be sporadic and at a lesser volume than other resources, they remain of considerable value as a subsistence food. For some Inupiat individuals and households, some of these less common foods were valued and special treats. Elders in particular considered polar bear a delicacy. Polar bear meat was widely distributed when harvested (field observations).

Since passage of the Marine Mammal Protection Act in 1972, the sale of polar bear hides (once a popular commodity) has been prohibited. Consequently, people no longer had an economic motivation for hunting this animal. However, the hides can still be used in traditional means such as for clothing and handicrafts. Polar bear hides were used occasionally for clothing and some hides were also used to sleep on at whaling camp.

Ringed and Spotted Seals

An average of 25 percent of Wainwright households harvested 75 ringed seals successfully during the study period, yielding a total of 3,129 edible pounds each year or 27 pounds per household (Table 6). These small seals contributed one percent of the total community harvest. Spotted seals were harvested in far fewer numbers. Over the two study years, residents reported an average of nine spotted seals taken per year, equaling 357 pounds or about three pounds of meat per household and contributing well under one percent of the year's total harvest. Combined, ringed and spotted seals represented approximately two percent of the total marine mammal harvest (Figure 10).

Ringed Seal

Though not one of the most preferred species overall (according to fieldwork for this study), ringed seals were hunted to supplement and provide variety from the staple meats, bowhead and caribou. Ringed seals are only somewhat migratory, and therefore many of these animals reside near the Wainwright shorefast ice through the winter (Stoker in ACI and SRB&A 1984), making them one of the few resources available to Wainwright hunters during the winter. Consequently, ringed seals provided a source of fresh meat in the winter diet. Fresh seal in the winter and spring was considered a treat and a large family might consume a ringed seal entirely in a day. For the most part these animals were harvested incidentally rather than being sought out specially, except during the winter. Ringed seal was valued as a secondary resource for Wainwright. Used mainly as a food for dogteams in the past, harvests of ringed seals have declined to the current use levels which reflect this animal's role as a secondary food for the human residents of Wainwright (Nelson 1969, 1981).

Ringed seals were hunted near Wainwright throughout the year in accordance with open water conditions. During the two study years, winter ice edge sealing was very poor due to the lack of open water in the Wainwright vicinity. When ocean leads did open, hunters quickly went out. The lead would freeze back over in a matter of days. Since the open lead in the winter rarely came close to Wainwright, hunters generally harvested most ringed seals when the ocean ice began to break open (usually in late April or early May during whaling season)

and continuing through July. Ringed seals were also harvested on the ice when people went duck hunting along the coast in early June.

Nelson (1969) reported that in the 1960s some elder hunters still hunted ringed seals (and occasionally bearded seals) at breathing holes. Breathing hole hunting is a solitary, traditional means of harvesting seals that involves locating a breathing hole in the winter sea ice and waiting motionlessly and silently by it for several hours. When the seal appeared at the hole, the hunter would shoot it and quickly act to retrieve the harvest before it disappeared under the ice. Nelson also commented that young men could not be convinced to adopt this method, which requires great skill and patience. In the recent two years of study, no Wainwright residents hunted at breathing holes and residents indicated that no one had hunted in that manner for many years. The field coordinator noted several reasons for this change. First, seals were not as important a resource as they had been when people depended on dogteams and needed large quantities of seals to feed their dogs. Second, people have better boats and outboard motors and are more efficient at hunting seals during the boating season, lessening the need to hunt seals in the winter. Third, people are very busy. Winter employment levels were high in the village during the two study years, and people needed to work to earn money for whaling and for subsistence equipment such as snowmachines and boats. Finally, quite a few of the young men hunted ringed seals in the winter but using the alternative method of hunting from the open leads rather than the breathing holes. Thus, given time constraints and better success obtaining ringed seals during summer boating and winter open lead hunting, young men had neither the time nor the need to hunt seals at breathing holes.

Spotted Seal

Spotted seals made up a very small portion of the marine mammal harvest. Over a two year period an average of nine spotted seals were harvested by six percent of the households. An annual average of 357 pounds of edible meat was provided by this harvest activity over the two study years (Table 6).

Spotted seal harvests during the study period were low for a few reasons. Residents indicated the main reason as being that most people did not particu-

larly care to eat spotted seals. Second, unlike the other arctic seals, the spotted seal was rarely found along the sea ice (Nelson 1969) and was present in the Wainwright area only in the summer. Moreover, the animals concentrated in two areas located some distance from Wainwright: in Avak Inlet (just east and inland from Icy Cape) and in Kugrua Bay (off Peard Bay). These two bays are at either extreme of the main coastal area used by Wainwright hunters, and hence, the species was not readily available to Wainwright hunters. Most harvests occurred incidentally to other pursuits such as fall brant hunting at Icy Cape. More often, however, hunters who encountered spotted seals left them alone.

Once a major resource, the spotted seal populations in Avak Inlet and Kugrua Bay provided residents a predictable source of food for local dog teams. One hunter recalled getting 80 seals in Avak with a friend when they needed food for their dogs. After he no longer had a dog team, he stopped hunting spotted seals. Beside being used historically as dog food and occasionally as a supplemental subsistence food for human consumption in both the past and the present, the spotted seal skin continued to be valued for use in clothing.

Beluga Whale

During the two years of study, one Wainwright household harvested two beluga whales in Year One, averaging one per year and yielding about 1,400 edible pounds each. Beluga contributed one-half of one percent of the total community harvest when this harvest was averaged over the two study years (Table 6).

Of all the marine species that Wainwright residents hunt, beluga whales are the most unpredictable in terms of harvest success. Belugas, like bowheads, are migratory and follow the same lead systems as the bowheads in their northerly spring migration (Stoker in ACI and SRB&A 1984). Belugas generally migrate in large groups, arriving in the Wainwright area ahead of the larger whales, as early as March (Nelson 1969); groups of belugas are often seen after bowhead whaling season, also. Although whalers would watch the beluga migration from whaling camps, they rarely pursued them while waiting for bowheads. Since IWC imposed the bowhead quota, Wainwright hunters (and hunters in other whaling communities) have abstained from hunting belugas during bowhead whaling so not

to jeopardize bowhead hunting. The practice of hunting bowheads requires a minimum of noise or disturbance in the hunting area. Wainwright hunters typically waited until after the spring breakup of shore ice to harvest belugas using boats to herd the animals into shallow waters where the whales can be shot. Herding whales is a difficult process requiring good communication between the boats and a bit of luck to keep the whales from eluding the hunters.

In the year preceding this study, Wainwright hunters landed over 30 belugas in the shallow water of the Kuk Lagoon. During the study period, residents of Point Lay (for whom the beluga is an important subsistence species) alerted Wainwright residents when the animals had migrated past Point Lay and were headed for Wainwright waters. However, Wainwright residents were usually whaling at this time or were unable to reach open water due to ice conditions. At one point, boats did attempt to herd a group of belugas until heavy fog rolled in and the whales got away. The one successful hunt during the study period occurred in Year One when a hunter landed two belugas from his duck hunting camp south of Wainwright. Generally, however, Wainwright people have expressed concern about the decreasing appearance of belugas in the Wainwright area. Nelson (1981) recorded the same concerns. In conversations with the field coordinator, residents said they thought the lack of belugas was due to excessive offshore disturbance from boats and air traffic. Compared to Wainwright, they remarked that Point Lay has less activity and better success hunting belugas.

SEASONAL HARVEST PATTERNS: TWO YEAR AVERAGES

With the ocean frozen much of the year, and the highly migratory nature of most marine mammals, Wainwright hunters obtained 98 percent of their marine mammal harvest in the five month period between April and August (Table 7). As mentioned throughout this section, marine mammals are strongly associated with the breakup of the ocean ice and the subsequent drifting pack ice. An average of 86 percent of the marine mammal harvest occurred during the three months (May through July) characterized by open leads and broken ice.

Table 7 shows harvest amounts for each marine mammal species by month, with the equivalent monthly percentage of the year's harvest for each species shown

TABLE 7: MARINE MAMMAL HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Pounds of Usable Resource Product)

TOTALS

SPECIES	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Bowhead Whale	13,671	91,603	0	0	0	0	0	0	0	0	0	0
Walrus	0	0	19,532	51,172	10,615	386	0	0	0	0	0	0
Bearded Seal	0	352	2,552	10,806	682	88	440	0	0	88	0	0
Polar Bear	0	1,736	496	0	248	0	744	0	496	0	0	992
Total Ring. & Spot. Seal	273	315	840	1,323	63	105	105	210	0	231	0	21
Ringed Seal	273	315	840	1,113	21	21	105	189	0	231	0	21
Spotted Seal	0	0	0	210	42	84	0	21	0	0	0	0
Beluga Whale	0	0	0	1400	0	0	0	0	0	0	0	0
All Marine Mammals	13,944	94,006	23,420	64,701	11,608	579	1,289	210	496	319	0	1,013

PERCENTS

SPECIES	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Bowhead Whale	13%	87%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Walrus	0%	0%	24%	63%	13%	0%	0%	0%	0%	0%	0%	0% = 100%
Bearded Seal	0%	2%	17%	72%	5%	1%	3%	0%	0%	1%	0%	0% = 100%
Polar Bear	0%	37%	11%	0%	5%	0%	16%	0%	11%	0%	0%	21% = 100%
Total Ring. & Spot. Seal	8%	9%	24%	38%	2%	3%	3%	6%	0%	7%	0%	1% = 100%
Ringed Seal	9%	10%	27%	36%	1%	1%	3%	6%	0%	7%	0%	1% = 100%
Spotted Seal	0%	0%	0%	59%	12%	24%	0%	6%	0%	0%	0%	0% = 100%
Beluga Whale	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
All Marine Mammals	7%	44%	11%	31%	5%	0%	1%	0%	0%	0%	0%	0% = 100%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) Based on 124 Year One and 119 Year Two households, including partial year households.

below. Table 8 presents the number of animals harvested each month by species. Figure 12 graphs the pounds presented in Table 7 for each species by month. The purpose of this figure is not to convey data so much as to convey the general trends in seasonal harvests and the relative contributions of different species throughout the year.

As Table 7 indicates, May was the month in which the highest marine mammal harvests occurred (44 percent of the year's marine mammals) and this peak is due to the bowhead whale harvest. During the two years of the study, bowhead whales were harvested only in April and May, with the majority in May. Although on average two whales were harvested in May to only one in April, the disparity in weight is much greater than two to one because the May whales were much larger than those taken in April. Residents described and field observations corroborated a pattern of the larger whales migrating generally later than the smaller whales.

The other large peak in marine mammal harvests occurred in July, the peak month for walrus, bearded seal, ringed seal, spotted seal and beluga whale harvests. Walrus harvests began in June when 24 percent of the year's walrus were taken. Sixty-three percent of the walrus were harvested in July, falling off to 13 percent in August and less than one percent in September. Bearded seal harvests followed a similar trend but were spread out over a longer period, starting slowly in May and tapering off in October, with the vast majority (72 percent) of the year's harvest taken in July. In an exception to this curve, one of the few non-migratory bearded seals was harvested in January of one of the study years. In the case of walrus in particular and bearded seal as well, harvests drop sharply as soon as the drifting summer pack ice leaves the general Wainwright marine hunting area, typically in August.

Hunters took ringed seals in every month but December and February; however, over half (63 percent) were harvested in June and July. The main spotted seal harvest period was July through September, with 59 percent taken in July, 12 percent in August, and 24 percent in September for a total of 95 percent in those three months. The only beluga whale harvest in the two study years occurred in July of Year One when one household harvested two belugas.

TABLE 8: MARINE MAMMAL HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Number Harvested)

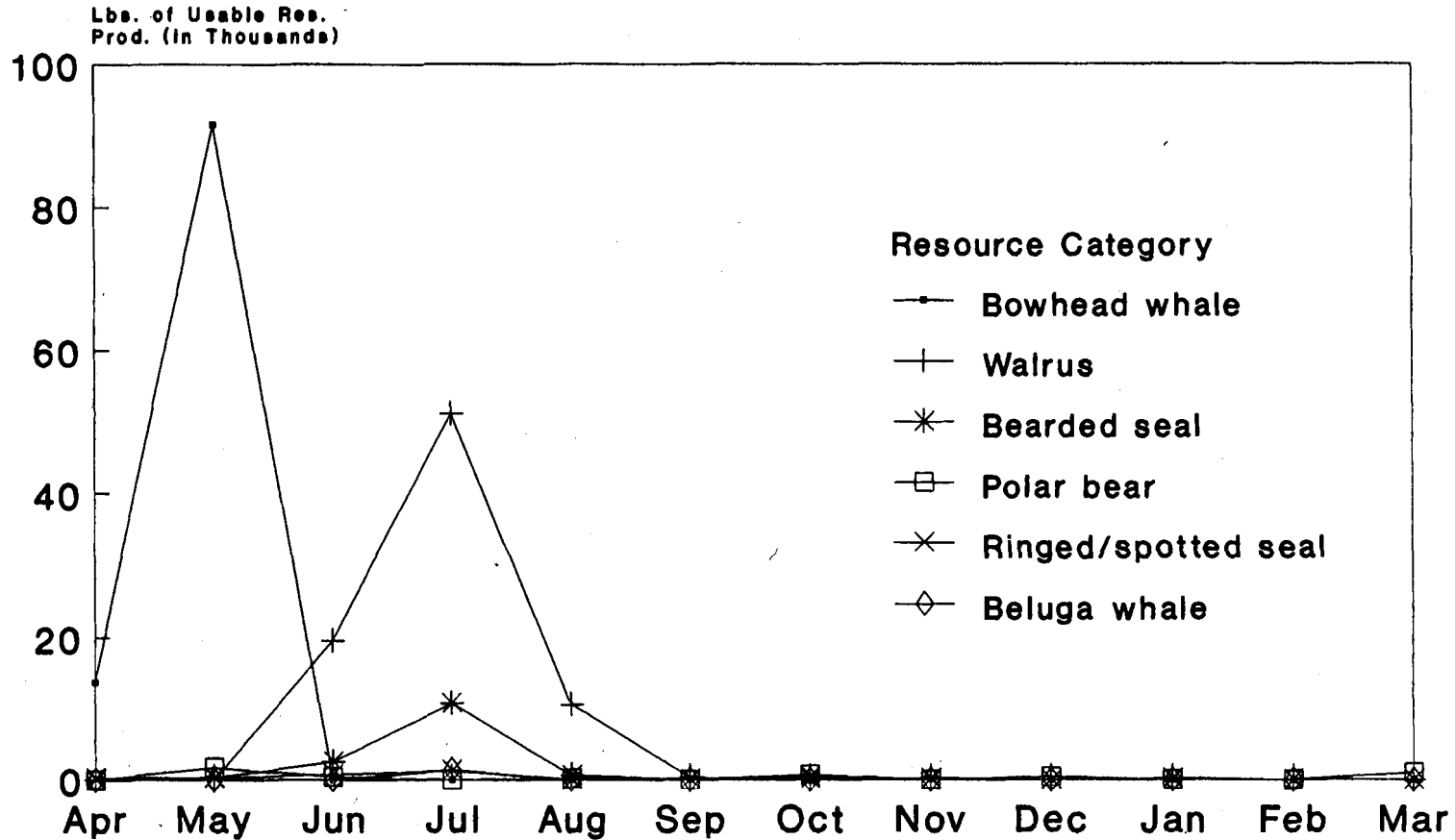
SPECIES	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Bowhead Whale	1	2	0	0	0	0	0	0	0	0	0	0
Walrus	0	0	25	66	14	1	0	0	0	0	0	0
Bearded Seal	0	2	15	61	4	1	3	0	0	1	0	0
Polar Bear	0	4	1	0	1	0	2	0	1	0	0	2
Total Ring. & Spot. Seal	7	8	20	32	2	3	3	5	0	6	0	1
Ringed Seal	7	8	20	27	1	1	3	5	0	6	0	1
Spotted Seal	0	0	0	5	1	2	0	1	0	0	0	0
Beluga Whale	0	0	0	1	0	0	0	0	0	0	0	0

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) Based on 124 Year One and 119 Year Two households, including partial year households.

Source: Stephen R. Braund & Associates, 1993

**Figure 12: Monthly Harvest of
Marine Mammals
Wainwright Years, One & Two Averaged**



Based on 124 Year One and 119 Year Two households, including partial year households.

Two years of study: 4/1/88 - 3/31/90

Source: Stephen R. Braund & Assoc., 1993

Polar bear harvests did not follow any obvious trend; rather, they occurred intermittently throughout the year, which is consistent with the earlier description of the harvests as largely incidental. May was the highest month for polar bear harvests (37 percent). This peak likely correlates with the peak of whaling activity. With higher numbers of people traveling across the ice to the open lead, the chances of encounters with polar bears increased. Furthermore, the presence of whale carcasses may have attracted polar bears to these same areas where people were concentrated for whaling. Although very few people go hunting specifically for polar bears, those people who do go indicated that they do so in October and November, mainly. Before the Marine Mammal Protection Act prohibited the sale of polar bear skins, people hunted polar bears in the late fall and winter months because the animal's fur was the whitest at that time. The coat turns yellower in the spring and summer, reportedly because of all the whale blubber the polar bears consume (field interviews).

In summary, Wainwright marine mammal hunters concentrated much effort on whaling in April and May, with the best results in May, and on harvesting walrus and seals in the summer, with the highest returns occurring in July. On average, 75 percent of the marine mammals (by weight) were harvested in these two months. Because most of these species are migratory and also due to ice conditions, marine mammal harvests were negligible from September through March, accounting for only one percent of total marine mammal harvest. Figure 12 clearly illustrates the highly seasonal nature of marine mammal hunting.

MARINE MAMMAL HARVEST LOCATIONS OVER TWO YEARS

Map 5 depicts the locations of all successful marine mammal harvests in the two study years. As described earlier (in Harvest Locations Over Two Years in Overview of Wainwright Subsistence), marine mammal harvests ranged from Barrow to Icy Cape and well offshore. Compared to the lifetime use line, representing the areas used by 14 hunters over their lifetimes up to 1979 (Pederson 1979), harvests during the two study years have extended nearly twice as far offshore than occurred prior to 1979. One likely reason for the difference is that hunters now use more powerful motors that allow them to travel farther in pursuit of marine mammals (Braund and Burnham 1984). Technological improvements in



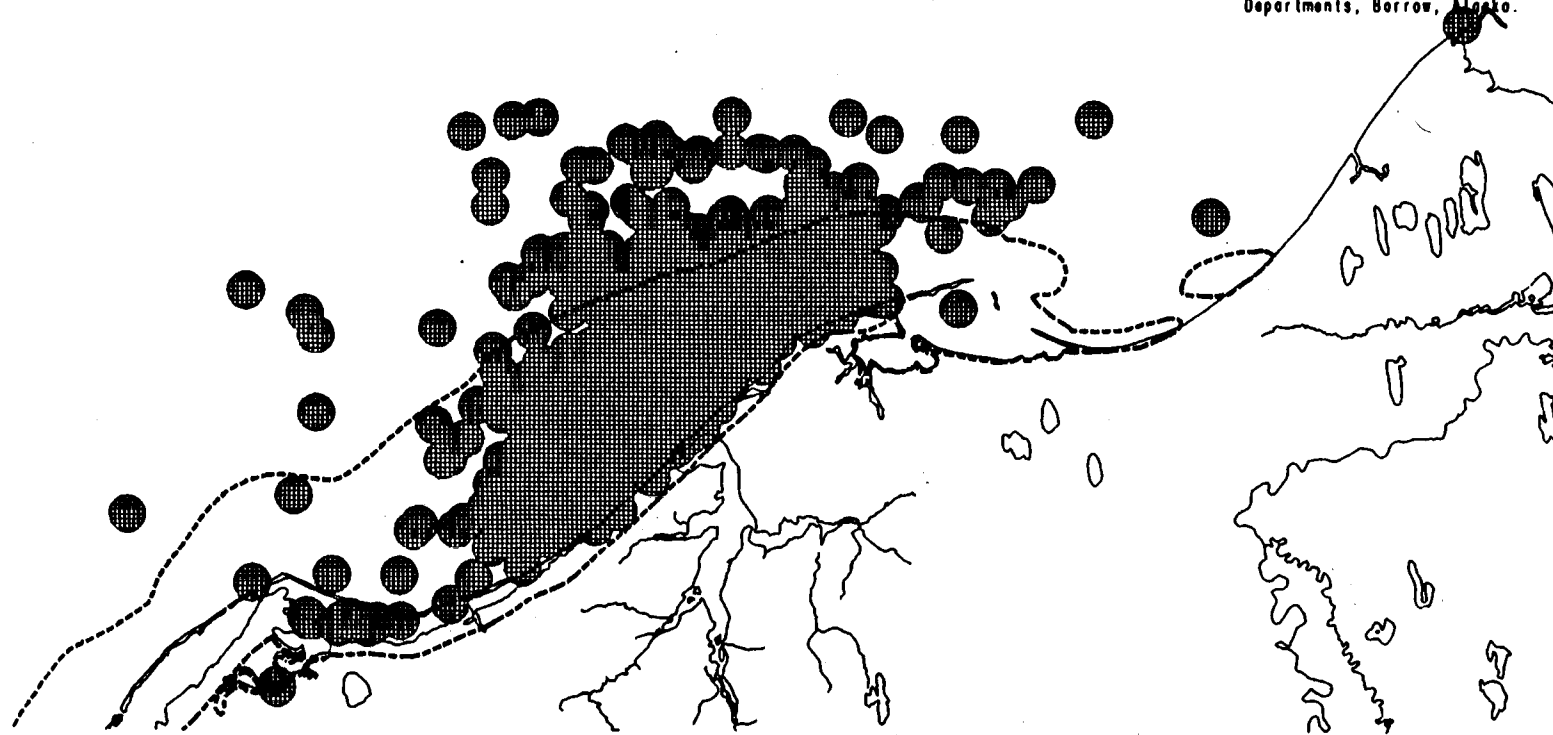
MAP 5

NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT

MARINE MAMMAL HARVEST SITES - ALL SPECIES, YEARS ONE AND TWO

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study. Lifetime-community harvest areas, collected in the form of map biographies from 14 households (Pedersen 1979), are also illustrated.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Brund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.



LEGEND INFORMATION

 Lifetime community land use (Pedersen 1979).

 Marine Mammals

- Bearded seal
- Ringed seal
- Spotted seal
- Bowhead whale
- Beluga whale
- Walrus
- Polar bear

Map Production: North Slope Borough GIS

Date: April 11, 1991

20 0 20 40 60 80

MILES



boating equipment have progressively extended the range of area that hunters can utilize in their pursuit of marine mammals. Motorized launches were introduced in Wainwright in the 1930s (Luton 1985). In the 1940s, residents began using outboard motors on their skin boats or *umiak* (Luton 1985, Milan 1964). During the study period, no one used skin boats; rather, the majority of marine hunters used aluminum boats with powerful outboard motors. Although hunters currently may travel farther to sea in pursuit of marine mammals, this more remote travel is simply an outward extension of the traditional hunting area, the offshore region between Icy Cape and Point Franklin.

Map 6 shows the harvest locations of walrus, bearded seals, and ringed and spotted seals. This map suggests that generally most of the near-shore harvests were of bearded, ringed and spotted seals, while most of the walrus harvests took place farther offshore. Walrus harvests occurred almost exclusively amid the floating pack ice, which tends to remain offshore; in contrast, seal harvests may occur not only amid the pack ice but also in the waters closer to shore. In the spring during breakup, bearded seals with ringed seals tended to feed around the entrance of the Kuk River lagoon. Also at this time many of these seals could be found sunning themselves on the shorefast ice. The area used during the study years to hunt walrus, bearded seal and ringed seals appears to be the same as Nelson (1981) described, offshore between Point Franklin and Icy Cape. Spotted seals can be found quite predictably in Avak Inlet (within Kasegaluk Lagoon, east side of Icy Cape) where they haul out on the sand bars to sun themselves. Most spotted seals harvested by Wainwright residents were taken here. Occasionally, spotted seals also have been seen in the Kuk Inlet and River, though not as commonly as in years past, according to some hunters. A local population of spotted seals can also be found in Kugrua Bay (within Peard Bay) but few Wainwright hunters use that area.

During the two study years, bowhead whale harvests all occurred a few miles offshore (where the spring leads opened up each year), from just north of Wainwright to Point Franklin (Map 7). The community of Wainwright itself is not advantageously situated for whaling as the leads do not open up near town; whalers would have to travel about 10 to 15 miles perpendicular from shore over rough ocean ice to reach the lead from Wainwright. Cutting a trail through miles of massive, jumbled sea ice is a major undertaking and therefore whalers



MAP 6




NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT

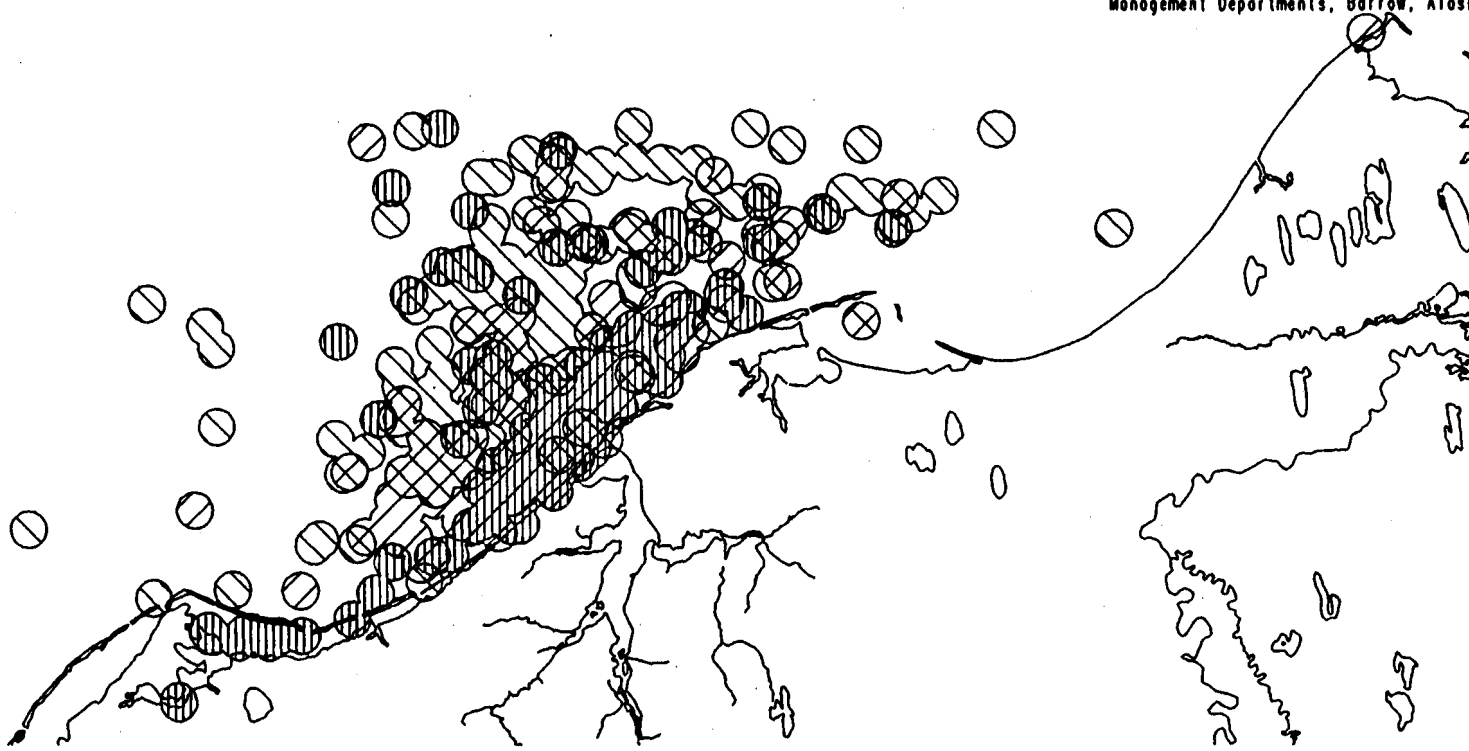
MARINE MAMMAL HARVEST SITES BY SPECIES, YEARS ONE AND TWO: WALRUS AND SEALS

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.

LEGEND INFORMATION

-  Walrus
-  Bearded seal
-  Ringed and spotted seals



Map Production: North Slope Borough GIS

Date: April 11, 1991








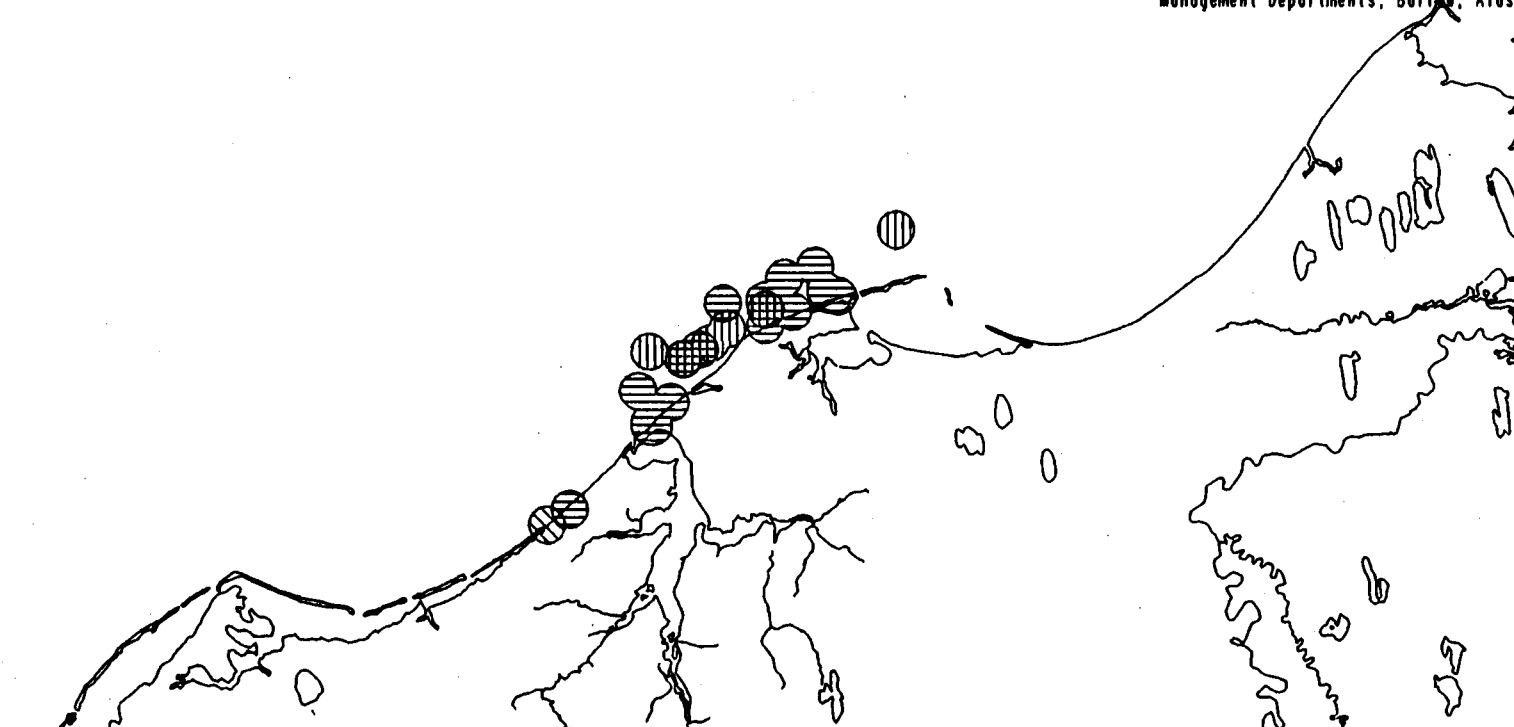
MAP 7
NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT
MARINE MAMMAL HARVEST SITES BY SPECIES, YEARS ONE AND TWO:
WHALE AND POLAR BEAR

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Brund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.

LEGEND INFORMATION

-  Bowhead whale
-  Beluga whale
-  Polar bear



Map Production: North Slope Borough GIS

Date: April 11, 1991



MILES



prefer not to go straight offshore from Wainwright for that reason. Instead, whalers generally travel overland north or south to locations where the open leads are nearer to the shore (typically one to five miles from shore). Traditionally, whaling crews traveled overland about 20 miles north of Wainwright to the area between Point Belcher and Ataniq, then headed out onto the ice to set up their camps at the lead edge, about five miles or less from shore. This area has been an important bowhead whaling location for decades (Ivie & Schneider 1979) and continues to be the main base for spring whaling (field observation). If a lead opens up closer to Wainwright as the season progresses, crews may move their camps down the lead in that direction. In the event that a lead does not open up near Ataniq, whalers indicated they occasionally would go to Icy Cape. However, this area is much farther from Wainwright and more difficult to travel in the springtime, and therefore is rarely used. From their camps in the Ataniq area, whaling crews hunt for bowheads in the leads from Wainwright to Point Franklin, the main area used. Ideally, whalers prefer to harvest whales near camp so that they do not have to tow the whale very far before landing it. A long tow can result in spoiled meat. When whales are scarce, however, hunters travel the leads from Peard Bay to Icy Cape in search of bowheads. The only beluga whales harvested during the study were taken south of town near Kilimantavi.

Polar bears were harvested in roughly the same area, though not quite as far north (Map 7). Before the Marine Mammal Protection Act of 1972, when more people specifically hunted the polar bear, hunters used to search the entire coastal area from Icy Cape to Point Franklin (Nelson 1981). During the two study years, the main hunting area was between Point Belcher and Point Franklin where walrus and whale carcasses tend to wash ashore in the fall, attracting polar bears, but some people said they also would search for polar bears south of Wainwright towards Kilimantavi. Hunters successfully obtained polar bears all along the coast from Ataniq to Kilimantavi, with most harvests occurring between Ataniq and Wainwright. Residents always were concerned about human safety if a polar bear was known to be near town; thus, some of the harvests near Wainwright were at least in part a matter of public safety.

Map 8 shows the marine mammal harvest sites by the two "seasons" that affect the method of hunting. From June through October, people can usually launch





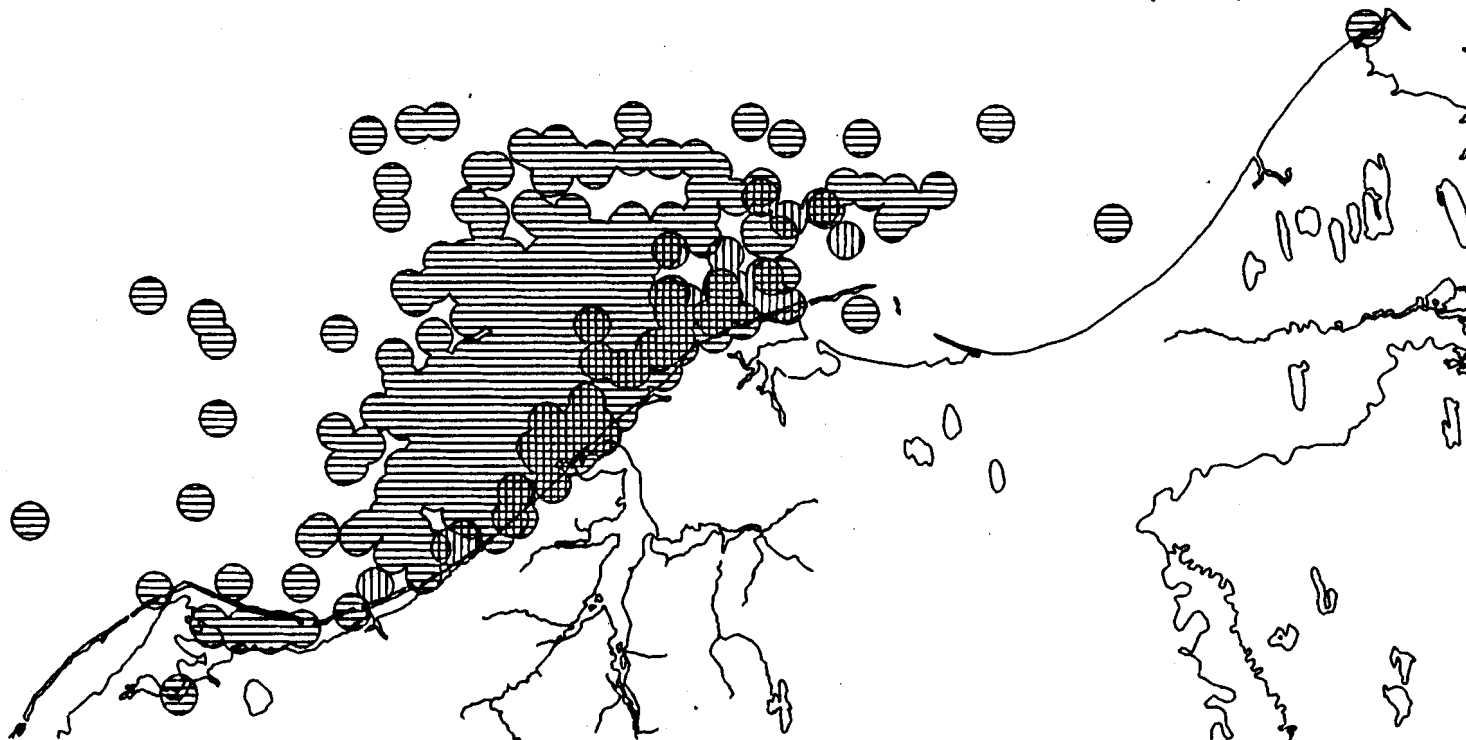
MAP 8 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT MARINE MAMMAL HARVEST SITES BY SEASON, YEARS ONE AND TWO

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SR&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SR&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.

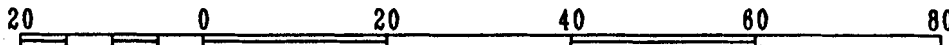
LEGEND INFORMATION

-  June - October Boating
-  November - May Ice Edge



Map Production: North Slope Borough GIS

Date: April 11, 1991



MILES



their boats from Wainwright and travel to open water (although in June they are mostly traveling through openings in the ice), allowing them to hunt over a broad area. November through May is the time when all hunting occurs on the ice, mainly at open leads. Because the leads typically form parallel to shore and offshore just a few miles, most harvests resulting from ice edge hunting took place closer to shore than the boat-based harvests.

MARINE MAMMALS: VARIATION FROM YEAR TO YEAR

As the previous sections addressed average harvests for the two study years in an effort to present the most generalizable marine mammal findings, this section examines how the two harvest years varied. According to hunters, Year One was an average year in terms of hunting conditions and success. The spring leads allowed whalers to land four whales, and the ocean ice broke up in such a way as to provide good walrus and seal hunting. In Year Two, whaling conditions were worse than average, and fewer whales were landed than usual. However, later in the summer, the drifting pack ice passed Wainwright closer than usual, providing ideal walrus and seal hunting. Overall, these two years were productive but, according to residents, did not represent unusually high or low marine mammal harvest years. Therefore, the data from this study do not represent the possible range of fluctuation in harvest levels but should give some idea of how harvests can vary between relatively "normal" years. Figure 13 is a bar chart that compares each year's harvest by species.

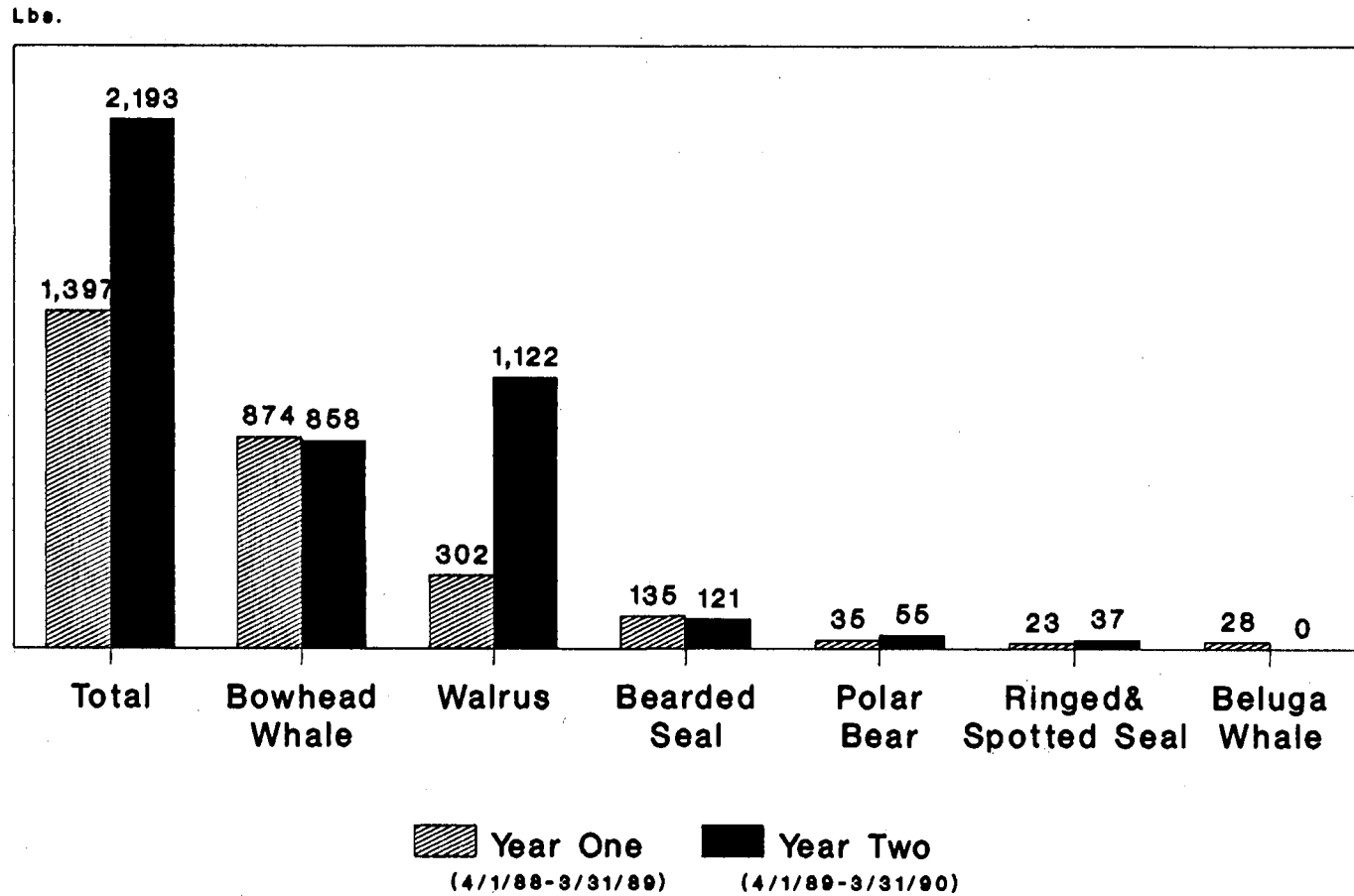
The previous review of two year averages was organized into three main sections: total harvests, seasonal patterns, and harvest locations, with discussions of each species within each section. In this section, where Year One and Year Two data are compared, discussions are organized by species within which totals, seasonal patterns, and harvest locations for each year are compared.

Bowhead Whale

Comparison of Year One and Year Two Bowhead Harvests

Year One (April 1, 1988 to March 31, 1989) was a successful year for the Wainwright whaling crews. In the first year of the study, Wainwright landed

Figure 13: Harvest of Marine Mammals
Wainwright, Years One & Two
(Mean Usable Pounds Per Household)



Based on 100 core households in the study for the full two years.

