

SUBSISTENCE HERRING FISHING IN
THE NELSON ISLAND DISTRICT AND
NORTHERN KUSKOKWIM BAY, 1987

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ABSTRACT

This report summarizes research done in 1987 on subsistence herring production by residents of five communities and one seasonal camp in the Nelson Island and north shore of Kuskokwim Bay. Research was conducted by a team of three people who administered surveys to all families who fished for herring for subsistence, made on-site calculations of harvests, mapped herring production facilities and use areas, and observed all aspects of the fishery. This was the second year of a two-year project involving the Nelson Island communities; the two years of data are briefly compared and contrasted.

The 1987 harvest of herring was 124 short tons by the four Nelson Island communities of Newtok, Tununak, Toksook Bay, and Nightmute, which is approximately 226 pounds per capita for the Nelson Island population. This represents a 25 percent decrease in harvest from 1986.

Harvesting and processing methods of subsistence herring production were essentially the same as in 1986 in the Nelson Island communities, as was the high level of community involvement in the fishery. Production was accomplished by multi-household extended family kin groups which harvested and processed herring for local family consumption.

Kipnuk is located on the north shore of Kuskokwim Bay. Kipnuk herring harvests were estimated at 14.4 short tons for a per capita harvest of 58.5 pounds. Kipnuk also demonstrates a high participation rate in the subsistence herring fishery.

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INTRODUCTION

This report is a summation of data collected between May and July 1987 as the second year of a three-year assessment of the subsistence use of herring in the Nelson Island District (Pete 1984; Pete and Kreher 1986)(Fig. 1). Four communities--Tununak, Toksook Bay, Nightmute, and Newtok--as well as the fish camp of Umkumiut, were surveyed to document harvest levels and related information regarding subsistence use of herring.

The community of Kipnuk (Fig. 1) was also surveyed to document subsistence herring use and harvest levels. Kipnuk residents submitted a proposal to the Alaska Board of Fisheries for the development of a commercial herring fishery near their community in 1986. This new herring fishery would target a resource currently used solely for subsistence by the residents of Kipnuk. Many concerns about the affects of commercial fishing on subsistence uses of herring voiced by Nelson Island residents are shared by the people of Kipnuk (Hemming, Harrison, and Braund 1978; Lenz 1980; Pete 1984).

PURPOSE

With rapid intensification of the Nelson Island commercial herring fishery, it is important to gain an effective understanding of all herring uses for sound management. Continual and periodic monitoring of subsistence use and harvest levels of

