NORTON SOUND-BERING STRAIT SUBSISTENCE KING CRAB FISHERY UPDATE

by
James S. Magdanz

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ABSTRACT

This update is a continuation of the Division of Subsistence's efforts to document the Norton Sound-Bering Strait subsistence king crab fishery. Since the area was opened to commercial fishing in 1977, subsistence harvests have declined sharply. The Board of Fisheries acted in 1981 and 1982 to restrict the commercial grounds and harvest. The 1982 subsistence harvests in three villages show signs of recovery, although harvests are equal to those of five years ago in only one village. The 1982 subsistence harvest in one village was the lowest in nearly a decade. The recovery may be based in part on recruit crab and prerecruit crab that have not yet been available to the commercial fishery. Local people continue to be concerned about the situation.

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INTRODUCTION

Since May 1980, the Nome office of the Division of Subsistence has been documenting the harvest and use of king crab in the Norton Sound and Bering Strait area. In March 1981, the Division published the results of an extensive survey of area villages in a report titled "Norton Sound-Bering Strait Subsistence King Crab Fishery." In March 1982, the Division published an update to that report, containing the findings of a similar survey in a sample of area villages and comparisons with the previous data. This update repeats the 1982 survey and extends the baseline of harvest and use data for Norton Sound and Bering Strait king crab. In consideration of the changes in membership of the Board of Fisheries, this update will describe in detail the research problem and the methodologies for the update. More discussion can be found in the initial report (Thomas 1981) and the first update (Magdanz 1982), which are available upon request from the Division of Subsistence.

THE RESEARCH PROBLEM

King crab have been a part of winter diets in Norton Sound and Bering Strait villages for as long as elders can remember. Crabbing occurs in the harsh environment of the sea ice in late winter or early spring. It is not often observed by outsiders, and may be overshadowed by concurrent subsistence activities, such as whaling at Southwest Cape on St. Lawrence Island. Before 1977, no one competed with villagers for king crab and no commercial or regulatory studies had been conducted. When the initial surveys and interviews were conducted in 1980 and 1981 (Thomas 1981), it

was discovered that crabs have long been taken and still are being taken (although in lesser numbers) throughout the area, from Little Diomede Island in the north, to Shaktoolik in the south and to St. Lawrence Island in the west. Harvest data for king crab prior to 1970 are sketchy. Until these surveys, no data existed for the villages. Based on the recollections of elders who talk of sled loads of crab they caught themselves, harvests were substantial (Thomas 1981:50). Permit data, although incomplete, exist for Nome beginning in 1978.

In 1976, in anticipation of federal oil and gas lease sales on the outer continental shelf, the National Oceanic and Atmospheric Administration (NOAA) conducted an extensive trawl survey in northwestern Alaskan waters. Among their findings was the presence of an abundance of king crab and tanner crab (Wolotira et al, 1977:217-238). Red king crab were concentrated in Norton Sound, especially in the waters just offshore from Nome. Blue king crab were found to the west near the Strait, around King Island and north of St. Lawrence Island. Tanner crab (opilio) were found in Norton Sound and to the north in Kotzebue Sound. At about the same time, there was an interest in developing a commercial crab fishery. Crab fishermen requested an experimental commercial season in Norton Sound, and in 1977 the Board of Fisheries agreed. There was no harvest guideline during the first year, but in subsequent years the Board approved guidelines ranging from 350,000 - 1,000,000 pounds (in 1978) to 2,000,000 - 5,000,000 pounds (in 1981). The harvest guideline for the 1982 summer commercial season was 500,000 pounds. As the fishery developed, it attracted crabbers from Dutch Harbor, Kodiak, and places as far away as Seattle. The Sound is not as productive as the Southern Bering Sea. However, as the season is scheduled between closures and openings of

more productive waters elsewhere, boats have fished in Norton Sound while waiting for openings further south. With the results of the 1976 NOAA trawl survey as a "road map," the commercial fleet targeted on the red king crab just offshore from Nome. They also ranged throughout Norton Sound, dropping pots near Golovin, near Little Diomede Island, and around St. Lawrence Island. Commercial harvest increased dramatically during the first three years (see Figure 1), but have since declined. The largest catch occurred in 1979, when 2,931,672 pounds (970,962 crab) were harvested. The commercial harvest in the summer of 1982 was less than 10 percent of that figure or 228,921 pounds (63,949 crab). Since 1977, the commercial fleet has harvested 8,335,951 pounds (2,627,289 crab). Nome interests were surprised at the magnitude of the commercial fishery that had developed in their own backyard; no boats from Nome were equipped to compete successfully in the fishing.

As the commercial harvests were accumulating, villagers began to notice their subsistence harvests were shrinking. Permit data from Nome showed that the annual household catch of crab decreased from 125 in 1978 to 16.9 crab in 1981 (Magdanz 1982:12). Golovin crabbers, who had enjoyed an average annual household catch of between 25 and 50 crab until 1980 (Thomas 1981:52), averaged only 1 crab per household in 1981 (Magdanz 1982: 14). Savoonga crabbers who crabbed on the northside of St. Lawrence Island in the mid-1970s averaged between 10 and 60 crab per household per year, but caught only 1.6 crab per household in 1980 (Thomas 1981:93) and only 0.14 crab per household in 1981 (Magdanz 1982:20).

A number of explanations have been advanced for the decline in subsistence harvests , such as changes in the ocean environment, natural fluctuations in crab populations, decline in effort by subsistence crabbers,