Source: Stephen R. Braund & Assoc., 1993

four bowhead whales compared to the two whales landed in Year Two (April 1, 1989 to March 31, 1990). However, although four whales were harvested in Year One, the number of total usable pounds (108,416 pounds - Table A-3) was only about 6,000 pounds more than the total of the two whales harvested in Year Two (102,132 pounds - Table B-3). The four whales harvested during Year One were smaller, ranging from 26 to 49 feet in length and averaging 27,104 usable pounds per whale, compared to the two large whales harvested in Year Two which measured over 50 feet long and averaged 51,066 pounds of potentially usable weight each.

Given ideal conditions, Wainwright whalers indicated that they preferred to harvest smaller whales. Not only are smaller whales more tender and flavorful, they are also much easier to tow and land than a large whale. A 26 foot whale was landed in five minutes in Year One in contrast to a 52 foot whale that took 18 hours to land in Year Two. In Year One, the ice conditions permitted Wainwright whaling crews a chance to harvest small whales in the early part of migration. In Year Two, however, the ice conditions were such that the crews were kept from whaling until the end of the migration, at which point the smaller whales had migrated already and only large whales were seen.

This preference for smaller whales has existed in Wainwright for many years. Waldo Bodfish Sr. (1991:41) wrote, "Whales came up every day while we were waiting down there on the edge of the lead. Big ones (bowheads) came up but they never bothered to shoot them. The only one they were looking for was a small whale." He also mentioned that the main reasons for selecting young, small whales were for ease of landing the animal (before whalers used blocks and tackles) and because the small whales had the most tender *maktak* and meat and made better *mikigak* (a dish made from fermented meat and blood). Bodfish (1991) mentioned that these smaller whales were the first to migrate in the spring and if the whalers were late setting up camps on the ice, they could miss the smaller whales entirely.

The number one priority, however, was having enough food for the winter and for community feasts. When environmental conditions were unfavorable for the whaling crews in Year Two, they did not have the luxury of picking and choosing the size whale they preferred. Rather, the whalers had to try to harvest

whales that could feed the community all year - i.e, large whales. Most of the smaller whales had migrated already, the migration of the larger whales was beginning to taper off, and ice conditions were deteriorating as temperatures warmed. Thus, the two large whales harvested in Year Two were selected mainly because of availability but also because they offered the maximum food value. In the 1990 whaling season (immediately following the end of this study), the field coordinator witnessed ideal ice conditions during which the Wainwright whalers harvested five "small" whales - decidedly the local residents' preference when possible.

The percentage of households participating in whaling in Years One and Two is interesting to compare (Tables A-3 and B-3). In Year One, 84 percent of Wainwright households were involved in harvesting the four whales, while in Year Two only 66 percent participated. The 84 percent participation in Year One is the highest household participation rate in the two study years for any species harvested. Various factors caused the Year Two decline in households participating in whaling. Two of the whaling crews that participated in Year One were unable to go out in Year Two due to employment conflicts and lack of funds. Each whaling season, whaling captains reportedly spent an estimated \$10,000 or more in supplies, maintenance and repairs to go whaling (field interviews). In Year Two, the whaling season was so poor due to environmental conditions that many people decided to stay home or go goose hunting rather than spend the time out on the ice. In contrast, Year One conditions were ideal and the whaling camps were filled with people. One of the Year One whales was harvested in a lead that opened up near the community. The closeness to town provided the opportunity for anyone to participate in the butchering and hauling of the whale.

Table B-3 and Figure B-4 illustrate that bowhead whale contributed the second largest amount of food out of all marine mammals in Year Two, with walrus contributing the most. Normally, bowhead would exceed walrus in terms of usable pounds harvested, as was the case in Year One (Table A-3, Figure A-4). The reasons behind this reversal are the poor whaling season in Year Two combined with an unusually productive walrus season. Only two bowheads were harvested this season compared to 153 walrus. Despite the lower yield in pounds for Year Two bowhead compared to walrus, more people participated in the

bowhead harvest (66 percent) than that of walrus (37 percent) or any other marine species in Year Two (Table B-3).

Comparison of Seasonality of Year One and Year Two Bowhead Harvests

Bowhead whaling in Wainwright occurs during a very limited season in the spring. With good ice and weather conditions, the bowhead whaling season can begin in April and last into June, as occurred in Year One. On the other hand, poor conditions can greatly reduce the opportunities to hunt, which was the case in Year Two. As Tables A-4 and A-5 indicate, and Figure A-6 illustrates, bowhead whales were landed in both April and May in Year One. Two small whales were landed in April, their combined weight totaling 27,342 usable pounds, and two larger whales were landed in May, totalling about 81,000 usable pounds. In contrast, Year Two's entire harvest of two bowheads occurred in May (Tables B-4, B-5 and Figure B-6). As discussed previously, favorable ice conditions in Year One allowed whalers to hunt successfully over a longer period, in contrast to Year Two when ice conditions kept crews from whaling until late in the migration, resulting in generally poor hunting.

Comparison of Year One and Year Two Bowhead Harvest Locations

The leads that form offshore from Wainwright each spring, providing the bowhead hunting grounds for Wainwright whaling crews, reoccur in the same general area each year between Point Franklin and Icy Cape. As mentioned previously, whaling crews usually set up their camps in the Ataniq/Point Belcher area (between Wainwright and Point Franklin - Map 1) where the leads form within one to five miles from shore. However, as the season progressed, crews would move their camps closer to Wainwright if productive leads opened in that direction. Whalers tended to hunt in the area between Wainwright and Point Franklin, but would look much farther (i.e., from Peard Bay to Icy Cape) when whales were scarce.

In both Years One and Two, whaling crews began the season camped in the Ataniq/Point Belcher area about 20 miles north of Wainwright. In Year One, the first whale was harvested by Point Belcher; each of the next three whales was harvested successively closer to Wainwright. The third whale was towed 10 to 12 miles and landed just offshore from Wainwright. In Year Two, poor ice

conditions limited whaling to the late part of the migration and hunters traveled longer distances than normal up and down the leads in search of small whales. When the whaling captains determined that no more small whales were available, they decided to harvest larger whales. The crews resumed hunting closer to the camps and harvested two large whales, one just north of Wainwright and the other by Point Franklin. The whale harvested near Wainwright was struck very near to camp (which had been moved south from Ataniq as the leads had opened). However, the crews could not land the whale there because the ice was too rough and steeply ridged; instead, they towed the whale toward Point Belcher to land and butcher it. Thus, the four Year One whales were harvested in a relatively concentrated area from a few miles north of Wainwright to just south of Ataniq, while the two Year Two whales were taken at either end of the main whaling area, Wainwright to Point Franklin.

Walrus

Comparison of Year One and Year Two Walrus Harvests

As discussed previously, the summer walrus hunting season generally is brief and subject to environmental conditions that can eclipse the season at any point. Consequently, walrus harvests can vary a great deal from year to year. Stoker (1983 - appendix in ACI & SRB&A 1984) reported that Wainwright walrus harvests ranged from 20 to 257 animals per year from 1963 to 1979. During the present study, Wainwright residents obtained 58 walrus in Year One (Table A-3) and 153 in Year Two (Table B-3). These wide ranges demonstrate the extreme variability in harvests from year to year, motivating hunters to hunt intensively when conditions allow.

In Year One, the drifting ice that the walrus inhabit in the summer lingered in the Wainwright boating area into August, providing hunters a relatively long and moderately successful season. The 58 walruses harvested provided 45,038 pounds of usable product for Wainwright, the equivalent of 302 pounds per family or 74 pounds per person. Walrus accounted for over 18 percent of the total Year One subsistence harvest.

Nevertheless, Year One harvests fell well below the Year Two walrus harvest. One factor contributing to lower harvests was that a major harvesting household was involved in an international effort to place radio collars on walrus. Thus, a family that usually would harvest many walruses had only enough time to harvest a few. Just 20 percent of the households in Wainwright successfully harvested walrus in Year One, compared to 37 percent in Year Two.

Additionally, hunters agreed that some ingredient was missing in Year One that existed in Year Two. Residents suggested that the key factor was that the walrus pack drifted closer to the community in Year Two. Greater proximity to town allowed more harvesters to participate in Year Two, pushing walrus harvests to a higher level in Year Two. Also, a successful trip took less time, allowing for more trips per week despite a shorter season overall than in Year One.

The optimal conditions for hunting walrus came about in Year Two when a group of over a thousand walrus drifted by Wainwright in late June and early July. When the ocean ice broke up, Wainwright hunters launched their boats and encountered this large herd of walrus drifting with the ice. For the next three weeks, the walrus remained accessible and plentiful. Walrus usually remain in the Wainwright area as long as pack ice is around, which was the case for these three weeks. Moreover, weather cooperated to allow safe boating. Thirty-seven percent of the households in Wainwright successfully harvested walrus in Year Two, the second highest participation level of all marine species after whaling. The fact that the ocean ice broke up just as the walrus were drifting by, and that the walrus remained accessible for three weeks, offered many families an opportunity for a successful harvest. Field observations suggest that some of these harvests may have been incidental to bearded seal hunting. Some people who were hunting specifically for bearded seal may have harvested walrus when encountering them on the ice.

Over the three months in which Wainwright hunters were able to harvest walrus in Year Two, 153 were taken, yielding 118,371 total pounds of potentially usable product (Table B-3). This harvest amounted to approximately 1,122 pounds per household, over three times the amount harvested in Year One (302 pounds per household - Figure 13). Year Two walrus harvests exceeded the bowhead harvest in terms of usable weight.

Comparison of Year One and Year Two Walrus Harvests by Month

Figure 14 illustrates that the walrus harvest in Year One began later than in Year Two. This difference was a function of the different times that the ice broke up each year to allow boat travel. When the ice broke up in early July of Year One, hunters rushed to harvest the first accessible pack of walrus. The weather deteriorated in the second half of the month, and then improved again in August. The ice was still in the area at that point, and Wainwright hunters resumed walrus hunting. As Table A-4 states, Wainwright residents took 48 percent of the year's walrus in July and 45 percent in August.

In Year Two, Wainwright hunters first observed walrus in May while pursuing bowhead whales. Nearly every spring, whalers see early-arriving walrus in the leads, and may or may not hunt them depending on ice conditions. In Year Two, ice conditions were too severe for hunters to pursue the early walrus. The main herd usually arrives in the Wainwright area in late June or early July, remaining for as long as the pack ice is around. In Year Two, the pack ice lasted only three weeks. The ice broke open in the last days of June and, by mid-July, most of the ice had drifted over the horizon. For those three weeks, the ice remained close to town and hunting conditions were excellent.

Table B-4 reflects that 99 percent of the walrus were taken during this prime three week period. When the ice drifted off in July, the walrus herd went with it toward Barrow. In two months, walrus provided 117,599 pounds of usable product. In the first two to three days of walrus hunting (in late June), 31 percent of the animals were taken, equal to 37,056 pounds of usable product. Walrus hunting was conducted at an intense pace, with everyone enjoying the fresh taste of the meat. Another major portion of the walrus harvest occurred when a very large herd of walrus drifted near Wainwright on the morning of July 8th. That morning, a strange bellowing and moaning could be heard through the heavy fog. Ice had floated in and with it came an overpowering fish odor from the huge herd of walrus drifting with the ice. July was the most productive month with 68 percent of all walrus taken, while in August the last one percent was harvested. The entire Year Two harvest took place in these three months. Figure 14 shows the months of break up (June and July) as the peak walrus hunting months. When the ice left in August, the numbers dropped sharply.

Figure 14: Comparison of Monthly Walrus Harvests Wainwright, Years One and Two

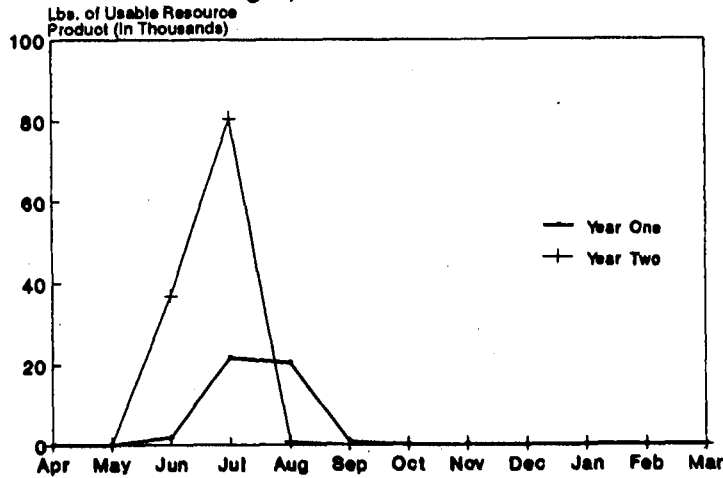


Figure 15: Comparison of Monthly Polar Bear Harvests Wainwright, Years One and Two

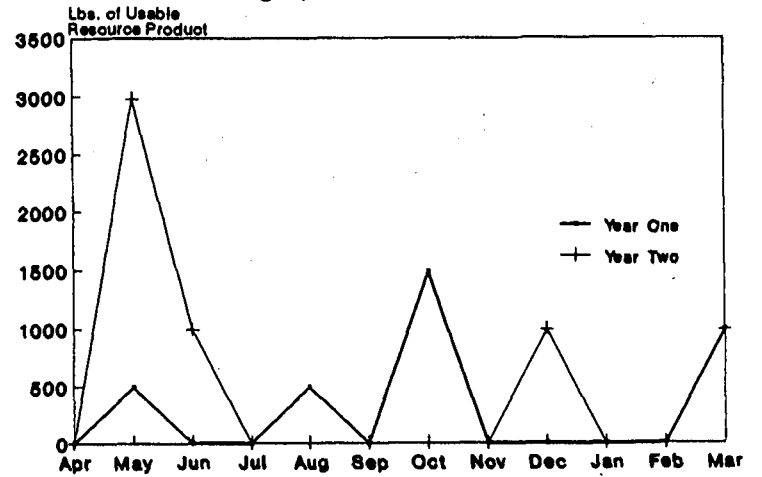


Figure 16: Comparison of Monthly Bearded Seal Harvests Wainwright, Years One and Two

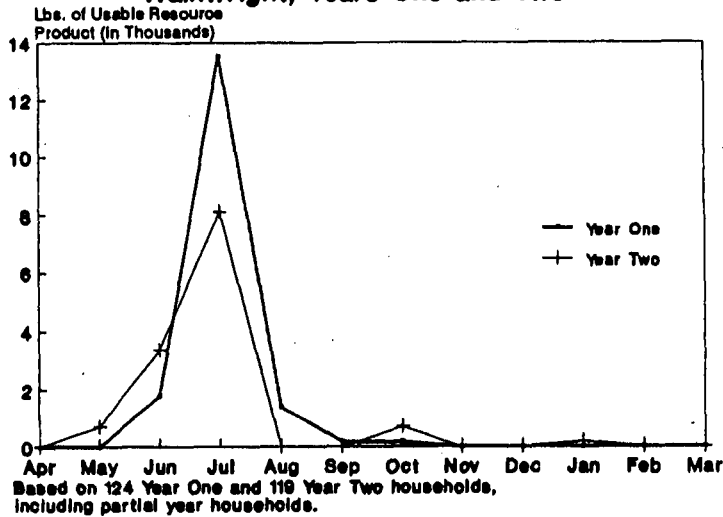
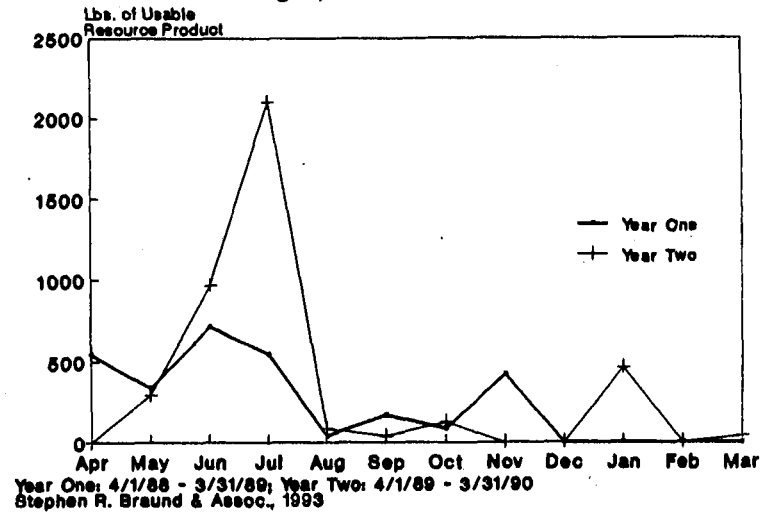


Figure 17: Comparison of Monthly Ringed & Spotted Seal Harvests Wainwright, Years One and Two



Comparison of Year One and Year Two Walrus Harvest Locations

In comparing the mapped walrus harvests for Years One and Two (Maps A-4 and B-4), the main difference appears to be in the density of harvest sites, reflecting the lower harvest in Year One and the higher harvest in Year Two. The main use area was essentially the same each year, i.e., the waters directly offshore from the coast between Icy Cape and Point Franklin and offshore to about 40 miles. Although the use area was generally the same each year, the most remote harvests in Year One extended farther than the most remote harvests in Year Two. The reason the Year One harvests were more sparse and spread out than Year Two is that in Year Two a very large herd came conveniently close to Wainwright and large numbers of walrus were taken in a concentrated area (and time period) relatively close to Wainwright, whereas hunters had to search more extensively to find the animals in Year One. The drifting ice floes on which the walrus are found were much more dispersed both geographically and chronologically in Year One than in Year Two. Hence, hunters traveled farther throughout July, August and even into September in Year One, whereas in Year Two the ice came by Wainwright densely packed with walrus, and within three weeks the ice was gone. Hunters had obtained enough walrus in those three weeks that they did not need to continue hunting far and wide for additional animals after the ice left the Wainwright area.

Bearded Seal

Comparison of Year One and Year Two Bearded Seal Harvests

The total number of bearded seals harvested in Year One was 97 animals, decreasing to 74 animals in Year Two (Tables A-3 and B-3). The main reason more bearded seals were harvested in Year One was that the ice pack remained near Wainwright for a longer time than in Year Two. Once people had completed their walrus harvests, they turned their attention toward bearded seals. In Year One, the 16,991 pounds of bearded seal harvested constituted nine percent of all marine hunting (Figure A-4) and almost seven percent of the total Year One subsistence harvest. Bearded seal averaged 135 pounds of usable meat per household (Table A-3) or 33 pounds per capita.

Some hunters attributed the decline in Year Two to the large numbers of walrus present and the possibility that the walrus scared the bearded seal out of the area (field interviews). Bearded seal hunting amid the summer pack ice occurs simultaneously with walrus hunting. When hunters went out in the summer, they usually were looking for either bearded seal or walrus and would harvest whichever species they encountered. In Year Two, hunters encountered a large group of walrus in the pack ice that drifted close to town. The walrus hunting was so good and so accessible that hunters concentrated mainly on walrus and were doing so still three weeks later when the ice left the area, taking with it the walrus herd and any bearded seals that were inhabiting the ice pack. Once the ice left, the bearded seals became less available.

Even with the limited opportunity to hunt bearded seals in Year Two, 74 bearded seals were harvested with 34 percent of the households participating. In Year Two, over 13,024 pounds of bearded seal meat were harvested, averaging out to 121 pounds per household (Table B-3) or 29 pounds per individual. Bearded seal contributed almost four percent of all species harvested and about five percent of marine mammals (Figure B-4).

Comparison of Year One and Year Two Bearded Seal Harvests by Month

The main bearded seal harvest time is during the summer boating season. In both years, July was the peak month for bearded seal harvests. In Year One, harvests jumped from 10 percent in June to 80 percent in July and back down to eight percent in August (Table A-4). Year Two harvests increased steadily over May, June and July, peaking in July with 62 percent of the total bearded seal harvest and dropping to zero in August (Table B-4).

Harvest timing directly reflected ice conditions in the Wainwright area. In June of Year One, the ice began to break up slowly, encouraging bearded seals to sun themselves on the shorefast ice and allowing some Wainwright hunters to harvest them. Then in July the ice broke open and many people went hunting. The ice remained accessible but had moved farther offshore in August, yielding much lower harvests than in July. In September, the ice moved out and bearded seal harvests were infrequent at best, as in October when the ice began to close back in. This correlation between ice conditions and harvest levels by

month occurred also in Year Two, with high harvests in June and July when the broken ice was nearby, and no harvests in August when the ice departed. Year One harvests were higher and sustained over a longer period than in Year Two due to the presence of the ice for several weeks instead of just three weeks.

A few bearded seals were harvested outside the main summer season each year. As with walrus, bearded seals usually were first seen in the open lead when whalers were out searching for bowheads. During whaling season, several bearded seals were harvested to feed crew members at whaling camp in Year Two, but not in Year One, as illustrated by May harvest totals in Figure 16 and in comparing Tables A-4 and B-4. This difference is due to the poor whaling conditions in Year Two. Being unable to hunt whales much of the time, hunters could instead pursue bearded seals (as well as other species such as birds). In contrast, the Year One whaling season went well and therefore did not provide much "down time" from whaling to allow hunters to harvest bearded seals and other species. Additionally, a few bearded seals were harvested in the fall of Years One and Two and in the winter of Year Two when open leads appeared near Wainwright.

Comparison of Year One and Year Two Bearded Seal Harvest Locations

Although people harvested more bearded seals in Year One than in Year Two, comparing Maps A-4 and B-4 shows that the bearded seal harvests in Year One were concentrated in a smaller area closer to shore than in Year Two. Visually there appear to be less harvests on the Year One map although in fact more animals were taken. The map gives this impression because many of the Year One mapped sites represent the harvest of several bearded seals in the same place, whereas the Year Two sites represent fewer animals per site. In Year One, the pack ice lingered off Wainwright throughout the whole month of July and for part of August. Due to this good access, bearded seal harvesting took place almost entirely in the ocean current of the Kuk River. Harvesters did not go as far south in Year One as in Year Two due to the availability of bearded seals near town; however, the Year One harvest area extended farther north along the coast, to Point Franklin and Peard Bay, than the Year Two area.

In Year Two, bearded seals were harvested from offshore of Ataniq all the way to Icy Cape. Most of the bearded seals that were harvested in Year Two occurred while hunters were out looking for walrus. Many of these harvests occurred just offshore between Kilimantavi and Wainwright.

Polar Bears

Comparison of Year One and Year Two Polar Bear Harvests

The total number of polar bears harvested in Year One was seven, providing 3,472 pounds of usable meat or a little over one percent of the total harvest. About five percent of all Wainwright households harvested polar bears during Year One (Table A-3). Polar bear harvests increased in Year Two, and the percentage of households harvesting them rose to eight percent. Twelve polar bears were taken, contributing an estimated 5,952 pounds (almost two percent of the community harvest - Table B-3). These twelve polar bears provided an average of 55 pounds of usable meat per household. This increase from Year One to Year Two is due in part to the slow whaling season in Year Two. At that time, whalers were spending more time on the ice, increasing their encounters with polar bears or their tracks, and the lack of whaling opportunity allowed hunters to pursue polar bears.

Comparison of Year One and Year Two Polar Bear Harvests by Month

Figure 15 reiterates the notion that polar bear harvests were largely incidental in Wainwright. No one hunting season exists for polar bears; rather, people tended to harvest these bears when they found them. In May of Year Two, Wainwright hunters harvested six polar bears, and the next highest harvest by month was in October of Year One when three were taken. Other months show harvests of one and two polar bears, and the months of July, September, November, January and February show no harvests in either study year. Although polar bear harvests were rather sporadic, those people who do actually go hunting specifically for polar bears tended to do so in the late fall/early winter months (e.g., October to December).

As mentioned in the previous discussion of polar bears and seasonality, the high harvest of six polar bears in May of Year Two likely was related to whaling activity. At that time, whalers were building and traveling on trails across the ocean ice to whaling camps situated near open leads. Polar bears also hunt at open leads. The higher numbers of people concentrated on the ice increased the chances that hunters would encounter polar bears. However, this same phenomenon did not occur during Year One whaling, perhaps because people were too busy, or environmental conditions brought fewer polar bears to the area, or because the study was new and reporting was incomplete.

Comparison of Year One and Year Two Polar Bear Harvests by Location

As can be seen on Map A-5, all Year One polar bear harvests occurred between Wainwright and Point Franklin and most appear to have been along the shore. Year Two harvests were in essentially the same area. One difference is that one (or more) harvests occurred south of Wainwright by Kilimantavi. Another difference is that many of the Year Two harvests were offshore. The six polar bears taken in May during whaling (when both whalers and polar bears were hunting the open leads) account for the offshore harvests. In contrast, only one polar bear was taken during Year One whaling; three were taken in August and October (combined), which is when these animals are found onshore.

Ringed seals

Comparison of Year One and Year Two Ringed Seal Harvests

Only 63 ringed seals were harvested in Year One compared to 86 in Year Two. One reason for the lower number in Year One may have been related to the relative abundance of bearded seals; thus, hunters focused on the larger bearded seal for food instead of the smaller ringed seal. Twenty-two percent of Wainwright households harvested ringed seals in Year One, six percent fewer than Year Two (Tables A-3 and B-3). Ringed seals for the most part were harvested incidentally rather than being specially sought out; during the winter, however, when a lead opened in the ice, ringed seals were actively pursued as a source of fresh meat.

Comparison of Year One and Year Two Ringed Seal Harvests by Month

Ringed seals are hunted almost year-round. As with the other seals and walrus, however, the prime seasons for harvesting ringed seals occurred during the breakup months of June and July (Figure 17). In contrast with Year Two, when 75 percent of the year's ringed seals were harvested in two months (June and July), the Year One harvests were spread more evenly across the months of April through November (Tables A-4, B-4). As mentioned before, the summer drifting ice lingered around Wainwright much longer in Year One than in Year Two. Although Year One ringed seal harvests were less than Year Two overall, 13 ringed seals were taken in April of Year One (Table A-5) in contrast with none in April of Year Two (Table B-5). This difference was due to the better conditions during the Year One whaling season. The ocean lead was open and hunters harvested seals for food while waiting for the whale migration to arrive at whaling camps. From April all the way through November, ringed seals were harvested, also a direct consequence of the favorable ice conditions throughout Year One. Once the ocean froze solid in late November, no seals were harvested. Table A-4 shows the breakdown of percents harvested for each month. June had the highest total of 27 percent, but both April (21 percent) and July (19 percent) were also high. November was the real surprise in Year One with 14 percent of the year's harvest. Ten seals were taken in November when a southwest storm broke open a lead in the ice. Hunters enjoyed the chance to go out and get some fresh seal meat in early winter.

In Year Two, the first ringed seal harvest occurred in May during the whaling season when hunters reached the open lead of water, but the majority of the ringed seals were harvested during the ocean ice breakup. By the end of July, 71 of the 86 seals had been harvested (Table B-5). July was the most productive month with 41 seals (48 percent) harvested while in June, 23 ringed seals were harvested. Harvests steadily increased from May through July, occurring sporadically thereafter with three taken in October, 11 in January when a lead opened up, and one in March.

Comparison of Year One and Year Two Ringed Seal Harvests by Location

The location of ringed seal harvests in Years One and Two followed patterns very similar to the Year One and Two bearded seal harvests discussed above and were determined mainly by ice conditions. Generally, Year One ringed seal harvests (Map A-4) were concentrated in a smaller area close to shore between Icy Cape and Ataniq because the summer ice was in that area in Year One. These harvest locations also reflect the spring leads where ringed seals were hunted during whaling season. In contrast, Year Two ringed seal harvests (Map B-4) were spread across a broad area along the same section of coastline, but much farther out to sea than in Year One. This geographic distribution again reflects the Year Two summer ice conditions; many of the ringed seal harvests occurred while hunters were hunting for walrus and bearded seals amid the pack ice. (Although the maps do not distinguish between ringed and spotted seals, it is useful to know that spotted seals were harvested mainly in Avak Inlet by Icy Cape.)

Spotted Seals

Comparison of Year One and Year Two Spotted Seal Harvests

Spotted seal harvests increased from Year One to Year Two, from five to 12 animals harvested, while the percentage of Wainwright households harvesting this pinniped remained constant at six percent (Tables A-3 and B-3).

As mentioned earlier, Wainwright residents rarely consumed spotted seals; these seals were not a popular food source. Consequently, harvest levels were generally low, and the increase between study years was not significant enough to be attributable to any particular cause. Seasonal harvest patterns were similar in both years, with all harvests occurring between July and November in Year One and between July and September in Year Two. A local population of spotted seal resides around the sandbars in the lagoons inside Icy Cape and in Avak Inlet. This is where most harvests occurred in both years, usually in the fall when hunters head south to Icy Cape for the fall brant migration.

Beluga Whale

The only two beluga whales harvested during the two study years were taken in Year One. The explanation for the lack of harvest in Year Two, mentioned in the previous section on beluga whales, was that ice and weather conditions in Year Two precluded any harvest of belugas as they migrated past Wainwright.

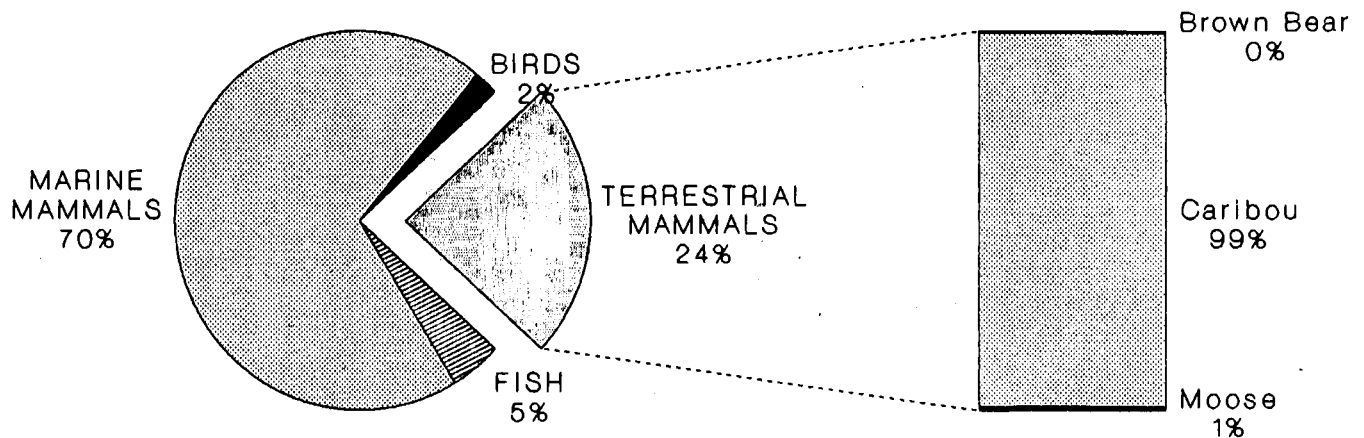
TERRESTRIAL MAMMALS: TWO YEAR AVERAGES

Wainwright's location at the mouth of the Kuk River has been a key variable in the community's adaptability as the location offers residents good access to both the terrestrial and marine environments. The previous section documented the great importance of the marine environment in the Wainwright subsistence way of life. This section on terrestrial mammal harvests, in combination with the next three sections on fish, birds and other resources, will describe residents' use of the terrestrial environment. While the vast majority of the total harvests derive from marine environs, the season for harvesting most marine resources is brief, and ice and weather conditions can severely impede hunters' success. The terrestrial environment, in contrast, yielded less in terms of usable pounds, but offered a steady source of sustenance (namely caribou) throughout the year. In addition to caribou, other animals harvested from the terrestrial environment during this study were brown bear, moose, ground squirrel, and the furbearers, which included arctic and red fox, wolverine, wolf, ermine, and in Year Two, a river otter. In Years One and Two, Wainwright residents' harvest of terrestrial mammals for subsistence purposes averaged 648 pounds of usable meat per household, 99 percent of which came from caribou (Figure 18). Sixty-two percent of the Wainwright population partook in successful terrestrial mammal harvests, providing 24 percent of the total community subsistence harvest each year (Table 9).

Caribou

The majority of the birds, fish and mammals in the Wainwright area are migratory species that arrive in the spring and leave in the fall. Whales swim north in the spring, feeding on the rich ocean environment and leaving when the

**Figure 18: Harvest Percentages
of Terrestrial Mammals
Wainwright, Years One & Two Averaged
(Usable Pounds Harvested)**



Based on 124 Year One and 119 Year Two households, including partial year households.
Two Years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

TABLE 9: HARVEST ESTIMATES FOR TERRESTRIAL MAMMALS - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1)

RESOURCE	CONVERSION	COMMUNITY TOTALS (3)		AVERAGE POUNDS		PERCENT OF TOTAL USABLE POUNDS HARVESTED (3)	PERCENT OF WAINWRIGHT HOUSEHOLDS HARVESTING RESOURCE (4)
	FACTOR (2) Usable Weight Per Resource in pounds	NUMBER HARVESTED	USABLE POUNDS HARVESTED	PER HOUSEHOLD	PER CAPITA		
Total Terrestrial Mammals	n/a	n/a	72,043	647.6	157.6	23.7%	62%
Caribou	117	608	71,141	638.6	155.4	23.4%	62%
Moose	500	2	750	7.5	1.8	0.2%	2%
Brown Bear	100	2	150	1.5	0.4	**	2%
Ground Squirrel	0.4	5	2	0.01	*	**	1%
Arctic Fox (Blue)	n/a	35	n/a	n/a	n/a	n/a	5%
Red Fox (Cross, Silver)	n/a	24	n/a	n/a	n/a	n/a	7%
Wolverine	n/a	14	n/a	n/a	n/a	n/a	4%
Wolf	n/a	6	n/a	n/a	n/a	n/a	3%
Ermine	n/a	6	n/a	n/a	n/a	n/a	3%
River otter	n/a	1	n/a	n/a	n/a	n/a	1%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) See Table C-3 for sources of conversion factors.

(3) Community totals and percent of total usable pounds harvested are based on harvest amounts reported by all 124 Year One households and 119 Year Two households for all species.

(4) Per household and per capita means and percent of households harvesting a resource are based only on the 100 core households in the study for the full two years.

* represents less than .1 pound

** represents less than .1 percent

n/a means not applicable

Source: Stephen R. Braund & Associates, 1993

winter weather arrives and ice begins to form on the ocean. Ducks and geese fill the summer air with their calls and flight. They nest in the tundra wetlands, then head south for winter. The pinnipeds, for the most part, arrive around breakup and disappear during the winter, except for the occasional seal harvested when a lead opens in the winter ice. Fish are harvested mainly in the summer and fall; smelt fishing provides a source of fresh fish for a few months each winter. However, only caribou offer residents of Wainwright a relatively accessible year-round resource. Though subject to fluctuations in herd size, caribou represented Wainwright's main "bread and butter" of subsistence resources. If whaling was important for cultural needs, caribou was key for providing fresh meat throughout the year.

Nelson observed in the 1960s that, "Caribou meat is the staple food here" (1969:153), and "The Wainwright people shoot a great number of caribou, the volume of which considerably exceeds that of seals. They often say: 'You never get tired of caribou, even though you easily tire of all other kinds of meat'" (1969:302). With regard to the sustenance provided by caribou in cold temperatures, Nelson wrote,

According to the Eskimos, food, especially certain types, will help to maintain bodily warmth during camping, hunting, and traveling, or under emergency conditions. They say that only Eskimo food, called *nekepiak* (*neke* = meat, *piak* = genuine), are really helpful for this purpose, and certain types are the best. Most preferred by the Wainwright people is *kwak* or frozen meat, especially caribou, eaten with seal oil (Nelson 1969:179).

In 1981, Nelson revisited Wainwright and confirmed the continued significance of caribou: "The importance of caribou in Wainwright's economy is enhanced by the people's high regard for its meat. This is one of the foods that they could least imagine going without" (Nelson 1981:50). A few years later, other researchers surveyed residents about the subsistence foods they hunted most and ate most often. That study found that 62 percent of the respondents said they hunted caribou most often; 55 percent said that caribou was the largest source of wild meat for them. When asked what subsistence meat they ate most often, 79 percent of the respondents indicated caribou (ACI and SRB&A 1984). Field observations from this study confirmed that, as in the past, caribou remained one of the most important sources of everyday food in Wainwright.

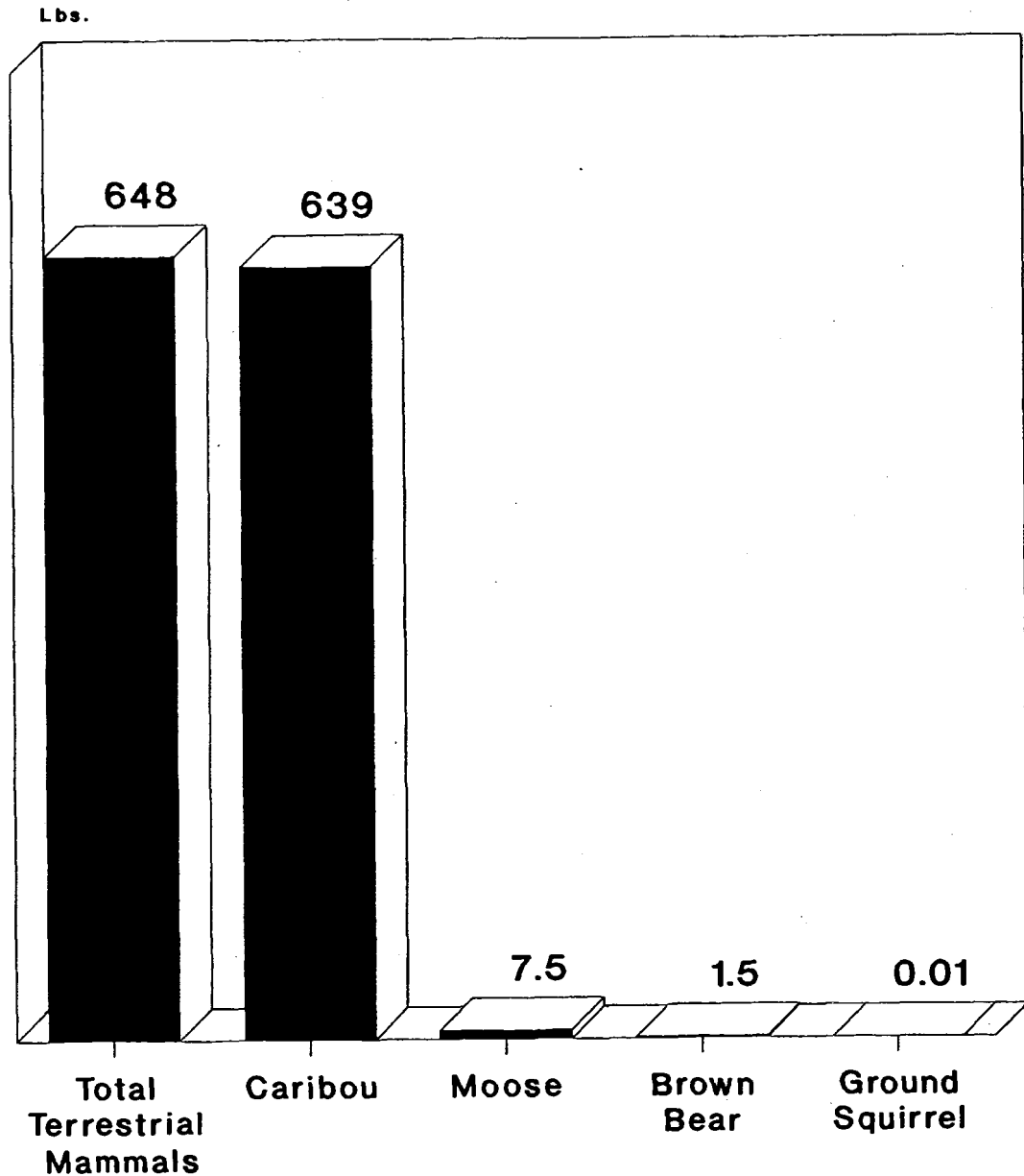
Data collected for this study found that Wainwright residents harvested an average of 608 caribou per year, equivalent to 71,141 usable pounds (Table 9). This number compares to Milan's observation in the 1950s that Wainwright residents harvested between 600 (1964:14) and 800 (1964:32) caribou per year. In 1988 and 1989, caribou harvests averaged about 639 pounds per household (Figure 19) or 155 pounds per person. This species contributed just over 23 percent of the community's total harvest (by weight). Sixty-two percent of the households successfully harvested caribou, the second highest participation rate in the harvest of an individual species following participation in bowhead whaling.

Unlike some of the other specialized hunts (whales, walrus and wolves), people of both sexes and all ages participated in the caribou hunt. Often, entire families took the boat upriver, searching the banks for caribou. Hunters hoped to find caribou close to the river to facilitate moving the dead animal to the boat. If the kill had to be carried any distance, the hunters gutted and split the animal with one person carrying the front half and another carrying the rear. During the winter, the animal was usually completely butchered on the spot and the quarters were wrapped in the skin and transported home on the snowmachine sled. Caribou hides served a variety of purposes. Typically, the hide was dried and used later as a mat for the sleds, a mattress at camp, or for clothing.

Other Terrestrial Mammals

As caribou represents 99 percent of the terrestrial mammal harvests, the remaining terrestrial species contributed very little to the total terrestrial mammal harvest, and even less to the overall community harvest. Moose and brown bear are the other two large land mammals occasionally harvested by Wainwright hunters. However, these animals generally were not hunted but rather were taken incidentally when encountered. Brown bears and moose were rarely seen and never actively sought. Their meat was not particularly desired, according to several people in town. Wainwright harvested an average of 1.5 moose and 1.5 brown bears each year during the study period, yielding 750 and 150 usable pounds respectively (Table 9).

**Figure 19: Terrestrial Mammal Harvests
Wainwright, Years One & Two Averaged
(Mean Usable Pounds Per Household)**



Based on 100 core households in the study for both years.
Two years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

Only five ground squirrels were reported harvested each year on average. These animals used to be collected for use in parkas. That type of parka is rarely made anymore; most ground squirrels were shot by young people learning how to hunt. These animals contributed only a negligible amount to the subsistence harvest. Porcupines and Dall sheep are other terrestrial species occasionally taken by Wainwright residents; however, neither of these animals was known to be harvested during the study period.

Wainwright residents devoted more effort, and consequently had more success, in the harvests of furbearing land mammals such as wolves, wolverines, fox, and ermine. Because these animals were harvested only for their furs and were not used for food, none of the data tables or figures provide calculations of usable weight for these species. The number of animals harvested in Year Two is shown on Table 9 but comparison between species cannot be shown (e.g., bar charts, graphs, or percentages of total harvest) because such comparisons require that all species be converted to a common unit of measurement, such as pounds. Over the two years, residents harvested an average of 35 arctic fox, 24 red fox, 14 wolverines, six wolves, six ermine, and less than one river otter. (In fact, the one river otter harvested in Year Two was the only one anyone could remember getting in Wainwright in recent memory; it was such an unusual harvest that identification was difficult and remains tentative.)

Only a few households harvested furbearers each year; participation rates ranged from seven percent for red fox, down to five percent for arctic fox, four percent for wolverines, three percent for wolf and ermine. Each year the same core group of hunters went to the mountains to hunt wolverines and wolves, and these same hunters accounted for most of the animals harvested (field observation). A number of hunters searched for furbearers during the two winters of the study period. However, these animals can be very difficult to locate and consequently several hunters were unsuccessful. Furbearers are mostly solitary animals and the hunter needs conditions that allow finding and following the animal's tracks. This activity generally required traveling considerable distances by snowmachine in the middle of winter, when darkness and bitter cold prevailed and dangerous blizzards and/or snowmachine failure could beset the traveler. Consequently, few households engaged in this activity, and fewer were successful.