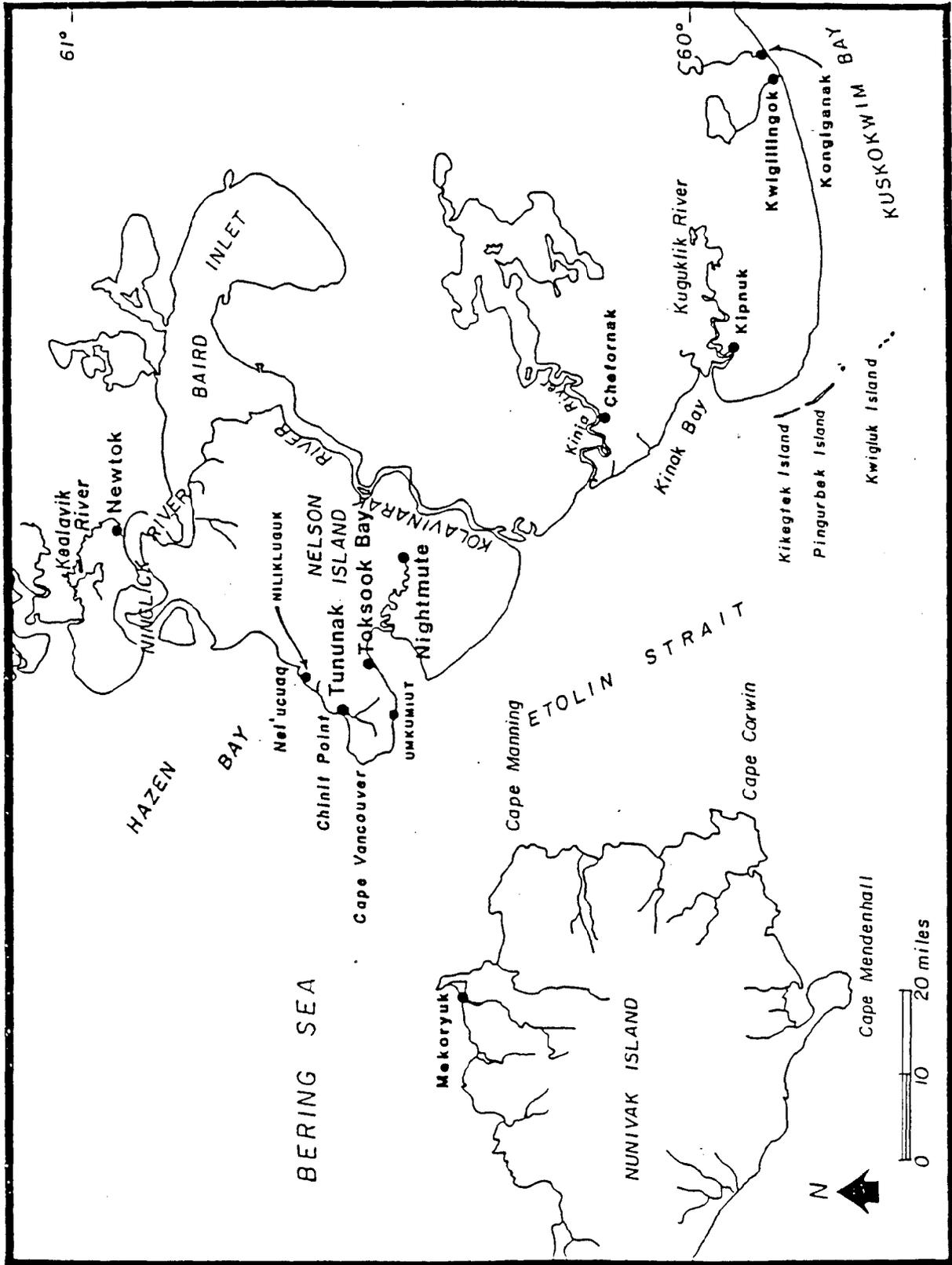


Fig. 1. Location of Communities in the Nelson Island area.

herring overtime shows patterns or cycles of use and range of harvests by communities. This information is critical to informed decision-making on management and allocation of the herring resource.

In 1987 Kipnuk was added to the study sample at their request. Kipnuk residents submitted proposals in 1986 to open commercial fishing on herring stocks that swim inshore near the community. They were aware of the need by the Board of Fisheries for current information on subsistence harvest of herring by their community in order to knowledgeably consider their proposals.

METHODOLOGY

Permission to continue the research for another year and for logistical planning was maintained in the same manner as the previous year by contacting community officials (Pete and Kreher 1986). Data gathering methods included a systematic survey, topically focused interviews, formal and informal discussion, attendance at public meetings, and participant observation. Fieldwork, conducted by four researchers, (a Subsistence Resource Specialist II, a Graduate Intern II, and two volunteers), occurred during all phases of the subsistence herring fishery. It was the the second year of participation in this project for the resource specialist and the graduate student.

As scheduled, one volunteer departed early in the field season to meet other responsibilities, just as the second

volunteer arrived. The team of three researchers traveled to each of the five communities surveyed. The Yup'ik speaking resource specialist conducted interviews while mapping, measurement of new drying racks, and quantification of harvest was done by the intern and volunteer. In general, procedures for collection and analysis of data followed those established during the 1986 season in the Nelson Island villages (Pete and Kreher 1986:3-4). The 1986 survey form was modified slightly for easier data compilation.

Household censuses compiled in 1986 for each community were updated and surveys were administered to 128 fishing families or production units. This represents a 100 percent sample of all subsistence herring production units in those communities in 1987 (Table 1). Production units are multi-household, extended family groups that cooperate in herring production (Pete and Kreher 1986). The community census compiled previously by the village council of Kipnuk was updated. Some (6 percent) Kipnuk and Nightmute fishing families were contacted by telephone from Bethel after the field season to fill in data gaps.

Some data sets on the survey form were not collected in Kipnuk because they would not be comparable to Nelson Island data. For example, drying racks were not measured in Kipnuk as they are general purpose meat and fish drying racks; there were other subsistence products on some racks along with herring. Also, some were situated close to or were attached to storage structures in such a way as to make them difficult to measure. The location of

TABLE 1. 1987 POPULATION AND HOUSEHOLD SIZE AND NUMBER
OF FISHING FAMILIES INTERVIEWED IN NELSON ISLAND
COMMUNITIES, AND KIPNUK

Village	Population	Number of Households	Average Household Size	Number of Production Units Interviewed*	Number of Households Involved in Production
Newtok	203	39	5.2	12	22
Tununak	314	66	4.8	34	56
Toksook Bay	411	76	5.4	35	63
Nightmute	165	29	5.7	15	19
Subtotal	1,093	210	5.2	96	160
Kipnuk	498	94	5.3	32	56
Total	1,591	304	5.2	128	216

*This represents a 100 percent sample of subsistence herring production units in all communities.

these racks were noted, however, in order to associate them with the appropriate households. Data on effort for harvest of roe-on-kelp was not gathered because no kelp grows in the vicinity; herring spawn on eel grass (Hemming et al. 1987; Pete 1984). Some respondents reported that a few residents were planning to collect roe on other substrates, such as eel grass, peeling the roe and seeing how edible it was. This activity was never substantiated by the researchers, primarily because most spawning had already occurred before they were in the community.

COMMUNITY CHARACTERISTICS

The 1986 report includes a general depiction of community facilities, political organizations, income levels and services in Nelson Island communities; researchers did not observe major changes in those aspects (Pete and Kreher 1986). Population figures for the five communities in this study based on the updated censuses are listed in Table 1. There were 1,591 people in the five communities distributed among 304 households in 1987 (Table 1). Population figures for Nelson Island villages are similar to last year's figures.

Kipnuk, or *Qipneq*, meaning "bend in a river," is similar to the other Nelson Island communities, having comparable services and facilities, lacking many opportunities for regular, year-round, employment, being relatively isolated, and predominantly Yup'ik Eskimo (99 percent). There is one significant difference:

Kipnuk has never been incorporated as a municipality through the state code, and neither has it officially organized under the federal Indian Reorganization Act (IRA) for IRA or "traditional" council status. They are federally-recognized as a "village" council with tribal status for funding purposes. This status affords them more local power in many public matters; they are not as restrained through subscription to state or federal guidelines regarding municipalities or chartered tribes.