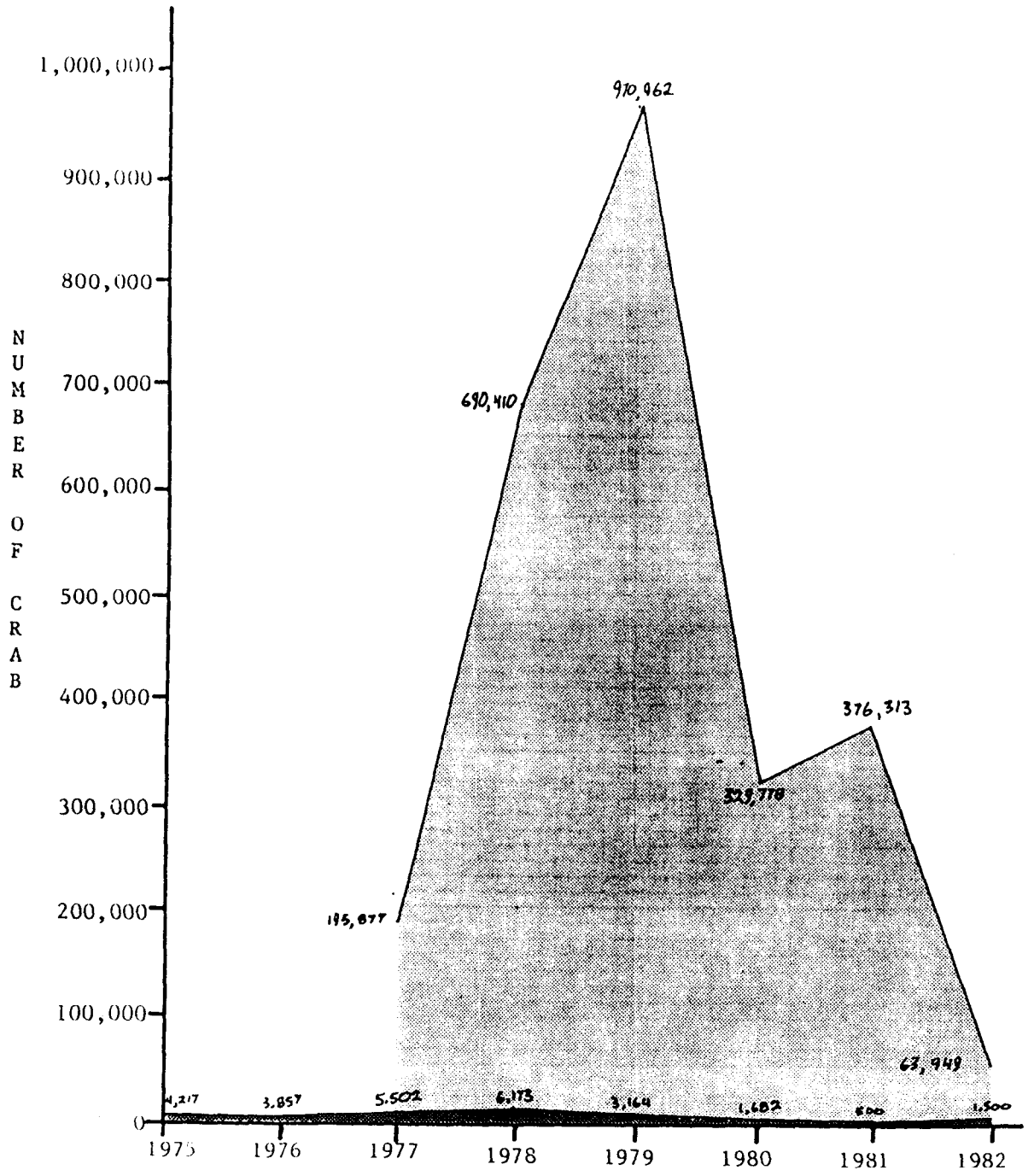


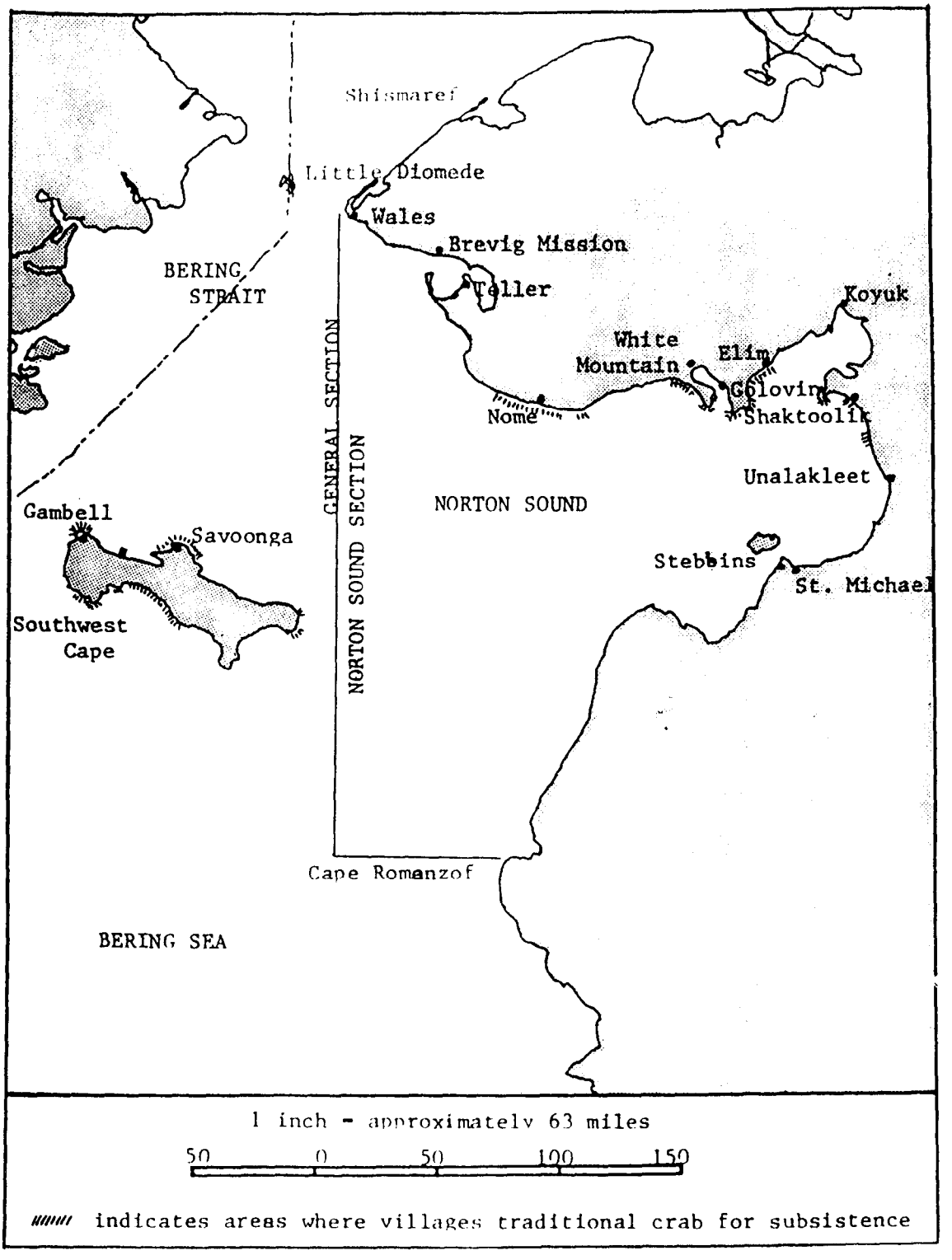
Figure 1: Commercial and subsistence king crab harvests in the Norton Sound Section. The data are graphed to the same scale, with commercial harvests indicated (▇) and subsistence harvests indicated (▒). The subsistence harvest occurs first each year, from January through May. The commercial harvest occurs in July, August, and September. See Appendix 3 for an explanation of the tabulation of the subsistence harvest figures for 1981 and 1982.