All the wolves and wolverines harvested during the study period were shot; people did not set traps for these animals. Hunters would, however, leave part of a caribou carcass as bait in the hope that the animal would be drawn to the carcass and leave tracks for the hunter to follow. A few hunters set traplines for foxes in Year One of the study, both near town and far up in the foothills. More often, however, people harvested foxes with a gun.

Though of no value as a food source, wolverine and wolf harvests held particular esteem for community members. Of all the furbearing animals, the wolf and wolverine were the most prized for their fur. Hunters would spend hundreds of dollars on fuel, food, and snowmachine parts in the chance of a successful harvest. People traveled greater distances from Wainwright looking for these species than for any other resource.

TERRESTRIAL MAMMAL SEASONAL HARVEST PATTERNS: TWO YEAR AVERAGES

Table 10 presents the pounds of each resource harvested each month and the equivalent percentage that month's total represents of the yearly total for that species. Furbearers are not shown on this table since they were not represented in pounds, but are found along with the other terrestrial mammals on Table 11, showing the average number of animals harvested by species by month. Figure 20 graphs the pounds data for caribou, brown bear and moose.

Caribou was the only species harvested every month of the year (when averaged over two years), not just among terrestrial mammals but also among all species harvested by Wainwright residents during the study period. Spring harvests (April, May, June) were the lowest of the year (primarily because people were whaling), averaging less than 500 pounds per month. Caribou harvests began to increase steadily from July (8,546 pounds), when the ice broke up, to the peak month of September (17,472 pounds), when people were upriver and concentrating on caribou hunting. Harvests then dropped off sharply from October (11,232 pounds) to November (2,633 pounds) because caribou went into rut, which taints the flavor of the meat; consequently, caribou in rut were avoided. The winter months from December through March were between one and five thousand pounds per month, approximately. August and September combined yielded 48 percent of the year's harvest.

TABLE 10: TERRESTRIAL MAMMAL HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Pounds of Usable Resource Product)

TOTALS

SPECIES	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Caribou	468	410	176	8,546	16,516	17,472	11,232	2,633	1,697	2,048	5,148	4,797
Moose	0	0	0	0	0	250	0	0	0	250	250	0
Brown Bear	50	0	0	0	50	50	0	0	0	0	0	0
Ground Squirrel	0	1	0	0	1	0	0	0	0	0	0	0
All Terrestrial Mammals (excluding furbearers)	518	411	176	8,546	16,567	17,772	11,232	2,633	1,697	2,298	5,398	4,797

PERCENTS

SPECIES	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Caribou	1%	1%	0%	12%	23%	25%	16%	4%	2%	3%	7%	7% = 100%
Moose	0%	0%	0%	0%	0%	33%	0%	0%	0%	33%	33%	0% = 100%
Brown Bear	33%	0%	0%	0%	33%	33%	0%	0%	0%	0%	0%	0% = 100%
Ground Squirrel	0%	60%	0%	0%	40%	0%	0%	0%	0%	0%	0%	0% = 100%
All Terrestrial Mammals (excluding furbearers)	1%	1%	0%	12%	23%	25%	16%	4%	2%	3%	7%	7% = 100%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) Based on 124 Year One and 119 Year Two households, including partial year households.

Source: Stephen R. Braund & Associates, 1993

TABLE 11: TERRESTRIAL MAMMAL HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Number Harvested)

TOTALS

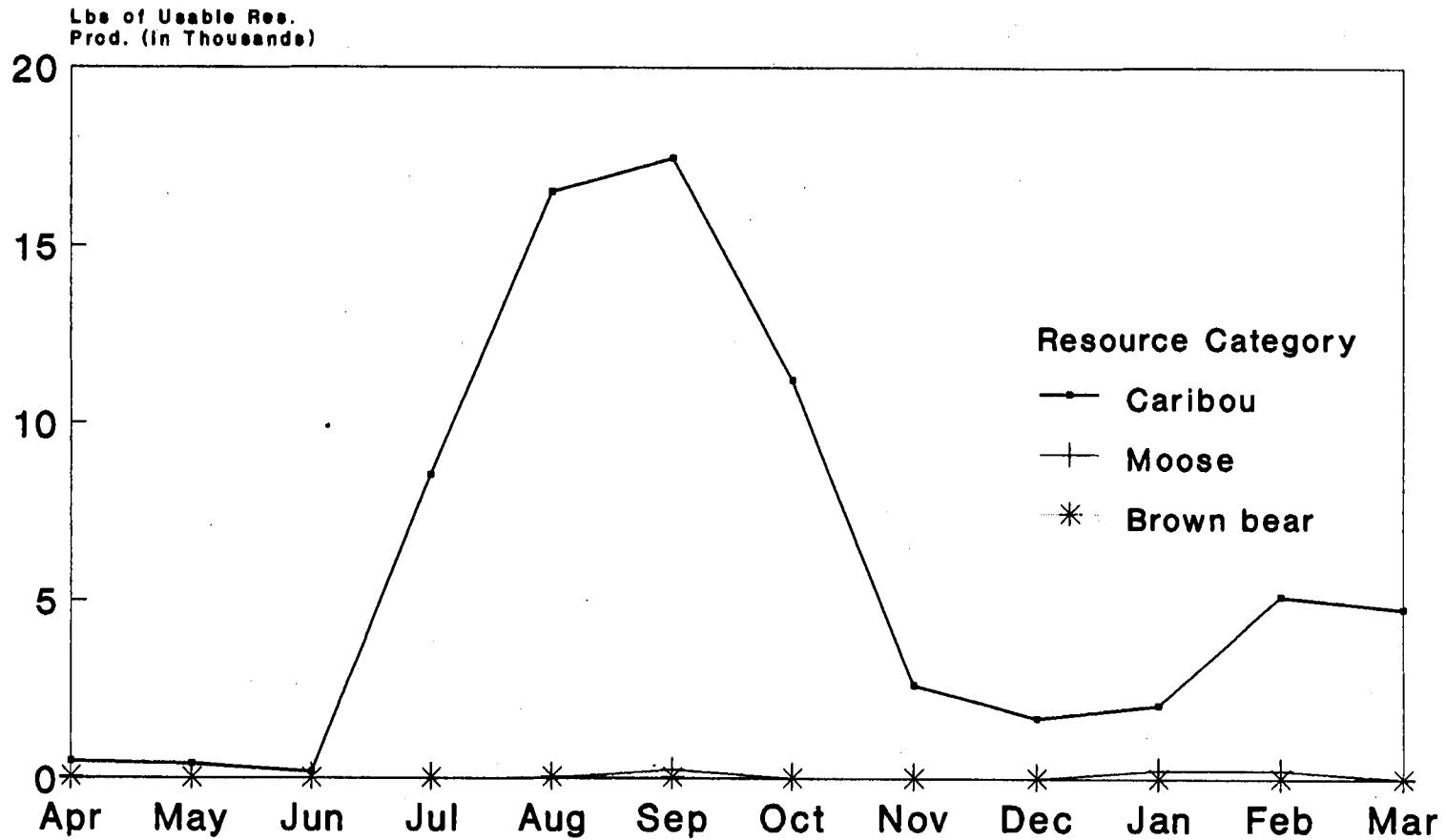
SPECIES	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Caribou	4	4	2	73	141	149	96	23	15	18	44	41
Moose	0	0	0	0	0	1	0	0	0	1	1	0
Brown Bear	1	0	0	0	1	1	0	0	0	0	0	0
Ground Squirrel	0	3	0	0	2	0	0	0	0	0	0	0
Arctic Fox (Blue)	1	8	0	0	0	0	0	0	9	2	8	8
Red Fox (Cross, Silver)	0	0	0	0	0	0	0	1	2	8	10	4
Wolverine	1	0	0	0	0	0	2	0	3	3	4	2
Wolf	0	2	0	0	0	0	0	1	1	1	0	1
Ermine	0	0	1	0	0	1	1	0	0	0	2	2
River otter	0	0	0	0	0	0	1	0	0	0	0	0

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) Based on 124 Year One and 119 Year Two households, including partial year households.

Source: Stephen R. Braund & Associates, 1993

Figure 20: Monthly Harvest of Terrestrial Mammals
Wainwright, Years One & Two Averaged



Based on 124 Year One and 119 Year Two households, including partial year households.
Two years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

While caribou generally were available year-round, Wainwright residents made a concentrated effort to get much of their year's supply after the summer marine mammal hunting season ended. When marine mammal hunting ended early (as in Year Two), people traveled up and down the coast by boat hunting caribou. (The intense insects of the summer tundra drive caribou to the coast for the relief provided by the coastal breezes.) As the temperatures began to cool, the bugs died down and the caribou moved inland to fatten up for the winter on tundra vegetation. In August, families went upriver to cabins and camps to fish, pick berries and hunt caribou. This time of year provides opportune circumstances for caribou hunting: marine mammal hunting has ended; caribou have begun to return inland from the coast; the caribou generally have fattened up for the winter so that their fur and their meat are at their prime, but they have not yet gone into rut, which spoils the flavor of the meat; and the rivers are still open for travel by boat. Moreover, the timing of this hunt corresponds with the brief berry season and good fishing, both of which also take place upriver.

One moose was harvested in September, January and February, and one brown bear was taken in April, August and September. Ground squirrels were harvested in May and August. Table 11 shows that, other than one ermine in June and one in September, furbearer harvests were confined to the period from October through May (except ermine which were harvested in June, September, October, February and March). Furbearers are hunted in the winter because the animal's fur is thickest in the depth of winter. Coincidentally, hunting for furbearers is only feasible in the winter when hunters can travel by snowmachine into the mountains where the furbearers reside in the winter. More hunting takes place in February and March than in December or January in part because of the amount of daylight available in March for traveling and tracking. Furbearer hunting declines in April when people begin to get ready for whaling. Arctic fox were taken every month from December through May, and red fox were harvested November through March. Wolverine harvests were recorded October through April (excluding November) and wolves were taken November through May, (excluding February and April). Ermines were trapped intermittently throughout the year, and the river otter was taken in October.

TERRESTRIAL MAMMAL HARVEST LOCATIONS OVER TWO YEARS

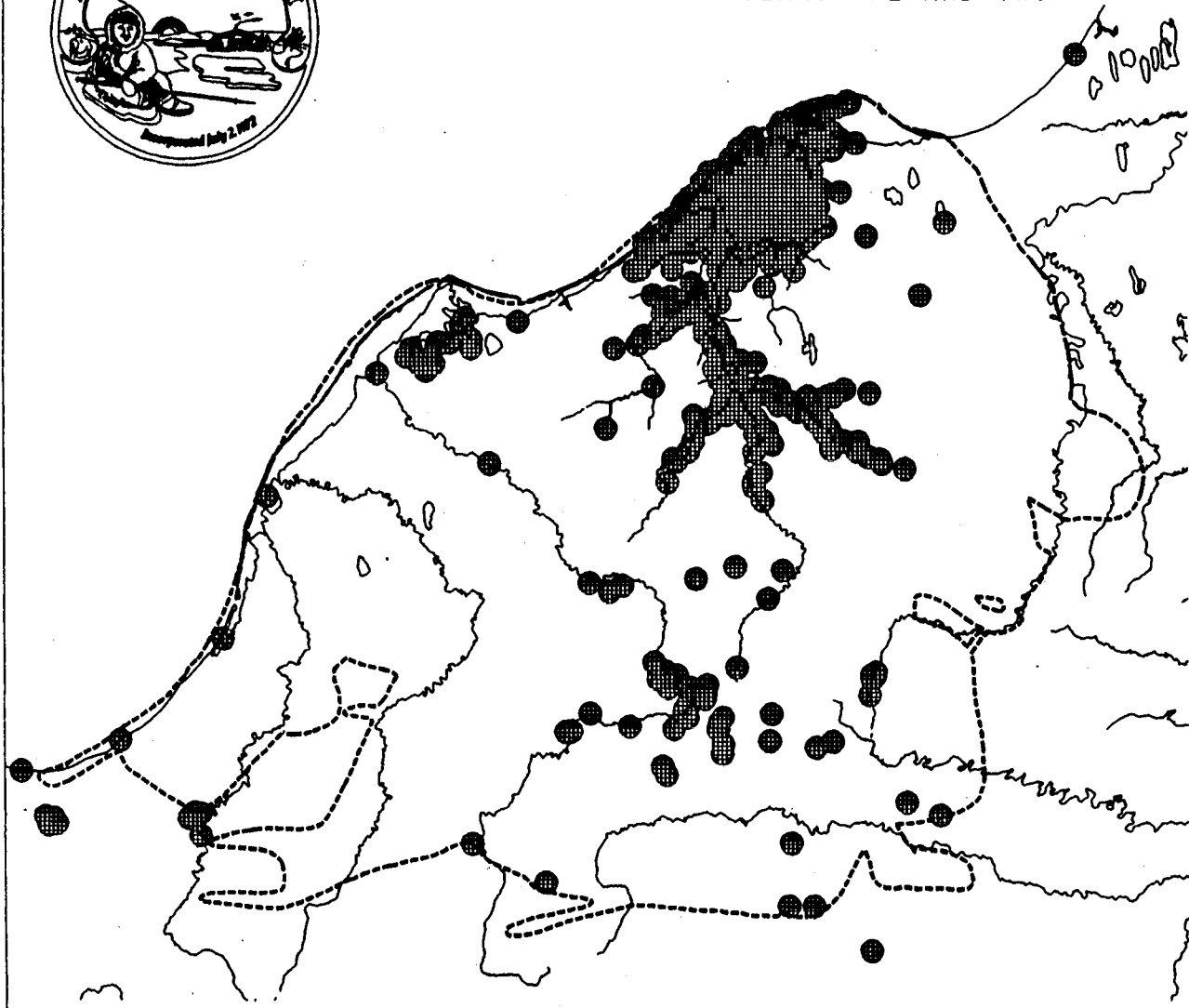
Map 9 shows all terrestrial mammal harvest sites for the two study years along with the lifetime community use line. Most terrestrial mammal harvests occurred within the lifetime use line with a few exceptions (mainly distant furbearer harvests). Transportation and the animals' habitat and seasonality influenced where and how people hunted terrestrially. Hunting for wolves and wolverines was easily the most travel-intensive subsistence activity undertaken by Wainwright hunters. During late fall, winter, and spring, hunters traveled by snowmachine from Wainwright all over a large inland area, well into the Brooks Range, in pursuit of furbearers (Map 10). Travelers used rivers, cabins, hills and other features as landmarks while navigating cross-country by snowmachine. The Kuk River and its tributaries served as their primary travel routes to inland cabins. Hunting for wolves and wolverines was conducted along the upper reaches of the Ketik, Utukok, Kaolak, Avalik, Kokolik, and Kukpowruk rivers. By snowmachine hunters followed these rivers to their headwaters near the foothills of the Brooks Range. Cabins in the foothills were built specifically as base camps for the purpose of hunting wolverines and wolves. From these cabins or camps in the mountains, hunters made extensive forays. One hunter reported traveling to within sight of the Noatak River; other hunters traveled far to the southwest, reportedly within sight of Point Hope and then east nearly to Atqasuk.

Winter was the only feasible season for Wainwright hunters to pursue furbearers since cross country travel (i.e., by snowmachine) was necessary to reach their habitat and because finding and following their tracks in the snow was instrumental to successful hunting. Coincidentally, winter was also the best season to harvest furbearers in terms of the quality of their fur. Hunters also used their snowmachines to obtain occasional caribou in the winter; unlike furbearers, however, caribou usually could be found within just a few miles of town in the winter.

As Map 11 shows, the caribou harvest during the two study years was strongly associated with the navigable waterways. During open water season, people can travel extensively by boat up and down the coast, hunting along the way or traveling to and up other river systems. During summer, caribou were usually





MAP 9 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT TERRESTRIAL MAMMAL HARVEST SITES - ALL SPECIES: YEARS ONE AND TWO



This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study. Lifetime-community harvest areas, collected in the form of map biographies from 14 households (Pederson 1979), are also illustrated.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.

LEGEND INFORMATION

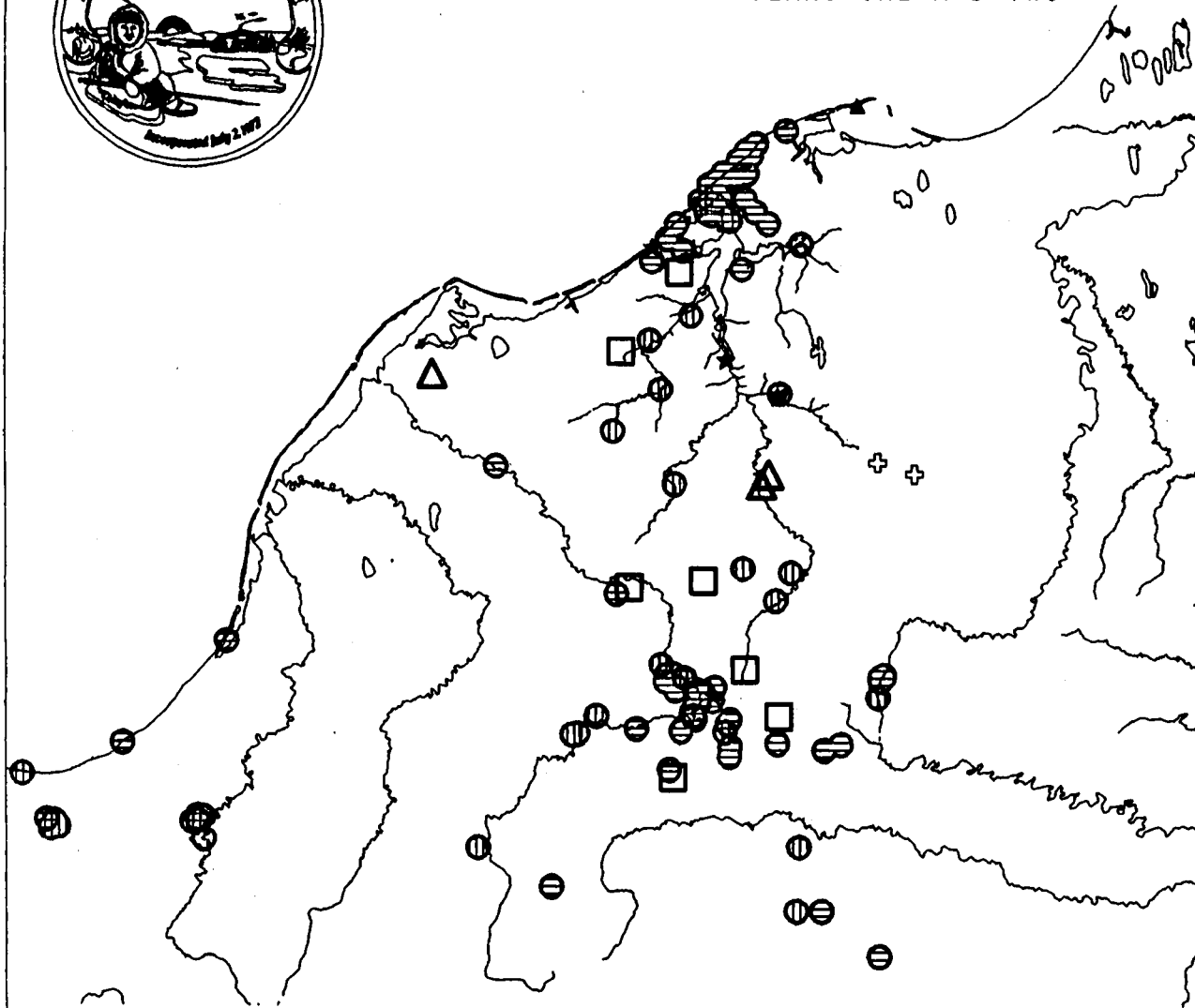
-  Lifetime community land use (Pederson 1979).
-  Terrestrial Mammals
 - Caribou
 - Moose
 - Brown bear
 - Fox
 - Wolf
 - Wolverine
 - Ermine
 - River otter
 - Ground squirrel



Map Production: North Slope Borough GIS
Date: April 11, 1991











MAP 10
 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT
 TERRESTRIAL MAMMAL HARVEST SITES BY SPECIES (EXCLUDING CARIBOU):
 YEARS ONE AND TWO



This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.

LEGEND INFORMATION

-  Moose
-  Fox
- Arctic
- Red
-  Wolverine
-  Brown bear
-  Wolf
-  Ermine
-  River otter
-  Ground squirrel

Map Production: North Slope Borough GIS

Date: April 11, 1991



MAP 11

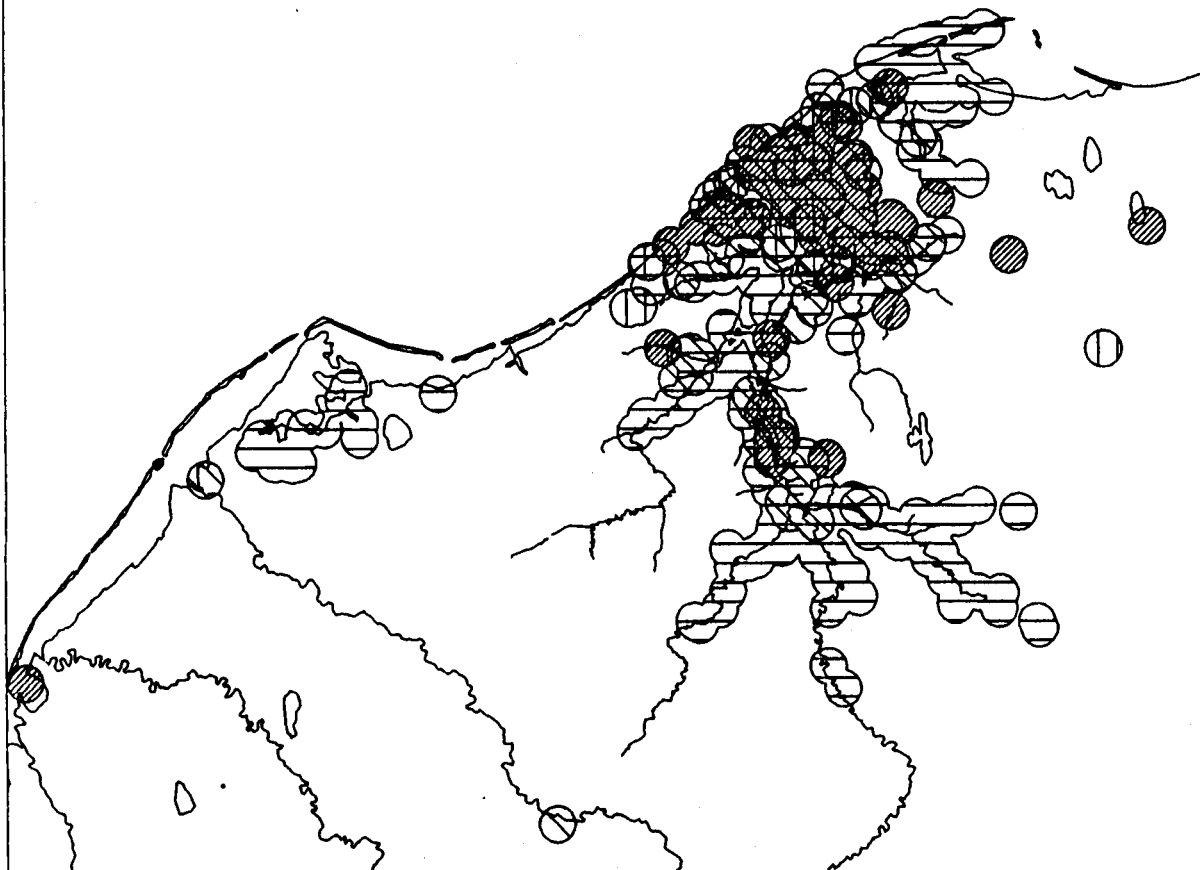
NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT

CARIBOU HARVEST SITES BY SEASON, YEARS ONE AND TWO







This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.



LEGEND INFORMATION

-  April, May, June
-  July, August, September
-  October, November
-  December, January, February, March

Map Production: North Slope Borough GIS

Date: April 11, 1991



found along the coast. However, most terrestrial mammal hunting took place up the Kuk River and its tributaries in late summer and fall, and was focused mainly on caribou (Map 11). The key to the most successful caribou harvests was the inland river network which brought the hunters into the heart of the migrating fall caribou. People traveled to their cabins or camps and based their caribou hunting activity from there, attempting to lay in the majority of their annual supply of caribou during these trips (Map 12). The late summer and fall are the time when caribou are most preferable (i.e., fattest); this also is the time when the animals tend to be inland and hunters are able to intercept them along the waterways. Nelson (1981:50) observed, "Herds move regularly along the river drainages, estuaries, and coastal beaches. And people who hunt them depend on the waters for locating, catching, and transporting this highly valued animal."

Comparison of Maps 10 and 11 shows that caribou harvests (Map 11) were strongly concentrated in the Kuk River system in the summer and fall, and in the area around Wainwright in the winter. In contrast, other terrestrial mammal harvests (Map 10) - principally furbearers hunted while traveling by snowmachine - were spread across a much broader area, particularly to the south and west.

TERRESTRIAL MAMMALS: VARIATION FROM YEAR TO YEAR

As the previous section addressed average harvests for the two study years in an effort to present the most generalizable terrestrial mammal findings, this section examines how the two harvest years varied.

Caribou

Comparison of Year One and Year Two Overall Harvests

Wainwright residents harvested 505 caribou in Year One compared to 711 in Year Two, an increase of about 41 percent (Tables A-6 and B-6). A nine percent increase in the number of households harvesting caribou (from 57 to 66 percent) likely explains at least part of the increase in harvests. The increased caribou harvests resulted in 761 usable pounds per household in Year Two

MAP 12

NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT

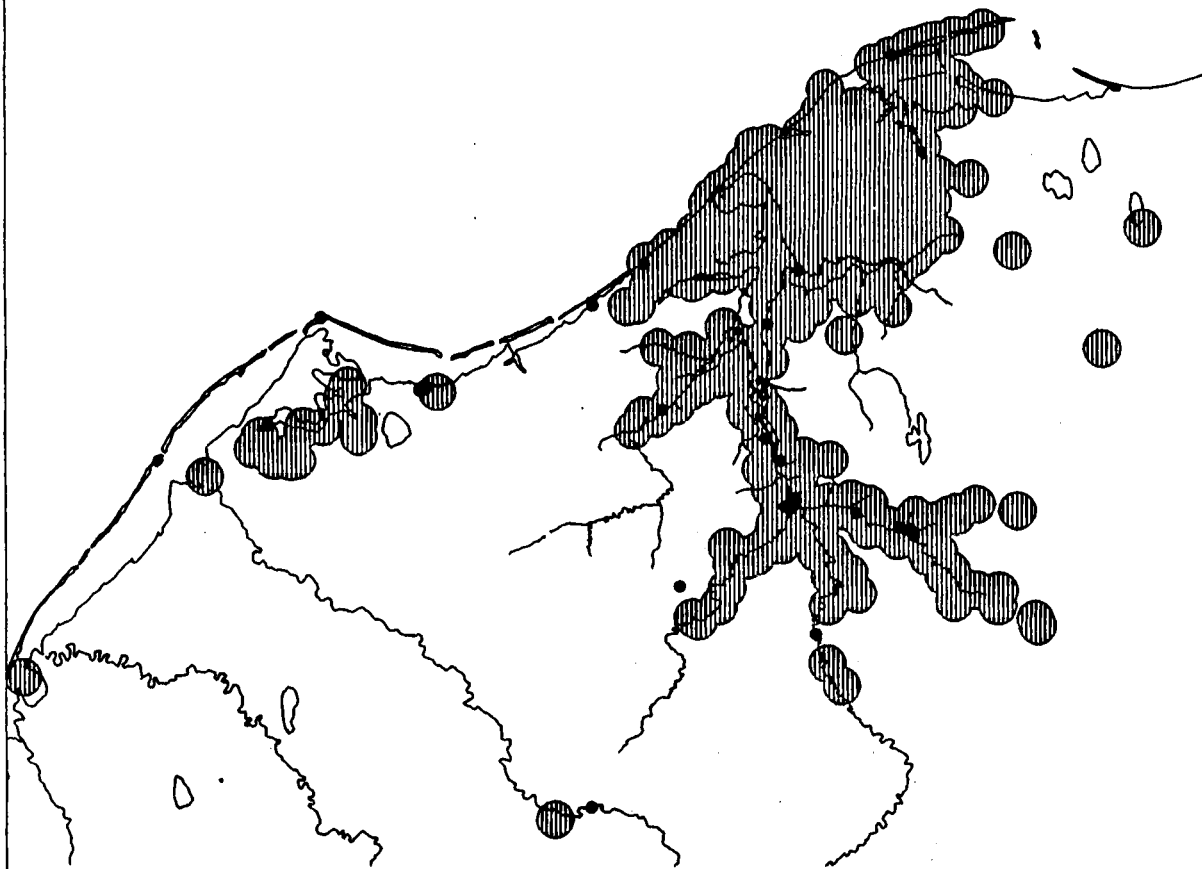
CABIN AND FIXED CAMP LOCATIONS AND CARIBOU HARVEST SITES

YEARS ONE AND TWO



This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study. This map also displays the locations of fixed hunting and fishing camps used by Wainwright residents. The locations of many temporary subsistence camps are not shown.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Brund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska. Camp and cabin location data compiled by Stephen R. Brund & Associates (1990).



LEGEND INFORMATION

-  Caribou harvest sites
-  Fixed camps and cabins

Map Production: North Slope Borough GIS

Date: April 11, 1991



compared to 517 pounds per household in Year One (Figure 21). Interestingly, the proportion of the total community harvest that caribou represented (approximately 23 to 24 percent) remained constant each year despite the large increase in absolute numbers.

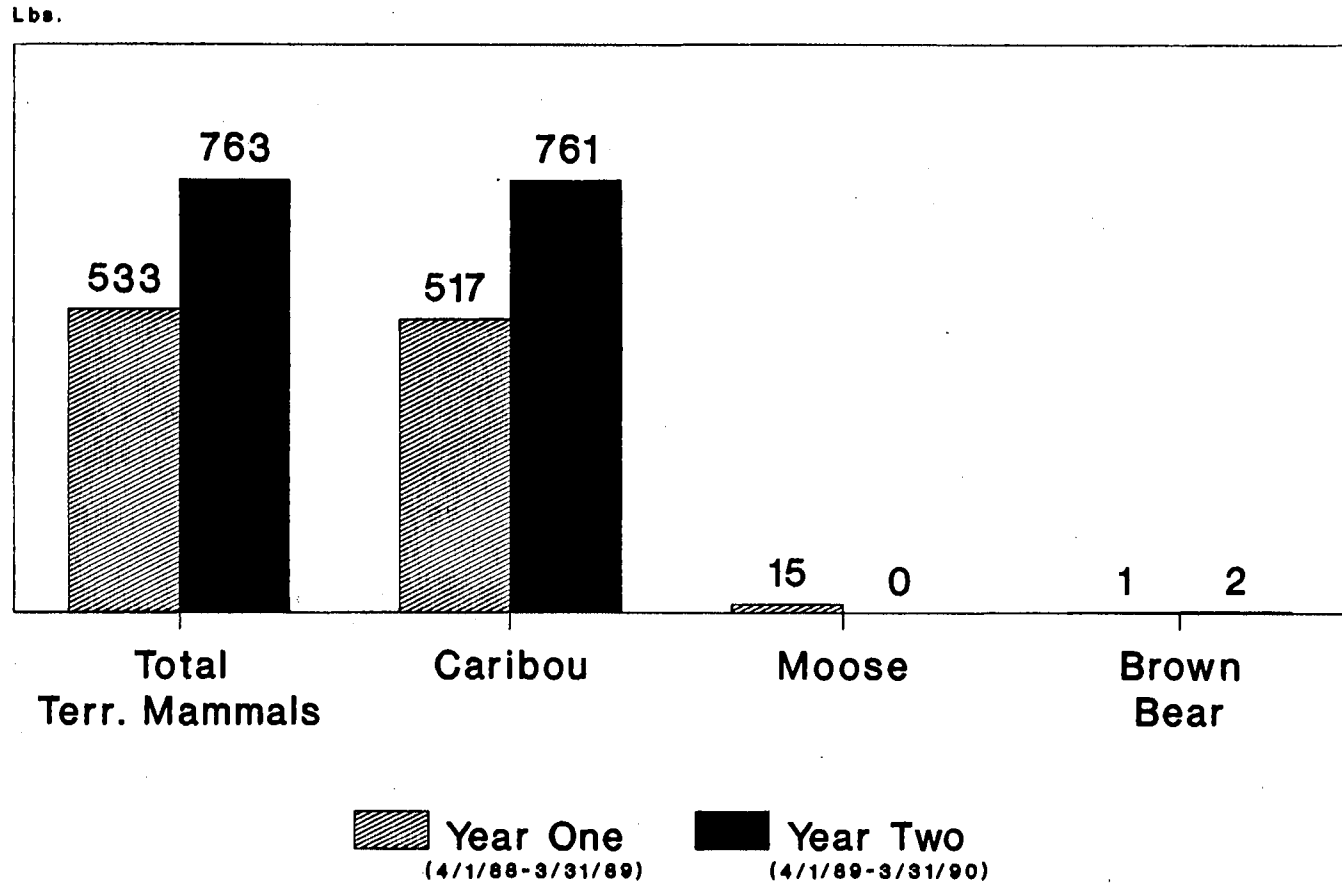
The main reason for the increase in the number harvested over the two years was that the caribou herd stayed closer to Wainwright over the winter of Year Two than was the case in Year One. Hence, caribou could be harvested easily from the village in a matter of an hour in Year Two; hunters headed out to get fresh caribou whenever supplies ran low. Whereas hunters obtained about 8,073 usable pounds of caribou during the six month period from November through April of Year One, in Year Two they harvested 25,506 usable pounds in that same time period, a 215 percent increase (Tables A-7 and B-7). Comparing only the three month period from January through March shows an 825 percent increase, from 2,340 pounds in Year One to 21,645 pounds in Year Two.

Year Two summer ice conditions also played a role in the higher caribou harvests that year. As mentioned in the marine mammals section, in Year One, the ocean pack ice (and hence marine mammals) remained near Wainwright through August. In contrast, the ice in Year Two was gone by mid-July. Thus, hunters who spent late July, August, and early September hunting marine animals in Year One decided instead in Year Two to travel up or down the coast, or go inland along the rivers to hunt caribou. This shift in focus gave Year Two hunters an earlier start on the main caribou hunting season. However, examining that season as a whole (July through October - Tables A-7 and B-7) indicates that Year One harvests started later (due to continued marine mammal hunting) but sustained high levels into October, whereas Year Two's harvests dropped off in October, by which time hunters had obtained ample supplies of caribou; also, the caribou left the fall hunting area earlier than in Year One. The net effect was that hunters in Year Two harvested about 7,000 pounds more than the same period in Year One, an increase of 14 percent.

Comparison of Year One and Year Two Caribou Harvests by Month

The preceding discussion about the influence of summer ice conditions on caribou hunting substantiates the study team's field observation that Wainwright

**Figure 21: Harvest of Terrestrial Mammals - Wainwright, Years One & Two
(Mean Usable Pounds Per Household)**



Based on 100 core households in the study for the full two years.

Source: Stephen R. Braund & Assoc., 1993

residents took complete advantage of the maritime environment for as long as it was productive. When no longer productive (i.e., the ice moved out), hunters turned their attention inland to caribou. Marine mammals took precedence over caribou hunting because the marine mammal season was short and unpredictable; caribou, in contrast, generally could be harvested throughout the year.

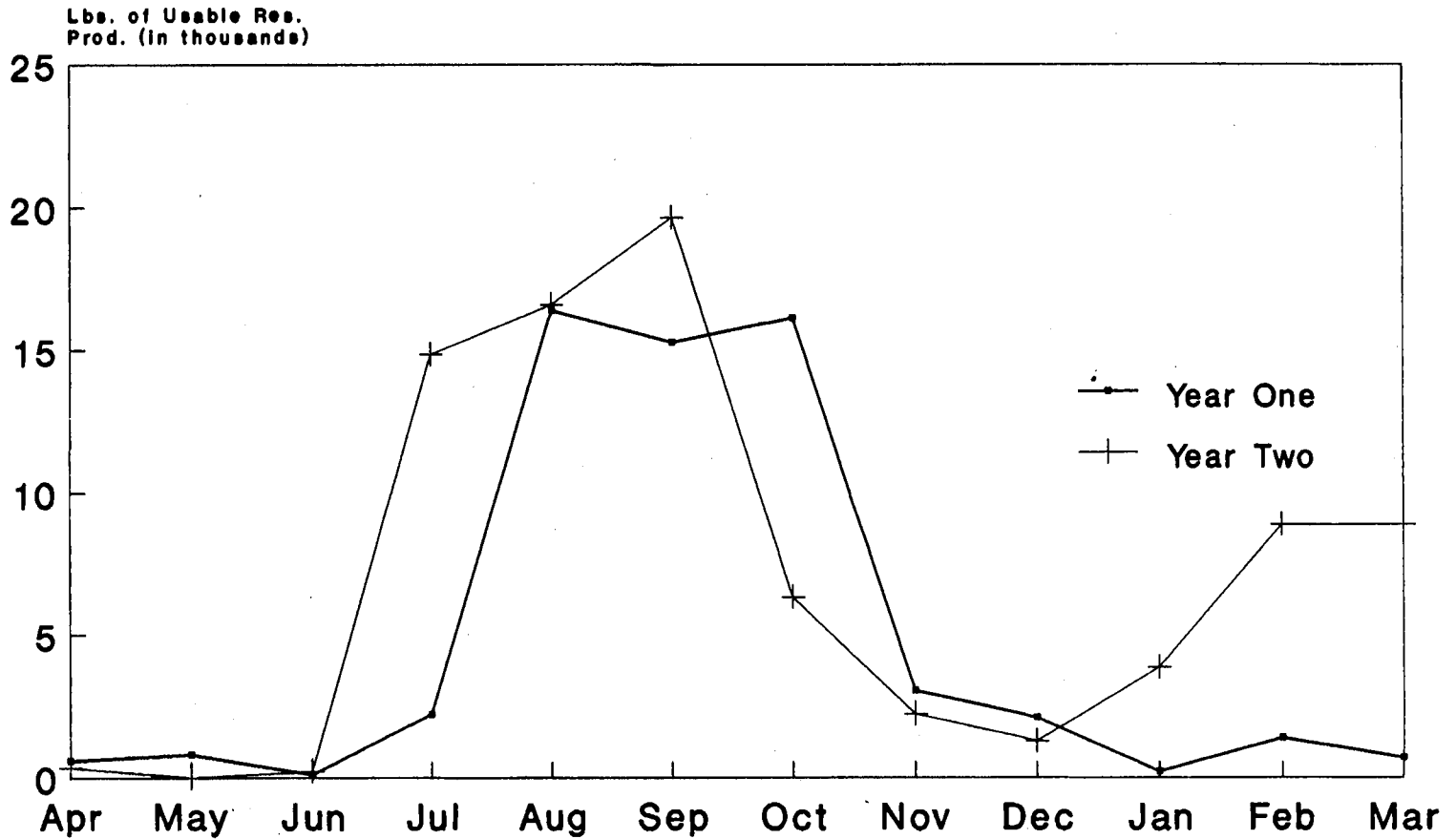
Tables A-7 and B-7 illustrate that Wainwright hunters got the majority of their caribou from August through October in Year One, and from July through September in Year Two. The earlier start in Year Two was due to the early end of marine mammal hunting that year, in contrast to Year One when marine mammals could be hunted into early September. The earlier end in Year Two fall caribou harvests was brought about by weather fluctuations in September that made both boating and overland travel difficult at best. Moreover, the usual effort to harvest caribou in the first half of October, before the rut began, was much lower in Year Two than Year One because most people stopped hunting to participate in a full-scale search and rescue effort for a missing Wainwright individual.

As discussed previously, hunters took more caribou in the winter months of Year Two than during the same time in Year One. This second high harvest period, illustrated in Figure 22, and contrasted with Year One's monthly harvests, occurred because the caribou wintered much closer to Wainwright than the year before, and were very easily harvested.

Comparison of Year One and Year Two Caribou Harvest Locations

As discussed above, the general pattern for hunting caribou during the two study years was to hunt along the coast in early summer, along the inland river system in late summer and fall, and around the Wainwright area in the winter. As Map A-9 (Year One) and Map B-9 (Year Two) show, this pattern was more or less consistent in each of the individual study years but with some variation from year to year. The overall impression from looking at these two maps is that more harvest sites were mapped in Year Two than in Year One. This difference is consistent with the harvest numbers, which were considerably higher in Year Two. Summer coastal harvests in Year One occurred around Ataniq but not Point Franklin, whereas the opposite occurred in Year Two. Year One

Figure 22: Comparison of Monthly Caribou Harvests Wainwright, Years One and Two



- 124 -

Based on 124 Year One and 119 Year Two households, including partial year households.

Year One: 4/1/88 - 3/31/89; Year Two: 4/1/89 - 3/31/90

Source: Stephen R. Braund & Assoc., 1993

summer harvests also occurred down the coast in various places between Wainwright and Icy Cape, and at the mouth of the Utukok River. In contrast, Year Two shows fewer summer coastal sites except in the Icy Cape area where numerous harvests were concentrated in Avak Inlet.

The majority of the summer harvests in both Years One and Two were concentrated along the Kuk Lagoon and the network of rivers that feed into it. However, a noticeable difference can be seen in comparing how far upriver the summer harvests extended each year. In Year Two, above average rainfall for the summer raised river levels, thus extending the navigability of the rivers considerably and allowing hunters to travel much farther in pursuit of caribou migrating through this area than was the case in Year One. Additionally, a new technology arrived in Wainwright between Years One and Two: an airboat. One family used their new airboat to travel farther upriver in Year Two than Year One. These boats are able to navigate much shallower waters than boats propelled by outboard motors, and therefore can travel farther up rivers than other boats.

In the winter months, caribou harvest locations also varied between Years One and Two. In Year One, the fall migration took most of the caribou away from the Wainwright area in November and December; this also occurred in Year Two. In Year One, a few caribou remained scattered sparsely throughout the broader Wainwright hunting area through the rest of the winter, and were harvested occasionally by hunters traveling overland on snowmachine. In Year Two, however, a significant aggregation of caribou moved back into the area behind Wainwright and the DEW line station and remained there from January through March. Whenever families desired fresh meat, they would simply go out behind the village or the DEW line and harvest a caribou or two. Often, this winter harvest would take less than an hour. The concentration of winter harvest sites is evident on the Year Two map (Map B-9), especially compared with winter sites on Map A-9 which were not particularly concentrated. The Year One map also shows one winter caribou harvested near Point Lay. This harvest was incidental to wolf and wolverine hunting which generally takes people much farther distances than one would go just to hunt caribou.

Finally, harvest sites for the months April through June barely appear on either the Year One or Year Two maps. Few harvests occurred during these months largely because people were concentrating on whaling and on hunting geese and ducks. Those caribou that were harvested during this time generally were near town, or were associated with geese and duck hunting trips.

These maps confirm the importance of the Kuk River system in providing access for Wainwright hunters. Virtually every river was utilized in the process of hunting caribou in Years One and Two.