This was the third year of the commercial herring fishery in the Nelson and Nunivak Island districts. There was a 60 percent overall increase in the number of permit holders from the 1986 season, however, the four Nelson Island communities accounted for only four percent of the increase (Table 2; Pete and Kreher 1986:10). Permit holders from all other places, excluding Kipnuk, accounted for 72 percent of the increase. However, the proportion of permits used decreased in 1987; only 37 percent of all permits were used compared to 42 percent in 1986. Nevertheless, proportionately more local people (53 percent) were involved in the commercial fishery in 1987, especially from Tununak and Newtok (Table 2). This was the first time in the three-year span of the fishery that the north shore of the island was ice-free throughout the whole fishery, allowing them relatively full participation. Permits held by residents of the Kuskokwim region, excluding the four Nelson Island villages, accounted for 27 percent of all permits used.

TABLE 2. NUMBER OF PERSONS HOLDING AND USING NELSON AND NUNIVAK ISLAND DISTRICT COMMERCIAL HERRING ROE FISHING PERMITS BY VILLAGE IN 1987^a

Village	Total Permit Holders	Number Permits Used ^b	Percent Village Permits Used	Percent of Total Permits Used	Average # Permits Per Household
Newtok	24	16	67%	6%	.62
Tununak	58	43	74	16	.88
Toksook Bay	80	62	78	24	1.05
Nightmute	26	18	69	7	.90
Subtotal:	188	139	74	53	.90
Kipnuk	63	31	49	12	.67
Subtotal: 5 Villages	251	170	68	65	.83
All other Places	447	91	20	35	
Total	698	261	37	100	

^aSource: Commercial Fisheries Entry Commission (CFEC).

^bSource: Alaska Department of Fish and Game, Division of Commercial Fisheries.

SUBSISTENCE HERRING ACTIVITIES, 1987

Geographic Use Areas

Use areas for the 1987 subsistence herring harvest in the Nelson Island district were generally the same as those described in 1986 with some expansion (Pete and Kreher 1986:10-11)(Fig. 2). Local weather conditions, in some cases, determined where people fished, but as a rule, harvesters used areas known to be consistently productive and relatively close to the community or camp processing areas (Fig. 2). Newtok fishermen expanded their fishing area in the Ninglick River outlet. The waters between Uluruk and Atrnak points were fished for herring, primarily by Toksook Bay fishermen who took a portion of their commercial catch home for subsistence use.

Kipnuk residents focused subsistence herring fishing around the sand bars and barrier islands near the mouth of the Kukuglik River (Fig. 3). The primary use area during 1987 was the waters between the mouth of the Kukuglik River and the north end of Kikegtek island as well as the east sides of Kikegtek and Pingurbek islands (Fig. 3).

The use areas for the harvest of beach grass or *taperrnat* and roe-on-kelp or *elquat* are the same as those described in 1986 (Pete and Kreher 1986)(Fig. 2).

A different, but unspecified, species of grass--*kelugkat* (plural; this term is also used for sinew thread)--is used by some