changes in the ice conditions, and alteration of crab distribution patterns. But residents of Norton Sound and Bering Strait villages are convinced that the opening of the commercial crab fishery is directly responsible for the decline in subsistence harvests. There were 199 nine crab tagged by the Division of Commercial Fisheries in 1982 during the winter near-shore subsistence fishery; four turned up in commercial pots that summer. Biologists with the Division of Commercial Fisheries agree that the commercial crabbing reduced the population and made fewer crab available for subsistence harvests.

Out of concern for the viability of the Norton Sound crab stocks, as well as for their continued use of crab as a food source, area residents presented the Board with a series of regulation proposals, beginning with a proposal for closure of the commercial fishery in 1981. A closure proposal was presented again in 1982, this time with the endorsement of the newly created Arctic Regional Council. A similar proposal for closure has been submitted this year (proposal number 39).

Management in the Norton Sound-Bering Strait area is complicated because the area falls into two fishery management sections and includes two king crab species. The General Section includes waters north of the latilatitude of Cape Romanzof and east of the International Dateline. The Norton Sound Section includes the waters north of the latitude of Cape Romanzof, east of 168 degrees W longitude, and south of the latitude of Cape Cape Prince of Wales (see Map 1). St. Lawrence Island, King Island and Little Diomede Island are in the General Section, where blue king crab are caught. Management of these stocks occurs through the Division of Commercial Fisheries in Dutch Harbor, 650 miles south of St. Lawrence Island. The coastal villages of Norton Sound are in the Norton Sound

Map 1



Map 1. Norton Sound-Bering Strait fishery management sections.

Section where red king crab are caught. Management of these stocks occurs through offices in Nome. Until this year, the closure proposals would have affected only the Norton Sound Section.

The Board responded to the problem of declining subsistence harvests in essentially two ways.[1] In 1981 it created a near-shore closure of the waters within approximately 15 miles of the mainland and, in 1982 created a near-shore closure of the waters within 3 miles of St. Lawrence Island, Little Diomede Island, and King Island. Commercial boats were not allowed to set pots in these waters (except in one instance discussed below). Second, in 1982 the board reduced the optimum yield from 40 percent of the harvestable male king crab to 20 percent. When the fishery is in progress, the area biologist has management authority. In 1981 the Division of Commercial Fisheries closed four areas (about 15 percent of the Norton Sound Section) to commercial crabbers to distribute effort to areas where little or no effort had occurred. In 1982 the Division relaxed the 15 mile near-shore closure by five miles when it became apparent that the boats were not going to meet the harvest guideline while fishing outside the closed waters. These actions were consistent with Board directives.

Because the 1982 survey showed that subsistence harvests in the area continued to be depressed, the Division of Subsistence continued to monitor the situation. The Division's purpose since 1980 has been to document the history of use, the tools and techniques of the fishery, the

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[1] Before the subsistence harvest declines were documented, the Board lowered the minimum size of legal crab from 5" to 4 3/4". This substanitally increased the allowable commercial harvest. The 4 3/4" minimum is still in effect.

locations of effort, the timing of effort, the preparation, storage and distribution of the catch, and other facets of the fishery. Thomas (1981) presented detailed infomation on these topics. The updates do not repeat his information. Thomas also documented the levels of harvest, year by year, in area villages. These data were used in the 1982 update and will be used in this update to compare current harvests.[1] The purpose of this update is to extend the baseline of harvest data for a selected sample of area villages and to note changes in tools and techniques, in the locations of effort, in the timing of effort, and in other features of the Norton Sound-Bering Strait king crab subsistence fishery during the 1982 season. The objective is to provide comparable harvest data, which can be graphed with data from previous years to show harvest trends in the subsistence fishery.

Three limitations apply to the harvest statistics. First, the statistics for Nome may be incomplete because they are based on permits.[1] Not all crabbers apply for or return permits. The Division of Commercial Fisheries is making a concerted effort to reach crabbers on the ice with permits. If the number of permits issued is any indication, compliance is increasing. Second, infomation from village crabbers derive from inteviews administered in the villages after the crabbing season is complete. These statistics are based on recall. (For a protocol of the questions used in the survey, see Appendix 1.) To minimize the affects of variable

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[1] The data in this, the 1983 update, comes from the 1982 harvest. Likewise, the 1982 update documented the 1981 harvest and the 19881 report documented harvests in 1980 and earlier years. The harvest was continuing as this update was being prepared. March and April are very productive months for most subsistence crabbers, so it would be premature and possibly misleading to present any conclusions now about the 1983 subsistence harvest.

sample size, the statistics are analyzed by computing the average annual catch per house and the average daily catch per house (catch per unit effort or CPUE). Third, Thomas' 1980 survey asked for harvest ranges instead of exact harvests. When he totalled his data, he used midpoints (see Thomas 1981:9-12). For example, people who reported catching 1-5 crab were counted as having caught 3 crab. People who reported catching 25-50 crab were counted as having caught 38 crab. But when people reported catching more than 75 crab (Thomas' highest range), there was no way to compute a midpoint. These cases were counted as having caught only 75 crab, although this understated both harvest totals and harvest averages. Thomas noted this limitation in his report. In the figures in this update, data affected by this limitation is distinguished by a circle around the data. Since subsequent surveys asked for actual harvests instead of harvest ranges, this limitation has been eliminated. Each year brings refinements in the statistical data gathering techniques and the reliability of the harvest total should increase with time. These limitations are unique to the statistical portions of the study. They do not apply to information about tools and techniques, location of effort, and other topics discussed in the report and updates.