Other Terrestrial Mammals: Comparison of Years One and Two

With respect to moose harvests, Years One and Two differed significantly insofar as residents harvested three moose in Year One and none in Year Two. Not a very plentiful animal in this area in the first place, Wainwright hunters saw no signs of moose in Year Two and consequently none were harvested. The lack of moose did not bother the people of Wainwright who did not eat moose very often due to their scarcity in the area. Hunters never specifically went moose hunting; rather, harvests occurred while the hunter was pursuing other game and encountered a moose incidentally. Even when encountered, hunters usually did not harvest moose. People preferred caribou which is easier to butcher, makes better *quaq* (raw frozen meat, usually eaten with seal oil), and has been abundant in recent years.

In Year One, one brown bear was taken in April on the Ketik River (Map A-8). In September of Year Two, a brown bear was taken near that same location; a second Year Two brown bear was taken in August in the Icy Cape region by hunters searching for caribou (Map B-8). No particular seasonal or geographic pattern emerges from such low harvest levels. Rather, harvests occurred randomly, when people encountered these animals incidentally.

Only three ground squirrels were reported harvested in Year One compared with seven in Year Two. Three were harvested in May of each year, and the additional four Year Two ground squirrels were taken in August. The Year Two ground squirrels all were taken right near Wainwright; the location of the Year One harvests was undetermined.

Furbearer harvests declined considerably from Year One to Year Two (Tables A-6 and B-6). Year Two was a bad year for hunting furbearing mammals. Hunters traveled many miles, sometimes over 300 miles in a weekend, looking for tracks of these animals. However, environmental conditions limited successful harvests. The lack of snow made traveling difficult and tracking next to impossible, resulting in low numbers on all of the furbearing animals.

An estimated 61 arctic fox were hunted and trapped near the Wainwright area in Year One (Table A-6), dropping sharply to just eight in Year Two (Table B-6). Only half the number of households harvested these animals in Year Two as in Year One (from six percent to three percent of households). The two main harvesters from Year One did not attempt to harvest any fox in Year Two because one of the trappers left town while the other trapper found full-time employment. Many arctic fox wandered into the village during Year One and were shot due to the risk of rabies. In Year Two, the number of such incidents was much lower. Arctic fox harvests occurred in Year One from December through May, averaging about 10 harvests per month during that time (Table A-8). In contrast, Year Two's eight arctic fox were taken in March when snow conditions improved (Table B-8). Arctic fox tend to be more coastal and are also found out on the ocean ice during the winter, and red fox tend to be found farther inland. Although not differentiated on the maps, Maps A-8 and B-8 show fox harvests clustered near Wainwright, which were predominantly arctic fox, and fox harvests farther inland, which were mainly red fox usually taken during winter wolf and wolverine hunting.

Red fox harvests declined only slightly, from 26 to 22, with a correspondingly minor shift from seven percent to six percent of households harvesting this species (Tables A-6 and B-6). In Year One, harvests took place from November through February; Year Two harvests occurred December through March, a month later than Year One in terms of the overall season (Tables A-8 and B-8).

Wolverine harvests dropped from 20 in Year One to seven in Year Two, and the number of households successfully harvesting wolverine dropped from six percent to two percent. (The same households hunted wolverines both years but fewer were successful in Year Two.) The Year One harvest period was longer than in Year Two, extending from October through April in contrast to December through

March in Year Two. Similarly, wolf harvests dropped from 10 in Year One to two in Year Two, and the percentage of households harvesting wolves halved, from four to two percent. The 10 wolves in Year One were harvested during four months in the period from November through January and May, while the two Year Two wolves were taken in March. Pursuit of these two species, wolf and wolverine, generally entails long trips toward and into the Brooks Range in the middle of winter when the animals' coats were thickest. Snow conditions for inland travel were poor in Year Two, mainly because of a lack of snow for snowmachine travel and for being able to track the animals. The only Year Two wolves were taken in March, when a snowstorm left improved conditions for traveling and tracking. Residents harvested the most wolverines that month in Year Two also. In terms of successful hunting areas, Year One hunters successfully harvested wolverines past Point Lay in the Cape Sabine area (Map A-8), but were unsuccessful when they returned to that area in the winter of Year Two (Map B-8). Wolverines were taken on the Ivisaruk River both years; those sites were the closest to Wainwright. The remaining wolverine harvest sites generally were farther up the Ketik River, high on the Utukok River (Year One only), and in the foothills of the Brooks Range. In both Years One and Two, wolves were harvested in the general area where the Utukok and Ketik Rivers are close to one another. Traveling over 100 miles a day from the cabins or from Wainwright was not unusual in the search for furbearers, particularly wolf and wolverine.

Of all the furbearer harvests, ermine and river otter were the only ones to increase from Year One to Year Two. The river otter harvest, as explained earlier, was so unusual as to be difficult for Wainwright residents to identify. Ermine increased from two to nine animals taken. One percent of Wainwright households caught the two ermine in Year One, and four percent were responsible for Year Two's nine ermine harvested. Seasonally, no pattern to these harvests was apparent; Year One's two ermine were trapped in September and October, and Year Two harvests occurred in June, February and March.

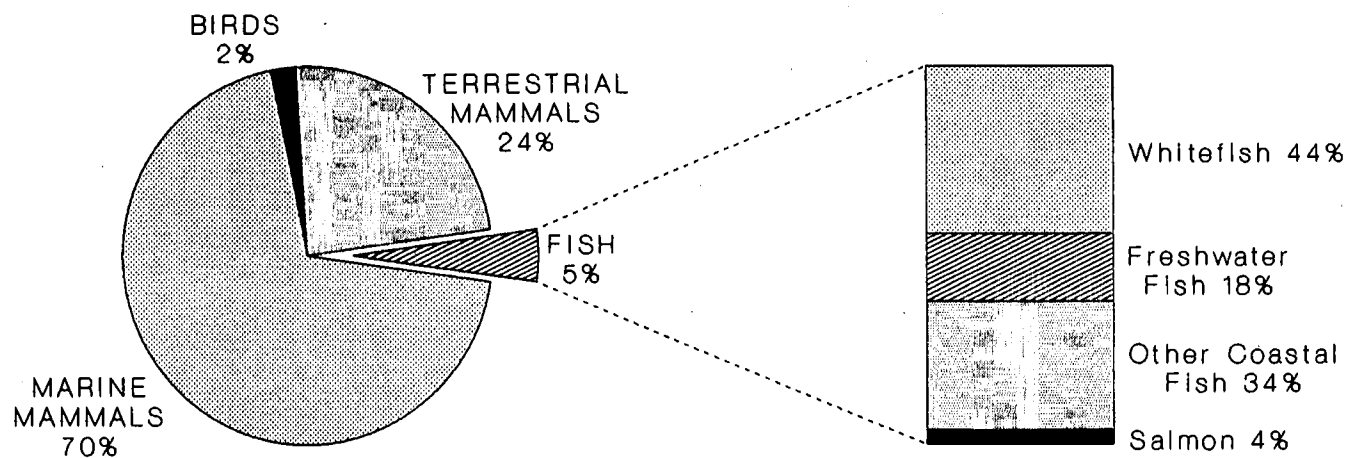
FISH: TWO YEAR AVERAGES

Fish were an important secondary resource for the Wainwright community. Although people valued and enjoyed fish as a subsistence food, they gave priority to harvesting marine mammals and caribou. Fish of one type or another, however, are available most months out of the year, including winter months when few other types of fresh food are available. This year-round availability, combined with availability near the village and participation by males and females of all age groups, makes fish an important subsistence resource in Wainwright. Researchers familiar with Wainwright suggest that fish probably have been an important back-up resource in years when other harvests were lean (Milan 1964, Nelson 1981, Luton 1985).

While marine and terrestrial mammals combined provided 94 percent of the total harvest of usable foods, fish provided just five percent of Wainwright's subsistence foods, a distant third among the four major resource categories in terms of total usable pounds averaged over the two study years (Figure 23). Even so, fish still contributed over 13,735 pounds to the total usable pounds of subsistence food harvested by the community of Wainwright (Table 12), averaging 121 pounds per household. The reader must bear in mind that in shifting from consideration of marine and terrestrial mammals, ranging in usable weight per harvested unit from 42 to several hundred usable pounds (or many thousands of pounds in the case of bowhead), the main fish species harvested in Wainwright yielded just one pound or less per harvested unit. While these weight figures suggest that fish harvests were relatively insignificant in Wainwright, the participation levels suggest otherwise: an average of approximately 66 percent of all Wainwright households caught fish each year over the two study years, second to marine mammal participation (82 percent) and slightly higher than terrestrial mammal participation (62 percent).

Fish harvests may have contributed less proportionally to the overall subsistence harvest during the study period than in preceding decades. According to Luton (1985), shortages of walrus and bowhead whale (both of which occurred early in this century due to commercial overharvests by non-Natives) caused Inupiat residents to depend more upon fish and seals for their subsistence needs. Luton also stated that "The older people in Wainwright grew to young

**Figure 23: Harvest Percentages
of Fish
Wainwright, Years One & Two Averaged
(Usable Pounds Harvested)**



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Based on 124 Year One and 119 Year Two households, including partial year households.
Two years of study: 4/1/88 - 9/31/90
Source: Stephen R. Braund & Assoc., 1993

TABLE 12: HARVEST ESTIMATES FOR FISH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1)

RESOURCE	CONVERSION	COMMUNITY TOTALS (3)		AVERAGE POUNDS		PERCENT	PERCENT
	FACTOR (2) Usable Weight Per Resource in pounds	NUMBER HARVESTED	USABLE POUNDS HARVESTED	PER HOUSEHOLD	PER CAPITA	OF TOTAL USABLE POUNDS HARVESTED (3)	OF WAINWRIGHT HOUSEHOLDS HARVESTING RESOURCE (4)
Total Fish	n/a	n/a	13,735	120.63	29.4	4.5%	66%
Total Whitefish		6,070	6,070	58.54	14.2	2.0%	23%
Whitefish (non-specified)	1.0	2	2	0.04	*	**	1%
Round Whitefish	1.0	200	200	2.00	0.5	0.1%	2%
Least cisco	1.0	5,649	5,649	56.31	13.7	1.9%	21%
Bering, Arctic cisco	1.0	219	219	0.19	*	0.1%	2%
Total Other Freshwater Fish		2,979	2,476	24.27	5.9	0.8%	27%
Arctic grayling	0.8	2,950	2,360	23.33	5.7	0.8%	25%
Burbot (Ling cod)	4.0	29	114	0.92	0.2	**	7%
Lake trout	4.0	1	2	0.02	*	**	1%
Total Salmon		96	547	5.31	1.3	0.2%	5%
Salmon (non-specified)	6.1	1	6	0.06	*	**	1%
Silver salmon	6.0	26	153	1.53	0.4	0.1%	3%
King salmon	18.0	5	81	0.81	0.2	**	2%
Chum (Dog) salmon	6.1	36	217	2.17	0.5	0.1%	3%
Pink (Humpback) salmon	3.1	29	90	0.74	0.2	**	3%
Total Other Coastal Fish		37,328	4,643	32.51	7.9	1.5%	54%
Rainbow smelt	0.1	37,139	4,457	30.92	7.5	1.5%	54%
Tomcod (Saffron Cod)	1.0	182	182	1.55	0.4	0.1%	2%
Arctic flounder	0.5	2	1	0.01	*	**	2%
Sculpin	0.6	6	3	0.03	*	**	2%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) See Table C-3 for sources of conversion factors.

(3) Community totals and percent of total usable pounds harvested are based on harvest amounts reported by all 124 Year One households and 119 Year Two households for all species.

(4) Per household and per capita means and percent of households harvesting a resource are based only on the 100 core households in the study for the full two years.

* represents less than .1 pound

** represents less than .1 percent

n/a means not applicable

Source: Stephen R. Braund & Associates, 1993

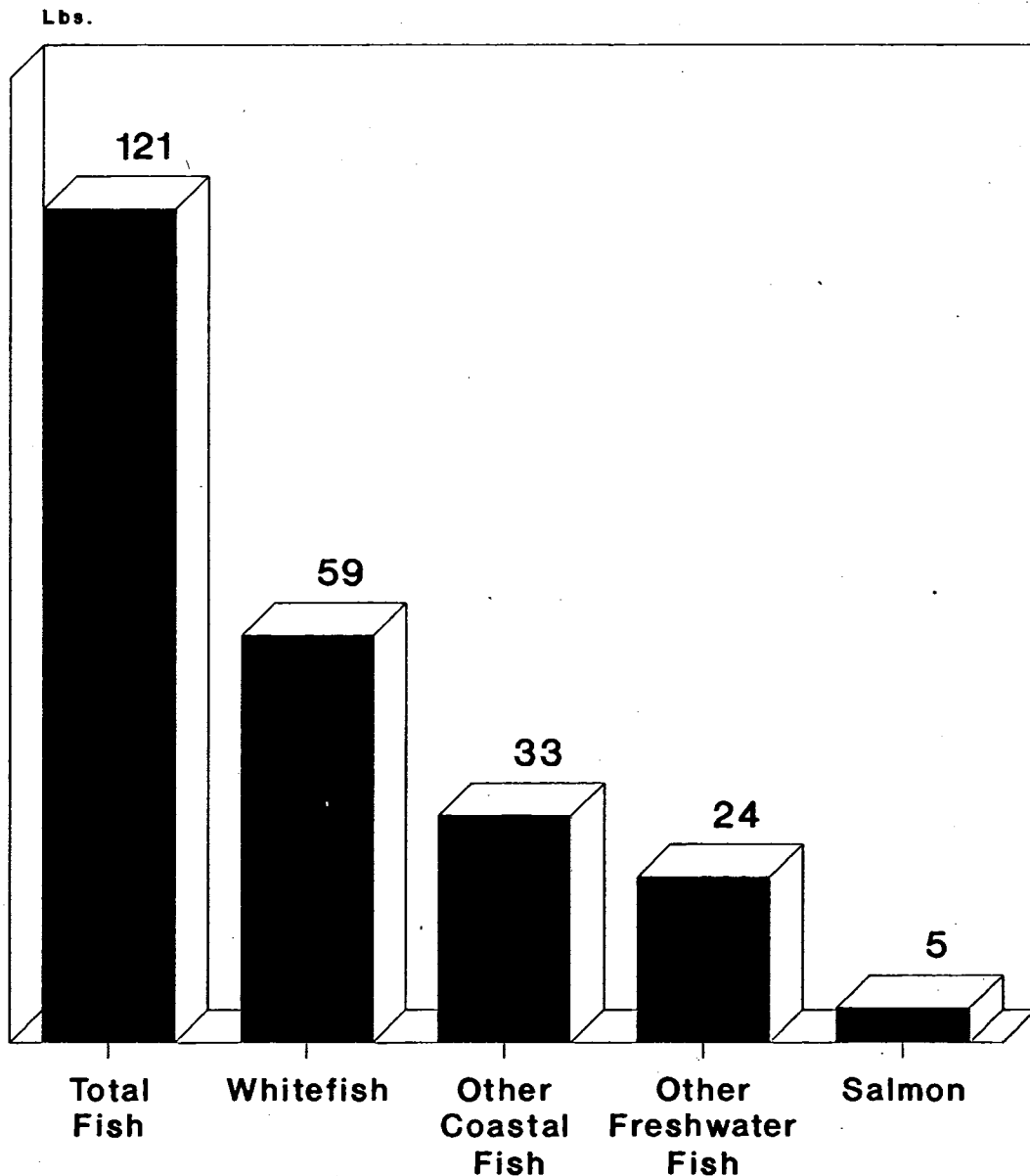
adulthood during an era of great caribou scarcity....During this period of scarcity, people also relied more on fish, both for human consumption and dog food; several elders commented on how they got tired of fish in the old days" (Luton 1985:202-3).

Figure 23 illustrates the relative importance of the four different fish harvest categories. Whitefish represented the largest fish harvest by weight (44 percent of the total fish harvest), followed by other coastal fish (34 percent), other freshwater fish (18 percent) and salmon (four percent). The whitefish harvest consisted almost exclusively of least cisco, with some arctic (Bering) cisco and round whitefish harvested as well. These species of whitefish combined produced an average usable yield of 6,070 pounds per year, or approximately 59 pounds per household (Table 12, Figure 24). About 23 percent of Wainwright households harvested one or more species of whitefish. The majority of these people either had a cabin upriver or had access to a cabin where they fished with gill nets (field observation).

Other freshwater fish (i.e., other than whitefish) caught by Wainwright residents included arctic grayling, burbot and lake trout and averaged, collectively, 2,476 pounds per year, or 24 pounds per household. Although these fish represented a smaller proportion of the total fish harvest than the whitefish discussed above, more households (27 percent) harvested these other freshwater fish species. Arctic grayling was the main species harvested in this subgroup of fish, by a wide margin. One reason for the higher participation was that many people went upriver in the summer of Year Two, due to the early end to marine mammal hunting. Late summer is the prime time for fishing for grayling by rod and reel, yet the whitefish have not yet begun to run. Thus, more people fished for grayling but used a low-yield method (rod and reel), compared to later in the fall when fewer people fished but used nets to harvest large quantities of whitefish.

With the departure of the ice in the summer, many families and hunters headed upriver to their cabins where they caught whitefish and other freshwater fish. Generally, the entire family participated in fishing with the younger children spending whole evenings out playing and fishing. Fishing was an activity that typically happened during a stretch of spare time such as after dinner, in the

**Figure 24: Harvest of Fish
Wainwright, Years One & Two Averaged
(Mean Usable Pounds Per Household)**



Based on 100 core households in the study for both years.
Two years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

early morning before everyone had awakened, while looking for caribou, or on rainy days.

The majority of the summer freshwater fish harvests were by rod and reel. Later in the fall when the fish became fat, fishing became a much more specialized and focused activity. Fisherman set their nets in the early fall (e.g., September) near their cabins with the intent of catching the winter supply of grayling and whitefish when the fish were fat and full of eggs. Harvesting in this manner usually occurred at fish camps and involved an extended stay, boat travel, and nets.

Wainwright fishermen caught four species of salmon - silver, king, chum and pink - in the two study years. Salmon harvests averaged 547 pounds of usable product per year, about five pounds per household (Table 12). The main species harvested was chum salmon, followed by pink and silver salmon. Salmon fishing was especially fruitful in the months of July and August when fishermen set their nets along the shoreline in front of Wainwright and in the inlet between the ocean and the lagoon and tended them entirely from Wainwright. Fishermen checked their nets in the evening, and usually one or two salmon were caught on each daily (or twice daily) net check. A few other people set nets upriver by their cabins also. Since only a handful of people had salmon nets, participation in this activity was low; only five percent of households reported catching salmon.

Other coastal fish (i.e., other than salmon) provided 34 percent of the fish harvest and 4,643 pounds of usable food, including rainbow smelt, tomcod, arctic flounder, and sculpin (Table 12). By far, the predominant species in this subgroup was rainbow smelt with 4,457 usable pounds harvested, constituting over 95 percent of the other coastal fish harvest. The high participation in fish as a major resource category, second only to marine mammal participation, was attributable mainly to rainbow smelt. As Table 12 shows, participation in rainbow smelt fishing averaged 54 percent per year, and the next highest participation rate among fish species was 25 percent (arctic grayling). The high household participation in smelt fishing stems from several reasons. First, people loved to eat them; in fact, Wainwright's smelt were renown across the North Slope as a delectable subsistence food.

Wainwright families sent smelt to relatives and friends in other North Slope communities. Second, Wainwright's lagoon is a rich rainbow smelt habitat in the winter months, mainly from January through March. At this time of year, when few other resources besides caribou and the occasional seal or ptarmigan can be harvested for fresh meat, smelt were eagerly sought. Third, the lagoon's proximity to town made access easy. Fourth, the activity of smelt fishing is technologically simple enough to be undertaken by virtually anyone with a few hours to spare. Finally, while smelt fishing could be a completely solitary activity, it often was the vehicle for social activity. One could take one's entire family, go with friends, or go alone and visit with the other people who came out to fish.

Since the fishing area for smelt was located at the edge of town, people commonly went to the lagoon during their lunch break to try to catch some smelt when the fish were "really biting." Weekends were also a popular time for smelt fishing. Some unemployed people would spend about five hours a day smelt fishing. People of all ages participated in this harvest; school classes even took outings to the lagoon to fish for smelt. (Children usually did not go without an adult, however, due to the possibility of encountering a polar bear.) Of smelt fishing, Nelson observed in the mid-1960s that "This remains an important activity today, especially for women and old men" (1969:148). Smelt fishing remained an important activity for women and old men in Wainwright in the late 1980s as well; however, field experience indicated that smelt fishing also drew considerable participation from the principal hunters in the community.

Smelt swim in large schools directly below the ice of the lagoon, their movements fluctuating with the changing tides and shifting currents. Consequently, one location might yield nothing while another location could produce hundreds of fish in a few hours; thus, people tried different locations if their initial efforts were unsuccessful. Often many holes were chipped through the ice before smelt were found. Some people used manual augurs to make their holes in the ice, but most people chipped a new hole or reopened an old hole. When fishing in the long mid-winter darkness, people sometimes left their snowmachines running with the headlight directed toward their fishing holes.

Tomcod were caught frequently while fishing for smelt; however, these harvests often were overlooked in reporting.

SEASONAL FISH HARVEST PATTERNS: TWO YEAR AVERAGES

As illustrated by the monthly harvest data presented in Tables 13 and 14 and in Figure 25, the prime month for fishing was September when an average 36 percent of the fish harvests (by weight) took place. The fall months of August through October yielded a combined total of 62 percent of the yearly fish harvests. Wainwright fishermen caught nine different species of fish in July, 10 in August and eight in September. The second highest fishing season was January through March when 33 percent of the year's fish were harvested. The winter harvest consisted predominantly of smelt but also included burbot and tomcod. Residents caught fish throughout the two study years except in the months of May and June when whaling and duck hunting were the focus of activity.

Whitefish harvests occurred from July through November, with 72 percent of all whitefish taken in September. Although round whitefish and arctic cisco peaked in October, least cisco peaked in September. Consequently, because least cisco constituted the majority of the whitefish harvest, September was the peak month for whitefish harvests overall. Grayling harvests peaked in October, and hence the category of other freshwater fish reflects that peak even though 72 percent of the burbot were caught in January and February, and all the lake trout were caught in September. These latter two fish species were minor, however, in contrast with the amount of grayling taken.

Fifty-seven percent of the average year's salmon harvest was caught in August, and 95 percent of the total salmon harvest occurred in July and August combined. The remaining five percent of the salmon were caught in September. The other coastal fish were taken predominantly in January (48 percent), February (30 percent) and March (15 percent). Thus, these three months yielded 93 percent of all the other coastal fish harvests. As discussed previously, smelt constituted the majority of the other coastal fish, and these winter months were the time to catch them. Residents reported additional minor smelt harvests in August, October through December, and April, as well. Tomcod were also caught in the winter months of November through March, with the peak month

TABLE 13: FISH HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Pounds of Usable Resource Product)

SPECIES	TOTALS											
	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Total Whitefish	0	0	0	22	854	4,359	734	101	0	0	0	0
Whitefish (non-specified)	0	0	0	0	0	0	1	1	0	0	0	0
Round Whitefish	0	0	0	0	0	38	113	50	0	0	0	0
Least cisco	0	0	0	16	847	4,317	420	50	0	0	0	0
Bering, Arctic cisco	0	0	0	7	7	5	201	0	0	0	0	0
Total Other Freshwater Fish	0	0	0	49	246	566	1,381	144	9	36	46	0
Arctic grayling	0	0	0	49	246	562	1,351	144	9	0	0	0
Burbot (Ling cod)	0	0	0	0	0	2	30	0	0	36	46	0
Lake trout	0	0	0	0	0	2	0	0	0	0	0	0
Total Salmon	0	0	0	207	313	27	0	0	0	0	0	0
Salmon (non-specified)	0	0	0	0	6	0	0	0	0	0	0	0
Silver salmon	0	0	0	57	84	12	0	0	0	0	0	0
King salmon	0	0	0	18	63	0	0	0	0	0	0	0
Chum (Dog) salmon	0	0	0	101	101	15	0	0	0	0	0	0
Pink (Humpback) salmon	0	0	0	31	59	0	0	0	0	0	0	0
Total Other Coastal Fish	170	0	0	2	16	0	22	54	39	2,236	1,414	690
Rainbow smelt	170	0	0	0	16	0	21	53	14	2,146	1,350	687
Tomcod (Saffron Cod)	0	0	0	0	0	0	0	1	25	90	64	4
Arctic flounder	0	0	0	1	1	0	0	0	0	0	0	0
Sculpin	0	0	0	2	0	0	1	0	0	0	0	0
All Fish Species	170	0	0	280	1,428	4,952	2,137	299	48	2,272	1,460	690

(Continued on next page)

TABLE 13, CONTINUED: FISH HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Pounds of Usable Resource Product)

SPECIES	PERCENTS												
	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March	
Total Whitefish	0%	0%	0%	0%	14%	72%	12%	2%	0%	0%	0%	0%	= 100%
Whitefish (non-specified)	0%	0%	0%	0%	0%	0%	50%	50%	0%	0%	0%	0%	= 100%
Round Whitefish	0%	0%	0%	0%	0%	19%	56%	25%	0%	0%	0%	0%	= 100%
Least cisco	0%	0%	0%	0%	15%	76%	7%	1%	0%	0%	0%	0%	= 100%
Bering, Arctic cisco	0%	0%	0%	3%	3%	2%	92%	0%	0%	0%	0%	0%	= 100%
Total Other Freshwater Fish	0%	0%	0%	2%	10%	23%	56%	6%	0%	1%	2%	0%	= 100%
Arctic grayling	0%	0%	0%	2%	10%	24%	57%	6%	0%	0%	0%	0%	= 100%
Burbot (Ling cod)	0%	0%	0%	0%	0%	2%	26%	0%	0%	32%	40%	0%	= 100%
Lake trout	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	= 100%
Total Salmon	0%	0%	0%	38%	57%	5%	0%	0%	0%	0%	0%	0%	= 100%
Salmon (non-specified)	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	= 100%
Silver salmon	0%	0%	0%	37%	55%	8%	0%	0%	0%	0%	0%	0%	= 100%
King salmon	0%	0%	0%	22%	78%	0%	0%	0%	0%	0%	0%	0%	= 100%
Chum (Dog) salmon	0%	0%	0%	46%	46%	7%	0%	0%	0%	0%	0%	0%	= 100%
Pink (Humpback) salmon	0%	0%	0%	34%	66%	0%	0%	0%	0%	0%	0%	0%	= 100%
Total Other Coastal Fish	4%	0%	0%	0%	0%	0%	0%	1%	1%	48%	30%	15%	= 100%
Rainbow smelt	4%	0%	0%	0%	0%	0%	0%	1%	0%	48%	30%	15%	= 100%
Tomcod (Saffron Cod)	0%	0%	0%	0%	0%	0%	0%	0%	14%	49%	35%	2%	= 100%
Arctic flounder	0%	0%	0%	50%	50%	0%	0%	0%	0%	0%	0%	0%	= 100%
Sculpin	0%	0%	0%	55%	9%	0%	27%	9%	0%	0%	0%	0%	= 100%
All Fish Species	1%	0%	0%	2%	10%	36%	16%	2%	0%	17%	11%	5%	= 100%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) Based on 124 Year One and 119 Year Two households, including partial year households.

Source: Stephen R. Braund & Associates, 1993

TABLE 14: FISH HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Number Harvested)

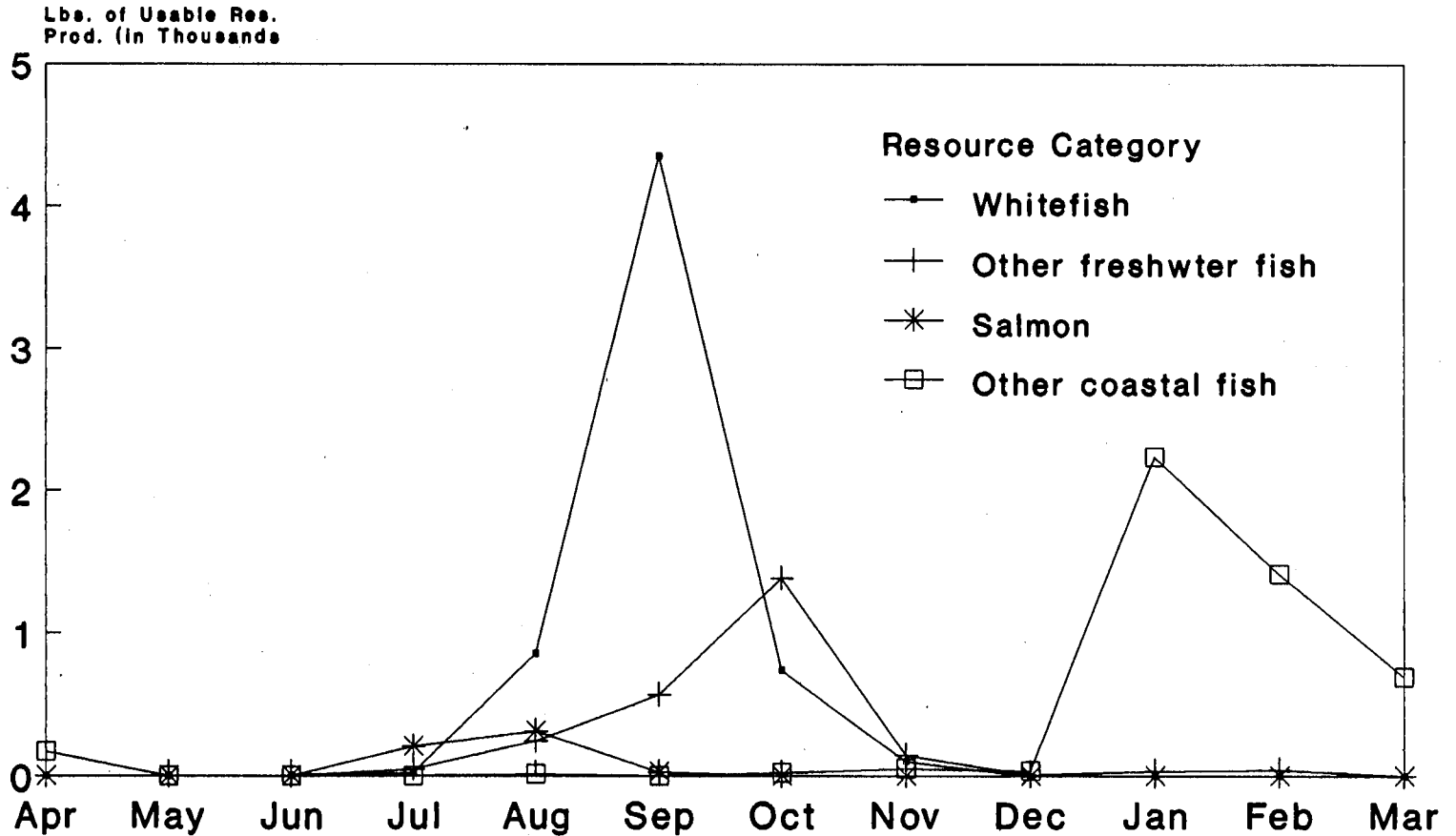
SPECIES	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Total Whitefish	0	0	0	22	854	4,359	734	101	0	0	0	0
Whitefish (non-specified)	0	0	0	0	0	0	1	1	0	0	0	0
Round Whitefish	0	0	0	0	0	38	113	50	0	0	0	0
Least cisco	0	0	0	16	847	4,317	420	50	0	0	0	0
Bering, Arctic cisco	0	0	0	7	7	5	201	0	0	0	0	0
Total Other Freshwater Fish	0	0	0	62	307	703	1,696	180	11	9	12	0
Arctic grayling	0	0	0	62	307	702	1,688	180	11	0	0	0
Burbot (Ling cod)	0	0	0	0	0	1	8	0	0	9	12	0
Lake trout	0	0	0	0	0	1	0	0	0	0	0	0
Salmon	0	0	0	37	54	5	0	0	0	0	0	0
Salmon (non-specified)	0	0	0	0	1	0	0	0	0	0	0	0
Silver salmon	0	0	0	10	14	2	0	0	0	0	0	0
King salmon	0	0	0	1	4	0	0	0	0	0	0	0
Chum (Dog) salmon	0	0	0	17	17	3	0	0	0	0	0	0
Pink (Humpback) salmon	0	0	0	10	19	0	0	0	0	0	0	0
Total Other Coastal Fish	1,415	0	0	4	132	0	180	442	138	17,976	11,315	5,728
Rainbow smelt	1,415	0	0	0	130	0	179	441	113	17,886	11,252	5,725
Tomcod (Saffron Cod)	0	0	0	0	0	0	0	1	25	90	64	4
Arctic flounder	0	0	0	1	1	0	0	0	0	0	0	0
Sculpin	0	0	0	3	1	0	2	1	0	0	0	0

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) Based on 124 Year One and 119 Year Two households, including partial year households.

Source: Stephen R. Braund & Associates, 1993

**Figure 25: Monthly Harvest of
of Fish
Wainwright, Years One & Two Averaged**



Based on 124 Year One and 119 Year Two households, including partial year households.

Two years of study: 4/1/88 - 3/31/90

Source: Stephen R. Braund & Assoc., 1993

being January. The two arctic flounder were caught in July and August in salmon nets, and the sculpin were caught in July, August, October, and November.

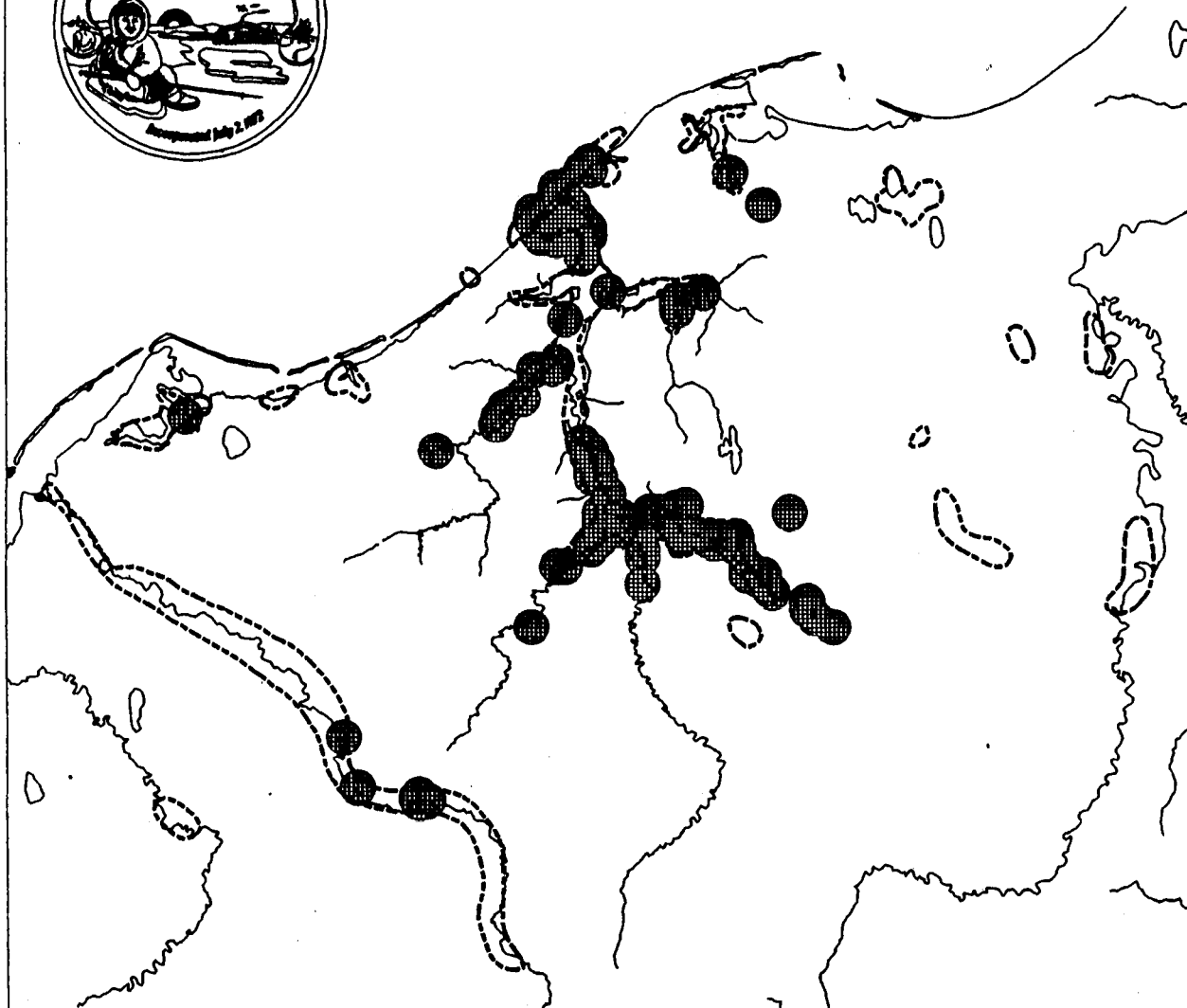
Field researchers found that fish harvest estimates generally were recalled less accurately than the estimates for larger species such as caribou, seals, or even geese and ducks. Large numbers of fish were harvested in a short period (e.g., a two week fall fishing trip) and mixed species generally were thrown together into a sack and frozen without having been counted. Hence, a harvester's estimate of his catch was often a best guess.

FISH HARVEST LOCATIONS OVER TWO YEARS

Map 13 illustrates that Wainwright residents harvested fish mainly from the waters adjacent to and extending from town, namely the beach in front of town, the lagoon, and the Kuk River and its tributaries. A few harvests are shown occurring up the Utukok River and at Icy Cape to the south of town, and at Peard Bay to the north. However, the vast majority of the community's fishing activity took place with little or no need to travel on the open ocean. Nearly all the harvest sites were located within the lifetime community use areas, with the exception of those harvests occurring in the highest reaches of the Kuk River tributaries. Certain areas used historically (as indicated by the lifetime community use lines) were not successful harvest sites during Years One or Two. Residents may have attempted to fish in these locations during the study period but were unsuccessful, or were successful and forgot to report their harvests; or perhaps these areas simply were not used during the study.

Map 14 differentiates the Year One and Two harvests by subgroup of fish. As would be expected, the coastal fish (salmon and other coastal species) were caught in the Wainwright Lagoon and the beach in front of town as well as at Peard Bay. A few species classified as "coastal" occasionally are found upriver. During Year One, some fourhorn sculpin were caught up the Kuk River. According to Morrow (1980:207), "This sculpin ascends rivers for considerable distances. It has been found in the Meade River, Alaska as much as 144 km upstream, and 192 km up the Mackenzie River in Canada." The freshwater species were caught up the Kuk and the Utukok rivers, and also in a couple of bays. A few families traditionally travel to the Utukok to fish each year. They stated



MAP 13 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT FISH HARVEST SITES - ALL SPECIES, YEARS ONE AND TWO



This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study. Lifetime-community harvest areas, collected in the form of map biographies from 14 households (Pedersen 1979), are also illustrated.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SR&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SR&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.

LEGEND INFORMATION

-  Lifetime community land use (Pedersen 1979).
-  All Fish Species
 - Whitefish
 - Arctic cisco,
 - least cisco,
 - round whitefish
 - Other Freshwater Fish
 - Grayling, burbot,
 - lake trout
 - Salmon
 - Chum, pink,
 - silver, king
 - Other Coastal Fish
 - Arctic cod, arctic flounder, tomcod,
 - rainbow smelt,
 - sculpin

Map Production: North Slope Borough GIS

Date: April 11, 1991

20 0 20 40 60 80

MILES





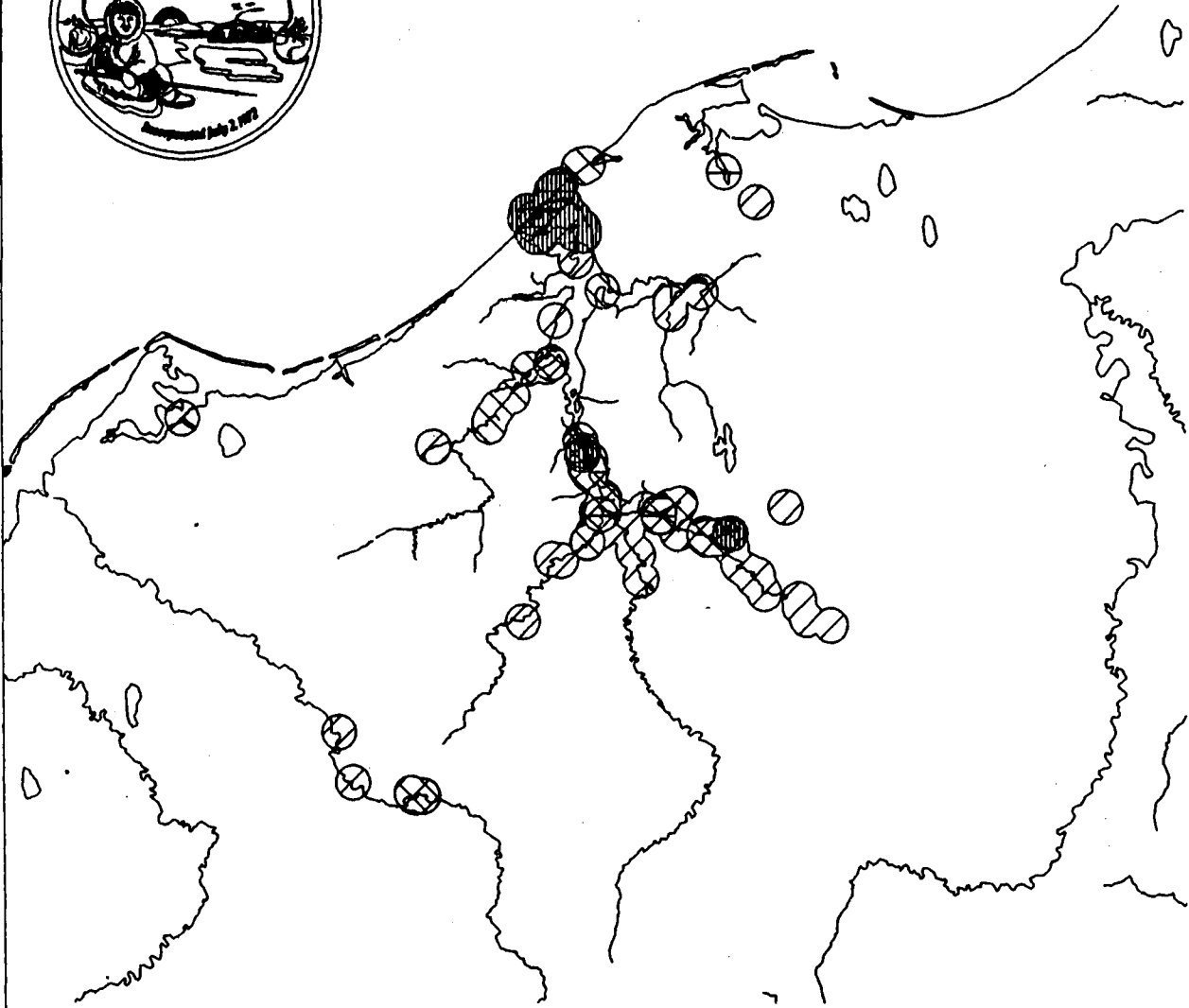
MAP 14

NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT





FISH HARVEST SITES BY SPECIES GROUPS, YEARS ONE AND TWO

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SRBA) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRBA is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.