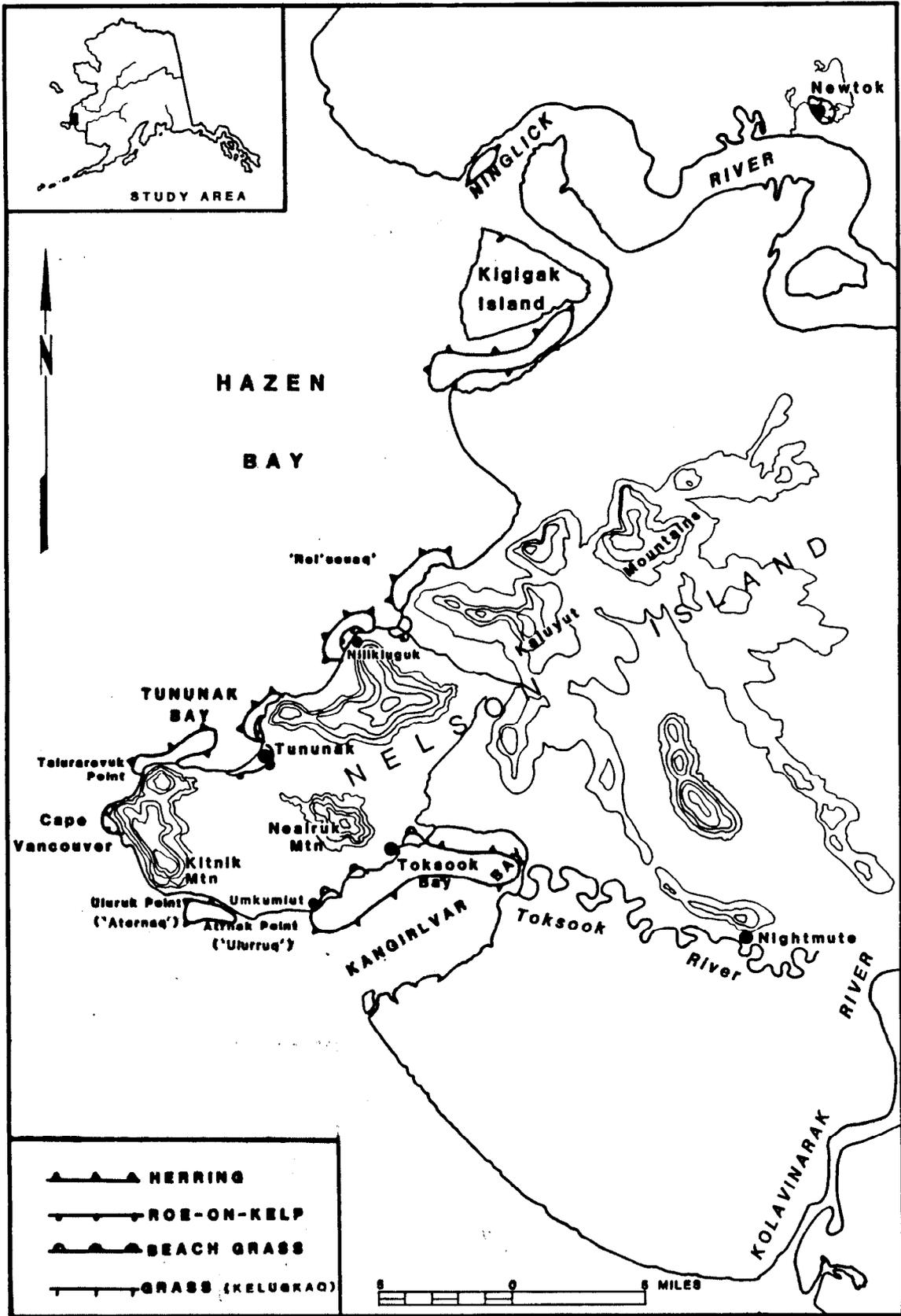


Fig. 2. Areas used by Nelson Island residents for subsistence herring fishing and roe-on-kelp, beach grass, and "kelugkaq" collecting in 1987.

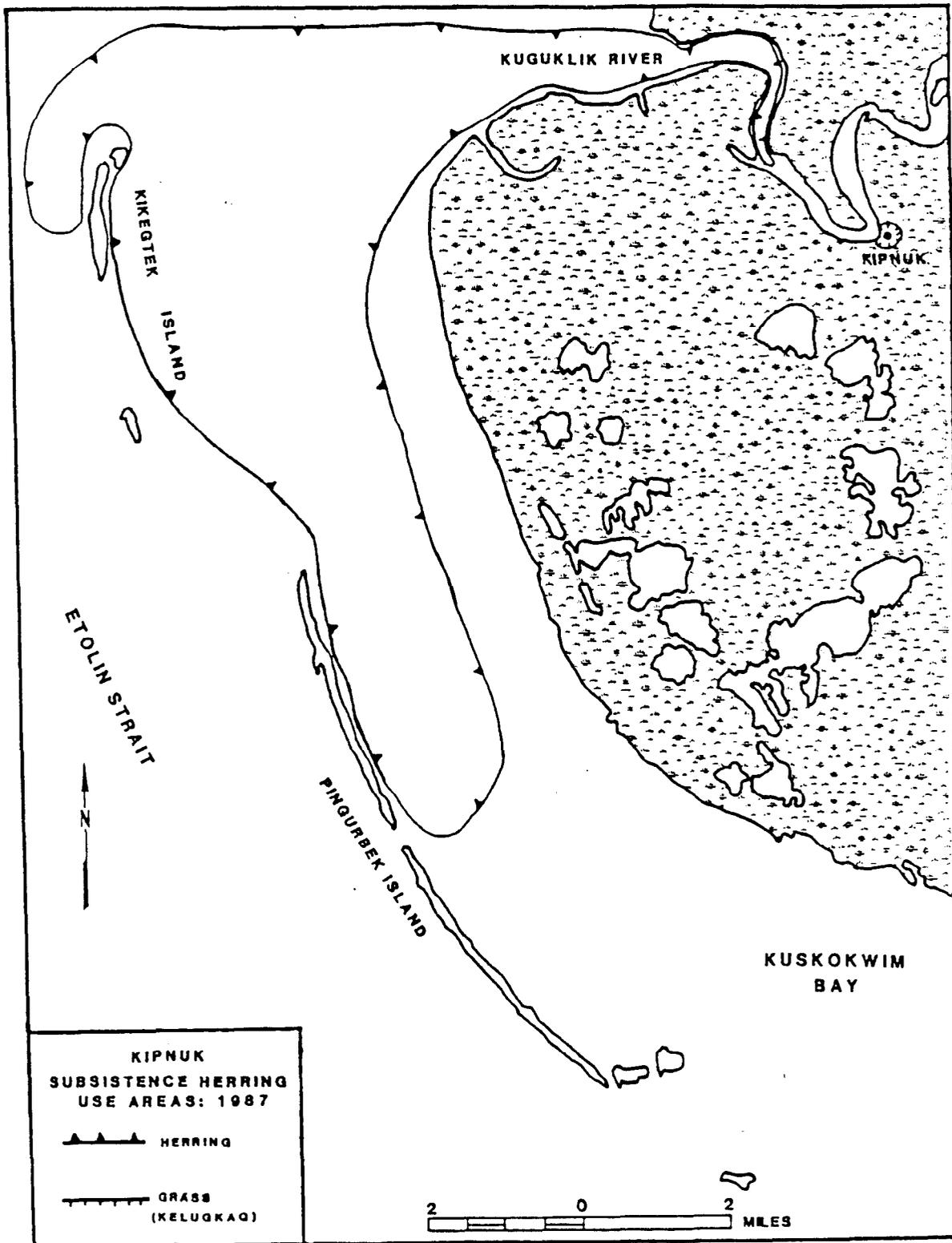


Fig. 3. Areas used by Kipnuk residents for subsistence herring fishing and "kelugkaq" collecting in 1987.