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[1] Data in this update do not always agree with data in the Division of Commercial Fisheries reports. In Commercial Fisheries reports, permit design has varied from year to year, incomplete or ambiguous permits have been returned, and different methods have been used for tabulating the data. See the 1978 Annual Management Report (Kuhlmann 1978:129) for details on the "expansion" of the 1978 data. This researcher obtained the original permits and tabulated them using the same procedures year-by-year, as explained in the methodology section.

METHODOLOGY

From the Division's information about the area and from local informants, Thomas identified villages where crabbing regularly occurred. A survey on crabbing effort, locations, harvests and gear for 1979 and 1980, and about harvests for 1970 and 1975-78 was administered in person to residents of Golovin, White Mountain, Elim, Shaktoolik, Gambell, Savoonga and Diomede (Thomas 1981:7). The survey was administered by mail to all post office box holders in Nome. A nearly 100 percent sample was obtained in Golovin, White Mountain, Elim, and Diomede, and a 30 percent sample in Savoonga and Gambell. In addition to the survey, inteviews were conducted with selected, knowledgeable informants about historical harvest, traditional methods, and other topics. Thomas intended that an abridged version of his initial survey be administered in subsequent years to extend his baseline data. The updates fulfill that intent.

For the updates, only selected villages have been surveyed. Personnel, time, and budgets are limited, and Thomas' findings support such a selective approach. As Golovin and White Mountain crab at the same location, a place near Rocky Point known as Ipnatchuaq, only Golovin was surveyed in 1982 and 1983 to represent that area. Similarly, as Savoonga and Gambell crab at Southwest Cape during the whaling season, only Savoonga was surveyed in 1982 and 1983. Shaktoolik was judged by Thomas to be less active in crabbing than the other villages surveyed (Thomas 1981:71-72). Shaktoolik was not surveyed in 1982 or 1983. Ingalik on Little Diomede Island is a very active crabbing village, but unlike other villages had not experienced a decline when Thomas did his survey (Thomas 1981:125). In summary, all heavily used crabbing areas Thomas documented in the Norton Sound Section

and two of the four areas documented in the General Section are represented in the updated data.

Within the selected villages, the same houses were contacted and the same identifying codes were used each year. Thus comparisons can be made of individual cases between Thomas' 1981 report and each of the updates (see Appendix 2). The sample size has grown in two villages. In 1981, the reported harvest in Golovin was so low that a concerted effort was made to made to locate individuals who had been unavailable when Thomas did his survey. Those individuals' houses were added to Thomas' sample and contacted again in 1982. In 1982, the reported harvest in Elim was so low that again a concerted effort was made to locate individuals who had been unavailable in 1980 and 1981. These individuals' houses were added to Thomas' sample and will be contacted again in 1983. In other villages, the sample has remained the same. For Nome data, Thomas relied on his survey, because not everyone obtained or returned permits. The 1982 update compared survey and permit data and found that, while catch totals might not agree, average catches per house were similar with both kinds of data. The Division of Commercial Fisheries is emphasizing compliance with the permit system, and to avoid duplication and confusion, the Division of Subsistence is not administering crab surveys in Nome. This update relies on permit data for Nome.

Village harvest data for this update were gathered during house to house visits by this researcher in Golovin, Elim and Savoonga. Harvest data were gathered using a protocol of questions (see Appendix 1), with answers recorded in a field notebook. Respondents who did not crab were asked only two questions, and the sessions might be relatively brief. The entire protocol was asked with respondents who fished both handlines

and pots for several months. In Savoonga, where crabbers use two locations, the protocol was repeated for each location. Although the primary purpose of the survey was to gather 1982 harvest data, the researcher also asked about the 1983 harvest (whether it had started, success, location of effort, gear, and so forth). Some interviews went beyond simple recitation of harvests. When these interviews provided data pertinent to the study, that data will be included in the findings.

Analysis of the survey data was relatively simple. Totals were calculated for the harvest for each gear type, the number of houses using each gear type, and the number of days reported for each gear type. Data from houses that could not remember either harvest or number of days were temporarily set aside. The following statistics were computed:

1. The total harvest for handlines was divided by the number of houses using handlines, to obtain the average annual catch per house for handlines.

2. The total harvest for pots was divided by the number of houses using pots to obtain the average annual catch per house for pots.

3. The total harvest reported for both pots and handlines was divided by the number of houses that crabbed to obtain the average annual catch per house. This statistic was graphed for each village in the findings section.

4. The total harvest for handlines was divided by the number of days reported by handline users, to obtain the average daily catch per house for handlines.

5. The total harvest for pots was divided by the number of days reported by pot users, to obtain the average daily catch per house for pots.

6. The total harvest for both pots and handlines was divided by the number of days reported to obtain the average daily catch per house. This statistic was graphed for each village in the findings section.

After these statistics were computed, the harvest totals were adjusted by adding data from houses that could not remember their harvest or the number of days they crabbed. In cases where the harvest was supplied, but not the days, the harvest for their case was divided by the average daily catch for other crabbers in that village, and the result was added to the village's "days" total. In cases where the response to a query about days or harvest was "a few", the value "2" was substituted. The value "3" was substituted for "several". Adjusted totals were then figured. The extrapolations are used only to compute adjusted harvest and effort totals, not to compute the average catch per house statistics.

Findings will be arranged village by village, and the presentation will be the same for each village. The narrative will describe the 1982 harvest totals, effort in terms of houses crabbing and days crabbed, the statistical averages and comments villagers had about crabbing, ice conditions, weather, regulations, or other features of crabbing. The narrative will offer comparisons between 1982 and previous years.

FINDINGS

Nome

As outlined in the methodology, the 1982 Nome data come from subsistence permits issued between December 21, 1981, and April 30, 1982 by the Division of Commercial Fisheries. Permit data from 1978 to 1981 are graphed

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[1] Two of the Nome harvest figures in the 1981 update were incorrect; pounds of crab were reported as numbers of crab. The effect of this error was to inflate the average annual catch per house and the average daily catch per house, making subsistence crab returns seem higher than they actually were. Figure 2 includes the corrected data. The harvest in 1980 was 213 crab and in 1979 was 275 crab, not 500 each year as stated in the 1981 update.

for comparison with survey data from Thomas' 1981 report (Figure 2).