LEGEND INFORMATION

- 
Whitefish
 Round whitefish, least cisco, arctic cisco
- 
Other Freshwater Fish
 Grayling, burbot, lake trout
- 
Salmon
 Chum, pink, silver, king
- 
Other Coastal Fish
 Tomcod, arctic cod, arctic flounder, sculpin, rainbow smelt



Map Production: North Slope Borough GIS
 Date: April 11, 1991



that the grayling from the Utukok taste far better than those of the Kuk River because the Utukok runs clear whereas the Kuk water is brown. The tastier fish is the main reason these families make a special trip to the Utukok most years to fish. Map 15 shows the fish harvest locations in conjunction with cabin and fixed camp sites.

VARIATION IN FISH HARVESTS FROM YEAR TO YEAR

Comparison of Year One and Year Two Overall Fish Harvests

From approximately 10,000 pounds in Year One, fish harvests increased to over 17,000 pounds in Year Two (Tables A-1 and B-1). On a per household basis, this increase was from 96 pounds to 145 pounds per household. Despite this 70 percent increase in absolute harvest numbers, the relative importance of fish in terms of the total subsistence harvest only increased by one percent (from four to five percent of the total harvest) because marine and terrestrial mammal harvests also increased markedly. Unexpectedly, the number of households responsible for harvesting fish decreased from 69 percent in Year One to 62 percent in Year Two. Fewer households fished in Year Two, but those who did were much more successful than in Year One.

Examination of the fish subgroups indicates that the increase occurred in all four of the subgroups. Whitefish harvests increased from 5,037 pounds to 7,102 pounds, a 41 percent increase. At the household level, the mean harvest increased from 50 to 67 pounds of whitefish per household (Figure 26). At least three species of whitefish were harvested in Year One: round whitefish, least cisco, and arctic cisco, plus a few non-specified whitefish. Although the number of species reported in Year Two decreased to two (least and arctic cisco), their numbers increased enough to result in the 41 percent increase in total whitefish harvests. Despite the increase in harvest amount, whitefish continued to represent two percent of the total subsistence harvest in Year Two as in Year One, and the percentage of households catching whitefish remained essentially the same: 22 percent in Year One and 23 percent in Year Two.

Other freshwater fish harvests (i.e., grayling, burbot, lake trout) rose only about 11 percent, from 2,343 to 2,609 pounds. As with whitefish, the number of

MAP 15 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT CABIN AND FIXED CAMP LOCATIONS AND FISH HARVEST SITES, YEARS ONE AND TWO



This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study. This map also displays the locations of fixed hunting and fishing camps used by Wainwright residents. The locations of many temporary subsistence camps are not shown.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Bround and Associates (SR&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SR&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska. Camp and cabin location data compiled by Stephen R. Bround & Associates (1990).

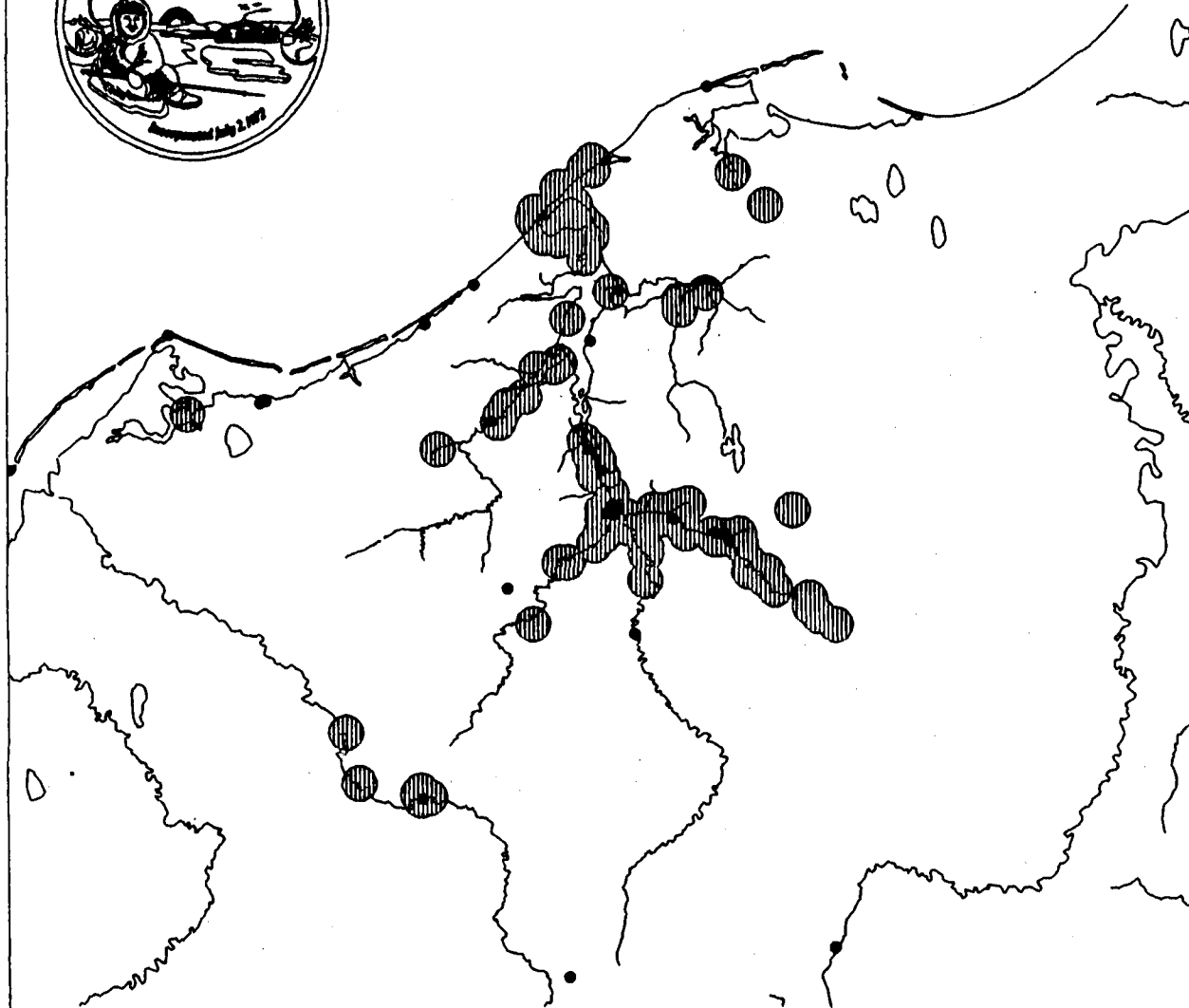
LEGEND INFORMATION



Fish harvest sites



Cabins and fixed camps



Map Production: North Slope Borough GIS

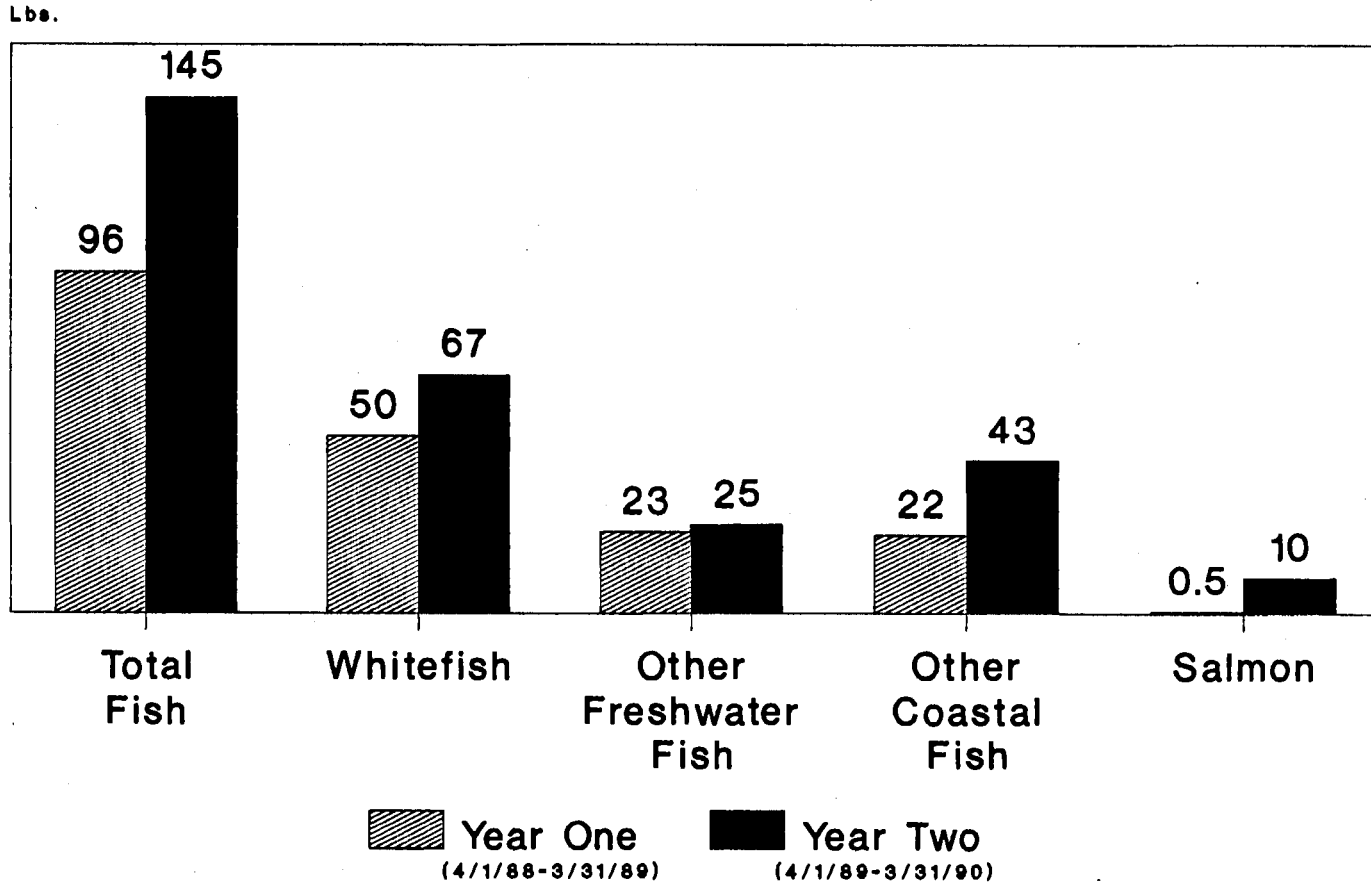
Date: April 11, 1991

20 0 20 40 60 80

MILES



**Figure 26: Harvest of Fish
Wainwright, Years One & Two
(Mean Usable Pounds Per Household)**



Based on core 100 households in the study the full two years.

Source: Stephen R. Braund & Assoc., 1993

species harvested actually decreased; residents reported catching grayling and burbot in both years, but they caught lake trout (one fish) only in Year One. Burbot harvests increased eightfold, while grayling harvests increased by about four percent. The big increase for other freshwater fish, however, was in the participation. Twenty-two percent of households caught other freshwater fish in Year One compared to 32 percent in Year Two. Grayling harvesters increased from 21 to 28 percent and burbot harvesters increased from three to 10 percent. In Year Two, more grayling were harvested by rod and reel than in Year One. With the high water levels in the rivers, people traveled high upstream and fished for grayling while waiting for caribou. This increase in rod and reel fishing may be related to the increase in household participation.

It is interesting to note that while virtually the same number of households caught considerably more whitefish from Year One to Year Two, a higher number of households catching other freshwater fish in Year Two resulted in about the same harvest amount as in Year One. In other words, whitefish harvesters became much more successful in their efforts from Year One to Year Two, while those households catching other freshwater fish caught fewer in Year Two than in Year One.

Wainwright residents showed markedly higher participation in salmon fishing and in resulting harvests in Year Two compared to Year One, with an increase from 49 pounds to 1,044 pounds harvested. At the household level, the mean harvest increased from half a pound to 10 pounds per household. The percentage of households catching salmon rose from two to seven percent. The earlier end of the marine mammal season in Year Two may have affected both the participation and the harvests of salmon in Year Two. Once finished with marine mammal hunting, more people were able to concentrate on salmon fishing. Also, residents speculated that the absence of marine mammals near town reduced predation on the salmon run, allowing for higher harvests.

Wainwright caught about 4,000 pounds more other coastal fish (i.e., principally rainbow smelt) in Year Two than in Year One, from 2,656 to 6,630 pounds. The average household got 43 pounds of other coastal fish in Year Two compared to 22 pounds in Year One. The number of households catching this subgroup of fish actually decreased from 55 to 53 percent of community households, however.

Tomcod harvests decreased from Year One to Year Two. A few arctic flounder were harvested in salmon nets in Year Two, much to the surprise of people in town who had never seen such a fish and did not know what to do with it until an elder came over and quickly took it home. The great majority of the increase in other coastal fish, however, occurred in the rainbow smelt harvest, which went from 2,423 to 6,490 pounds, nearly tripling. In terms of actual fish, the harvest increased from 20,194 to 54,083 smelt which represents a significant increase in effort considering that these fish are caught individually rather than in a net. The percentage of households participating decreased by one percent, from 54 to 53 percent. The cause of this increased smelt harvest stemmed from various factors. The most common explanation offered by Wainwright residents was that "the fish were really biting this year." People located good areas to dig through the ice to find the schooling fish, with some people catching hundreds of fish in just a few hours. Currents, tides, the schooling of the fish and placement of fishing holes were all reasons given by Wainwright residents for the much higher productivity of Year Two smelt fishing.

Comparison of Year One and Year Two Fish Harvests by Month

A comparison of Tables A-10 and B-10 shows that the overall fish harvest was concentrated more heavily in the summer and fall months in Year One, when 71 percent of the year's fish were caught between August and October, than in Year Two, when only 56 percent of the year's fish were caught during that same peak period. The difference lies in the high Year Two smelt harvest. That harvest shifted a large proportion of the Year Two total harvest to the winter months. In Year One, 21 percent of the year's fish were caught between January and March compared to 38 percent for that same time in Year Two. Figures A-12 and B-12 illustrate this proportional difference in the distribution of the fish harvests across the seasons.

In terms of absolute numbers, however, the higher July harvests in Year Two compared with July of Year One may be due in part to the earlier termination of marine mammal hunting in Year Two. Once marine mammal hunting ended, people shifted their focus, as they do every year, to laying in their winter supplies of fish and caribou. Some people headed upriver earlier than usual, and others

in town set nets along the beach for salmon, in contrast to the year before when they may have been hunting marine mammals at that time.

Figure 27, a line graph, compares whitefish harvests by month for Years One and Two. This graph shows, first, that the Year Two harvest occurred generally a month earlier than Year One's harvest. Second, the graph indicates that while the peak months yielded virtually identical harvest levels, the months just before and after the peak were much higher in Year Two than Year One; thus, the months just before and after the peak harvest of whitefish were the pivotal months when the large difference in harvests between the two years occurred. Whitefish harvests in August of Year Two likely were higher because of the earlier end to marine mammal hunting which allowed people to go upriver sooner to begin fishing.

Other freshwater fish harvests are depicted similarly in Figure 28. Having established earlier that the harvests remained nearly the same from one year to the next, this graph shows that the timing of the harvests differed quite a bit. Year One's harvest of other freshwater fish was concentrated mainly in the month of October. In contrast, Year Two's harvests exhibit a less intense peak, rising more gradually and peaking across two months, September and October. January and February harvests occurred in Year Two in contrast to none at that time in Year One.

Figure 29 mainly shows the dramatic rise in salmon harvests from Year One to Year Two. The peak harvest month was August in both years. Although no salmon were caught in July of Year One, quite a few were caught in July of Year Two. This difference might have been due to the environmental and biological obstacles mentioned previously. Residents suggested that perhaps the earlier departure of the ocean ice in Year Two resulted in less seal predation, which in turn yielded higher harvest numbers. Concomitantly, the departure of the ocean ice ended marine mammal hunting and allowed people to concentrate more on setting and tending nets.

Other coastal fish harvests, as graphed in Figure 30, reflect the difference in both magnitude and timing of the two years' harvests. Year One harvests were much lower than Year Two harvests, occurred over a broader time span (October

Figure 27: Comparison of Monthly Whitefish Harvests Wainwright, Years One and Two

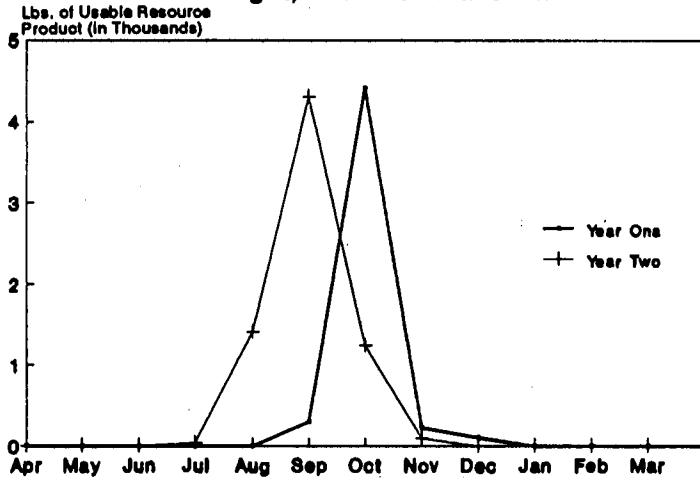


Figure 28: Comparison of Monthly Other Freshwater Fish Harvests Wainwright, Years One and Two

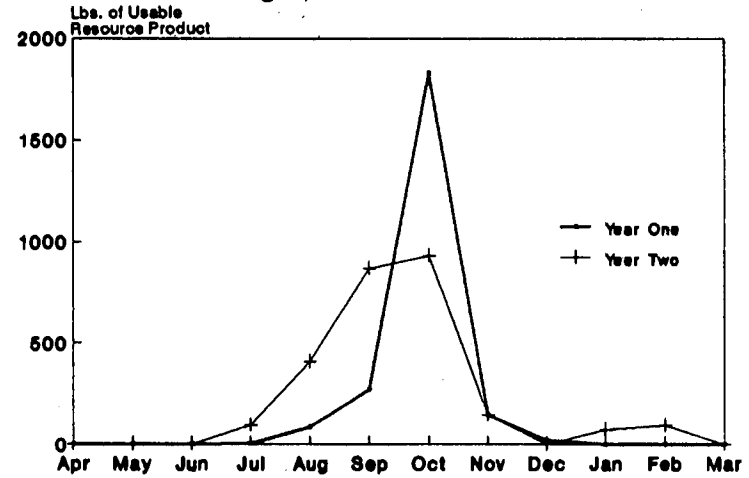


Figure 29: Comparison of Monthly Salmon Harvests Wainwright, Years One and Two

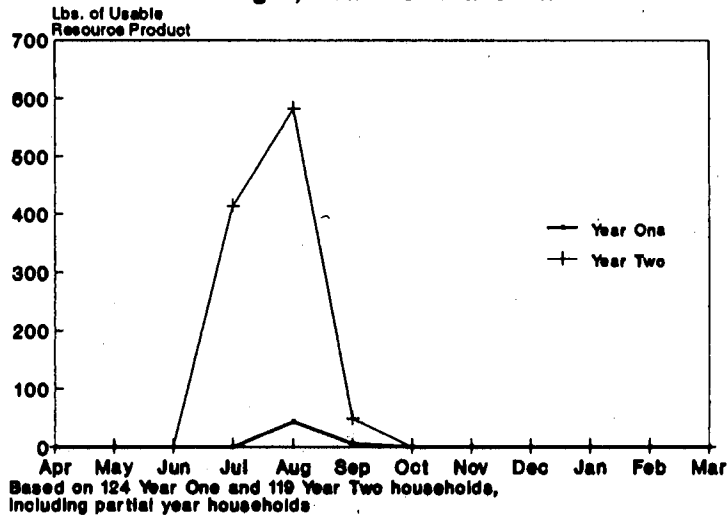
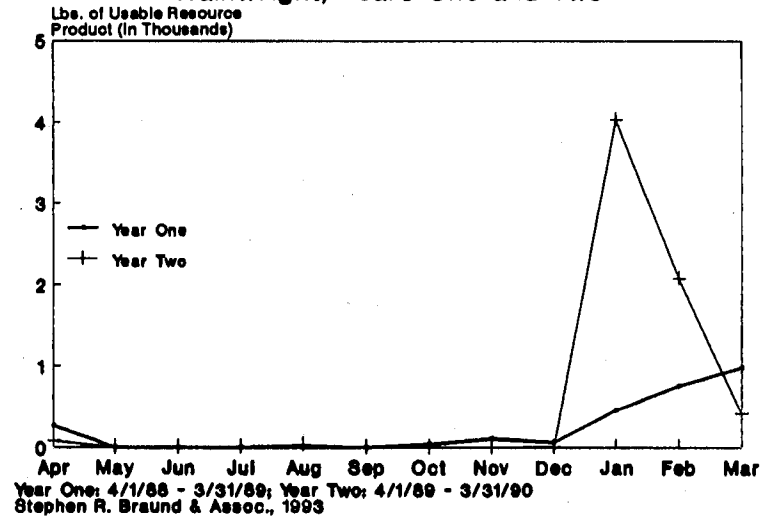


Figure 30: Comparison of Monthly Other Coastal Fish Harvests Wainwright, Years One and Two



through April), and peaked in March. Year Two's harvests were concentrated into the three month period from January through March, peaking sharply in January and tapering off steadily thereafter.

Comparison of Year One and Year Two Fish Harvest Locations

Maps A-10 and B-10 illustrate fish harvest locations for Years One and Two, respectively. Maps A-11 and B-11 show the same locations, but differentiated by the type of fish (i.e., fish subgroup) caught at each site. Comparing Year One and Year Two fish maps illustrates clearly that fishermen in Year Two caught fish several miles farther up the Kuk River and its tributaries than in Year One. Rainfall in late summer raised the river levels higher than normal, allowing boat travel farther up the rivers than usual and likely explaining the broader harvest area in Year Two.

Along the Utukok River, several harvest sites were mapped in Year One in contrast to only one in Year Two. Three of the families that traditionally have fished each year on the Utukok River did not make it there in Year Two, for various reasons. Another difference between Years One and Two is seen in the Icy Cape area where a freshwater fish harvest is shown occurring in Year Two compared to no harvests there in Year One.

Summary

Fishing was a secondary subsistence activity that provided the people of Wainwright with a highly valued food source with important substitutional potential. Fish totals appear minor compared to the sheer mass of bowhead whale, walrus and caribou harvests, but the level of participation is indicative of the importance of fish as a subsistence food in Wainwright. Fishing occurred throughout nearly the entire year with whitefish and rainbow smelt being the prime species harvested. The timing of the harvests varied slightly from year to year within generally consistent seasonal boundaries. Environmental factors influenced the timing, the harvest levels, and the areas fished. For example, in Year Two high water expanded the extent of fishing harvests, while the early end to marine mammal hunting allowed people to go upriver earlier, spend more time fishing, and hence catch more fish. Fishing

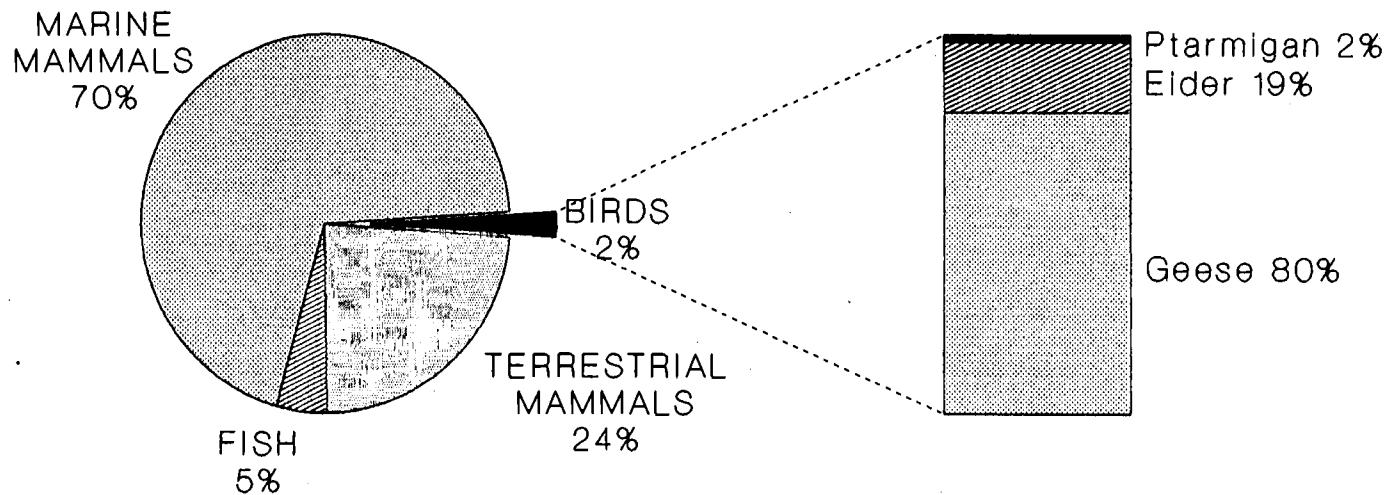
is strongly associated with summer and fall trips upriver to cabins and camps, a valued time for families to spend together in subsistence pursuits. Nelson (1981) noted that the use of upriver fish camps had waned but was re-emerging in the early 1980s as an important activity due to easier travel and a resurgent cultural value on families pursuing subsistence activities on the land together. Fishing was more of a family activity than any other subsistence pursuit. People of all ages and skill levels participated in fishing, both upriver in the summer and fall, and on the inlet during winter smelt fishing.

BIRDS: TWO YEAR AVERAGES

Harvesting birds was a major activity for residents of Wainwright, particularly in the spring. Waterfowl are among the first of the migratory subsistence species to return each year. As such, these birds were eagerly anticipated as harbingers of the many migratory subsistence species soon returning, providing the first taste of the spring and summer harvests.

As Figure 31 indicates, Wainwright bird harvests represented an average of two percent of the total community harvest each year, or 6,682 usable pounds (Table 15). Since the birds harvested yielded less than five usable pounds each, their actual significance in the overall subsistence picture is overshadowed, like fish, by the high volume of usable meat from the much larger marine and terrestrial mammals. As Nelson (1969:153) stated, "During the spring and fall a considerable effort is put into waterfowl hunting....In spite of intensive waterfowl hunting, the actual volume of meat is miniscule compared to that of caribou or sea mammals". The importance of harvesting birds may be reflected more accurately in the fact that, despite low overall harvest amounts, an average of 56 percent of the households participated in successful bird harvests each year (Table 15). Additionally, stews made from geese and ducks are a fundamental part of any community feast, along with bowhead whale. In contrast, some species that were harvested in a higher volume of usable pounds than birds, such as walrus and bearded seal, were not essential elements of the celebratory feasts (field observation).

**Figure 31: Harvest Percentages
of Birds
Wainwright, Years One & Two Averaged
(Usable Pounds Harvested)**



Based on 124 Year One and 119 Year Two households, including partial year households.
Two years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

TABLE 15: HARVEST ESTIMATES FOR BIRDS - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1)

RESOURCE	CONVERSION	COMMUNITY TOTALS (3)		AVERAGE POUNDS		PERCENT	PERCENT
	FACTOR (2) Usable Weight Per Resource in pounds	NUMBER HARVESTED	USABLE POUNDS HARVESTED	PER HOUSEHOLD	PER CAPITA	OF TOTAL USABLE POUNDS HARVESTED (3)	OF WAINWRIGHT HOUSEHOLDS HARVESTING RESOURCE (4)
Total Birds	n/a	n/a	6,682	60.83	14.8	2.2%	56%
Total Geese		1,388	5,296	48.97	11.9	1.7%	45%
Goose (non-specified)	4.5	65	290	2.77	0.7	0.1%	6%
White-fronted goose	4.5	669	3,008	27.99	6.8	1.0%	25%
Brant	3.0	634	1,901	17.37	4.2	0.6%	32%
Lesser snow goose	4.5	18	81	0.68	0.2	**	6%
Canada goose	4.5	4	16	0.16	*	**	1%
Total Eiders		828	1,242	10.66	2.6	0.4%	40%
Eider (non-specified)	1.5	170	255	1.68	0.4	0.1%	10%
Common eider	1.5	43	65	0.35	0.1	**	6%
King eider	1.5	458	687	6.58	1.6	0.2%	24%
Spectacled eider	1.5	155	233	2.03	0.5	0.1%	17%
Stellar's eider	1.5	3	4	0.02	*	**	2%
Ptarmigan	0.7	166	116	0.92	0.2	**	14%
Total other birds		17	26	0.26	0.1	**	4%
Duck (non-specified)	1.5	6	9	0.10	*	**	2%
Pintail duck	1.5	9	14	0.11	*	**	3%
Mallard duck	1.5	1	1	0.01	*	**	1%
Oldsquaw	1.5	1	2	0.02	*	**	1%
Arctic loon	3.0	1	2	0.02	*	**	1%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) See Table C-3 for sources of conversion factors.

(3) Community totals and percent of total edible pounds harvested are based on harvest amounts reported by all 124 Year One households and 119 Year Two households for all species.

(4) Per household and per capita means and percent of households harvesting a resource are based only on the 100 core households in the study for the full two years.

* represents less than .1 pound

** represents less than .1 percent

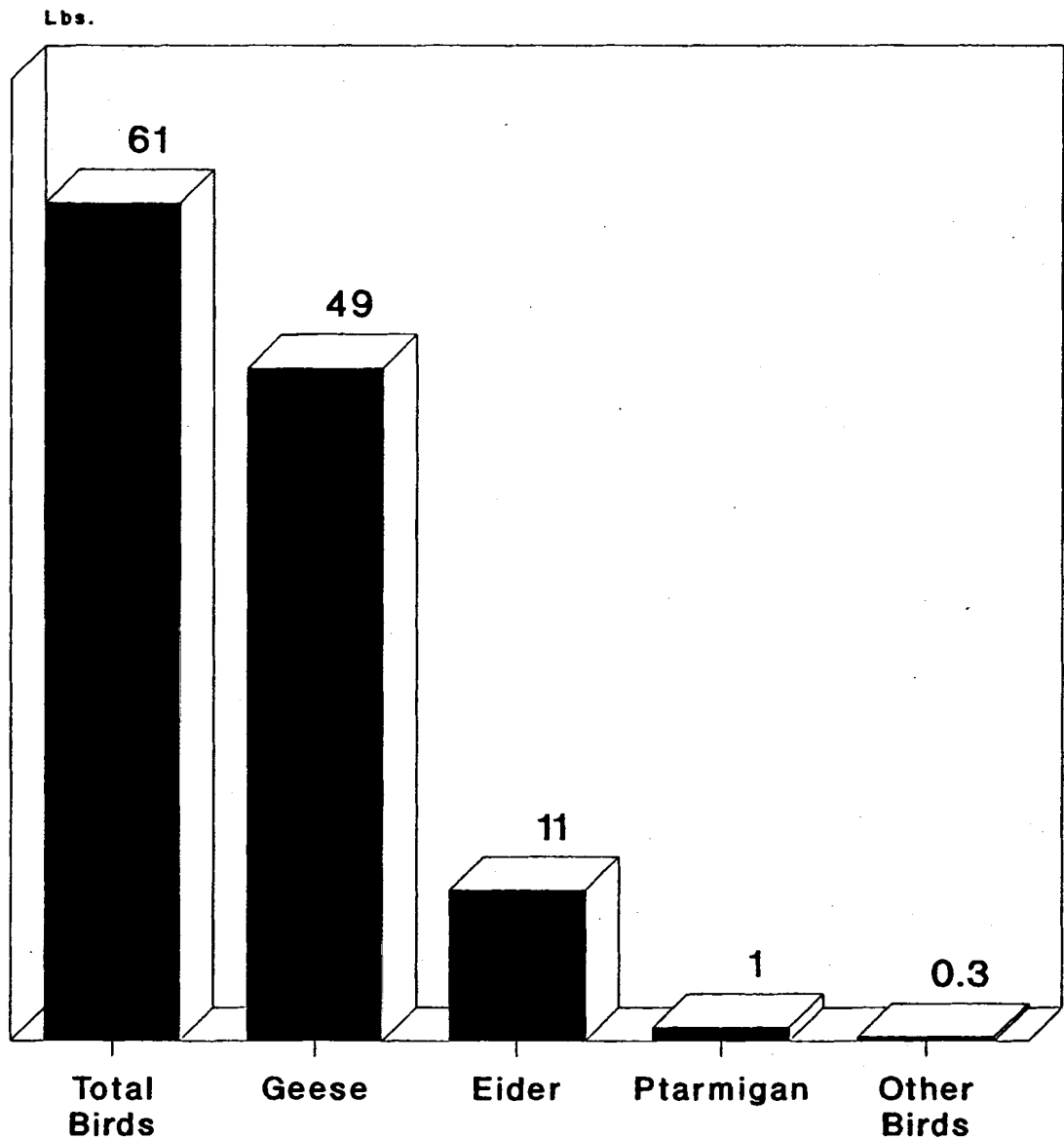
n/a means not applicable

In a brief and busy season, Wainwrighters avail themselves of the migrating waterfowl. White-fronted geese, brants, and eiders (all species) provided the bulk of the waterfowl harvest. Each of these species has a specific migration route and schedule which hunters must know for a successful harvest. Hunters took a good deal of time to learn these locations, and some hunters traveled a great distance to intercept the migrating flocks. The degree of knowledge, time and effort spent on harvesting waterfowl further implied that this harvest was an important subsistence activity, more important than the harvest numbers suggest. Indeed, as described above, waterfowl played a significant part in the Wainwright subsistence pattern. Ducks and geese provided fresh food at a time when preferred foods were lacking, duck and goose soup were served on special occasions, and birds stored in the ice cellar provided a change of diet during the winter. Nelson (1981:33), over a decade after his first observation, pointed out that "waterfowl hunting is a key element in Wainwright subsistence routine. Like fishing it provides a much smaller volume of meat than hunting for large game, but the resource is accorded a high value in cultural and social terms."

Migrating along the open leads, king and common eiders were the first waterfowl to arrive (late April) but usually were not harvested until May when hunters were able to get out on the ice. The returning eiders fly in such concentrations that at times they appear to be large black clouds drifting across the horizon; this migration continues into July. Other ducks and sea birds arrive in early spring as well, such as oldsquaws, surf scoters, murrets and guillemots. These birds are rarely harvested, however (if at all). The white-fronted geese and brants arrive next along with occasional spectacled and Steller's eiders, snow geese, Canada geese, and sandhill cranes. White-fronted geese migrate over land, feeding and resting in marshy areas and tundra ponds. Brants, like eiders, follow the open water or, lacking open water, follow the flat ice just offshore in their flight north. Other bird species sometimes harvested or available in the Wainwright area during the two study years included various species of loons, tundra swans, pintails, mallards, mergansers, scaups, and rock and willow ptarmigan.

The bird harvest is presented in four categories or subgroups of birds: geese; eiders; ptarmigan; and other birds (Figure 32). Geese (which include white-

**Figure 32: Harvest of Birds
Wainwright, Years One & Two Averaged
(Mean Usable Pounds Per Households)**



Based on 100 core households in the study for both years.
Two years of study: 4/1/88 - 3/31/90
Source: Stephen R. Braund & Assoc., 1993

fronted geese, snow geese, Canada geese and brant) accounted for the majority of the birds harvested by weight, representing 80 percent of the total bird harvest. The two major species of geese were white-fronted geese and brant.

White-fronted geese and brant generally were hunted in different habitats and at different times, although some overlap did occur. White-fronted geese were usually harvested upriver in mid-May just before the rivers broke up. People who did not participate in whaling went inland to hunt geese, while many of the whalers would hurry inland to hunt geese immediately after whaling if breakup had not already ensued. Sometimes, as in Year Two when ice conditions halted whaling for a few days or more, whalers would make brief trips inland to hunt geese. Inland geese hunting was dependent upon the ice and river conditions, but generally lasted from one to three weeks and usually provided families with their total white-fronted geese harvest for the year. When the rivers broke up, hunters headed home to Wainwright. An average of 669 white-fronted geese were harvested per year, or 3,008 usable pounds with 25 percent of the households successfully harvesting this bird (Table 15). Incidental to the inland white-fronted geese harvest, people also obtained a few snow geese and an occasional Canada goose.

The brant harvest, on the other hand, occurred in May through mid-July (during their northward migration) and in August and September when the brants returned south. After whaling, hunters traveled by snowmachine, by ATV, or by foot down the coast from Wainwright to favored spots between Wainwright and Mitliktavik (about five miles south of Kilimantavi) to hunt brants (and eiders). After the lagoon broke up, people would load their snowmachines or three- or four-wheelers into their boats, ferry them across the lagoon, and continue south on land by snowmachine or ATV. Next, when the ice along the coast broke up, people could then travel down the coast by boat to brant hunting locations. Brant hunting during the fall migration took place at Thomas Point (at the mouth of the Kuk Lagoon) and around the mouth of the Sinararuk River (the small inlet shown on Map 1 between Wainwright and Ataniq). The prime fall brant hunting area, however was by the mouth of the Avak River (near Icy Cape) where brants could be found feeding in large flocks in the Kasegaluk Lagoon. People who traveled there in the fall to hunt brants usually were very successful. However, several residents explained that once the brants had been feeding on

the marine vegetation for several days, their flesh tasted "stinky." Therefore, some people limited their lagoon harvesting to within the first few days after the birds arrived at the lagoon. Wainwright hunters got an average of 634 brants annually for a total of 1,901 pounds each year (Table 15). Despite lower harvest totals for brant than for white-fronted geese, more households participated in successful brant harvests: 32 percent on average. Higher participation in successful brant harvests is related to access; the brants migrate right in front of Wainwright, whereas hunters usually have to travel inland to intercept white-fronted geese. The average household harvested 49 pounds of geese each year, consisting of 28 pounds of white-fronted geese and 17 pounds of brant, and another four pounds of snow geese, Canada geese and non-specified geese combined.

Eiders were the second largest subgroup of birds harvested, constituting 19 percent of the average annual bird harvest (Figure 31). All of the eider species - king, spectacled, common, and Steller's eiders - were harvested in Wainwright, in this order of relative importance. Approximately 40 percent of households successfully hunted eiders each year, for an average community total of 828 eiders or 1,242 usable pounds (Table 15). The average household harvest was about 11 pounds. King eiders made up just over half the eider harvest. Wainwright whalers hunted eiders while at whaling camp for these birds migrate along the lead system and constituted a source of fresh meat for whalers. Eiders usually were available even when the lead was closed, a time when other resources were not available. People hunted eiders after whaling, making special trips down the coast to hunt both eiders and brants. Hunters continued to get eiders well into the summer boating season but hunting birds at this time was secondary to marine mammal hunting (walrus and bearded seals).

Wainwright residents harvested an average of 166 ptarmigan each year, yielding 116 pounds of usable meat. This harvest was the third highest among the bird categories, yet constituted just two percent of the total bird harvest. Averaged across community households, ptarmigan provided about one pound per household. Ptarmigan were harvested mainly when the opportunity arose, such as while a person was upriver at camp or out hunting other animals. One could usually find ptarmigan just behind town during the winter. People typically hunted these birds when fresh meat was desired. Also, children frequently

hunted ptarmigan. About 15 percent of the Wainwright households reported getting ptarmigan each year. However, this species was easily forgotten during harvest discussions if the field coordinator did not specifically ask about ptarmigan.

Other birds that Wainwright residents harvested in Year One or Year Two included several duck species (pintail, mallard, oldsquaw, and non-specified) and an arctic loon. These birds were harvested incidentally and the total harvest of other birds averaged 26 usable pounds per year, less than one percent of the total bird harvest.

SEASONAL BIRD HARVEST PATTERNS: TWO YEAR AVERAGES

Tables 16 and 17 show bird harvest data by species and by month, and Figure 33 graphs the pounds per month for each category of birds. As these tables and the graph show, bird harvests took place in a concentrated period from April through September, with occasional ptarmigan harvests occurring through the winter months. On average, 50 percent of the bird harvests occurred in just one month: May. May and June harvests combined constituted 77 percent of the total annual bird harvest. The reason this harvest was concentrated into such a brief period is due mainly to migration and nesting patterns. The spring northward migration tends to follow specific routes each year and the birds concentrate along these flyways. Access for hunters is most opportune during spring migration. Once the birds nest, hunters do not pursue the birds. Finally, on the southward fall migration, hunters may attempt to hunt birds but the flight generally is less concentrated and therefore is not as productive as in the spring.

As described previously, the migratory waterfowl begin to return to the Wainwright area in April on their way to their summer nesting grounds. Geese harvests, shown in Figure 31 as constituting 80 percent of the total bird harvest, were harvested predominantly in May. This high peak was due mainly to white-fronted geese, 77 percent of which were harvested in May. White-fronted geese harvests dropped off rapidly to 18 percent taken in June, and the remaining two and three percent taken in July and August respectively. This harvest was so concentrated into one month because of the traditional method of

TABLE 16: BIRD HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Pounds of Usable Resource Product)

SPECIES	TOTALS											
	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Total Geese	59	2,933	1,056	147	699	404	0	0	0	0	0	0
White-fronted goose	0	2,324	529	63	93	0	0	0	0	0	0	0
Brant	0	363	467	62	606	404	0	0	0	0	0	0
Goose (non-specified)	59	225	7	0	0	0	0	0	0	0	0	0
Lesser snow goose	0	20	38	23	0	0	0	0	0	0	0	0
Canada goose	0	0	16	0	0	0	0	0	0	0	0	0
Total Eiders	0	349	708	180	0	5	0	0	0	0	0	0
Eider (non-specified)	0	26	228	2	0	0	0	0	0	0	0	0
Common eider	0	11	53	1	0	0	0	0	0	0	0	0
King eider	0	302	227	152	0	5	0	0	0	0	0	0
Spectacled eider	0	11	197	25	0	0	0	0	0	0	0	0
Stellar's eider	0	0	3	1	0	0	0	0	0	0	0	0
Ptarmigan	10	70	3	0	8	1	5	1	2	6	2	9
Total Other Birds	0	12	13	2	0	0	0	0	0	0	0	0
Pintail	0	8	5	0	0	0	0	0	0	0	0	0
Duck (non-specified)	0	3	6	0	0	0	0	0	0	0	0	0
Mallard	0	1	0	0	0	0	0	0	0	0	0	0
Oldsquaw	0	0	0	2	0	0	0	0	0	0	0	0
Arctic loon	0	0	2	0	0	0	0	0	0	0	0	0
All Bird Species	69	3,363	1,781	329	707	410	5	1	2	6	2	9

(continued on next page)

TABLE 16, CONTINUED: BIRD HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Pounds of Usable Resource Product)

SPECIES	PERCENTS											
	April	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March
Total Geese	1%	55%	20%	3%	13%	8%	0%	0%	0%	0%	0%	0% = 100%
White-fronted goose	0%	77%	18%	2%	3%	0%	0%	0%	0%	0%	0%	0% = 100%
Brant	0%	19%	25%	3%	32%	21%	0%	0%	0%	0%	0%	0% = 100%
Goose (non-specified)	20%	78%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Lesser snow goose	0%	25%	47%	28%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Canada goose	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Total Eiders	0%	28%	57%	14%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Eider (non-specified)	0%	10%	89%	1%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Common eider	0%	16%	83%	1%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
King eider	0%	44%	33%	22%	0%	1%	0%	0%	0%	0%	0%	0% = 100%
Spectacled eider	0%	5%	85%	11%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Stellar's eider	0%	0%	80%	20%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Ptarmigan	9%	60%	2%	0%	7%	1%	4%	1%	2%	5%	2%	8% = 100%
Total Other Birds	0%	46%	49%	6%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Pintail	0%	61%	39%	0%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Duck (non-specified)	0%	33%	67%	0%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Mallard	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Oldsquaw	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
Arctic loon	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0% = 100%
All Bird Species	1%	50%	27%	5%	11%	6%	0%	0%	0%	0%	0%	0% = 100%

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) Based on 124 Year One and 119 Year Two households, including partial year households.