Newtok women to supplement *taperrnat*, and almost exclusively used in Kipnuk for braiding herring. *Taperrnat* does not grow in any appreciable amount near Newtok, and is not local to Kipnuk at all. *Kelugkat* grows around inland wet tundra lakes into stands up to approximately four feet in height. Processors using *kelugkat* for braiding herring need thicker strands than if they were using *taperrnat*, as the former is not as tough. *Kelugkat* is gathered in the immediate vicinity of both Newtok and Kipnuk (Figs. 2 and 3). Most *kelugkat* collected by Kipnuk women is taken from the shores of lakes near the airstrip at Kipnuk (Fig. 3). Most *taperrnat* is used for basket making, with the "old" or less resilient bunches used to supplement *kelugkat* in braiding herring. Some women from Kipnuk trade for *taperrnat* with relatives in Chefornek, or buy it from women from Platinum and Goodnews Bay when they go to work at Bristol Bay canneries.

Herring Harvest Activities

The 1986 report on subsistence herring fisheries provides a complete description of the nature of herring harvest activities in the Nelson Island area (Pete and Kreher 1986). As in 1986, weather was the primary factor affecting daily harvest schedules for 1987. Table 3 presents the total timespan of harvest and the timing of major effort (i.e. when most nets were set and the majority of herring was caught) by community.

TABLE 3. FISHING EFFORT IN NELSON ISLAND AND KIPNUK
SUBSISTENCE HERRING FISHERIES, 1987

Village	Timespan of Harvest (Timing of Major Effort)	Total Fishing Days ^a	# of Pro-duction Units	Average Fishing Days Per Produc-tion Unit	# House-holds Providing Harvester
Newtok	May 25 - June 21 (June 3 - 13)	20	12	1.66	17
Tununak	May 23 - June 15 (June 2, 3, & 7)	79	34	2.32	52
Toksook Bay ^b	May 27 - June 28 (June 7 - 13)	98	35	2.80	51
Nightmute ^c	June 3 - 23 (June 10 - 15)	25	15	1.66	16
Umkumiut ^d	June 7 - 28 (June 10 - 15)	17	7	2.40	9
Kipnuk	June 4 - 20 (June 4 - 8, 10 - 15)	46	32	1.44	41

^aDefined as the aggregate number of days fished by all production units.

^bIncludes one production unit from Nightmute which operated from Toksook Bay.

^cIncludes one production unit which operated from Tununak; they were the only family who fished prior to June 10 from Nightmute.

^dThe figures for Umkumiut harvesters (four production units from Toksook Bay and three from Nightmute) are also included in their respective communities, but are broken out here for comparison.

Overall, there was an increase in fishing time in 1987 for Nelson Island communities. Most notable was 26 more days of fishing in Toksook Bay (Table 3; Pete and Kreher 1986). The longer time for fishing was most attributable to weather as wind and rough seas prevented sustained fishing early in the season. Further, as soon as herring were on the drying racks and before they developed a "tacky" protective coat, a hot, windless, sunny day spoiled a sizable portion of some families' harvests in Toksook Bay. The flesh got "cooked" and rancid; some of it separating from or falling off of the skin after the first rain. Tununak was not as affected by this hot weather as the majority of the herring had been on the racks long enough to develop the protective dry layer. Also, the north side of the island was slightly cooler with an occasional breeze throughout that day. Toksook Bay families replaced some of this loss by fishing again late in the season. This is reflected in the increased fishing time relative to last year.

Concomitant with more fishing days was a higher number of households providing harvesters in 1987 compared to 1986 (Table 3; Pete and Kreher 1986). There was a "turnover" in fishing personnel, particularly for families who fished later in the season as some of the usual fishermen were committed to other activities, such as commercial halibut and/or salmon fishing or being a crew member in Bristol Bay fishing fleets.

In 1987, there were four production units from Toksook Bay and three from Nightmute who fished and processed herring at

Umkumiut. This is an increase of one production unit from Toksook Bay and a decrease of two from Nightmute compared to 1986. One of the Nightmute families did not fish for herring at all in 1987 due to personal circumstances; the other family transported their fish to the village because they wanted the proximity to medical facilities as one in their family had failing health.

Intervillage movement to produce herring occurred also, as it did last year. A woman from Nightmute took her unmarried daughters to her married daughter's home in Tununak to fish for and process herring during the subsistence fishery. This was partly in response to the Tununak family's inability to process the large amount of herring harvested prompted by inclement weather.

One family from Nightmute and two from Chefnak fished from, and processed herring in Toksook Bay using existing but unused racks belonging to relatives in Toksook Bay. This apparently is a regular pattern for this Nightmute family. The two Chefnak families who fished from Toksook Bay were cooperating in harvesting and processing. They had also fished from Umkumiut and had more herring on drying racks owned by relatives from Toksook Bay at Umkumiut. There were not enough unused racks in Toksook Bay. Their harvests were documented and relayed to Division of Commercial Fisheries staff who were responsible for herring harvest data collection in Chefnak in 1987.

Roe-on-kelp Collecting

Typically herring roe-on-kelp harvests coincide with and continue until just after the subsistence herring fishery. As in 1986, relatively few Nelson Island families reported collecting roe-on-kelp. Overall, 22 percent of the production units attempted to harvest herring roe-on-kelp. Local commercial fishery regulations which do not allow commercial roe-on-kelp fishing anywhere in the district reflect local concern over the maintenance of spawning grounds in the area. Similarly, commercial fishing is prohibited near principal spawning areas at Chinit Point and Cape Vancouver (Fig. 2). Low subsistence harvests also demonstrate local concern about conservation of herring roe-on-kelp.

In Tununak, where the majority of subsistence harvests for roe-on-kelp occurred, village officials requested that people collecting roe-on-kelp avoid certain spawning areas. They also recommended harvest methods designed to limit damage to kelp beds, such as using scissors to cut the roe-laden kelp rather than pulling it off of rocks.