After three years of low harvests, Nome crabbers reported an increased harvest in 1982. Permits show 1,288 crab caught in 1982, compare to 371 in 1981, 213 in 1980, and 275 in 1979.[1] Although the 1982 harvest was greater, it was still only 10 percent of the 1978 harvest of 12,506. 9 in 1980, 15 in 1979, and 149 in 1978. (More than 150 permits have been issued as of mid-February 1983 for the 1983 season). The number of days spent crabbing increased in proportion to the number of people who crabbed, 541 days in 1982 compared to 198 in 1981 and 50 in 1980.

In terms of average catches per day and per year per house, the average catch per house in 1982 was 24.7 crab, up slightly from 16.9 in 1981, 23.7 in 1980, and 18.3 in 1979 (Figure 2). The year 1978 still stands apart; that year the average catch per house was 125.0 crab.

The most revealing statistic, average daily catch per house (or CPUE) was 2.3 crab in 1982, compared to 1.8 in 1981, 4.3 in 1980, 3.2 in 1979 and 15.4 in 1978 (Figure 2). Note that the permit data and the survey data show very similar average daily and annual catches, although the catch totals reported by the two instruments differ.

Early returns from Nome crabbers in 1982 were promising (see Regnart and Schwarz 1983:5). But a strong north wind blew the ice out in mid-February. A number of people lost their pots -- including the Division of Commercial Fisheries -- and some ended their efforts. One permittee simply scribbled across his permit "did not get any crab, lost pots." Those crabbers that did try on the reformed ice were not as successful as before. A similar phenomenon seemed to be occuring this winter. Crabbers started out with daily pot catches of 10 or 20 crab, but success quickly dropped off to only 2 or 3 crab per pot in some areas. Most of

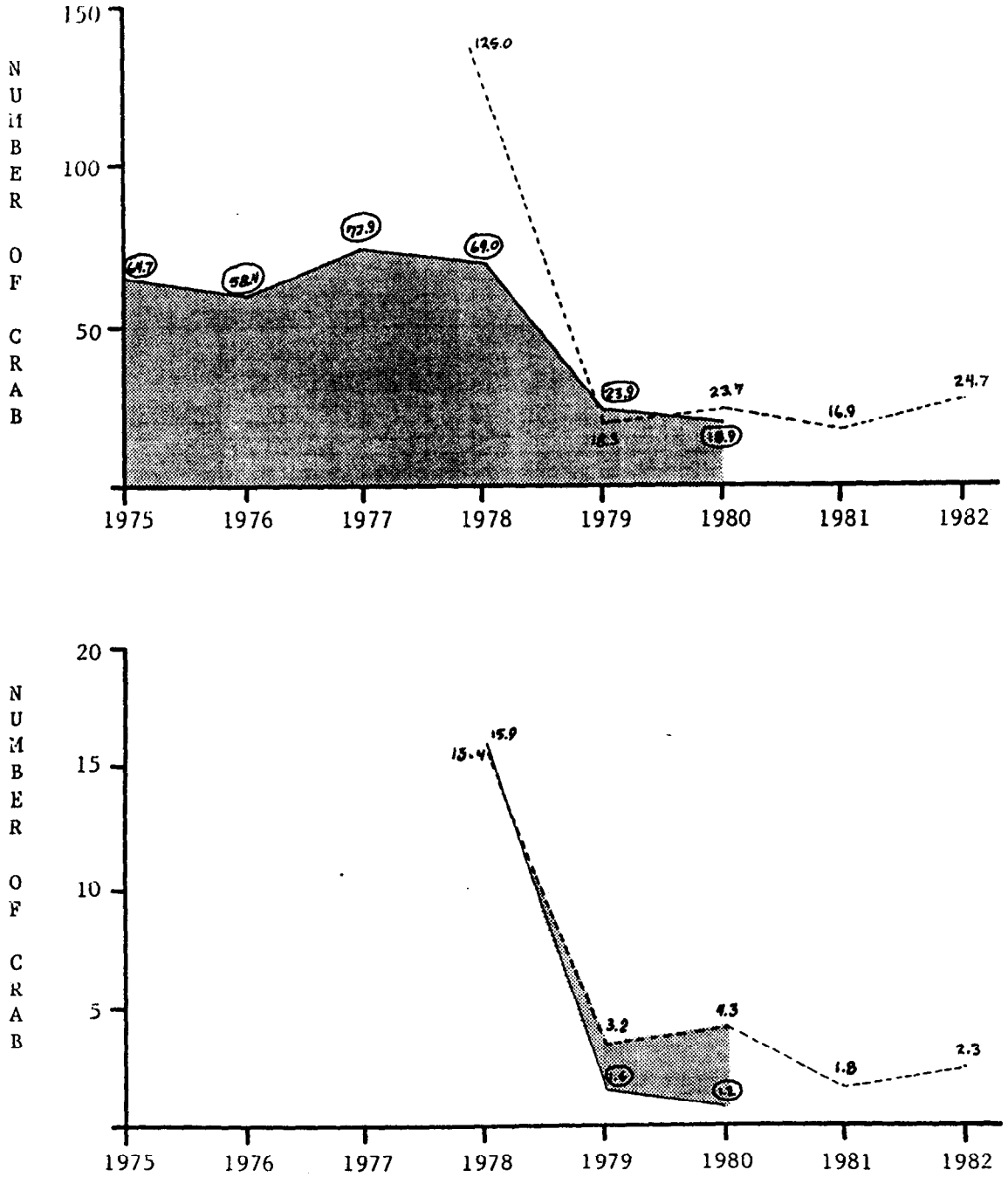

Figure 2: Average annual catch per house (top) and average daily catch per house (bottom) reported in Nome from 1975 to 1982. Solid lines (——) represent data from Division of Subsistence survey. Dotted lines (----) represent data from Division of Commercial Fish permits.

Circled data are minimums. See note in methodology section.

the crab caught in 1982 and many of the crab caught this year are recruits or pre-recruits. Only occasionally does a crabber report catching a "lunker" crab. Effort is up for the second year in a row; more than 150 permits had been issued by mid-February. The ice, though rough, has resisted several strong north winds and appears solid enough to stay in place until break up, which would allow nearly continuous crabbing from late December through mid-May. The ice in front of Nome is dotted with crab holes for lines and pots, from Fort Davis (three miles east) to Dredge Number 6 (three miles west). The solid ice, the increased effort, and the apparent compliance with the permitting system should result in very good data for 1983.