Source: Stephen R. Braund & Associates, 1993

TABLE 17: BIRD HARVEST BY SPECIES AND MONTH - WAINWRIGHT, YEARS ONE & TWO AVERAGED (1,2)
(Number Harvested)

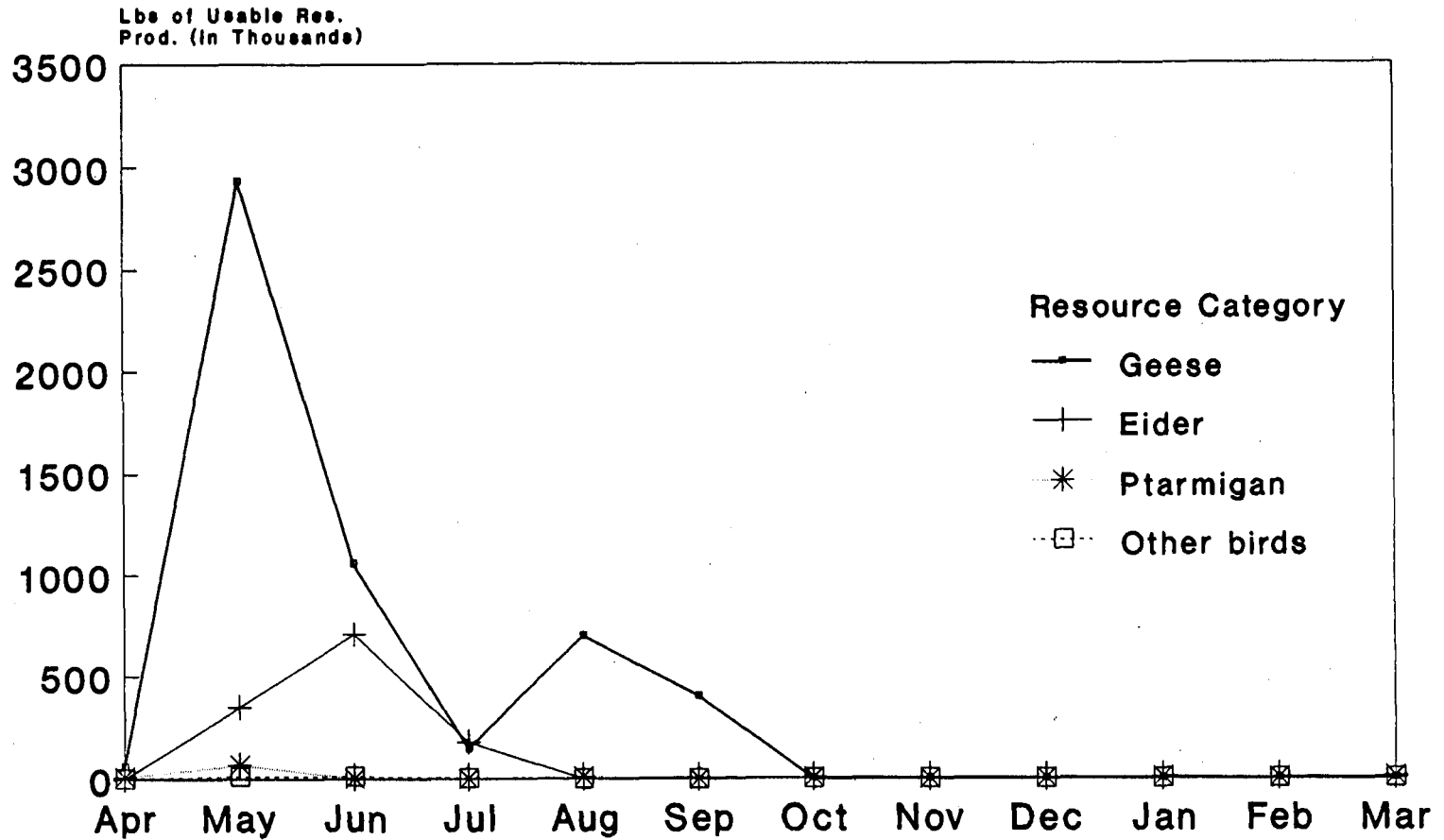
SPECIES	April	May	June	July	August	Sapt.	October	Nov.	Dec.	Jan.	Feb.	March
Total Geese	13	692	287	40	223	135	0	0	0	0	0	0
White-fronted goose	0	517	118	14	21	0	0	0	0	0	0	0
Brant	0	121	156	21	202	135	0	0	0	0	0	0
Goose (non-specified)	13	50	2	0	0	0	0	0	0	0	0	0
Lesser snow goose	0	5	9	5	0	0	0	0	0	0	0	0
Canada goose	0	0	4	0	0	0	0	0	0	0	0	0
Total Eiders	0	233	472	120	0	4	0	0	0	0	0	0
Eider (non-specified)	0	17	152	1	0	0	0	0	0	0	0	0
Common eider	0	7	36	1	0	0	0	0	0	0	0	0
King eider	0	202	152	102	0	4	0	0	0	0	0	0
Spectacled eider	0	7	132	17	0	0	0	0	0	0	0	0
Stellar's eider	0	0	2	1	0	0	0	0	0	0	0	0
Ptarmigan	15	100	4	0	12	2	7	2	3	8	3	13
Total Other Birds	0	8	8	1	0	0	0	0	0	0	0	0
Pintail	0	6	4	0	0	0	0	0	0	0	0	0
Duck (non-specified)	0	2	4	0	0	0	0	0	0	0	0	0
Mallard	0	1	0	0	0	0	0	0	0	0	0	0
Oldsquaw	0	0	0	1	0	0	0	0	0	0	0	0
Arctic loon	0	0	1	0	0	0	0	0	0	0	0	0

(1) Two years of study: April 1, 1988 - March 31, 1990.

(2) Based on 124 Year One and 119 Year Two households, including partial year households.

Source: Stephen R. Braund & Associates, 1993

**Figure 33: Monthly Harvest
of Birds
Wainwright, Years One & Two Averaged**



Based on 124 Year One and 119 Year Two households, including partial year households.
 Two years of study: 4/1/88 - 3/31/90
 Source: Stephen R. Braund & Assoc., 1993

hunting white-fronted geese. Since these birds migrate over land, Wainwright hunters have for generations made a special spring trip inland to traditional geese hunting camps or cabins for one to three weeks (depending on snow and river ice conditions) of intensive hunting. Hunters went inland by snowmachine and returned to Wainwright before spring breakup made snowmachine travel impossible. Some whalers made their geese hunting trip during a time when the ice conditions temporarily stopped whaling activity. Findings from the two study years indicate that this single effort resulted in a substantial majority of all the year's bird harvests, and virtually the entire white-fronted geese harvests for the year. This hunt is represented in Figure 33 by the large spike in the graphed geese harvest.

The timing of the brant harvest followed a different pattern. Brant harvests began in late May, when an average of 19 percent of the year's brant were taken, increased slightly in June to 25 percent, and dropped off to just three percent in July. The peak month for brants in terms of numbers harvested was August, when 32 percent of the year's supply were taken. (This peak is misleading in that only a few people hunted brants in August and were extremely successful, while more people hunted brants in June with less success per capita.) September harvests brought in 21 percent of the yearly total. Comparing the harvest levels for other birds in August and September (Table 16) shows that brant hunting was virtually the only significant bird harvest extending beyond July. The second spike in the geese harvests depicted in Figure 33 is caused mainly by this fall brant harvest which typically is more concentrated along the coast than the fall migration of other species of birds.

Eider harvests were concentrated into a shorter period than the geese harvests; Wainwright hunters began hunting eiders in May and finished in July. The peak month was June when 57 percent of all eiders typically were taken. The predominant species in the early stages of eider migration was the King eider, with the common and spectacled eiders arriving later; Steller's eiders occurred infrequently. The percentages in Table 16 indicate that the harvest season for king eiders was distributed more evenly across the three months than the other eider species, whose harvests were concentrated more heavily into one particular month. King eider harvests peaked in May (during whaling), with strong harvests shown also for June and July. In contrast, all of the other eider

species peaked in June when 80 percent or more of the year's harvest of each species was taken.

Wainwright residents harvested ptarmigan year-round. This tundra bird is not a migratory species, and therefore is found around Wainwright and farther inland all year. July, when the birds nest, was the only month in which ptarmigan were not harvested in either year. Residents harvested an average of 15 or less ptarmigan every month except May, when the harvest for the community was 100 birds. One reason for the large increase in May was that flocks of ptarmigan were close to the community and people went to harvest them near the snow fences. Another reason for much higher harvests in May was that the activity occurred in association with the spring white-fronted geese harvests, described above, that took place inland from Wainwright. While people were at their cabins or camps waiting for geese, they hunted ptarmigan. Ptarmigan were also harvested upriver around cabins during the fall and winter. Residents stated that they usually hunted ptarmigan when they desired a change in diet.

As stated previously, the "Other Birds" category consisted entirely of waterfowl. Being migratory, the season in which these few incidental birds were harvested was the three month period from May through July.

BIRD HARVEST LOCATIONS OVER TWO YEARS

Map 16 shows all the bird harvest locations mapped in the course of the two study years, along with the lifetime community use line indicating historic bird hunting areas for a sample of Wainwright hunters. This map shows harvests concentrated heavily along the coast from Point Franklin in the north to south of Icy Cape, just above the mouth of the Utukok River. The offshore harvests extended thirty miles or more from land, well beyond the lifetime use area. Inland harvests were concentrated mainly along the Kuk River system, with isolated locations east of the Kuk and south in the foothills. A few locations also appear high on the Utukok River, and at least one harvest occurred while a Wainwright resident was in Barrow.

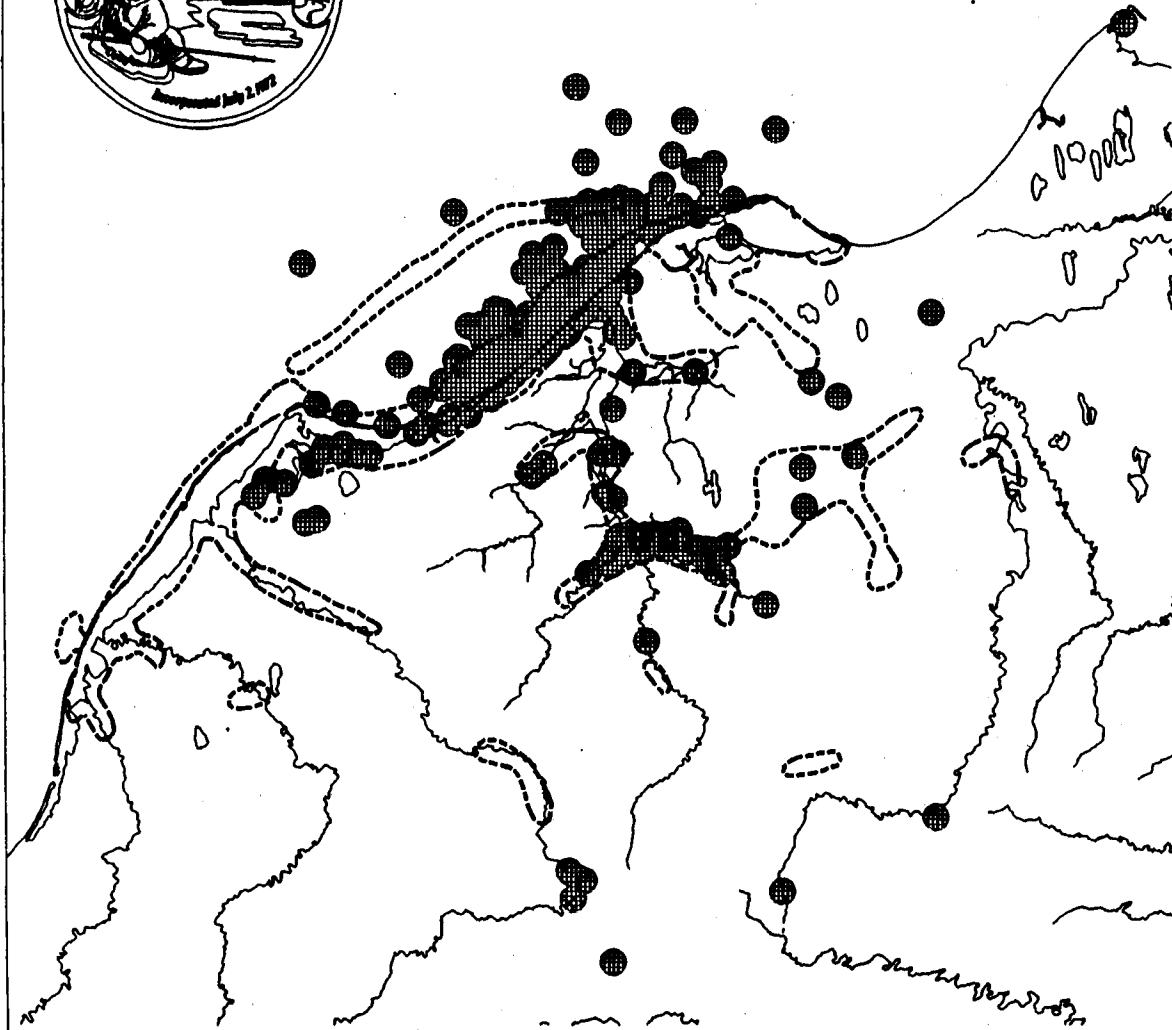
On Map 17, the category of bird harvested at each site is depicted. The great majority of the offshore sites were eider harvests, taken while people were

MAP 16 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT BIRD HARVEST SITES - ALL SPECIES, YEARS ONE AND TWO




This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study. Lifetime-community harvest areas, collected in the form of map biographies from 14 households (Pedersen 1979), are also illustrated.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.



LEGEND INFORMATION

 Lifetime community land use (Pedersen 1979).

 Birds

- Eiders
Common, king, spectacled, Steller's
- Other ducks
Oldsquaw, pintail, mallard
- Geese
White-fronted goose, black brant, lesser snow goose, Canada goose
- Ptarmigan
- Rock willow
- Arctic loon

Map Production: North Slope Borough GIS

Date: April 11, 1991

30 0 30 60 90

MILES










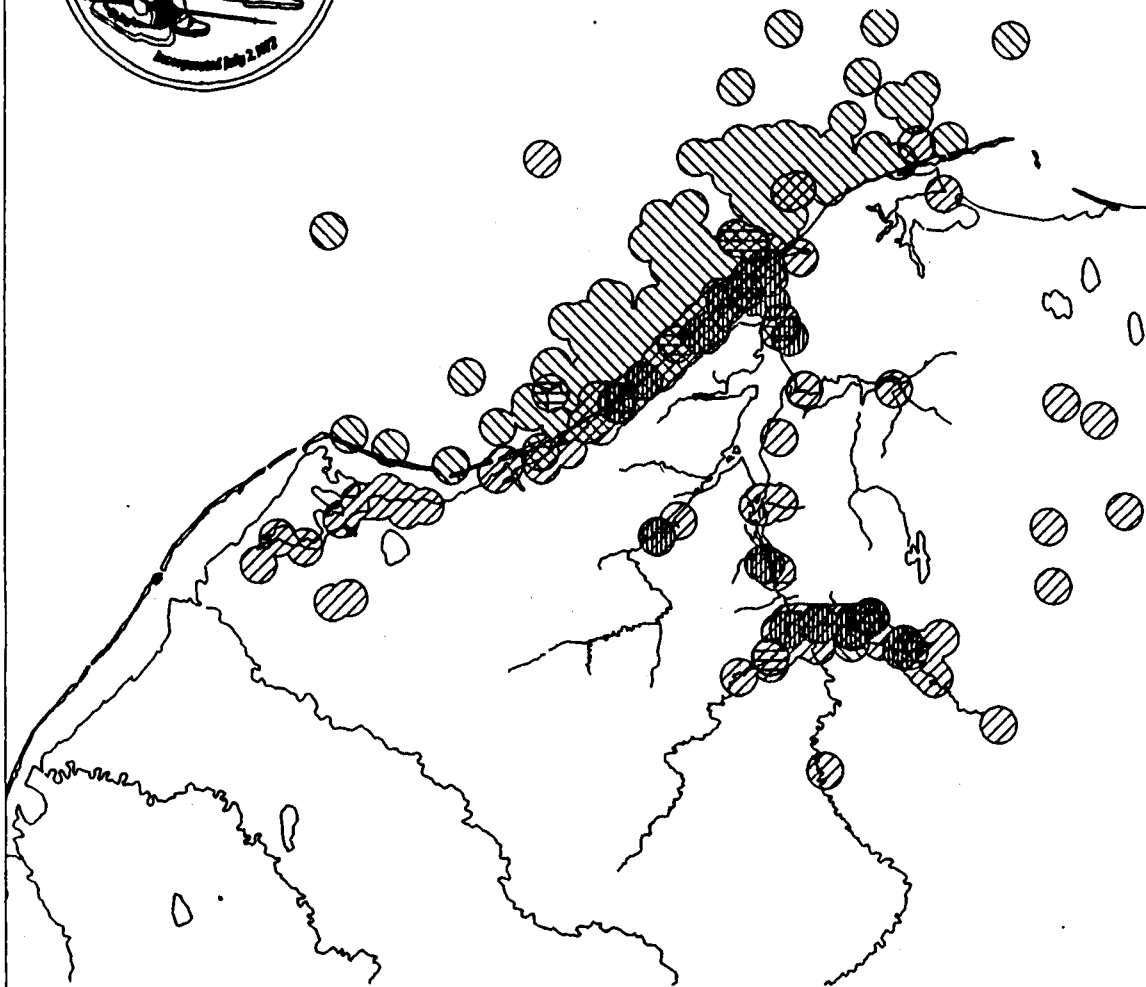
MAP 17 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT BIRD HARVEST SITES BY SPECIES, YEARS ONE AND TWO

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.

LEGEND INFORMATION

-  Arctic loon
-  Eiders
Common, spectled,
king, Stellar's
-  Other ducks
Oldsquaw, pintail, mallard
-  Geese
White-fronted goose, black
brant, lesser snow goose,
Canada goose
-  Ptarmigan
Rock, willow



Map Production: North Slope Borough GIS

Date: April 11, 1991



camped at the ice edge for whaling in the spring, or taken while marine mammal hunting amid the floating ice in the summer. In contrast, almost all the sites shown inland were geese (predominantly white-fronted geese) and ptarmigan. As Map 18 indicates, most of these inland harvests were associated with cabins. The geese harvests shown along the coastline and the bays at Icy Cape were predominantly brant (according to field experience).

Bird harvesting areas have remained consistent through time, and hunters knew when to go to these areas to harvest specific waterfowl. During both study years hunters headed inland along the Kaolak, Ketik, Avak, and Omalik rivers to hunt the northward migration of white-fronted geese. Some hunters have special locations that they used when weather, ice, employment, and travel conditions permitted. When conditions for traveling inland were poor, hunters concentrated their bird harvest on the Kasegaluk Lagoon extending north from the mouth of the Avak River. Here migrating brants, eiders and geese followed the open water (or meltwater on ice) of this lagoon while hunters sat and waited behind blinds. This hunt could be either a day adventure or a two week camping journey depending on the hunter's in-town commitments and the number of birds. If the birds were "not flying," hunters would usually return to Wainwright. Another factor that influenced where people went to hunt birds was the entrance of the Kuk River lagoon where strong currents break up the ocean ice long before the shorefast ice has begun to break up. Hunters sometimes had to travel far out on the solid ice, around the broken ice of the inlet, to reach Wainwright. This inlet claimed a few snowmachines each year as hunters tried to push the window of time for hunting birds south of Wainwright. By late June, the inlet was thawed and could be crossed only by boat. Hunters would load their ATVs on the boat and ferry them to the other side to continue the last part of this northern run of geese.

VARIATION IN BIRD HARVESTS FROM YEAR TO YEAR

Comparison of Year One and Year Two Overall Bird Harvests

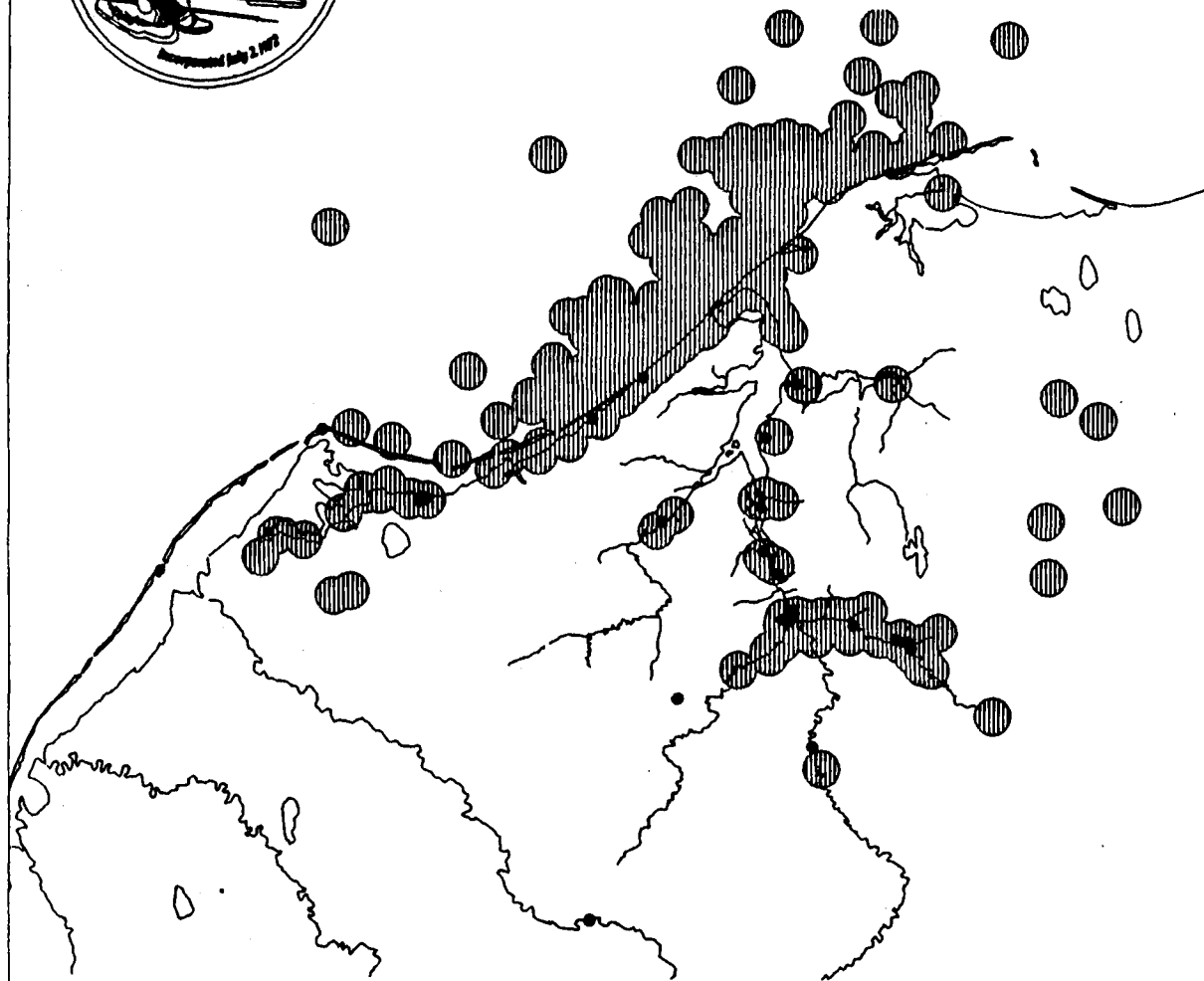
The total bird harvest increased from 6,146 usable pounds in Year One to 7,214 pounds in Year Two, a 17 percent increase (Tables A-12 and B-12). At the household level, this increase was from 53 to 69 pounds per household (Figure



MAP 18
NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT
CABIN AND FIXED CAMP LOCATIONS AND BIRD HARVEST SITES,
YEARS ONE AND TWO

This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study. This map also displays the locations of fixed hunting and fishing camps used by Wainwright residents. The locations of many temporary subsistence camps are not shown.

Source: Contemporary subsistence use information gathered and compiled by Stephen R. Braund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska. Camp and cabin location data compiled by Stephen R. Braund & Associates (1990).



LEGEND INFORMATION



Bird harvest sites



Fixed camps and cabins

Map Production: North Slope Borough GIS

Date: April 11, 1991



MILES



34). Of all the major resource groups, birds increased the least. Because the other resource groups increased by a larger margin, the percentage of the total harvest represented by birds decreased from 2.4 percent in Year One to 2.1 percent in Year Two. The percentage of households harvesting birds increased slightly from 55 to 57 percent.

Geese harvests increased by only five percent overall, from 5,166 pounds to 5,426 pounds. White-fronted geese increased by 20 percent and brant by 23 percent; however, the sharp decline in non-specified geese, snow geese and Canada geese resulted in the relatively low overall increase in geese harvests. Participation in white-fronted geese and brant harvests increased by eight percent each.

In both Years One and Two, residents observed that breakup on the Kuk River system occurred so soon after whaling as to disrupt many people from their usual sequence of traveling inland to hunt geese after whaling - or, if they did go inland, their trip was shortened by early breakup. Additionally, in Year One the weather was so bad during inland geese hunting that successful harvests were limited; according to residents, it was not uncommon for people to spend two weeks inland but only have two or three days when they could hunt during the entire time. In Year Two, ice and weather conditions prevented whaling to such a degree that some people headed inland between attempts at whaling (or gave up on whaling entirely) and thus harvested their geese in that manner, resulting in increased participation and harvests in Year Two compared to Year One.

The brant harvest rose from Year One's 1,701 pounds (567 brants) to Year Two's 2,100 pounds (700 brants). This increase was mainly due to a very successful harvest in August south of Wainwright in the Icy Cape region. Also in Year Two, more people participated in successful harvests. In Year One, 28 percent of the households successfully harvested brants, while in Year Two, 36 percent were successful.

The biggest year-to-year difference in bird harvests can be seen in eiders. Wainwright residents nearly doubled their eider harvest from Year One to Year Two, from 560 to 1,097 birds. The average household harvest increased from

five to 16 pounds per household (Figure 34). Most of this increase was in the harvests of king and spectacled eiders. This change was due mainly to the poor whaling conditions in Year Two. In normal years, whalers indicated that they concentrate more on whaling and hunt eiders occasionally when the conditions limit whaling. Bad whaling conditions prevailed throughout much of the Year Two whaling season; consequently, hunters kept active by harvesting eiders, which during that time were predominantly king eiders. In May of Year Two, at whaling camp, hunters made many large harvests, sometimes getting more than 100 birds in a day. While waiting for whales, eiders would be harvested to feed the whaling crews, to feed family back home and to serve at *Nalukataq*. In Year Two, 816 out of the 1,097 eiders harvested were kings. In Year One, the number of king eiders harvested was 100 out of a total of 560. Spectacled eider harvests increased from 64 in Year One to 246 in Year Two. Corresponding to the sizable increase in eider harvests, and probably a causal factor, was the increase in household participation in eider harvests from 31 percent to 48 percent of Wainwright households. Many people had taken a large amount of time off work to go whaling. However, whaling conditions were such that people did not use as much leave time as anticipated and therefore had more time to spend hunting birds. Another reason for the increased eider harvest was a reporting factor. In Year One when the project was new, people indicated they were hesitant to report out-of-season bird harvests. In Year Two they were more comfortable reporting these harvests. Finally, Year Two was simply a good year for eiders, according to hunters.

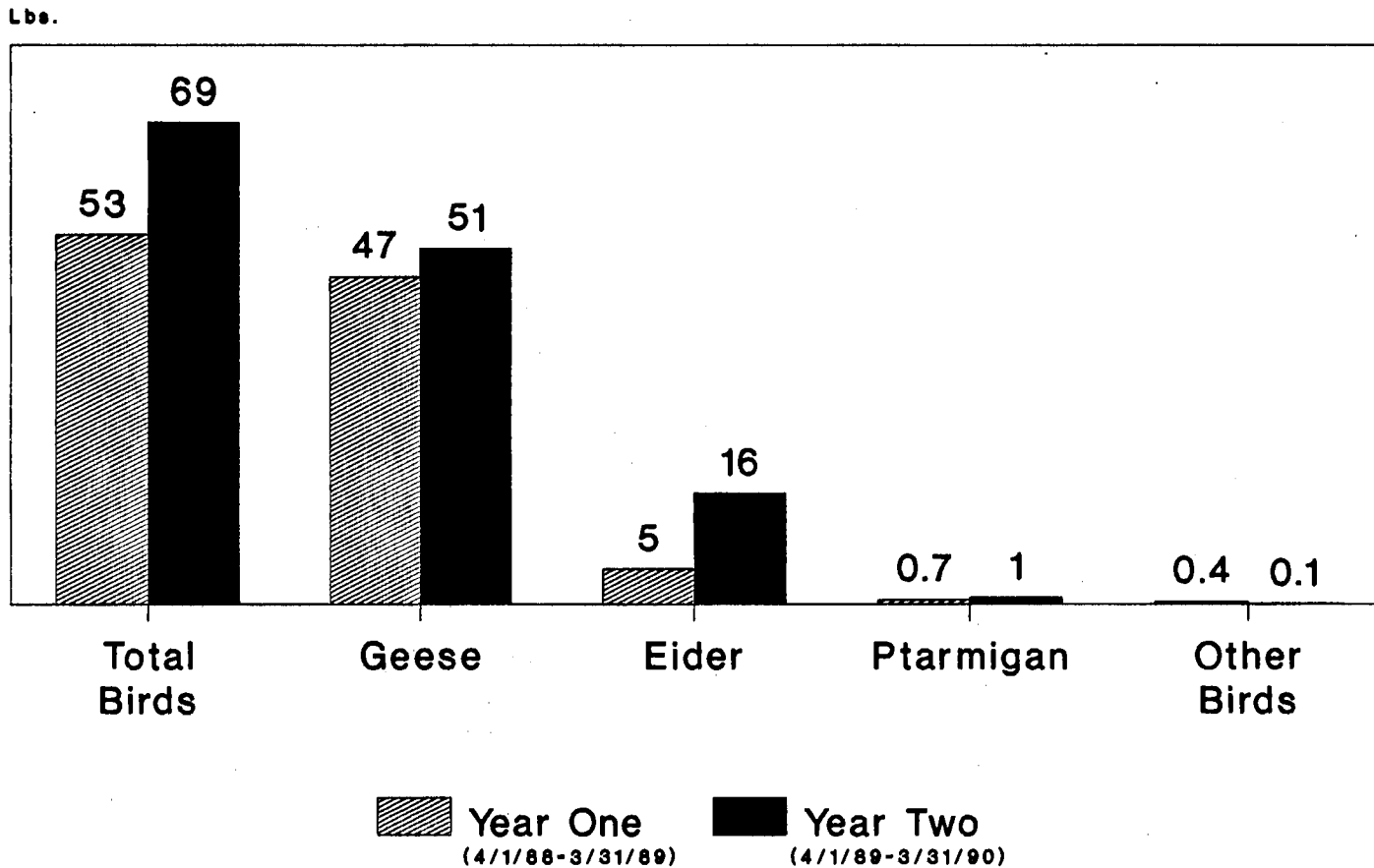
Ptarmigan harvests increased by about 45 percent, from 135 taken in Year One to 196 in Year Two. However, participation increased only one percent, from 14 to 15 percent of Wainwright households.

The incidence of successful harvests of other birds decreased from 31 other birds in Year One to only three recorded in Year Two.

Comparison of Year One and Year Two Bird Harvests by Month

As a comparison of Figures A-15 and B-15 shows, the majority of the Wainwright bird harvests (by weight) occurred each year in the period between April and September. Within that time frame, slight variations in the monthly pattern of

**Figure 34: Harvest of Birds
Wainwright, Years One & Two Averaged
(Mean Usable Pounds Per Household)**



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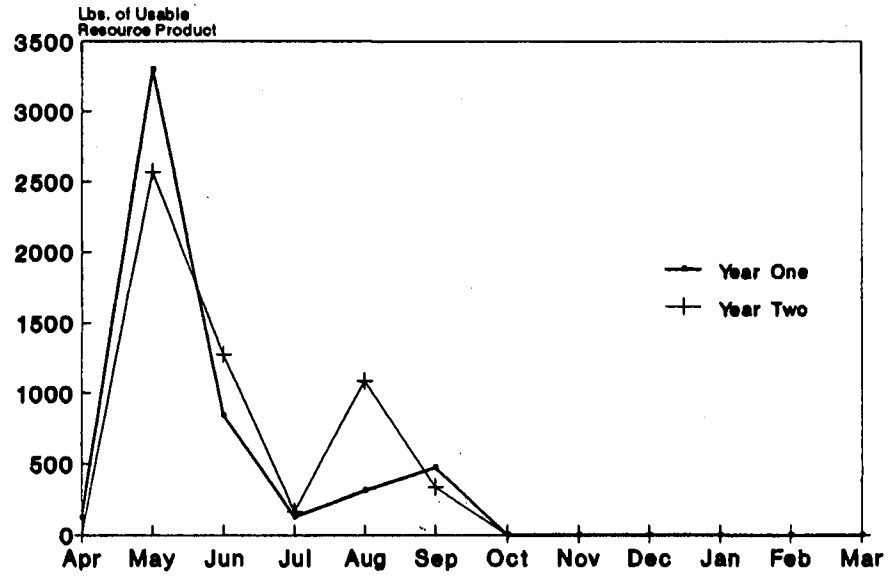
Based on 100 core households in the study the full two years.

Source: Stephen R. Braund & Assoc., 1993

the harvests differentiated Years One and Two. Tables A-13 and B-13 present pounds harvested per month per species, and the percentage breakdown by month of the year's harvest of each species. As the bottom line of those tables indicates, May was the peak month for all bird harvests in both years; however, that peak was higher in Year One with 57 percent of all bird harvests compared to Year Two, when 44 percent of the bird harvests occurred in May. The main difference in overall bird harvests between the two years was that in Year One the harvests were concentrated more intensively into fewer months (May and June) compared to Year Two.

Of the two main geese species, white-fronted and brant, the white-fronted geese harvests followed similar timing in both study years while the brant harvests showed some variation from year to year. May yielded 79 percent and 76 percent of the white-fronted geese harvests in Years One and Two respectively, and 19 and 17 percent in June. Year One brant harvests peaked in late May (39 percent) and declined to 14 percent in June, two percent in July, and then increased to 17 percent in August and a second peak month of 28 percent in September. In contrast, the Year Two brant harvests peaked in August. May yielded only three percent, followed by 33 percent of the year's harvest in June, four percent in July, 44 percent in August, and 16 percent in September. Thus, the Year Two brant harvest got off to a slower start, tapered off earlier, and peaked much later than in Year One. The later peak (August) in Year Two was due to a small number of very successful hunters, as discussed previously. Thus, the main hunt (in terms of participation) was in June even though the most birds were harvested in August (field observation). People perceived that brants, over the long term, have been decreasing in abundance. Although Year Two harvests were reported higher than Year One, several people commented that Year Two was a bad year for brants and that there were "hardly any." Likely these people were ones who hunted in June, rather than the few who were very successful in August. Figure 35 compares the Year One geese harvests by month to the same data for Year Two. The spring harvests were very similar. However, Year Two's high harvests in August and September were unique; virtually no geese harvests occurred during those months in Year One. This high Year Two fall harvest was due to a few hunters who harvested brants intensively and successfully at Kasegaluk Lagoon.

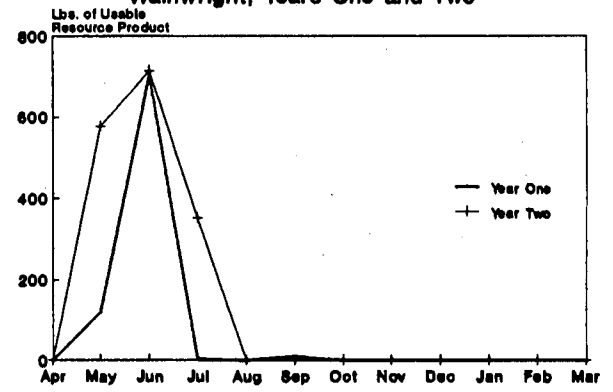
**Figure 35: Comparison of Monthly Geese Harvests
Wainwright, Years One and Two**



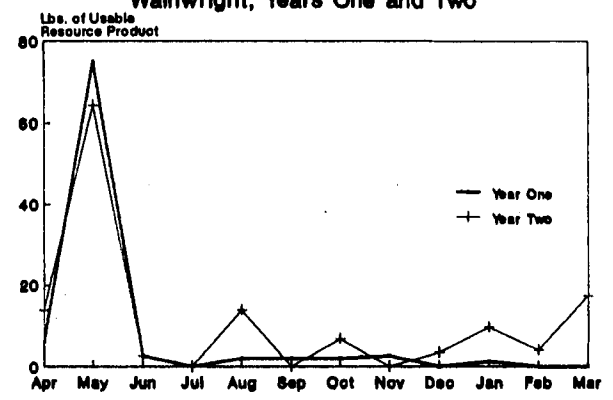
Based on 124 Year One and 119 Year Two households, including partial year households.

Stephen R. Braund & Associates, 1993

**Figure 36: Comparison of Monthly Elder Harvests
Wainwright, Years One and Two**



**Figure 37: Comparison of Monthly Ptarmigan Harvests
Wainwright, Years One and Two**



Eider harvests in Year One were concentrated heavily in the month of June, with 84 percent of all eiders harvested that month. Another 14 percent were taken in May. These two months constituted virtually the entire eider season in Year One (Figure 36). In contrast, the Year Two season for eiders was distributed more evenly across a three month period, with 35 percent taken in May, 43 percent in June, and 22 percent in July. The majority of the Year Two July eider harvest occurred in the first two weeks in July in association with intensive walrus hunting. When the ice left and marine mammal hunting virtually ceased, eider hunting also came to a halt.

As mentioned previously, ptarmigan are the only non-migratory subsistence bird species in the Wainwright area and are thus available virtually all year long. Ptarmigan were harvested in eight months of the year in Year One and in nine months in Year Two. The peak month was May in both years (Figure 37) due to the fact that most of the harvests occurred, as mentioned before, when people went inland to hunt geese. While waiting for geese, they often hunted ptarmigan. Another similarity between the two years of ptarmigan harvests was that none were reported harvested in July of either year. July was a low month for all bird harvests because this is the month when the birds nest and raise their young, and hunters tended to leave them alone at that time.

Comparison of Year One and Year Two Bird Harvest Locations

Although the main bird harvest areas remained generally the same in Years One and Two, the geographic extent of bird harvests was broader in Year Two (Maps A-12 and B-12). Year Two harvests ranged much farther offshore and were concentrated more heavily in the area just east of Icy Cape compared to Year One sites. To the south (inland), Year Two bird harvests also extended farther than in Year One.

Eider harvests occurred much farther from shore in Year Two than they did in Year One (Maps A-13 and B-13). One reason for this difference was that the ocean lead during whaling was farther offshore in Year Two compared to Year One. Additionally, hunters went farther offshore to harvest walrus, and during these trips they also harvested eiders.

The inland geese harvest area (predominantly white-fronted geese) was remarkably similar for the two years. Such similarity was expected since this activity was a traditional spring event that particular families and individuals did year after year and which was based typically around cabins and traditional campsites. The main strip of coastline from Wainwright down south to Mitliktavik (just south of Kilimantavi) was used consistently and successfully during the two study years and was the location of one of the prime harvesting events of the year. The bird migrations along this southern coastline were so consistent that Wainwright residents returned to this area each year where they could count on harvesting eiders, brants and other geese. This activity was comparable to whaling in that hunters returned to set up camps in the same locations each year along an unchanging migratory path.

Summary

In summary, Wainwright residents harvested an average of 6,682 usable pounds of birds during the two study years, accounting for two percent of the total Wainwright subsistence harvest. Yet these relatively low harvest numbers fail to convey the high cultural value placed on birds as an important subsistence food. White-fronted geese was the species harvested in greatest quantity, followed by brants, the various eider species (combined), ptarmigan, and other birds. From Year One to Year Two, bird harvests increased by 17 percent, the smallest year-to-year increase of all the major resource groups. Of the bird species, eiders increased the most, nearly doubling due to a poor whaling season in Year Two that allowed hunters to concentrate more heavily on eiders than usual. Similarly, poor whaling also provided substantial breaks during which some hunters traveled inland to hunt white-fronted geese or down the coast to hunt brants and eiders.

Bird harvests generally began in late April or May with the eiders' return. During May and June, eiders were harvested both at whaling camps and in front of the village. Meanwhile, some families went inland to hunt white-fronted geese from their cabins and camps. Whalers also went inland when weather kept them off the ice and/or immediately following whaling, if snow conditions permitted travel inland. In early June, hunters began to travel down the coast for brants, eiders and geese. They were joined later when whaling crews

returned, some of whom traveled south along the coast to hunt birds. They were also joined by white-fronted geese harvesters who were forced out of the interior by flooding. Camps were located every few miles along the coast south of Wainwright, usually on the points of land projecting into the lagoons. July was a more opportunistic month for harvesting birds, with occasional eiders and brants harvested by boaters out hunting for walrus and seals. In August and September, brants passed by Wainwright as they migrated south and many were harvested, especially in the Icy Cape region where they concentrated to feed on the windrows of seaweed accumulated on the shores. Finally, ptarmigan were hunted all year long, with the heaviest harvests occurring during spring geese hunting inland.

OTHER RESOURCES

Other resources that residents reported harvesting included berries, coal and water in its various forms (e.g., water, ice and snow). These resources were least likely to be recalled of all harvests because the majority of Wainwright subsistence activity revolved around the harvest of various animal species, and consequently respondents and the field coordinator focused mainly on the animal harvests. Hence, it is likely that the harvest amounts for coal, water and berries were underreported during this study, and the complete absence of other resources (such as bird eggs) may be a function of underreporting as well.

Berries

No berries were reported harvested in Year One; residents indicated that 1988 was a very bad season for berries. In Year Two, in contrast, many Wainwright residents were pleasantly surprised by the abundant salmonberry season. Rain fell all summer in the Wainwright area. In August, the tundra behind the inland cabins turned orange from the large salmonberries reaching ripeness. People of all ages spent many hours on the wet tundra with bags and buckets collecting gallons of these prized berries. Berries were collected and stored, or eaten at once when arriving home from caribou hunting. Other berries were harvested as well, such as crowberries, blueberries, and cranberries. These berries were rarely reported, however, even though every hunter, at one time or

another, harvested a handful while hunting or butchering caribou. Mainly salmonberries were reported because people preferred them and therefore focused more heavily on them both while harvesting and reporting. In Year Two, a total of 484 quarts of berries were reported harvested, averaging just over a gallon per household. Over two years, berry harvests averaged 242 quarts per year for the community, or two quarts per household. Twenty-six percent of the households reported gathering berries in Year Two. As Map 19 shows, berry harvests occurred up the Kuk River system, where most late summer subsistence activity took place. Two harvest sites are also shown to the north by Ataniq and along the Kugrua River.