Some local people believe that commercial herring harvests at the end of May were so effective that minimal spawn was deposited in the Tununak vicinity. Subsequent runs of herring in June deposited thick layers of spawn on available substrate. Turbulent weather during the same period covered spawn with silt lowering its desirability as food.

Gear

Gear used in the Nelson Island area during the 1987 subsistence herring fishing season varied little from that used in 1986 (Pete and Kreher 1986:33-35). There were slight increases in the average boat size and net length of subsistence gear, primarily due to some families using commercial gear for subsistence fishing. Aside from these minor changes, the subsistence fishing fleet was essentially the same as that in action in 1986. Gill nets ranged in length from 25 to 600 feet, with stretched mesh sizes from 2 to 2-5/8 inches. All but one net was less than 300 feet in length. Outboard powered vessels were 14 to 28 feet in length and made of wood, fiberglass, or aluminum. Subsistence nets are pulled by hand.

In Kipnuk, vessels used for subsistence herring fishing ranged from 16 to 28 feet in length. Twenty-seven of the 32 vessels used were 18-foot aluminum skiffs. Two locally-constructed wooden boats, 21 and 28 feet long were the largest boats used in 1987.

The majority of the nets used in Kipnuk were monofilament and ranged between 25 and 300 feet in length. Stretched mesh sizes ranged from 2 to 2-3/4 inches, with the majority of the nets used having mesh sizes between 2-1/4 and 2-1/2 inches.

Processing and Storage

The general pattern for processing and storage of herring, sac-roe, and roe-on-kelp was described in the 1986 report (Pete and Kreher 1986). As with harvesting, weather played a qualifying role in processing activities in 1987. Harsh weather in early June made cleaning and braiding of herring even more arduous. As mentioned above, poor drying conditions resulted in some spoilage of processed herring in Toksook Bay. Loss of herring due to less than optimal drying conditions is a common risk.

In Kipnuk a sharp-edged knife or *uluaq* is used to open fresh herring. Herring are not aged, but are usually left overnight in above-ground containers, such as commercially bought plastic fish totes or wash tubs, rather than being aged in *elliviit*, or temporary storage pits. Wet tundra conditions in the Kipnuk area prohibits construction of deep, dry pits. Herring are headed, gutted, and most are split open, like *ullipengayiit* in Nelson Island, regardless of fat content. *Ullipengayiit* are herring processed as open "blankets" usually without the backbone; this method of processing is reserved for fatty herring on Nelson Island. Table 4 shows the high percentage (79 percent) of herring processed as *ullipengayiit* at Kipnuk. The herring are then washed. A section of the backbone near the tail is broken so it stands away from the flesh through which it is braided into strings, rather than through the gill section of the attached head as in Nelson Island. Sac-roe is dried at Kipnuk as it is on

Nelson Island, however, it is not aged prior to being spread out to dry.

As previously discussed, herring are hung on multi-purpose drying racks at Kipnuk. This is a major contrast to Nelson Island communities which have specialized racks for herring. Further, some strings of herring included incidentally caught smelt which were noted and subtracted from herring harvest estimates. Smelt were few and generally easy to differentiate because they are processed and braided in the same manner as non-fatty herring are on Nelson Island.

Storage methods at Kipnuk are also different than those on Nelson Island (Pete and Kreher 1986). The use of large open-weave baskets (*tut'at*) is not as prevalent. Instead the dried strings of herring are hung up in the storage shed or cache, or the dried carcasses are put in freezers, or stored half-dried in sealskin pokes with a bit of fresh seal oil.

HARVEST LEVELS

Table 4 illustrates subsistence herring harvest levels for the communities surveyed in 1987. Overall, there was a 25 percent decrease in harvest levels of herring for subsistence use in Nelson Island communities compared to the 1986 harvest of 167 short tons (Pete and Kreher 1986). The total 1987 harvest was 124 short tons. However, 1987 harvests were higher than the 1985 harvest of 108 short tons (Pete, fieldnotes 1985; Alaska

TABLE 4. ESTIMATED 1987 SUBSISTENCE HERRING HARVEST LEVELS FOR
NELSON ISLAND COMMUNITIES AND KIPNUK*

Community	Total Pounds	Total Short/Metric Tons	Average Pounds Per Production Unit	Average Short/Metric Tons Per Production Unit	Total # of Strings (% Ullipeng-ayit)	Pounds Per Capita
Newtok	19,834	10/9	1652.8	.83/.75	463 (8%)	98.0
Tununak	96,070	48/43.7	2825.6	1.4/1.3	2331 (17)	306.0
Toksook Bay	102,762	51/47	2636.0	1.5/1.3	2348 (9)	250.0
Nightmute	28,895	15/13.1	1926.3	1.0/.87	758 (4)	175.1
Subtotal	247,561	124/112.8	2578.8	1.3/1.2	5898 (13)	226.5
Kipnuk	28,878	14.4/13	902.4	.45/.41	597 (79)	58.5
Total	276,439	138.4/125.8	2159.7	1.08/.98	6495 (19)	173.7

*Umkumiut seasonal camp harvests (14,092 pounds) included in totals for Nightmute (7,746.9 pounds) and Toksook Bay (6345.1 pounds).

Department of Fish and Game 1987). Figure 4 graphically shows subsistence herring harvests for Nelson Island for the most recent three years as well as 1978. The 1978 harvest levels, however, reflect a time when herring stocks were low, so harvest was depressed (Hemming et al. 1978; Pete 1984).