Golovin

Golovin data comes from a survey conducted in October and November in Golovin. This researcher was involved in a six-month-long field project as part of a baseline study on Golovin subsistence. The crab data was gathered in connection with a resource survey involving more than 100 other subsistence resources. Note that in the raw data summary (Appendix 2) several Golovin houses are grouped; this reflects an increased understanding of the organization of subsistence production in Golovin.

After an abysmal harvest in 1981 (4 crab for the entire village), Golovin enjoyed a partial recovery in 1982. The catch reported by all village houses was 164 crab, compared to 201 in 1980 and 356 in 1979. Effort was up sharply; 14 houses reported crabbing in 1982, compared to only 4 in 1981, 8 in 1980, and 12 in 1979. However, days spent crabbing was about the same, 36 in 1982 compared to 34 in 1981. Golovin crabbers crabbed 55 days in 1980 and 64 days in 1979.

The average annual catch per house increased from 1 crab in 1981 to 11.7 in 1982, but was not as high as 1980 and 1979 when crabbers reported catching 25.1 crab and 29.7 crab per house, respectively (Figure 3). The average daily catch per house increase from 0.1 crab in 1981 to 3.2 crab in 1982, which was not quite as high as averages reported in 1980 and 1979 when crabbers caught 3.7 and 5.6 crab per day, respectively.

Crabbing conditions were reasonably good for Golovin crabbers in 1982. They usually crab with White Mountain people near Rocky Point, where strong currents frequently carry away the ice. One Golovin woman actually fell through the ice at Ipnatchuaq last spring, but was prepared for it with a change of clothes and kept on crabbing. Most of the Golovin crab were caught in April.

During the summer, the Division of Commercial Fisheries loaned a crab pot to a fisherman in Golovin. The researcher helped fish that pot during August when the commercial fishery was going on. With only a 22-foot skiff, we were reluctant to set far offshore, but set at sites that the Golovin fisherman knew to be productive in the winter. We caught only two small hair crab (telmessus cheiragonus) during the month and no king crab. The pot was pulled up in early September as storms increased. It was reset in February 1983 and was fished for two weeks at Ipnatchuaq with no success. It was moved to Chiukak and fished for two days before being buried in a "house size" pile of rubble and lost. Some handline effort was reported informally to this researcher in February 1983, but no crab had yet been caught.

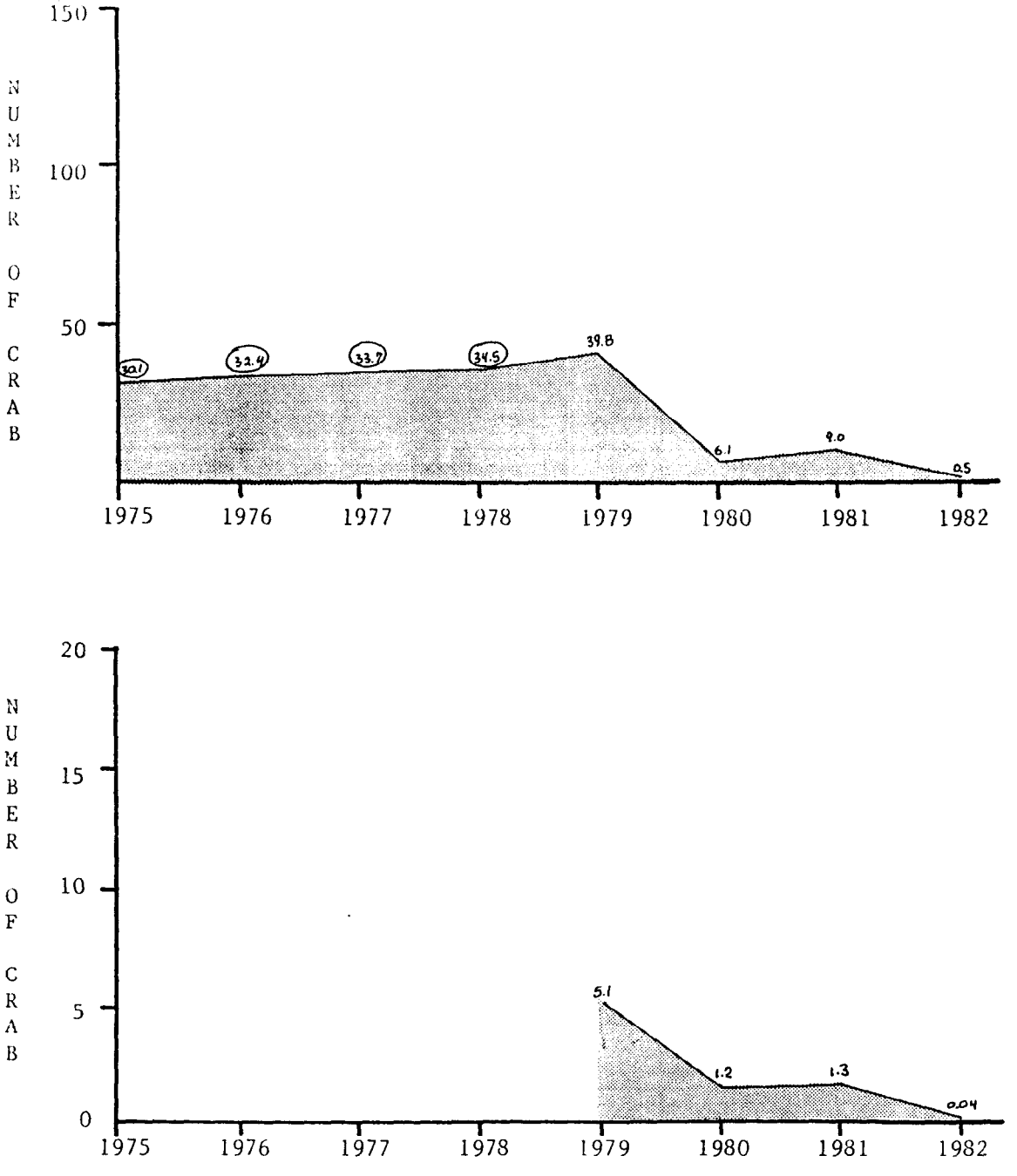

Figure 3: Average annual catch per house (top) and average daily catch per house (bottom) in Golovin from 1975 to 1982. Total harvest reported by 14 houses in 1982 was 164 crab.