Vegetation such as sourdock, wild teas and grasses were harvested but never reported due to the field coordinator forgetting to ask about them specifically. However, the harvest of such greens generally was very minor and infrequent.

Coal

Three inactive coal mines are situated within 15 miles of Wainwright up the Kuk River (Map 19). River access to the sites enabled residents to get coal by boat during the summer as well as by snowmachine in the winter. People also collected coal along the shores of the Kuk River where it washed up after rough waters battered the exposed coal seams. In Year One, five percent of the households reported getting a total of 172 sacks of coal. Collection of coal in Year Two dropped significantly since the Point Lay coal project delivered a large supply of coal for the community to use, free of charge. Residents reported collecting only 20 sacks of coal in Year Two. Some people still collected coal at the old mines and along the shores; however, most of the coal collected in Year Two was taken to upriver cabins to be burned there. Due to the large quantity of Point Lay coal available right in town, the field coordinator was not as thorough in Year Two as in Year One in asking about coal harvests.

Water

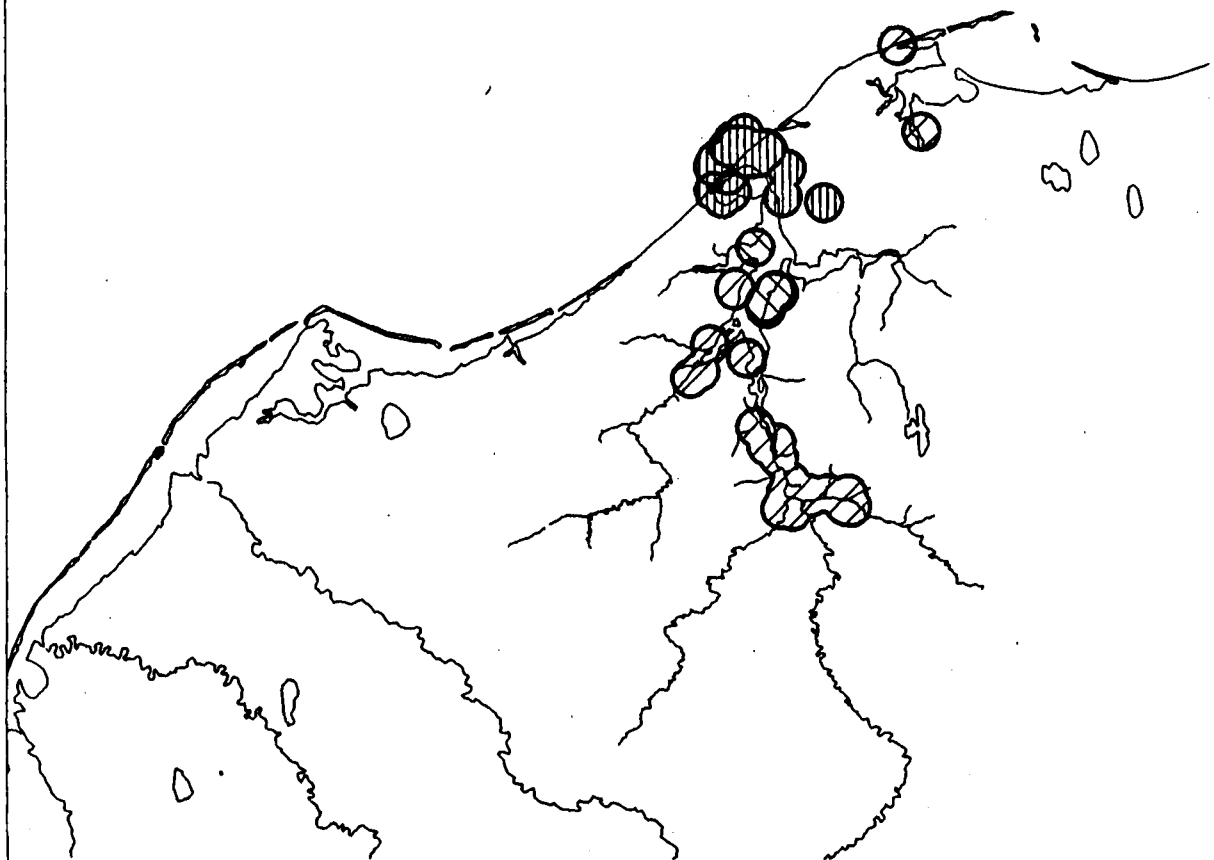
Fresh water was collected by almost all households. Based on field observation, the majority of the households collected fresh water in the form of lake

MAP 19 NORTH SLOPE SUBSISTENCE STUDY - WAINWRIGHT COAL, WATER, AND BERRY COLLECTION SITES YEARS ONE AND TWO






This map depicts approximate subsistence harvest sites for the time period April 1, 1988 to March 31, 1990: Years One and Two of the Wainwright North Slope Subsistence Study. Harvest sites shown were used by approximately 124 Wainwright households. All harvest sites are depicted with a 2 mile buffer. Additional areas were used by Wainwright residents not included in the study.

Source: Contemporary subsistence use information gathered and compiled by Stephan R. Braund and Associates (SRB&A) with the assistance of local research assistants hired through the North Slope Borough Mayor's Job Program. SRB&A is under contract to the Minerals Management Service, U.S. Department of Interior, and received assistance in the study from the North Slope Borough Planning and Wildlife Management Departments, Barrow, Alaska.



LEGEND INFORMATION

-  Water
 - Freshwater
 - Freshwater ice
 - Fresh sea ice
-  Coal
-  Berries
 - Cloudberries
 - Crowberries
 - Salmonberries

Map Production: North Slope Borough GIS

Date: April 11, 1991



ice for drinking water. When lake ice was not available, snow was collected, or in the summer, fresh water. However, only 36 percent of households (on average) reported collecting water or ice during the study period. As mentioned above, data for this resource likely was underreported because it was not an animal harvest and not a food product. Residents reported getting 16,831 gallons of water, ice and snow in Year One and 11,650 gallons in Year Two, for an average of 14,241 gallons per year, or 136 gallons per household.

In Year One and part of Year Two, a large supply of glacier ice (aged sea ice from which the salt has leached out) was located near the village and many families took the opportunity to harvest this resource (Map 19). In the winter months of Year Two, however, very little "glacier ice" was available and all of the ice harvests came from the lakes.

Residents indicated that the best time to cut ice was in the fall months (October) when the ice was not too thick. At this time the lake was frozen about a foot deep and was easily cut into six foot long blocks or "cakes" which were then stacked along the lake shore and retrieved all winter long. Later in the winter, the lake ice was much thicker and impossible to saw into blocks; therefore, if people needed ice, they would bring a pick axe and chop chunks from the lake ice which they would transport back to town by sled or snowmachine. A "sled load" was commonly the reporting unit for ice harvests. The field coordinator determined that one sled load consisted of about six cakes of ice, or the equivalent of about 100 gallons of water.

IV. HARVEST LEVEL ANALYSIS

Thus far, this report has presented the Wainwright Year One and Year Two harvest data (averaged) in terms of community totals (by month and for the entire year) and household and per capita means. Preceding data tables have also shown the percentage of Wainwright households participating in the harvest of each species. This section of the report expands upon that statistic as well as the household means in order to look more closely at the distribution of harvest activity across households and to look at selected characteristics of households grouped according to their level of annual harvest.

Based on statistical analysis (rather than field observations), the study team divided the 100 core study households into four categories according to the average total pounds each household harvested in Years One and Two. Using a listing of the amount of pounds harvested by each household, the categories or harvester levels were defined by placing 25 percent of the households in each category. Thus, the first quarter of the households (Harvester Level 1) harvested between zero and 424 pounds. The next quarter harvested 425 to 1,060 pounds, followed by those households that harvested 1,061 to 2,499 pounds and the highest group of households (Harvester Level 4) harvesting 2,500 pounds or more per year. The actual range in total pounds harvested was from zero pounds to one household that harvested over 17,000 pounds. The total pounds per household upon which these breakdowns were based included only usable products and thus excluded furbearers, coal, and water.

The harvest data by harvester level are presented in two tables. Table 18 shows what percentage of the total community harvest of a species was obtained by each harvester level. Table 19 presents the average amount of each species harvested per household within each harvester level. The far right column of Table 19 shows mean harvests per household for the entire community. For most entries, this statistic corresponds to the column entitled "Average Pounds Harvested Per Household" in Tables 3, 6, 9, 12 and 15. These figures do not match for bowhead whale, and consequently for the total marine mammals and total mean household harvest. The calculations for bowhead in Tables 18 and 19 are different than those used in other tables in this report because the former

TABLE 18: PERCENTAGE OF TOTAL POUNDS HARVESTED BY SPECIES AND BY HARVESTER LEVEL, WAINWRIGHT YEARS ONE & TWO AVERAGED /1

SPECIES HARVESTED	HARVESTER	HARVESTER	HARVESTER	HARVESTER	TOTAL
	LEVEL 1 0-424 LBS	LEVEL 2 425-1059 LBS	LEVEL 3 1060-2499 LBS	LEVEL 4 2500++ LBS	
All Species	2.2%	9.0%	19.6%	69.2%	100%
Total Marine Mammals	2.8%	9.5%	17.1%	70.6%	100%
Bowhead	11.7%	26.7%	27.6%	34.0%	100%
Walrus	0.0%	2.7%	11.5%	85.8%	100%
Bearded Seal	0.0%	10.0%	28.0%	62.0%	100%
Polar Bear	0.0%	5.6%	11.1%	83.3%	100%
Total Ringed & Spotted Seal	0.0%	8.0%	18.2%	73.8%	100%
Ringed Seal	0.0%	9.1%	18.9%	72.0%	100%
Spotted Seal	0.0%	0.0%	12.5%	87.5%	100%
Beluga Whale	0.0%	0.0%	0.0%	100.0%	100%
Total Terrestrial Mammals /2	0.6%	8.5%	22.8%	67.7%	100%
Caribou	1.1%	8.7%	22.7%	67.6%	100%
Moose	0.0%	0.0%	33.3%	66.7%	100%
Brown Bear	0.0%	0.0%	0.0%	100.0%	100%
Ground Squirrel	0.0%	0.0%	0.0%	100.0%	100%
Total Fish	2.4%	5.8%	27.0%	64.9%	100%
Total Whitefish	*	4.3%	26.9%	68.7%	100%
Whitefish (non-specified)	0.0%	0.0%	0.0%	100.0%	100%
Round Whitefish	0.0%	25.0%	75.0%	0.0%	100%
Least cisco	0.0%	3.6%	25.2%	71.1%	100%
Bering, Arctic cisco	13.5%	0.0%	35.1%	51.4%	100%
Total Other Freshwater Fish	4.6%	6.2%	26.1%	63.1%	100%
Arctic grayling	4.8%	6.2%	26.7%	62.2%	100%
Burbot (Ling cod)	0.0%	4.3%	10.9%	84.8%	100%
Lake trout	0.0%	0.0%	0.0%	100.0%	100%
Total Salmon	0.0%	0.0%	33.6%	66.4%	100%
Salmon (non-specified)	0.0%	0.0%	100.0%	0.0%	100%
Chum (Dog) salmon	0.0%	0.0%	50.7%	49.3%	100%
Pink (Humpback) salmon	0.0%	0.0%	35.4%	64.6%	100%
Silver (Coho) salmon	0.0%	0.0%	5.9%	94.1%	100%
King (Chinook) salmon	0.0%	0.0%	33.3%	66.7%	100%
Total Other Coastal Fish	5.2%	9.2%	26.5%	59.1%	100%
Rainbow smelt	5.5%	9.7%	27.8%	57.0%	100%
Tomcod (Saffron Cod)	0.0%	0.0%	0.0%	100.0%	100%
Sculpin	0.0%	0.0%	45.5%	54.5%	100%
Arctic flounder	0.0%	0.0%	50.0%	50.0%	100%

(Continued next page)

TABLE 18 (continued): PERCENTAGE OF TOTAL POUNDS HARVESTED BY SPECIES AND BY HARVESTER LEVEL, WAINWRIGHT YEARS ONE & TWO AVERAGED

SPECIES HARVESTED	HARVESTER	HARVESTER	HARVESTER	HARVESTER	TOTAL
	LEVEL 1 0-424 LBS	LEVEL 2 425-1059 LBS	LEVEL 3 1060-2499 LBS	LEVEL 4 2500++ LBS	
Total Birds	2.2%	10.3%	22.0%	65.5%	100%
Total Geese	2.2%	10.3%	22.7%	64.9%	100%
White-fronted goose	1.0%	9.6%	25.9%	63.4%	100%
Brant	3.1%	10.6%	20.7%	65.5%	100%
Goose (non-specified)	8.1%	4.1%	8.1%	79.7%	100%
Lesser snow goose	0.0%	40.0%	3.3%	56.7%	100%
Canada goose	0.0%	71.4%	0.0%	28.6%	100%
Total Eiders	2.5%	10.1%	19.3%	68.1%	100%
Eider (non-specified)	0.9%	29.3%	39.8%	30.0%	100%
Common eider	0.0%	6.4%	2.1%	91.5%	100%
King eider	3.1%	5.1%	15.5%	76.3%	100%
Spectacled eider	2.2%	11.1%	18.1%	68.6%	100%
Stellar's eider	0.0%	0.0%	0.0%	100.0%	100%
Ptarmigan	2.3%	5.3%	21.3%	71.1%	100%
Other birds	6.7%	33.3%	16.7%	43.3%	100%

* = Less than .1 percent.

1. The percentages for bowhead in this table are based upon the number of crew member or village shares each household reported receiving, rather than on the entire usable whale weight divided by the number of Wainwright households, as was done elsewhere in this report.
2. Furbearers were not included in the calculation of harvester levels or amounts harvested per harvester level. They are not harvested for food and therefore are not measured in pounds, the unit upon which this analysis is based.

Source: Stephen R. Braund & Associates, 1993

TABLE 19: MEAN USABLE POUNDS HARVESTED PER HOUSEHOLD BY
HARVESTER LEVEL, WAINWRIGHT YEARS ONE & TWO AVERAGED /1

SPECIES HARVESTED	HARVESTER	HARVESTER	HARVESTER	HARVESTER	MEAN LBS.
	LEVEL 1 0-424 LBS (LBS.)	LEVEL 2 425-1059 LBS (LBS.)	LEVEL 3 1060-2499 LBS (LBS.)	LEVEL 4 2500++ LBS (LBS.)	PER HOUSE- HOLD FOR ENTIRE COMMUNITY
All Species	182.7	737.9	1,611.0	5,682.3	2,053.5
Total Marine Mammals	139.0	463.6	838.1	3,457.3	1,224.5
Bowhead	139.0	315.8	327.1	402.2	296.0
Walrus	0.0	77.2	326.6	2,444.9	712.2
Bearded Seal	0.0	51.0	142.8	316.7	127.6
Polar Bear	0.0	9.9	19.8	148.8	44.6
Total Ringed & Spotted Seal	0.0	9.7	21.8	88.6	30.0
Ringed Seal	0.0	9.7	20.2	76.9	26.7
Spotted Seal	0.0	0.0	1.7	11.8	3.4
Beluga Whale	0.0	0.0	0.0	56.0	14.0
Total Terrestrial Mammals /2	26.9	221.1	589.3	1,753.0	647.6
Caribou	26.9	221.1	579.3	1,726.9	638.6
Moose	0.0	0.0	10.0	20.0	7.5
Brown Bear	0.0	0.0	0.0	6.0	1.5
Ground Squirrel	0.0	0.0	0.0	*	*
Total Fish	11.4	28.2	130.1	313.0	120.6
Total Whitefish	0.1	10.2	63.1	160.8	58.5
Whitefish (non-specified)	0.0	0.0	0.0	0.2	*
Round Whitefish	0.0	2.0	6.0	0.0	2.0
Least cisco	0.0	8.2	56.8	160.2	56.3
Bering, Arctic cisco	0.1	0.0	0.3	0.4	0.2
Total Other Freshwater Fish	4.5	6.0	25.3	61.2	24.3
Arctic grayling	4.5	5.8	24.9	58.0	23.3
Burbot (Ling cod)	0.0	0.2	0.4	3.1	0.9
Lake trout	0.0	0.0	0.0	0.1	*
Total Salmon	0.0	0.0	7.1	14.1	5.3
Salmon (non-specified)	0.0	0.0	0.2	0.0	0.1
Chum (Dog) salmon	0.0	0.0	4.4	4.3	2.2
Pink (Humpback) salmon	0.0	0.0	1.1	1.9	0.7
Silver (Coho) salmon	0.0	0.0	0.4	5.8	1.5
King (Chinook) salmon	0.0	0.0	1.1	2.2	0.8
Total Other Coastal Fish	6.8	12.0	34.5	76.9	32.5
Rainbow smelt	6.8	12.0	34.4	70.5	30.9
Tomcod (Saffron Cod)	0.0	0.0	0.0	6.3	1.6
Sculpin	0.0	0.0	0.1	0.1	*
Arctic flounder	0.0	0.0	*	*	*

(Continued next page)

TABLE 19, continued: MEAN USABLE POUNDS HARVESTED PER HOUSEHOLD BY HARVESTER LEVEL, WAINWRIGHT YEARS ONE & TWO AVERAGED

SPECIES HARVESTED	HARVESTER	HARVESTER	HARVESTER	HARVESTER	MEAN LBS.
	LEVEL 1 0-424 LBS (LBS.)	LEVEL 2 425-1059 LBS (LBS.)	LEVEL 3 1060-2499 LBS (LBS.)	LEVEL 4 2500++ LBS (LBS.)	PER HOUSE- HOLD FOR ENTIRE COMMUNITY
Total Birds	5.4	25.0	53.6	159.1	60.8
Total Geese	4.2	20.2	44.4	127.1	49.0
White-fronted goose	1.2	10.8	29.0	71.0	28.0
Brant	2.2	7.4	14.4	45.5	17.4
Goose (non-specified)	0.9	0.5	0.9	8.8	2.8
Lesser snow goose	0.0	1.1	0.1	1.5	0.7
Canada goose	0.0	0.5	0.0	0.2	0.2
Total Eiders	1.1	4.3	8.3	29.0	10.7
Eider (non-specified)	0.1	2.0	2.7	2.0	1.7
Common eider	0.0	0.1	*	1.3	0.4
King eider	0.8	1.4	4.1	20.1	6.6
Spectacled eider	0.2	0.9	1.5	5.6	2.0
Stellar's eider	0.0	0.0	0.0	0.1	*
Ptarmigan	0.1	0.2	0.8	2.6	0.9
Other birds	0.1	0.3	0.2	0.4	0.2

* = Less than .1 pounds.

1. The averages for bowhead in this table are based upon the number of crew member or village shares each household reported receiving, rather than on the entire usable whale weight divided by the number of Wainwright households, as was done elsewhere in this report.
2. Furbearers were not included in the calculation of harvester levels or amounts harvested per harvester level. They are not harvested for food and therefore are not measured in pounds, the unit upon which this analysis is based.

Source: Stephen R. Braund & Associates, 1993

reflect the number of crew member or village shares households reported receiving, multiplied by the estimated weight of such shares. In contrast, other tables in this report derive household means for bowhead from the total estimated usable weight from each whale, including all the blubber and shares set aside for community feasts, not just shares received and reported to this project by study households.

Table 18 shows that, in terms of all species combined, Level 4 harvested an average of 69 percent of the total annual community harvest. In other words, one fourth of the households harvested over two thirds of the total pounds harvested. Level 3 harvested about one-fifth of the total amount harvested. Level 2 harvested nine percent and Level 1 harvested less than two percent of the total usable pounds.

When looking at major resource groups, these proportions remain roughly the same. For example, Level 4 harvested between 65 and 71 percent of the total marine mammals, terrestrial mammals, fish and birds. Level 3 harvested 17 to 27 percent of those four resource categories, while Level 2 harvested five to 10 percent and Level 1 harvested between less than one and over two percent of the major resource groups.

In addition to allowing comparisons of harvest level means to the overall mean, Table 19 is also useful for scanning intra-level relationships. By looking down the Harvester Level 1 column, one observes that marine mammals (specifically, bowhead whale) represent the largest share of their entire yearly harvest, followed by terrestrial mammals (caribou), fish (salmon), and birds. While the first two major resource categories are represented by only one species, Level 1 households harvested a few fish species (mainly grayling and rainbow smelt) and a variety of geese and eider species. A similar examination of the columns for each of the other levels reveals an increasing variety of species harvested the higher the harvester level. Table 20 summarizes the number of species harvested by harvester level.

In Year Two of this project, the study team collected data from households on four descriptive socioeconomic characteristics: household size, ethnicity, income, and the number of person-months worked per year. Ninety-nine percent

TABLE 20: NUMBER OF SPECIES HARVESTED BY HARVESTER LEVEL,
WAINWRIGHT YEARS ONE & TWO AVERAGED¹

	HARVESTER LEVEL 1 <u>0-424 LBS.</u>	HARVESTER LEVEL 2 <u>425-1059 LBS.</u>	HARVESTER LEVEL 3 <u>1060-2499 LBS.</u>	HARVESTER LEVEL 4 <u>2500+ LBS.</u>
Marine Mammals	1	5	6	7
Terrestrial Mammals	1	1	2	3
Fish	3	5	13	14
Whitefish	1	2	4	3
Other Freshwater Fish	1	2	2	3
Salmon	0	0	4	4
Other Coastal Fish	1	1	3	4
Birds	5	9	9	12
Geese	2	4	3	4
Eiders	2	3	3	4
Ptarmigan	1	1	1	1
Other Birds	0	1	2	3
TOTAL:	10	20	30	36

1. Harvests recorded as "non-specified" whitefish, salmon, geese, eiders, or ducks were not included in this table.

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of the core study households were Inupiat (wherein "Inupiat" means the head of household or spouse was Inupiat). Because of the lack of diversity, the following discussion does not examine harvester levels with regard to ethnicity but rather focuses instead on household size, income and person-months of employment per year. Tables 21 and 22 present cross-tabulations of these three variables with harvester levels and reflect the two different ways one might want to examine the data. Table 21 presents the data in such a way as to describe the characteristics of each harvester level. For example, this table shows the relative distribution of different household sizes across Level 1, in which eight percent of the Level 1 households are single person households, 44 percent are two to three person households, another 44 percent are four to five person households, and four percent of the Level 1 households consist of six or more persons. In contrast, Table 22 presents the distribution of harvester levels across household sizes. For example, of all the single person households in Wainwright, 20 percent were in Level 1, 40 percent were in Level 2, 30 percent were in Level 3, and 10 percent were in Level 4. Both tables present means for each harvester level and for the entire community.

Continuing with household size, Table 22 indicates that the highest proportion of large households in Wainwright (six people or more), 41 percent, were those households of Level 3, harvesting between 1,060 and 2,499 pounds per year. The majority of four to five person households (33 percent) harvested 2,500 pounds or more per year. Both Level 3 and Level 4 averaged 4.7 persons per household compared to 3.1 and 3.8 in Levels 1 and 2 respectively, and to a community mean household size of 4.1 persons per household. In general, as household size increased, so also did the amount of subsistence foods harvested annually.

The information on person-months of employment was collected by asking households how many people in their household were employed each month over the two study years. The totals for each year were averaged and cross-tabulated with harvester levels. In every harvester level, the majority of households worked one to 12 person months per year (Table 21). None of the Level 1 households (low harvesters) worked 25 person months or more. As Table 22 shows, over half of the unemployed households were also the low harvesters (Level 1). In contrast, two-thirds of the heavily employed households (25 person-months or more) were also the heavy harvesters (Level 4), harvesting

TABLE 21: DESCRIPTIVE CHARACTERISTICS OF HARVESTER LEVELS,
MAINWRIGHT YEARS ONE & TWO AVERAGED (1)

	Harvester Lev 1	Harvester Level 2	Harvester Level 3	Harvester Level 4	Entire Community
Household Size	Under 425 lbs	425-1,059 lbs.	1,060-2,499 lbs	2,500 lbs. & up	
1	8 %	16 %	12 %	4 %	10 %
2,3	44	32	16	20	28
4,5	44	28	36	52	40
6+	4	24	36	24	22
	---	---	---	---	---
	100 %	100 %	100 %	100 %	100 %
Mean household size	3.2	3.8	4.7	4.7	4.1
Total Months Worked By Household Members					
0	28 %	13 %	9 %	4 %	13
1-12	40	71	48	52	53
13-24	32	13	39	28	27
25+	0	4	4	16	6
	---	---	---	---	---
	100 %	100 %	100 %	100 %	100 %
Mean Person-Mos. Worked per Household:	10.3	10.9	13.3	14.1	12.1
Approximate Year Two Household Income					
Under \$4,999	31	17	8	8	16
\$5,000-19,999	9	29	21	24	21
\$20,000-\$39,999	44	42	46	44	44
\$40,000 plus	17	13	25	24	20
	---	---	---	---	---
	100 %	100 %	100 %	100 %	100 %
Approximate Mean Income (Scale: 1 to 10)*	4.6	4.7	5.8	5.6	5.2

* Incomes were reported as a code representing the ranges below; the mean incomes above represent an average of the responses (codes) reported. Based on ranges, the codes cannot be accurately converted to dollars.

*INCOME SCALE: 1 Under \$4,999 5 \$20,000-24,999 8 \$40,000-49,999
2 \$5,000-9,999 6 \$25,000-29,999 9 \$50,000-59,999
3 \$10,000-14,999 7 \$30,000-39,999 10 \$60,000 or more
4 \$15,000-19,999

(1) Based on 100 core study households.

Source: Stephen R. Braund & Associates 1993

TABLE 22: SOCIOECONOMIC CHARACTERISTICS BROKEN DOWN BY HARVESTER LEVEL,
WAINWRIGHT YEARS ONE & TWO AVERAGED (1)

	Harvester Lev 1	Harvester Level 2	Harvester Level 3	Harvester Level 4	Entire Community
Household Size	Under 425 lbs	425-1,059 lbs.	1,060-2,499 lbs	2,500 lbs. & up	
-----	-----	-----	-----	-----	-----
1	20 %	40 %	30 %	10 %	100 %
2,3	39	29	14	18	100
4,5	28	18	23	33	100
6+	5	27	41	27	100
Mean household size	3.2	3.8	4.7	4.7	4.1
Total Months Worked By Household Members					

0	54 %	23 %	15 %	8 %	100 %
1-12	20	33	22	26	100
13-24	30	11	33	26	100
25+	0	17	17	67	100
Mean Person-Mos. Worked per Household:	10.3	10.9	13.3	14.1	12.1
Approximate Year Two Household Income					

Under \$4,999	47 %	27 %	13 %	13 %	100 %
\$5,000-19,999	10	35	25	30	100
\$20,000-\$39,999	24	24	26	26	100
\$40,000 plus	21	16	32	32	100
Approximate Mean Income (Scale: 1 to 10)*	4.6	4.7	5.8	5.6	5.2

* Incomes were reported as a code representing the ranges below; the mean incomes above represent an average of the responses (codes) reported. Based on ranges, the codes cannot be accurately converted to dollars.

*INCOME SCALE: 1 Under \$4,999 5 \$20,000-24,999 8 \$40,000-49,999
2 \$5,000-9,999 6 \$25,000-29,999 9 \$50,000-59,999
3 \$10,000-14,999 7 \$30,000-39,999 10 \$60,000 or more
4 \$15,000-19,999

(1) Based on 100 core study households.

Source: Stephen R. Braund & Associates 1993

2,500 pounds per year or more. Person-months of employment increased with the harvest levels, from an average of 10.3 person-months of work per year in Level 1 to 14.1 person months in Level 4, compared to a community mean of 12.1 person-months of employment per household per year.

Income, reported as a range rather than a specific amount, also increased with the harvest level, generally. Level 3 households showed the highest income, although Level 4 households were nearly as high. Table 21 indicates that in every harvest level (as in the community overall), the largest proportion of households fell in the \$20,000 to \$39,999 range. Table 22 shows that 47 percent of the lowest income households (earning less than \$4,999 per year) were also the low harvesters, Level 1. In contrast, 32 percent of the higher income households were high harvesters (Level 4) and another 32 percent were in Level 3.

The selection of harvester levels imposes an artificial structure on the range of total harvests for Wainwright households, but is useful as a tool for examining certain dynamics. Also interesting is a distribution of individual harvest levels; however, such a table of disaggregated data cannot be presented due to the need to preserve confidentiality. The distribution of individual households' total harvest amounts indicates that only five percent of Wainwright households did not harvest subsistence resources at all in either study year. Thus, 95 percent of Wainwright households harvested something at some point in the two years of study. (This statistic differs from the average percentage of households participating, shown on Table 4 to be 82 percent. The latter figure is an average of the participation levels of the two years, whereas 95 percent represents the two years cumulatively.) The disaggregated distribution also indicates that the highest average annual household harvest was estimated to be 17,367 pounds. Ninety-seven percent of the households harvested less than 10,000 pounds, whereas three percent harvested between 10,000 and 18,000 pounds.

The households that did not report any harvests over the two study years are not easily characterized. One household contained a single mother and her children; another contained a single older person. In two households, the middle-aged Inupiat male heads of household likely did some subsistence

activities on a very limited basis but did not report them. No readily apparent reasons explain their non-participation in subsistence.

The heavy harvesters also cannot be easily characterized. Some of these households were headed by men who were very successful at juggling subsistence and employment and had several offspring who also contributed significantly to their households' harvests. These families stored considerable subsistence food in their ice cellars which they shared with the households of kin and of members of their whaling crews.

In summary, an examination of harvest amounts by harvester level indicates that one fourth of the households harvested over two-thirds of the total pounds harvested per year. The data also show that the variety of species harvested increases with each harvester level, as does the average household size, person months of employment, and income for each harvester level.

V. COMPARISON OF BARROW AND WAINWRIGHT SUBSISTENCE HARVESTS

As mentioned in the Introduction, the collection of Wainwright harvest data was part of a larger project that also included three years of data collection in the larger community of Barrow, located approximately 100 miles to the northeast of Barrow. Subsistence harvest data were collected in Wainwright for the two year period from April 1, 1988 through March 31, 1990 and comparable data were collected in Barrow for three years, from April 1, 1987 through March 31, 1990. Thus, Years Two and Three of the Barrow effort were concurrent with Years One and Two of the Wainwright data collection effort. Conducting the same research in two different communities during the same time period provides a unique opportunity to compare the findings for each community. This comparison, not originally part of the study design, presents data in tables and briefly addresses salient points. A thorough presentation of the Barrow study results is found in the MMS Technical Report No. 149 entitled North Slope Subsistence Study - Barrow, 1987, 1988 and 1989 (SRB&A and ISER 1993).

Barrow and Wainwright are different in many ways. While Barrow is a community of over 3,000 people, the regional hub for most of the North Slope, Wainwright is a smaller community of around 500 residents. Barrow's population is about half Inupiat while Wainwright's population is almost entirely Inupiat. During this study, employment and income levels in Barrow were much higher than in Wainwright. Table 23 presents some background data on Barrow and Wainwright for comparison. The NSB conducted community censuses in Barrow and Wainwright in 1988. Most of the community characteristics reported in the 1988 census differ from those used or found by this study. For example, the Barrow sample was based on the 1985 NSB census which reported a population of 3,016 residents in 937 households. These figures were the basis for weighting the findings, even though the more recent census (1988) was performed during this study. Thus, demographic characteristics differ in part because of the difference in timing between the two censuses. In Wainwright, the NSB 1988 census counted everyone, including temporary construction workers, whereas this study counted only households present for the entire two years (thus excluding temporary construction workers and also seasonally resident schoolteachers). Data from the NSB 1988 census as well as from this study are both presented in Table 23.

TABLE 23: SOCIOECONOMIC CHARACTERISTICS OF BARROW AND WAINWRIGHT¹

	<u>Barrow</u>	<u>Wainwright</u>
Basis for SRB&A harvest study estimates		
Study population	3,016 ²	411 ³
Ethnicity (Percent Inupiat)	59%	98%
Number of households	937 ²	101
Average household size	4.0	4.1
Average person-months employment per household per year	18.8	12.1
Average household income (on a scale from 1 to 10 ⁴)	8.1	5.2
NSB Census Data (1988) ⁵		
Population	3,379	514 ⁶
Ethnicity (Percent Inupiat)	61%	90%
Number of households	1,031	131
Average household size	3.3	3.9
Average months employed per individual	8.2 ⁷	5.4 ⁷
Average months unemployed per individual	---	6.5 ⁷

1. Barrow study period: 4/1/87 through 3/31/90;
Wainwright study period: 4/1/88 through 3/31/90.
2. The NSB 1985 Barrow Census, Housing and Employment Survey was the source of these population and household figures for Barrow. These data were the basis for the original sampling design.
3. This Wainwright population reflects only those residents who were present in Wainwright for the full two study years. Thus, this figure does not include seasonally resident schoolteachers, temporary construction workers, or anyone else who was present only part of the two study years.
4. Income scale:

1	Under \$4,999	6	\$25,000 - \$29,999
2	\$5,000 - \$9,000	7	\$30,000 - \$39,999
3	\$10,000 - \$14,999	8	\$40,000 - \$49,999
4	\$15,000 - \$19,999	9	\$50,000 - \$59,999
5	\$20,000 - \$24,999	10	\$60,000 and above
5. Source: NSB Department of Planning and Community Services, 1989, unless otherwise noted.
6. This figure included anyone living in Wainwright at the time the census was conducted (e.g., temporary construction workers, schoolteachers, etc.)
7. Source: NSB Department of Planning and Community Services, personal communication, 1989.

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Comparative harvest data are presented in subsequent tables. Table 24 shows mean household harvest levels for Barrow and Wainwright by species or species group, averaged for the study period. (The Barrow household means are subdivided into household means for Inupiat households and for all Barrow households.) The relative proportion that each species or species group represented in the overall subsistence harvest, averaged over the study period, is also presented in this table for each community. Finally, the percentage of households successfully participating in harvests of each species is presented for each community, with Barrow's participation rate shown both for the Inupiat households and for the entire Barrow community. In terms of total subsistence harvests, Wainwright households harvested an average of 2,624 usable pounds in contrast to Barrow Inupiat household harvests of 1,171 pounds and all Barrow households' harvests of 750 pounds. (These amounts work out to 638 pounds per capita for Wainwright, and 245 pounds per capita for Barrow Inupiat and 233 pounds per capita for all of Barrow.) In other words, the average Wainwright household harvested over twice the amount as Barrow Inupiat households, and 3.5 times as much as all Barrow households. Despite the large difference between Barrow and Wainwright in terms of total pounds harvested per household, the overall participation rate among Wainwright study households (98 percent Inupiat) and Barrow Inupiat households was nearly identical, 88 and 87 percent respectively. Participation among all Barrow households was 68 percent.

Comparison of the major resource categories in terms of the percentage of total harvest that each category contributed indicates that the order of importance was the same in each community; i.e., in both Barrow and Wainwright, marine mammals contributed the most to the total harvest, followed by terrestrial mammals, fish and birds. The relative proportions varied, however. Whereas marine mammals represented over half (55 percent) the total harvest in Barrow, this category represented over two-thirds (70 percent) of the total Wainwright harvest. Terrestrial mammals represented 30 percent in Barrow compared to 24 percent in Wainwright, fish represented 11 and 4.5 percent in Barrow and Wainwright respectively. Finally, birds were 3.5 percent of the total harvest in Barrow compared to two percent in Wainwright. In short, Wainwright's subsistence harvest was dominated by marine mammals; marine and terrestrial mammals combined constituted 94 percent of the total harvest. Marine mammals also dominated Barrow's subsistence harvest, but the harvest was more evenly

TABLE 24: AVERAGE ANNUAL HOUSEHOLD MEANS, PERCENTAGES AND PARTICIPATION
BASED ON USABLE POUNDS HARVESTED, BARROW AND WAINWRIGHT (1)

	BARROW (WEIGHTED)					WAINWRIGHT		
	INUPIAT HH MEANS	ALL BRW HH MEANS	% OF TOTAL	% PARTICIPATION: INUPIAT ALL BRW		HH MEANS	% OF TOTAL	% PARTI- CIPATION
All species	1,171	750	100.0%	87%	68%	2,624	100.0%	88%
Marine mammals	670	412	55.8%	76%	48%	1,795	69.6%	82%
Bowhead	476	283	38.3%	75%	46%	866	34.6%	75%
Walrus	104	68	9.1%	29%	27%	712	26.9%	29%
Bearded seal	48	33	4.4%	46%	29%	128	5.0%	35%
Ring. & spot. seal	29	18	2.4%	27%	19%	30	1.1%	26%
Polar bear	13	11	1.5%	7%	6%	45	1.5%	7%
Land mammals	320	226	30.1%	77%	54%	648	23.7%	62%
Caribou	304	199	26.6%	77%	54%	639	23.4%	62%
Moose	16	26	3.4%	7%	7%	8	0.2%	2%
Dall sheep	1	1	*	3%	3%	0	0.0%	0%
Fish	142	85	11.3%	60%	41%	121	4.5%	66%
Whitefish	110	65	8.7%	54%	34%	59	2.0%	23%
Other fresh- water fish	20	12	1.6%	33%	23%	24	0.8%	27%
Salmon	8	5	0.7%	16%	12%	5	0.2%	5%
Other coastal fish	4	2.2	0.3%	23%	14%	33	1.5%	54%
Birds	39	26	3.5%	65%	53%	61	2.2%	56%
Geese	24	16	2.1%	40%	29%	49	1.7%	45%
Eiders	13	10	1.3%	52%	43%	11	0.4%	40%
Ptarmigan	1	1	0.1%	26%	20%	0.9	*	15%
Other birds	*	*	*	1%	*	0.3	*	4%

(1) Barrow study period: 4/1/87 through 3/31/90
Wainwright study period: 4/1/88 through 3/31/90

* less than .1 or .1%

Source: Stephen R. Braund & Associates, 1993

distributed across the four major resource categories than occurred in Wainwright. The main reason for this difference was the high harvest of walrus in Wainwright during the study years. When comparing the percentage of total harvest that each of the major species represented (e.g., bowhead whale, walrus, bearded seal, other seals, caribou), the proportion of total harvest was similar (i.e., between Barrow and Wainwright) with the exception of walrus. Walrus provides a very large amount of potentially usable meat, yet residents typically did not eat all of the usable portions. Consequently, these animals appear to constitute a larger proportion of both Barrow and Wainwright residents' diet than was actually the case (particularly in Wainwright where the harvest was much higher). Consequently, the relative importance of caribou or fish, for example, (for which the usable weight more closely matches the amount actually eaten) appears underrepresented by comparison as a year round resource and everyday food.

The percentage of households participating in marine mammal harvests was very similar between Barrow Inupiat households and Wainwright households. Participation rates were identical in the case of bowhead whale, walrus and polar bear, and differed only by one percent between communities in their participation in ringed and spotted seal harvests. The main difference in participation occurred in bearded seal harvests, in which Barrow Inupiat participated at a rate of 46 percent compared to 35 percent in Wainwright. The higher involvement in this activity in Barrow likely was a reflection of the use of bearded seal skin boats in Barrow and resultant need for skins, which were not used for boats in Wainwright.

Barrow Inupiat participation was higher in terrestrial mammals and birds than Wainwright's level of participation. More Wainwright households harvested fish (66 percent), however, than did Barrow Inupiat households (60 percent). The high participation in Wainwright fish harvests was due mainly to the unique activity of rainbow smelt fishing. Wainwright residents fished smelt through the inlet ice in the winter months. Participation was high because smelt fishing was easily undertaken by a variety of age groups within a short distance from town, because the season did not conflict with other harvests, and because people considered smelt a delicacy. Although rainbow smelt fishing in Wainwright garnered an equal level of participation as whitefish harvests in

Barrow, an additional 12 percent of Wainwright households harvested other kinds of fish, whereas in Barrow only another six percent harvested other fish.

Barrow household means were higher than in Wainwright in the harvests of only two species groups: Whitefish and ptarmigan. In the case of salmon, Barrow and Wainwright household means were identical. In all other species or species groups, Wainwright household means were higher than in Barrow.

Table 25 contains the number of animals harvested each study year by species for each community, as well as average annual harvest levels for each community. The level of detail in this table does not lend itself to discussion but serves as a source of data on absolute numbers harvested by species, by year and by community.

As in Wainwright, the study team analyzed harvester levels in Barrow. Tables showing harvester levels cross-tabulated by socioeconomic characteristics follow. Table 26 describes Barrow harvester levels (and is taken from the Barrow report [SRB&A and ISER 1993]) while Table 27 restates Wainwright data presented in Table 21 in the previous section of this report. Although the harvester levels were defined differently for each community, certain generalizations can be drawn from these tables. While 25 percent of Wainwright households harvested 2,500 pounds or more per year, only six percent of Barrow households harvested as much. Another 25 percent of Wainwright households harvested 1,060 to 2,499 pounds compared to 11 percent of Barrow households that harvested 1,000 to 2,499 pounds. In Wainwright, 50 percent of the households harvested 1,059 pounds or less whereas in Barrow 83 percent of the households harvested under 1,000 pounds per year. Thirty-two percent of Barrow households did not harvest anything during the study period compared to only five percent of Wainwright households who were non-harvesters. (The latter statistic for Wainwright is not shown on Table 27.)