Although this research did not focus on individual family's reasons for decreased harvests, there were some evident factors accounting for some of the decrease. A few people noted that they still had some herring from 1986, although the majority said they ran out in April or just before 1987 new season. In Tununak, two families who usually fish for herring for subsistence moved to Bethel during the winter. Although one returned during the subsistence fishery to put up herring, they noted that they were purposely harvesting less herring so as not to overburden family members remaining in Tununak who would have to tend to the herring until they were in storage.

Two production units in Tununak and two in Newtok who usually maintained separate production efforts combined with those of their relatives (either children with parents or siblings sets) in 1987 because of reductions in labor force in their respective units. One production unit in Newtok and another in Nightmute did not fish for herring due either to health problems or other circumstances.

With the calculation of 1.7 short tons as the average harvest per production unit, the loss of seven separate production units in Nelson Island communities could account for approximately

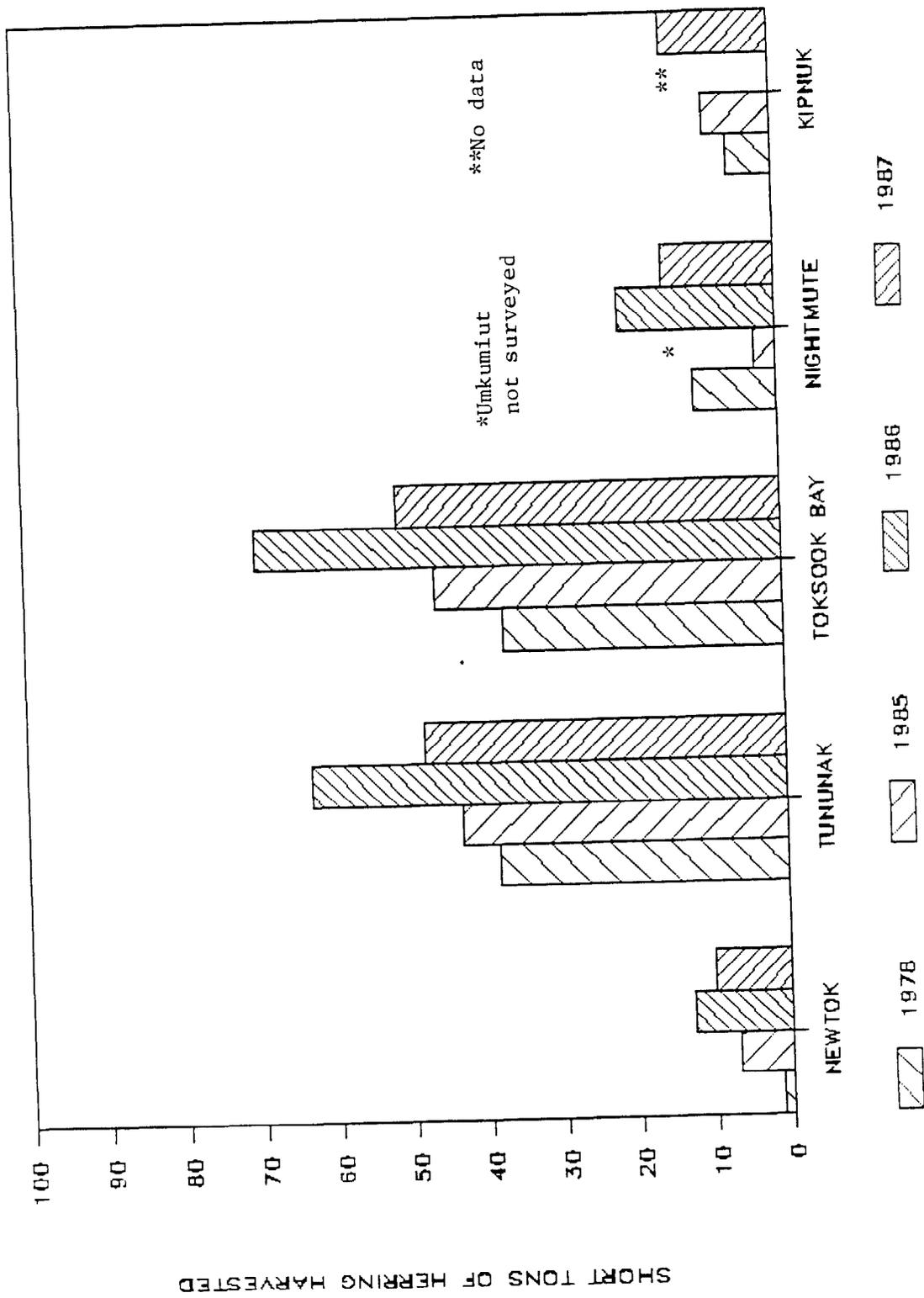


Fig. 4. Estimated subsistence herring harvests by the communities in the Nelson Island district and Kipnuk in 1978, 1985, 1986, and 1987.

12 short tons of the 43 short-ton reduction in harvest between 1986 and 1987. Part of the decrease between 1986 and 1987 may be due to a cycle or pattern of harvest levels not fully discernible with only three years of relatively comparable data. Herring are still an important component of the total subsistence output in Nelson Island villages demonstrated by the per capita harvest of 225.9 pounds in 1987 (Table 4). Further, based on a random sample of over 50 percent of the households in Tununak in 1986, herring accounted for 40 percent of the total subsistence output in pounds of a wide array of resources harvested.

THE PRODUCTION OF HERRING FOR SUBSISTENCE USE

As described in earlier research, the production of herring for subsistence use involves cooperation of kin groups (Fienup-Riordan 1983; Hemming et al. 1978; Pete 1984; Pete and Kreher 1986). Production units are composed of members of a multi-household extended family which is inter- as well as intravillage in scope. Cooperation in the production of subsistence foods is an important mechanism for social integration in Yup'ik society. Data on production units for subsistence herring reflect the high level of community involvement.