Elim

Elim data comes from a survey conducted in Elim by this researcher between February 4 and February 9, 1983. Elim, the most southernly of the villages surveyed for the updates, suffered its lowest harvest to date in 1982, one year after Golovin hit bottom and two years after Nome. The total harvest reported for the village of Elim in 1982 was 7 crab, compared with 99 in 1981, 86 in 1980, and 637 in 1979. Despite the poor harvest, effort was steady. In 1982, 13 houses reported crabbing, compared to 11 houses in 1981, 14 in 1980, and 16 in 1979. The number of days spent crabbing was the highest since surveying began, 157 compared with 75 in 1981, 52 in 1980, and 57 in 1979. But this figure is affected stongly by one crabber, who reported a 90-day pot soak without harvesting a single crab. That individual aside, crabbing effort was similar to effort in past years.

Although the 90-day soak above affects the averages reported for Elim, even without it the average annual catch per house and the average daily catch per house would be by far the lowest ever reported for Elim. In 1982, the average annual catch per house was only 0.5 crab, compared to 9.0 in 1981, 6.1 in 1980, and 39.8 in 1979 (Figure 4).

The average daily catch per house in 1982 was 0.04 crab, which equals the all-time low CPUE reported at Savoonga (northside) in 1981. That compares to 1.3 crab per day in 1981, 1.2 in 1980, and 5.1 in 1979.

Ice conditions were reasonably good, effort was as high as ever, crabbers ranged over 25 miles from the village. This suggests that the poor 1982 harvest was due to lack of crab. "Nothing happened, they didn't even chew the bait," said one crabber. "No use to crab when they don't eat the bait." In years past, Elim people caught crab even after the ice

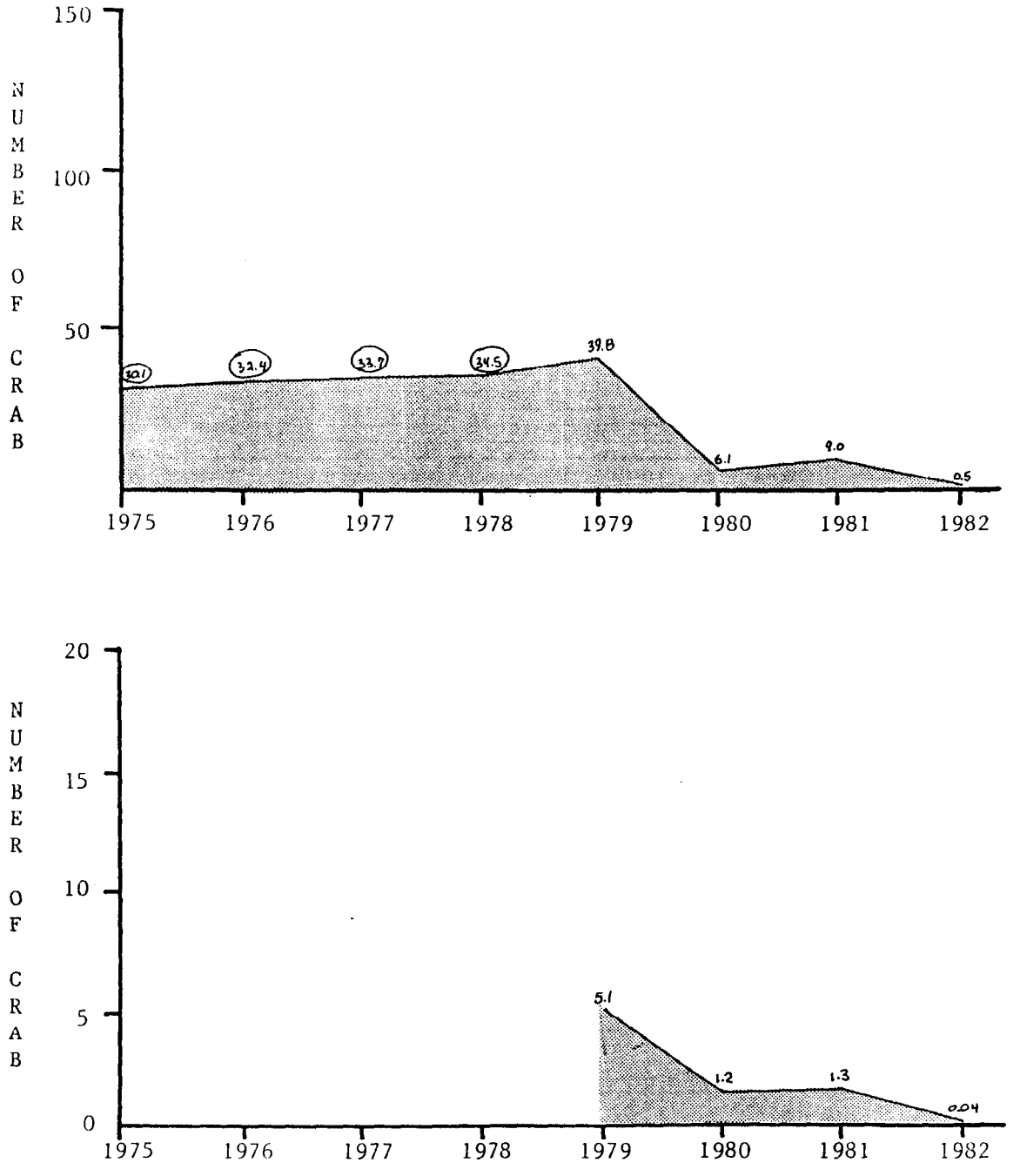

Figure 4: Average annual catch per house (top) and average daily catch per house (bottom) in Elim from 1975 to 1982. The total harvest reported by 13 houses in 1982 was 7 crab.

Circled data are minimums. See note in Methodology section.

went out, by hooking them in shallow water from a boat. "Usually we can catch all we want," said another crabber, "and see them through the water. But this year, nothing. We went real slow, close by the cliff, but nothing, absolutely nothing." After a spring storm, juvenile crab will be washed up on the beaches between Elim and Cape Darby. "We didn't see these little crab on the beach this summer like we did before," reported one person. One Elim man, who was born and raised at Golovin, went over to Golovin last spring and crabbed with Golovin people. He landed five there.

About five houses reported attempts at crabbing so far in 1983. One house got one crab, two houses worked together to get four, and two more houses tried but got nothing. Elim people miss the crab, especially the elders who are unable to crab themselves and depend on sharing networks. "We have no crab for several years," said one old man. "No one share with us. Can't share when they catch only one."