Of the households harvesting 2,500 pounds or more (Harvester Level 4 in both communities), household size was slightly larger in Wainwright (4.7 persons per household compared to 4.3 in Barrow) and employment months were slightly higher than in Barrow (14.1 person months of employment compared to 13.8). However, income in this harvester level was lower in Wainwright than Barrow (5.6

TABLE 25: NUMBER OF ANIMALS HARVESTED, BARROW (1987-90) & MAINWRIGHT (1988-90)

	BARROW (weighted)				MAINWRIGHT		
	Year 1	Year 2	Year 3	3-yr.avg	Year 1	Year 2	2-yr.avg
Bowhead whale	7	11	10	9	4	2	3
Walrus	84	61	101	81	58	153	106
Bearded seal	236	179	109	174	97	74	85
Ringed seal	466	388	328	394	63	86	75
Spotted seal	2	4	4	3	5	12	9
Polar bear	12	11	39	21	7	12	10
Beluga whale	0	0	0	0	2	0	1
Caribou	1,595	1,533	1,656	1,595	505	711	608
Moose	52	53	40	48	3	0	2
Dall sheep	12	12	9	11	0	0	0
Brown bear	1	1	0	1	1	2	2
Porcupine	5	0	0	2	0	0	0
Ground Squirrel	24	0	17	14	3	7	5
Wolverine	4	2	1	2	20	7	14
Arctic fox	192	146	48	129	61	8	35
Red fox	8	4	2	5	26	22	24
Wolf	0	0	0	0	10	2	6
Ermine	0	0	0	0	2	9	6
Whitefish	27,366	20,628	38,053	28,683	5,037	7,102	6,070
Non-specified	5,108	173	0	1,760	4	0	2
Round	2,122	721	16	953	400	0	200
Broad-riv.&lake	10,579	11,431	30,047	17,352	0	0	0
Humpback	1,225	647	3,648	1,840	0	0	0
Least cisco	7,024	7,505	2,929	5,819	4,622	6,676	5,649
Arctic cisco	1,309	151	1,413	958	11	426	219
Grayling	12,664	8,684	8,392	9,914	2,894	3,006	2,950
Arctic char	38	76	135	83	0	0	0
Burbot	1,086	392	550	676	6	51	29
Lake trout	153	72	216	147	1	0	1
Northern pike	2	0	10	4	0	0	0
Salmon	196	80	2,089	788	11	180	96
Non-specified	66	3	439	169	2	0	1
Chum	11	5	529	182	3	68	36
Pink	12	1	261	92	6	52	29
Silver	103	70	828	334	0	51	26
King	4	1	31	12	0	9	5
Capelin	3,960	0	346	1,435	0	0	0
Rainbow smelt	97	0	1,480	526	20,194	54,083	37,139
Arctic cod	0	7,945	17,018	8,321	0	0	0
Arctic flounder	0	0	0	0	0	4	2
Tomcod	0	194	0	65	230	134	182
Sculpin	0	11	0	4	4	7	6
Geese	2,873	3,334	3,943	3,384	1,337	1,439	1,388
Non-specified	329	69	34	144	129	0	65
Brant	127	221	973	440	567	700	634
White-fronted	2,417	3,035	2,932	2,795	607	730	669
Snow	0	8	4	4	29	7	18
Canada	0	1	1	1	5	2	4
Eiders	5,173	4,499	8,590	6,087	560	1,097	828
Ptarmigan	2,454	1,350	329	1,378	135	196	166
Other birds	79	0	9	30	31	3	17

Source: Stephen R. Braund & Associates, 1993

TABLE 26: HOUSEHOLD CHARACTERISTICS BY HARVESTER LEVEL,
BARROW YEARS ONE, TWO & THREE AVERAGED (1)

Household Size	Harvester Level	Harvester Level	Harvester Level	Harvester Level	Entire Community (100% of HHs)
	1 0 lbs. (32% of HHs)	2 1-999 lbs. (51% of HHs)	3 1,000-2,499 lbs (11% of HHs)	4 2,500 lbs. & up (6% of HHs)	
1	40 %	1 %	4 %	21 %	15 %
2,3	19 %	25 %	16 %	15 %	21 %
4,5	34 %	40 %	39 %	35 %	38 %
6+	7 %	34 %	41 %	29 %	26 %
	---	---	---	---	---
	100 %	100 %	100 %	100 %	100 %
Mean household size:	2.9	4.6	4.8	4.3	4.1
Total Months Worked By Household Members					
0	3 %	2 %	0 %	23 %	3 %
1-12	42 %	24 %	35 %	18 %	31 %
13-24	55 %	49 %	22 %	41 %	47 %
25+	0 %	25 %	43 %	18 %	19 %
	---	---	---	---	---
	100 %	100 %	100 %	100 %	100 %
Mean Person-Mos. Worked per Household:	15.9	20.6	21.1	13.8	18.8
Mean Household Income					
Under \$4,999	1 %	2 %	0 %	21 %	3 %
\$5,000-19,999	12 %	6 %	3 %	6 %	8 %
\$20,000-\$39,999	9 %	28 %	9 %	36 %	20 %
\$40,000 plus	78 %	64 %	88 %	37 %	69 %
	---	---	---	---	---
	100 %	100 %	100 %	100 %	100 %
Approximate Mean Income (scale: 1 to 10)*	8.5	8.0	8.6	6.5	8.1

*Incomes were reported as a code representing the ranges below; the mean incomes above represent an average of the responses (codes) reported. Based on ranges, the codes cannot be accurately converted to dollars.

*INCOME SCALE: 1 Under \$4,999 4 \$15,000-19,999 7 \$30,000-39,999 10 \$60,000 or more
2 \$5,000-9,999 5 \$20,000-24,999 8 \$40,000-49,999
3 \$10,000-14,999 6 \$25,000-29,999 9 \$50,000-59,999

(1) Years One through Three = 4/1/87 through 3/31/90.

Source: Stephen R. Braund & Associates, 1993

TABLE 27: CHARACTERISTICS OF HARVESTER LEVELS,
WAINWRIGHT YEARS ONE & TWO AVERAGED (1,2)

Household Size	Harvester Level 1 0-424 lbs. (25% of HHs)	Harvester Level 2 425-1,059 lbs. (25% of HHs)	Harvester Level 3 1,060-2,499 lbs (25% of HHs)	Harvester Level 4 2,500 lbs. & up (25% of HHs)	Entire Community (100% of HHs)
1	8 %	16 %	12 %	4 %	10 %
2,3	44 %	32 %	16 %	20 %	28 %
4,5	44 %	28 %	36 %	52 %	40 %
6+	4 %	24 %	36 %	24 %	22 %
	100 %	100 %	100 %	100 %	100 %
Mean household size:	3.2	3.8	4.7	4.7	4.1
Total Months Worked By Household Members					
0	28 %	13 %	9 %	4 %	14 %
1-12	40 %	71 %	48 %	52 %	53 %
13-24	32 %	13 %	39 %	28 %	28 %
25+	0 %	4 %	4 %	16 %	6 %
	100 %	100 %	100 %	100 %	100 %
Mean Person-Mos. Worked per Household:	10.3	10.9	13.3	14.1	12.1
Year Two Household Income					
Under \$4,999	31 %	17 %	8 %	8 %	16 %
\$5,000-19,999	9 %	29 %	21 %	24 %	21 %
\$20,000-\$39,999	44 %	42 %	46 %	44 %	44 %
\$40,000 plus	17 %	13 %	25 %	24 %	20 %
	101 %	101 %	100 %	100 %	101 %
Approximate Mean Income (scale: 1 to 10)*	4.6	4.7	5.8	6.5	5.2

*Incomes were reported as a code representing the ranges below; the mean incomes above represent an average of the responses (codes) reported. Based on ranges, the codes cannot be accurately converted to dollars.

*INCOME SCALE: 1 Under \$4,999 4 \$15,000-19,999 7 \$30,000-39,999 10 \$60,000 or more
2 \$5,000-9,999 5 \$20,000-24,999 8 \$40,000-49,999
3 \$10,000-14,999 6 \$25,000-29,999 9 \$50,000-59,999

(1) Based on 100 core study households.

(2) Years One and Two = 4/1/88 through 3/31/90

Source: Stephen R. Braund & Associates, 1993

compared to 6.5 on a scale from one to 10). In the next highest group of households, Harvester Level 3, household size was nearly identical in the two communities but person-months worked and income were much higher in Barrow than in Wainwright. Harvester Level 3 households in Barrow averaged 21.1 person-months of employment and an income level of 8.6, in contrast to 13.3 person-months and an income level of 5.8 in Wainwright. Finally, among the households harvesting approximately 1,000 pounds or less (Harvester Levels 1 and 2), one can see that Wainwright households had significantly lower income and employment levels than Barrow households.

In summary, Barrow and Wainwright differed not only demographically but also in subsistence harvest levels. Wainwright subsistence harvests averaged 2,624 pounds per household (688 pounds per capita) compared to 750 pounds per household in Barrow (233 pounds per capita). Barrow Inupiat household harvests were closer to Wainwright household harvest levels at 1,171 pounds per household, and participation of Barrow Inupiat households in subsistence harvests (87 percent) was nearly identical to Wainwright participation levels (88 percent). In each community, marine mammals provided the largest proportion of the subsistence harvest each year, followed by terrestrial mammals, fish and birds. In Wainwright, 25 percent of the households harvested 2,500 pounds or more per year, whereas in Barrow only six percent of the households conducted subsistence at that level. At the low end of the harvest scale, Barrow contained a higher proportion of non-harvesting households. Thirty-two percent of Barrow households harvested nothing during the study period compared to five percent of Wainwright household that were non-harvesting. Barrow households, on average, showed higher levels of income and employment and lower levels of subsistence harvests than Wainwright households.

VI. STATUS OF MAJOR FAUNAL RESOURCES

by Sam Stoker, PhD.

Beringia

The following section discusses recent population histories for major subsistence species harvested at Barrow and Wainwright, and presents estimates of current population size and trends, areal and temporal distribution, recruitment rates, sustainable yield levels, and impact of subsistence harvests on these populations.

When reviewing this information, it must be kept in mind that the numbers presented are best estimates only. In the case of marine mammals in particular, census work is costly and difficult and the results are always imprecise and subject to interpretation. Similar imprecision applies to recruitment rates and sustainable yield estimates for both marine and terrestrial resources. These figures are based primarily on the productivity (birth rate) of the population, age composition of the population, and natural mortality rates, all of which are poorly understood and documented for most species in question and are often subject to unpredictable environmental factors such as weather and ice conditions.

Reservations also pertain to estimates of subsistence harvest impacts on these populations. As noted above, population and sustainable yield levels for the resources themselves are subject to uncertainty, which makes it difficult to accurately assess effects on such populations resulting from subsistence harvests or other sources of impact. In addition, harvest figures themselves are in most cases incomplete and inadequate. For instance, good harvest data may exist for certain communities for specific years, but the application of such data to regional and usually migratory populations is of limited value without comparable information on a broader areal and temporal scale. For most species in question, such regional harvest information consists of estimates only, often extrapolated from a few locations during specific years. Such estimates are not without value, but at the same time must be viewed and applied with caution. As has been noted in other studies (Stoker 1984)

subsistence harvests tend to be extremely variable from location to location and from year to year in both magnitude and species composition.

Subsistence strategies are by nature flexible and opportunistic, with emphasis shifting from resource to resource depending not only on need but also on local abundance, weather, ice conditions, and timing of migrations. To extrapolate results from any one location or for any given year to the population as a whole is risky at best.

The following pages will discuss, in as much detail as is possible, population status, distribution, sustainable yield and subsistence harvest impact, by species or general taxa, for resources of major importance to Barrow and Wainwright. Current information suggests that such species or resources are (not necessarily in order of importance): bowhead whale, walrus, bearded seal, ringed seal, caribou, fish, and waterfowl.

BOWHEAD WHALE (*Balaena mysticetus*)

Population estimates for the western bowhead stock have increased rather dramatically over the past 10 years. In 1978 the population estimate, derived from shore counts near Barrow during the spring migration, was 1,783 to 2,864 animals, with 95 percent confidence limits. In subsequent years this estimate was increased conservatively to a 1988 mean of 7,800, with a 95 percent confidence range from about 5,400 to 10,200 (IWC 1988). Though the population itself is thought to be on the road to recovery after severe depletion by commercial interests during the latter 19th and early 20th centuries, the rapid increase indicated by these figures is almost certainly due more to improved census techniques than to population increase per se over that period of time.

Estimates of productivity, natural mortality, net recruitment and maximum sustainable yield rates for the western bowhead population are somewhat uncertain at present. For purposes of simulation models, the IWC currently employs a conservative annual natural mortality rate of five percent and an annual net recruitment range of 1.9 to 2.9 percent. Employing the currently accepted population mean of 7,800, this calculates to an annual population increase of from 148 to 226 animals, well in excess of the 41 landed or 54

struck annual quota approved by the IWC in 1991 for the nine communities currently participating in bowhead whaling.

The western bowhead stock is distinctly migratory, moving annually from winter grounds in the southern and central Bering Sea to summer feeding areas in the eastern Beaufort Sea. The population begins its northward migration about March, depending on weather and ice conditions, normally passes through Bering Strait in late March or early April and from there follows nearshore lead systems up the Chukchi coast, usually arriving in the vicinity of Barrow during May. From Barrow the whales continue their migration to the east, following offshore leads to the vicinity of Banks Island where they spend the summer months. The fall migration usually begins in September or early October with a nearshore movement from the eastern Beaufort to Point Barrow, then largely offshore from Barrow south through the Chukchi and northern Bering seas. Whaling is conducted primarily during the spring migration by residents of Bering Strait and the Chukchi coast, and during the fall by residents of the Beaufort. Barrow, and to some extent communities of the Bering Strait region, are able to take advantage of both spring and fall migrations, though the spring hunt is generally more productive.

Bowheads are baleen filter-feeders, obtaining their food from the water column in the form of zooplankton (krill) such as copepods, mysids, and euphausiids.

WALRUS (*Odobenus rosmarus divergens*)

Like the bowhead whale, the walrus was subjected to major commercial exploitation in the last half of the nineteenth and first half of the twentieth centuries and suffered a consequently severe population decline. The initial, pre-commercial harvest population, estimated to be at least 200,000, was reduced to dangerously low levels by the mid-twentieth century. Over the past few decades, however, the Bering/Chukchi walrus stock has been under joint US-USSR management and protection, and populations have recovered to pre-exploitation levels. The most recent estimates, derived from joint US-USSR aerial surveys, place the population at about 233,000 (Gilbert 1989), down slightly from the 1980 estimate of 246,000.

The bulk of the walrus population, particularly the females, calves and young males, are distinctly migratory in nature. Most winter in the central and northwestern Bering Sea, then move northward into the Chukchi Sea in spring and summer (Fay 1982). Exceptions to this pattern are groups of adult males that summer at specific locations in Bristol Bay, Anadyr Gulf and Bering Strait. These groups move northward to mingle with the southward migrating females in the autumn, before the population settles on their wintering grounds (F.H. Fay and J.J. Burns, personal communication). Depending on weather and ice conditions, the bulk of the migratory population passes through Bering Strait in May and June and arrives in the vicinity of Barrow and Wrangel Island in July. By late September they are moving back southward, passing through Bering Strait again in October and November.

Walrus are limited for feeding purposes to continental shelf areas with water depths of 100 meters or less. Though they prey on a wide variety of benthic invertebrates, including clams, snails, crabs, shrimp, worms, tunicates, and other taxa, the majority of their diet seems to consist of a few genera of bivalve mollusks (Fay 1982, Fay and Stoker 1982). In addition to invertebrates they ingest small demersal fish on occasion, and are known to prey to some extent on seals.

There are indications that the walrus population may have been at or in excess of the carrying capacity of its environment (probably defined by food resources) by about 1980, and may have begun to decline since then. These indications include: greater diversity and smaller size of prey species found in stomachs, increasing average age of the population, reduced birth rate and calf survival, and decreased fat reserves observed from harvested animals (Fay and Stoker 1982, Fay et al. 1989). Recent calculations indicate that the current annual recruitment rate may be as low as one percent (Fay et al. 1989).

Concurrently, subsistence harvests have increased significantly in recent years on both the Alaskan and Soviet sides. Total retrieved Alaskan harvests have increased from about 1,500 to 2,000 per year in the 1960s and early 1970s to harvests exceeding 5,000 per year in the 1980s, while Soviet harvests have increased from about 1,000 to 4,000 per year. Factoring in a killed but lost ratio, current mortality from hunting may be 10,000 to 15,000 per year (Fay et

al. 1989), or four to six percent of the population. If the annual recruitment estimate of one percent is accurate, this current harvest level is probably in excess of sustainable yield, and will likely result in further population decline over the coming years. In addition to increased overall harvest levels, the percentages of adult females in this harvest have increased in recent years, compounding the effect.

Historically, the bulk (plus or minus 80 percent) of the Alaskan harvest takes place in the north Bering Sea and Bering Strait region in spring and summer. An additional seven to eight percent are taken between Point Hope and Barrow during summer, and the remaining 10 to 12 percent in the Bering Strait and north Bering Sea during fall and winter.

BEARDED SEAL (*Erignathus barbatus*)

Bearded seals are distributed over virtually all of the continental shelf waters of the northern Bering, Chukchi and Beaufort seas, with largest concentrations observed during late winter (January through April) in the northern Bering Sea (Burns 1981, Braham et al. 1984). The general population is somewhat migratory, shifting northward from the Bering and southern Chukchi toward the northern Chukchi and Beaufort in summer and back southward during winter months. The bulk of the northward movement usually begins in April, passes through Bering Strait sometime from early May to mid-June, and by June or July is in the vicinity of Barrow. This is a trend, however, as opposed to a distinct and predictable migration, with some animals remaining in the Bering Sea throughout the summer and others wintering in the Beaufort Sea. As for most marine mammals of the region, the fall movement, occurring from September through December, is even less concentrated and predictable than is the movement northward in the spring.

As a general rule bearded seals stay within the seasonal ice but avoid zones of unbroken shorefast ice or dense pack ice, preferring broken ice and areas with leads and polynas (Burns 1981). Bearded seal is the most widely distributed pinniped occurring in the drifting seasonal ice of the Bering and Chukchi seas (Burns and Frost 1979).

Bearded seals are opportunistic bottom feeders, utilizing a wide variety of prey including crabs, shrimp, mollusks and demersal fish (Lowry et al. 1982). They appear to be limited to continental shelf areas with feeding depths of 150 to 200 meters (Kelly 1988a, Burns et al. 1981), and as might be expected concentrate in relatively shallow waters with high benthic biomass such as occur in the northern Bering and southern and central Chukchi seas.

Population estimates for bearded seals are imprecise, deriving largely from fixed-wing aerial surveys of seals resting on the ice in spring and summer (Kelly 1988a). Available estimates for the Bering/Chukchi population range from 250,000 to 300,000 animals (U.S. Interagency Task Group Report 1976, Burns 1981, Popov 1976, Kelly 1988a).

Information regarding productivity, natural mortality, recruitment rates and sustainable yield levels for bearded seals is limited and incomplete. Gross annual productivity was estimated at about 24 percent for the Bering and Chukchi population during the 1960s and 1970s (Kelly 1988a). Reliable estimates of natural mortality and net recruitment to the population, however, are not presently available. Total recommended harvest levels for Alaska range from 3,000 retrieved seals per year (U.S. Federal Register 1979) to 9,000 retrieved per year (U.S. Interagency Task Group Report 1976).

Data pertaining to total annual subsistence harvests of bearded seals in Alaska are also incomplete, particularly in recent years, and consist for the most part of general estimates based on harvest returns from a few locations in certain years. The total annual retrieved harvest for Alaska is estimated at 1,784 per year (with a standard deviation of 941) between 1966 and 1977 (Burns 1981, Kelly 1988a). There is some indication, however, that this number may be on the low side. During 1977 a retrieved harvest of 4,750 was recorded for Alaska, probably due to increased monitoring effort that year rather than to unusually high harvest levels (Lloyd Lowry, Alaska Department of Fish and Game, personal communication). An earlier report (Burns 1967) estimates the total kill of bearded seals in Alaska to be about 7,000 to 9,000 per year. If a killed but lost ratio of 50 percent is assumed, this would equate to an annual retrieved harvest of 3,500 to 4,500, more in accord with the 1977 return.

On the Soviet side, retrieved harvests in the Bering and Chukchi seas are estimated to range between 1,986 and 7,009 per year (mean 4,467 with standard deviation 1,974) for the period 1966 through 1970, declining to 1,150 to 2,053 per year (mean 1,448 with standard deviation 249) for 1971 through 1983 (Kelly 1988a).

Total US/USSR harvests, applying the conservative estimates of 1,784 and 1,448, calculate to 3,232 per year retrieved or approximately 6,500 killed using a killed but lost ratio of 50 percent. This would equate to two to three percent of the total population per year, presumably well within the range of maximum sustainable yield. This assumption is awkward, however, since the harvest estimates are for somewhat different sets of years and are probably conservative. Also, precise estimates are not available for recruitment and sustainable yield for this population on either a numbers or percentage basis, and population data are out of date and imprecise. Alaskan harvests do appear, however, to remain within levels recommended by federal agencies as described above.

RINGED SEAL (*Phoca hispida*)

The ringed seal is the most common and widely distributed arctic seal, occurring throughout the region. As with bearded seals, population estimates are based on aerial observations in the summer, when at least some seals are on the ice, and are imprecise and subject to variable interpretation. For Alaskan waters, the best guess seems to be one to 1.5 million (Kelly 1988b, Littlefield 1977), with annual sustainable yield estimated at eight to 11 percent (McLaren 1958). Again, however, it must be pointed out that these figures are based on incomplete information and are estimates only.

In Alaskan waters, ringed seals seem to be strongly reliant on ice as a substrate for hauling out, for molting, and for pupping, which occurs in subnival dens in shorefast ice or within stable pack ice. And though they inhabit to some extent the ice-covered reaches of the Bering, Chukchi and Beaufort seas during all seasons, they are somewhat migratory. The bulk of the population shifts from north to south in the fall and winter and back during spring in response to ice conditions. In recent years the greatest numbers are

taken in the Bering Strait vicinity from late April through June, arriving in the Barrow vicinity in late June (Alaska Department of Fish and Game 1976). The population distribution at any one time or during any given year seems to vary depending on ice and weather conditions. It is estimated, for example, that from 1970 through 1977 the density of ringed seals declined by 50 percent in the Beaufort Sea and by 35 percent in the northern Chukchi Sea, presumably in response to severe ice conditions. At the same time a corresponding increase in population was observed in the southern Chukchi and northern Bering seas (U.S. Department of Commerce 1978). During mid-winter, ringed seals tend to concentrate inshore, replacing the larger bearded seals which move offshore to areas of flawed and moving ice (Burns 1967).

Ringed seals are opportunistic feeders, including items such as fish (primarily arctic and saffron cod), shrimp, mysids, and euphausiids in their diet.

The subsistence harvest of ringed seals has declined significantly in Alaska in recent years, although the population of seals has not. From estimates of 10,000 to 20,000 ringed seals taken per year in the 1950s and 1960s, the the harvest has fallen to levels of 4,000 to 5,000 or lower in recent years (U.S. Department of Commerce 1978, Frost 1985, personal communication with John Burns). The recommended sustainable yield for Alaska is estimated at 20,000 per year, including killed but lost, significantly above the present harvest level (U.S. Federal Register 1979, U.S. Interagency Task Group Report 1976).

CARIBOU (*Rangifer tarandus granti*)

The Western Arctic caribou herd (WAH), the largest in the state and the one from which most of the Barrow and Wainwright harvest is taken, seems particularly prone to drastic population fluctuations. Though no numerical data are available, historical records indicate that caribou were "abundant" in the WAH region in the early 1800s and "scarce" by the late 1800s and early 1900s. By 1950, when the first aerial survey was undertaken, the population had recovered to an estimated 238,000. By the mid-1960s population estimates had increased to around 300,000 animals, but declined again to 242,000 in

1970. By 1975 this decline had accelerated (102,000 estimated), and by 1976 the WAH had reached a low of 77,000 to 82,000 (Davis et al. 1980). At that time major harvest restrictions were imposed by the state. Since 1976 the herd has increased steadily to estimated levels of 113,000 in 1979, 165,000 in 1981, 239,000 in 1986, 311,000 as of 1988 (Davis and Valkenburg 1978, Jim Davis, personal communication), and 400,000 by the summer of 1990 (Pat Valkenburg, personal communication).

The other caribou herd from which harvests are taken by residents of Barrow is the Teshekpuk herd. Though figures for this herd are less available than for the Western Arctic herd, the Teshekpuk population also seems to be on the increase at present, with recent estimates at 11,000 animals in 1983 (Jim Davis, personal communication) and 16,500 in 1990 (Pat Valkenburg, personal communication).

For both herds, the annual recruitment rate is estimated at 11 to 14 percent. This calculates to an annual recruitment to the Western Arctic herd of about 44,000 to 56,000 animals, and 1,800 to 2,300 to the Teshekpuk herd. As of 1983, a conservative sustained yield estimate of five percent per year was derived for the Western Arctic herd (Jim Davis, personal communication), which would equate to about 20,000 per year for this herd and about 825 per year for the Teshekpuk herd at present population levels.

FISH (all species)

Various species of whitefish constitute the bulk of fish harvests at Barrow, followed by grayling, capelin, cod and salmon. The primary species taken at Wainwright is smelt (by number harvested, not by pounds harvested), followed by whitefish and grayling.

For the region as a whole, total annual fish harvests are estimated at about 210,000 pounds for the villages of Barrow, Wainwright, Point Lay, Atqasuk, Nuiqsut and Kaktovik (Craig 1989), consisting primarily of various species of whitefish, arctic char, Pacific herring, grayling, lake trout, burbot, rainbow smelt, arctic and saffron cod, arctic flounder, fourhorn sculpin, capelin and several species of salmon.

Little information is available concerning population or sustainable yield levels for any of these species in this region, so it is impossible to assess the impact of present harvest levels other than to say that such harvest levels seem to be relatively stable over years for which data are available. The only population data available are for the Colville River arctic cisco fishery (Gallaway et al. 1989). This population seems to be somewhat variable from year to year, though it is thought that such variability is not due to fisheries impacts.

WATERFOWL

The most recent and most comprehensive estimates of waterfowl populations available to Barrow and Wainwright hunters are derived from aerial surveys of the Arctic coastal plain nesting grounds and the Teshekpuk Lake area. Results of these surveys calculate to a five year average (1986 to 1990) of about 824,000 nesting ducks on the Arctic coastal plain, with annual estimates ranging from about 622,000 in 1986 to 1,010,000 in 1989. Major species included in this estimate are oldsquaw (441,000), pintail (290,000) and scaup (46,000), followed by several other species of lesser numerical importance. Estimates of nesting white-fronted geese on the coastal plain averaged about 106,000 over the same five year period, ranging from 86,000 in 1990 to 145,000 in 1989, while brant estimates averaged roughly 9,000, with a range of from 3,500 in 1990 to 18,300 in 1989 (U.S. Fish and Wildlife Service [USFWS] survey data, 1991). Survey estimates indicate rather large population fluctuations from year to year, probably the result, for the most part, of displacement of birds from more southern nesting grounds due to varying environmental conditions rather than to actual population changes in the region itself (King and Cain 1987). There are also some indications that goose and, particularly, brant populations may have been adversely affected in recent years by poor nesting conditions in the Yukon delta region (King 1987).

In addition to the average estimates presented above, an average of 3,500 non-breeding white-fronted geese were counted in the Teshekpuk Lake region during the same five year period, and about 14,600 brant, bringing total five year estimates to 109,500 white-fronted geese and 23,600 brant (USFWS survey data, 1991). In addition, another 15,000 to 20,000 brant migrate past Barrow

and Wainwright from the Herschel Island nesting grounds each year, raising the average available brant population to the neighborhood of 39,000 to 44,000 (Rodney King, personal communication).

Eiders, one of the major species taken by both Barrow and Wainwright, were poorly sampled during the surveys quoted above due to somewhat different distributions (Rodney King, personal communication). Earlier surveys, however, estimated the fall migration of eiders past Point Barrow at about 800,000 to 1,000,000 (Johnson 1971, Barry 1968, Watson and Divoky 1974).

LOCAL IMPACT

For most species or resources discussed, the impact of local harvests on regional populations is minimal. This is certainly true regarding the impact of Barrow and Wainwright on walrus, and probably holds true for bearded seals, ringed seals and most other species.

Combined bowhead landing by Barrow and Wainwright averaged 13 whales per year from 1987 through 1989. By all estimates, this number is well below the estimated rate of increase of the bowhead population, which range from about 148 to 226 animals per year with current harvest (quota) levels taken into account.

The combined retrieved harvest of walrus by Barrow and Wainwright for respective survey periods averaged 187 animals per year, constituting approximately three to four percent of the average total subsistence harvest for Alaska. Present levels of subsistence harvest may pose some threat to the stability of the walrus population, but the major focus of that harvest is Bering Strait and the north Bering Sea, not the northeast Chukchi coast.

The combined average retrieved bearded seal harvest by Barrow and Wainwright for the same period was approximately 260 animals per year, about eight percent of the total combined US-Soviet take. So far as is known, the present harvest of bearded seals is well within sustainable limits, and there appears to be no immediate threat to this population.

Harvests of ringed seals by residents of Barrow and Wainwright during the survey averaged 469 retrieved seals per year, about 10 to 13 percent of the total for all Alaska. Ringed seal harvests have declined overall in recent years due to changing subsistence patterns, and are thought to be well below sustainable yield levels.

As discussed above, the Western Arctic caribou herd and the Teshekpuk herd seem to be healthy and are increasing at present. It is difficult to say how the harvest is divided between these two herds. It seems unlikely, however, that local harvests are sufficient to adversely affect either population at this time. A combined average of 2,203 caribou per year were taken by Barrow and Wainwright during the study period, amounting to about 0.5 percent of the current population estimate, or about 10 percent of the estimated sustainable yield.

As stated above, it is impossible to evaluate the effect of fish harvests on the various populations at this time. Harvests do seem to be relatively stable, however, which probably indicates that they are within sustainable yields and that populations are being maintained.

The combined average waterfowl harvest taken by residents of Barrow and Wainwright over the study period included 3,464 white-fronted geese, 1,074 brant, 209 non-specified geese, and 6,915 eiders per year. Applying five year average estimates derived from USFWS survey data, as discussed above, this harvest amounts to about three percent of the available white-fronted goose population, two to three percent of the available brant population, and less than one percent of the eider population. So far as is known, all of these harvests are well within sustainable yield limits for these populations.

REFERENCES CITED

- Alaska Consultants, Inc., C. Courtnege, and Stephen R. Braund & Associates
1984 Barrow Arch Socioeconomic and Sociocultural Description. Social and Economic Studies Program, Minerals Management Service, Alaska Outer Continental Shelf Region. Technical Report No. 101.
- Alaska Consultants, Inc. and Stephen R. Braund & Associates
1984 Subsistence Study of Alaska Eskimo Whaling Villages. Prepared for the U.S. Department of the Interior.
- Alaska Department of Fish and Game (ADF&G)
n.d. ADF&G Division of Subsistence Community Profile Database, Communities of Nuiqsut (1985) and Kaktovik (1986).
1976 A Compilation of Fish and Wildlife Resource Information for the State of Alaska. Volume I: Wildlife. Juneau, AK.
- Andrews, C.L.
1939 The Eskimo and His Reindeer in Alaska. Caxton Printers, Ltd. Caldwell, ID.
- Barry, T.W.
1968 Observations on the Natural Mortality and Native Use of Eider Ducks Along the Beaufort Sea Coast. Canadian Field Naturalist. Volume 82, Number 2, pp. 140-144.
- Bockstoce, J.R.
1986 Whales, Ice & Men: The History of Whaling in the Western Arctic. University of Washington Press in association with the New Bedford Whaling Museum. Seattle, WA.
- Bodfish, H.H.
1936 Chasing the Bowhead. Harvard University Press. Cambridge, MA.
- Bodfish, W.
1991 Kusiq: An Eskimo Life History from the Arctic Coast of Alaska. Recorded, compiled and edited by William Schneider in collaboration with Leona Kisautaq Okakok and James Mumigana Nageak. University of Alaska Press.
- Braham, H.W., J.J. Burns, G.A. Fedoseev, and B.D. Krogman
1984 Habitat Partitioning by Ice-Associated Pinnipeds: Distribution and Density of Seals and Walruses in the Bering Sea, April 1976. *In*: F.H. Fay and G.A. Fedoseev, editors. Soviet-American Cooperative Research on Marine Mammals. Volume I: Pinnipeds. NOAA Technical Report NMFS 12.
- Braund, S.R., and D.C. Burnham
1984 Subsistence Economics and Marine Resource Use Patterns. *In* The Barrow Arch Environment and Possible Consequences of Planned Offshore Oil and Gas Development. Prepared for the Outer Continental Shelf Environmental Assessment Program, NOAA/Ocean Assessments Division.

- Braund, S.R. & Associates and Institute of Social & Economic Research
 1988 North Slope Subsistence Study - Barrow, 1987. Technical Report No. 133. Prepared for U.S. Department of Interior, Minerals Management Service.
- 1989a North Slope Subsistence Study - Barrow, 1988. Technical Report No. 134. Prepared for U.S. Department of Interior, Minerals Management Service.
- 1989b North Slope Subsistence Study - Wainwright, 1988. Technical Report No. 135. Prepared for U.S. Department of Interior, Minerals Management Service.
- 1993 North Slope Subsistence Study - Barrow, 1987, 1988 and 1989. Technical Report No. 149. Prepared for U.S. Department of Interior, Minerals Management Service.
- Braund, S.R., S.W. Stoker and J.A. Kruse
 1988 Quantification of Subsistence and Cultural Need for Bowhead Whales by Alaska Eskimos. Stephen R. Braund & Associates, Anchorage, Alaska.
- Brosted, Jens
 1975 Ulgunik: A Report on Integration and Village Organization in Alaska. Translated and typed by James Heimann.
- Brower, C.D.
 1942 Fifty Years Below Zero: A Lifetime of Adventure in the Far North. Grosset & Dunlap, New York. Written in collaboration with Philip J. Farrelly and Lyman Anson.
- Burch, E.S., Jr.
 1985 Subsistence Production in Kivalina, Alaska: A Twenty-Year Perspective. Prepared for Alaska Department of Fish & Game, Division of Subsistence.
- Burns, J.J.
 1967 The Pacific Bearded Seal. Alaska Department of Fish and Game, Juneau, Alaska.
- 1981 Bearded Seal - *Erignathus barbatus* Erxleben, 1777. In: S.H. Ridgway and R.J. Harrison, editors. Handbook of Marine Mammals. Volume 2. Seals. Academic Press, NY.
- Burns, J.J. and K.J. Frost
 1979 The Natural History and Ecology of the Bearded Seal, *Erignathus barbatus*. Alaska Department of Fish and Game. Juneau, AK.
- Burns, J.J., L.H. Shapiro, and F.H. Fay
 1981 Ice as Marine mammal Habitat in the Bering Sea. In: D.W. Hood and J.A. Calder, editors. The Eastern Bering Sea Shelf: Oceanography and Resources. Volume 2. U.S. Department of Commerce, NOAA, Office of Marine Pollution Assessment. Juneau, AK.

- Craig, P.C.
1989 Subsistence Fisheries at Coastal Villages in the Alaskan Arctic, 1970-1986. *In*: Norton, D.W., editor. Research Advances on Anadromous Fish in Arctic Alaska and Canada: Nine Papers Contributing to an Ecological Synthesis. Biological Papers of the University of Alaska. Institute of Arctic Biology, Fairbanks, AK.
- Davis, J.L. and P. Valkenburg
1978 Western Arctic Caribou Herd Studies. Alaska Department of Fish and Game. Juneau, AK.
- Davis, J.L., P. Valkenburg and H.V. Reynolds
1980 Population Dynamics of Alaska's Western Arctic Caribou Herd. E. Reimers, E. Gaare and S. Skjenneberg, editors. Proceedings from the Second International Reindeer/Caribou Symposium, Roros, Norway, 1979. Direktoratet for Vilt og Frskvaansfisk, Trondheim.
- Fay, F.H.
1982 Ecology and Biology of the Pacific Walrus, *Odobenus rosmarus divergens* Illiger. U.S. Department of the Interior, Fish and Wildlife Service. North American Fauna Series #74. Washington, D.C.
- Fay, F.H. and S.W. Stoker
1982 Reproductive Success and Feeding Habits of Walruses Taken in the 1982 Spring Harvest, with Comparisons from Previous Years. Final Report to the Eskimo Walrus Commission. Nome, AK.
- Fay, F.H., B.P. Kelly and J.L. Sease
1989 Managing the Exploitation of Pacific Walruses: A Tragedy of Delayed Response and Poor Communication. Marine Mammal Science 5(1):1-16.
- Frost, K.J.
1985 The ringed Seal. Unpublished Report, Alaska Department of Fish and Game. Fairbanks, AK.
- Gallaway, B.J., W.J. Gazey, and L.L. Moulton
1989 Population Trends for the Arctic Cisco (*Coregonus autumnalis*) in the Colville River of Alaska as Reflected by the Commercial Fishery. *In*: Norton, D.W., editor. Research Advances on Anadromous Fish in Arctic Alaska and Canada: Nine Papers Contributing to an Ecological Synthesis. Biological Papers of the University of Alaska. Institute of Arctic Biology, Fairbanks, AK.
- Gilbert, J.R.
1989 Aerial Census of Pacific Walruses in the Chukchi Sea, 1985. Marine Mammal Science 5:17-28.
- Impact Assessment, Inc.
1989 Point Lay Case Study. Final Technical Report No. 139. Prepared for U.S. Department of Interior, Minerals Management Service, Alaska OCS Region, Anchorage, Alaska.

- International Whaling Commission
1988 Report of the Scientific Committee. IWC/40/4.
- Ivie, P. and W. Schneider
1979 Wainwright Synopsis. *In*: Native Livelihood and Dependence: A Study of Land Use Values Through Time. North Slope Borough Contract Staff. Prepared for NPR-A, Work Group 1, U.S. Department of Interior, NPR-A, 105 (c) Land Use Study. Anchorage, AK.
- Jackson, S.
1905 Fourteenth Annual Report on Introduction of Domestic Reindeer into Alaska with Maps and Illustrations. Washington: Government Printing Office. 58th Congress, 3d Session, Senate Document No. 61.
- Johnson, L.L.
1971 The Migration, Harvest and Importance of Waterfowl at Barrow, Alaska. M.S. Thesis, University of Alaska, Fairbanks.
- Kelly, B.P.
1988a Bearded Seal, *Erignathus barbatus*. *In*: Lentfer, J.W., editor. Selected Marine Mammals of Alaska: Species Accounts with Research and Management Recommendations. U.S. Marine Mammal Commission. Washington, D.C.
1988b Ringed Seal, *Phoca hispida*. *In*: Lentfer, J.W., editor. Selected Marine Mammals of Alaska: Species Accounts with Research and Management Recommendations. U.S. Marine Mammal Commission. Washington, D.C.
- King, R.J.
1987 Aerial Goose Survey in the Teshekpuk Lakes Area, Alaska - 1987. U.S. Fish and Wildlife Service, Migratory Bird Management, Fairbanks, AK.
- King, R.J. and S.L. Cain
1987 Aerial Waterbird Surveys of the Arctic Coastal Plain, Alaska - 1987. U.S. Fish and Wildlife Service, Migratory Bird Management, Fairbanks, AK.
- Littlefield, M.P.
1977 Recommended Decision to the Secretaries of Commerce and the Interior in the Matter of the Request of the State of Alaska to Waive the Moratorium on Nine Species of Marine Mammals and Allow the State to Resume Management. U.S. Department of the Interior. Arlington, VA.
- Lowry, L.F., K.J. Frost, D.G. Calkins, G.L. Swartzman, S. Hills
1982 Feeding Habits, Food Requirements and Status of Bering Sea Marine Mammals. Report from Alaska Department of Fish and Game to North Pacific Fisheries Management Council.

- Luton, H.H.
1985 Effects of Renewable Resource Harvest Disruptions on Socioeconomic and Sociocultural Systems: Chukchi Sea. Technical Report No. 91. Prepared by The John Muir Institute, Inc. for Alaska Outer Continental Shelf Office, Social and Economic Studies Program, Minerals Management Service, Anchorage, Alaska.
- McLaren, I.A.
1958 The Biology of the Ringed Seal (*Phoca hispida*) in the Eastern Canadian Arctic. Fisheries Research Board of Canada Bulletin 118.
- Milan, F.A.
1964 The Acculturation of the Contemporary Eskimo of Wainwright, Alaska. Anthropological Papers of the University of Alaska, Volume 11, Number 2, January 1964, College, Alaska.
- Morrow, J.E.
1980 The Freshwater Fishes of Alaska. Alaska Northwest Publishing Company, Anchorage, Alaska.
- Nelson, R.K.
1969 Hunters of the Northern Ice. The University of Chicago Press, Chicago and London.
1981 Harvest of the Sea: Coastal Subsistence in Modern Wainwright. A Report for the North Slope Borough's Coastal Management Program.
- North Slope Borough Contract Staff
1979 Native Livelihood and Dependence: A Study of Land Use Values Through Time. National Petroleum Reserve in Alaska 105(C), Field Study 1, U.S. Department of Interior, Anchorage, Alaska. In cooperation with the North Slope Borough.
- North Slope Borough Department of Planning and Community Services
1989 North Slope Borough Census of Population and Economy - Final Report. Barrow, AK.
- Patterson, A.
1974 Subsistence Harvests in Five Native Regions. Report for the Joint Federal-State Land Use Planning Commission for Alaska. Anchorage, Alaska.
- Pedersen, S.
1979 Regional Subsistence Land Use, North Slope Borough, Alaska. Occasional Paper No. 21. Jointly published by Anthropology and Historic Preservation, Cooperative Park Studies Unit, University of Alaska, Fairbanks and by the North Slope Borough, Barrow, AK.
- Popov, L.A.
1976 Status of Main Ice Forms of Seals Inhabiting Waters of the U.S.S.R. and Adjacent to the Country's Marine Areas. FAO ACMRR/MM/SC/51.

- Sonnenfeld, J.
1956 Changes in Subsistence Among the Barrow Eskimo. Unpublished Ph.D. dissertation. Johns Hopkins University. Baltimore, MD.
- Spencer, R.F.
1959 The North Alaskan Eskimo: A Study in Ecology and Society. Smithsonian Institution Bureau of American Ethnology Bulletin 171. Smithsonian Institution Press, City of Washington.
- Stoker, S.W.
1984 Subsistence Harvest Estimates and Faunal Resource Potential at Whaling Villages in Northwestern Alaska. Appendix A, *In*: Alaska Consultants, Inc., with Stephen Braund & Associates. Subsistence Study of Alaska Eskimo Whaling Villages. U.S. Department of the Interior, Washington, D.C.
- University of Alaska, Arctic Environmental Information and Data Center
1978 Wainwright. Prepared for the U.S. Department of the Interior.
- U.S. Department of Commerce
1978 Environmental Assessment of the Alaskan Continental Shelf, Interim Synthesis: Beaufort/Chukchi. Environmental Research Laboratory, National Oceanic and Atmospheric Administration. Boulder, CO.
- U.S. Department of Commerce, Bureau of the Census
1921 Fourteenth Census of the United States Taken in the Year 1920, Volume I, Population, 1920, Number and Distribution of Inhabitants. Prepared under the supervision of William C. Hunt. Washington Government Printing Office.
- 1932 Fifteenth Census of the United States: 1930, Outlying Territories and Possessions, Number and Distribution of Inhabitants, Composition and Characteristics of the Population, Occupations, Unemployment and Agriculture. Prepared under the supervision of Starke M. Grogan. United States Government Printing Office, Washington.
- 1942 Sixteenth Census of the United States: 1940, Population, Volume I, Number of Inhabitants, Total Population for States, Counties, and Minor Civil Divisions; for Urban and Rural Areas; for Incorporated Places; for Metropolitan Districts; and of Census Tracts. Comprising the First Series of Population Bulletins for the States, Territories, and Possessions. Prepared under the supervision of Dr. Leon E. Truesdell. United States Government Printing Office, Washington.
- 1952 Seventeenth Census of the United States, Census of Population: 1950, Preprint of Volume 1, Chapter 51. Number of Inhabitants - Alaska. Population Census Report P-A51.
- 1961 The Eighteenth Decennial Census of the United States, Census of Population: 1960, Volume I, Characteristics of the Population, Part A, Number of Inhabitants, Total Population Counts for the U.S., States, Outlying Areas, Counties, Cities, Standard Metropolitan Statistical Areas, Urban and Rural, etc. Prepared under the supervision of Howard G. Brunsman.

- 1972 1970 Census of Population, Volume I: Characteristics of the Population, Part A: Number of Inhabitants, Section 1: United States, Alabama-Mississippi. U.S. Government Printing Office, Washington, D.C.
- 1981 1980 Census of Population. Alaska: Number of Inhabitants. PC80-1-A3.

U.S. Federal Register

- 1979 Taking of Certain Marine Mammals: Waiver of the Moratorium, Final Environmental Impact Statement. Volume 44, Number 8.

U.S. Fish and Wildlife Service

- 1991 Waterfowl Survey Data from Migratory Bird Management Division.

U.S. Interagency Task Group Report

- 1976 Considerations of the Moratorium and Return of Certain Marine Mammals to the State of Alaska. Washington, D.C.

Watson, G.E. and G.J. Divoky

- 1974 Marine Birds of the Western Beaufort Sea, pp. 681-695. *In* J.C. Reed and J.E. Sater (eds.), *The Coast and Shelf of the Beaufort Sea*. Arctic Institute of North America, Washington, D.C.

Worl, R. and C.W. Smythe

- 1986 Barrow: A Decade of Modernization. The Barrow Case Study. Prepared for the U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Alaska OCS Socioeconomic Studies Program.