The structure of production units is described in the 1986 report (Pete and Kreher 1986); changes in the number of Nelson Island production units were noted above. Production of herring for subsistence use in Kipnuk has the same social organization

TABLE 5. PRODUCTION OF HERRING FOR SUBSISTENCE USE IN THE
NELSON ISLAND DISTRICT AND KIPNUK, 1987

	Newtok	Tununak	Toksook Bay	Nightmute	Kipnuk
Community Population	203	314	411	165	498
Total Community Households	39	66	76	29	94
# of Households Involved	22 (56%)	56 (85%)	63 (83%)	19 (65%)	56 (60%)
# of Production Units	12	34	35	15	32
Average # of Households Per Production Unit (Range)	2 (1 - 4)	2.6 (1 - 5)	2.5 (1 - 4)	1.4 (1 - 3)	2.0 (1 - 4)
Range of # of Persons Per Production Unit	2 - 7	2 - 7	2 - 8	2 - 7	2 - 7
Number of Fishermen	20	92	81	22	62
Average # of Fishermen Per Production Unit (Range)	1.66 (1 - 3)	2.7 (1 - 5)	2.3 (1 - 3)	1.5 (1 - 2)	1.9 (1 - 3)
Number of Processors	35	93	106	35	62
Average # of Processors Per Production Unit (Range)	2.9 (1 - 5)	2.7 (1 - 4)	3.0 (1 - 5)	2.3 (1 - 5)	2.0 (1 - 5)
Total # of Persons Involved	54	155	168	55	119
Number from Local Community	53	142	156	49	118

mechanisms as in Nelson Island villages. Production units in 1987 were, for the most part, very similar in details of numbers of people involved either as fishermen or processors, and average and range in size of the unit (Table 5; Pete and Kreher 1986). Percentage of households involved again was high, ranging from 56 percent in Newtok to 85 percent in Tununak. The "rack managers" or those in charge of production units and their members' activities were essentially the same individuals as last year, so their age structure is the same.

In Nelson Island, essentially the same relatives returned to their families of origin from other communities to help with production of subsistence herring. These relatives were from other Nelson Island villages, other communities in the region such as Chefornek, Hooper Bay, Eek, Akiachak, and Bethel; or from places outside the region including Juneau, Fairbanks, and Seward.

In terms of herring production facilities in Nelson Island villages, only minor changes occurred in proportions of racks used because less herring were harvested. Two sets of drying racks in Tununak were added while three were dismantled due to their decrepit state. Several drying racks in Toksook Bay also were rebuilt or modified. New racks were built by two families in Toksook Bay, and one family in Nightmute replaced an old rack with a new one. As noted above, data on dimensions of general drying racks in Kipnuk were not collected.

DISCUSSION

The subsistence herring fishery in Nelson Island is a significant aspect of the economy of the villages in the area, demonstrated by total harvests, per capita harvests, and, with available data, by the proportionate contribution of herring to total wild resource outputs. Herring are also commercially harvested. Although Kipnuk's harvest is not of the same magnitude as in the Nelson Island villages, the percentage of households involved in harvesting and processing herring for subsistence is comparable (Table 5). The recency of herring in the Kipnuk area may contribute to its lower profile relative to its role in Nelson Island villages (Hemming et al. 1978: Pete 1984).

Division of Subsistence staff has documented data on the subsistence fishery for three consecutive years in Tununak, two consecutive years in Toksook Bay, Newtok, and Nightmute, and two alternate years in Kipnuk. The major differences between the operation of the subsistence fishery among those years has been the varying effects of weather and seas, and the harvests levels.

As noted above, some of the factors affecting harvest levels from year to year include decrease in involvement by a few families due to personal circumstances and some families having herring left from the previous year. Also, yearly changes in subsistence harvest levels may be part of regular fluctuations in subsistence outputs due to weather and other unknown factors which continued harvest monitoring could detect.

REFERENCES

- Alaska Department of Fish and Game
1987 Annual Management Report, Kuskokwim Area: 1985-1986.
Division of Commercial Fisheries, Bethel.
- Commercial Fisheries Entry Commission
1987 Permits Listed by Permit Holder. Microfiche card file,
Alaska Department of Fish and Game, Division of Commercial
Fisheries, Bethel.
- Fienup-Riordan, Ann
1983 The Nelson Island Eskimo: Social Structure and Ritual
Distribution. Alaska Pacific University Press, Anchorage.
- Hemming, James E., Gordon S. Harrison, and Stephen R. Braund
1978 The Social and Economic Impacts of a Commercial Herring
Fishery on the Coastal Villages of the Arctic/Yukon/Kuskokwim
Area. North Pacific Management Council. Dames and Moore,
Anchorage, Alaska.
- Lenz, Mary
1980 You Don't Forget Hunger: In Support of Subsistence Harvest
of Herring in Nelson Island, Western Alaska. Nunam
Kitlutsisti, Bethel, Alaska.
- Pete, Mary C.
1984 Subsistence Use of Herring in the Nelson Island Region.
Alaska Department of Fish and Game, Division of
Subsistence, Juneau, Technical Paper Number 113.

1985 Tununak and Kipnuk fieldnotes.
- Pete, Mary C. and Ronald E. Kreher
1986 Subsistence Herring Fishing in the Nelson Island District:
1986. Alaska Department of Fish and Game, Division of
Subsistence, Juneau, Technical Paper Number 144.