Savoonga

Savoonga data comes from a survey conducted in Savoonga from December 10 to December 15, 1982. Savoonga was the only village surveyed where the reported harvest and statistical averages resembled years prior to the introduction of the commerical crab fleet. Savoonga people crab in two different areas on St. Lawrence Island, the northside near the village and Southwest Cape where they hunt bowhead whales in April. The data from the two locations are considered separately, as they are different crab populations.

The village reported a total harvest of 823 crab on the north side in 1982, compared to only 1 crab in 1981, 16 crab in 1980, and 500 crab in 1979. More than twice as many houses crabbed in 1982 as reported in

most previous years of the survey, 21 houses, compared to 7 in 1981, 10 in 1980, and 9 in 1979. This could be one factor in the high total harvest. People spent more than twice as many days crabbing on the north side in 1982 as in past years. The 1982 report showed 179 days crabbing, compared to 24 days in 1981, 62 days in 1980, and 65 days in 1979. So not only were more houses crabbing, each house crabbed more days in 1982.

The average annual catch per house in 1982 was 41.2 crab, a dramatic improvement over 1981 when people caught 0.14 crab per house and 1980 when people caught 1.6 crab (Figure 5). In 1979 the average annual catch per house was 55.6 crab. The average daily catch per house was 4.7 crab in 1982, compared to 0.04 in 1981, 0.3 crab in 1980, and 7.7 crab in 1979.

Two households accounted for half of the harvest; each took about 200 crab. These were distributed in part through sharing networks to other houses in the village. One of these households used handlines; the other used both handlines and pots. Three households reported attempts with pots in 1982, a risky endeavor at this locale. Two of the households lost their pots. One pot fisherman never set his pot overnight, only about four hours at a time, but he still lost it in moving ice. Handlines remain the preferred method. The highly successful handliner above reported that a few of her crabs were quite large (one had a 30-inch leg span). Others reported small and medium-sized crab. The two successful crabbers were both aggressive in terms of effort and exploration. One woman reported using their holes on days after they had good luck and not catching many crabs.

On the south side of St. Lawrence, Savoonga people set up camp to hunt bowhead whales each April. While they wait for whales, they crab off the ice edge or through holes. But in 1982, a whale was struck

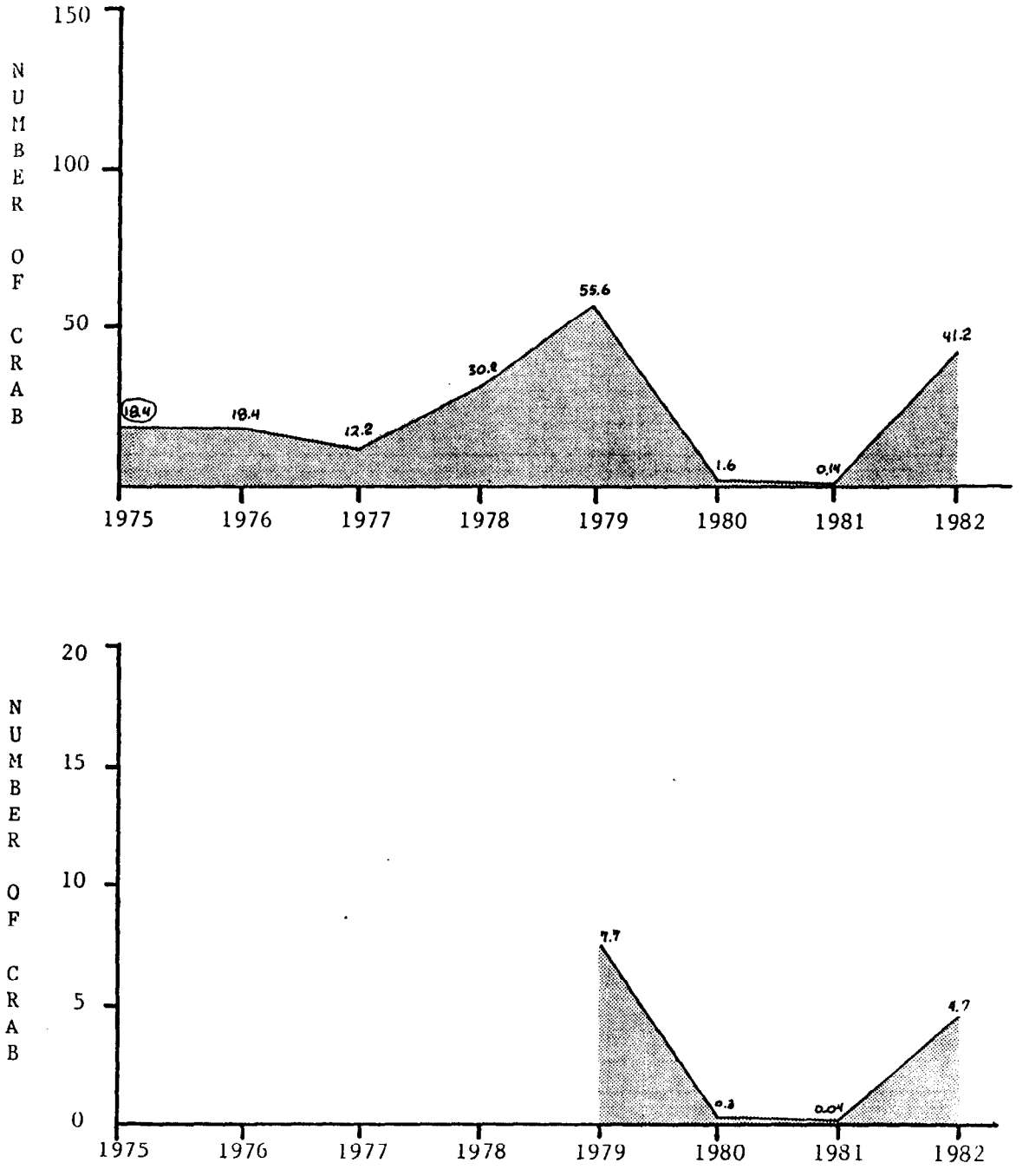

Figure 5: Average annual catch per house (top) and average daily catch per house (bottom) by Savoonga on the north side of St. Lawrence Island from 1975 to 1982. The total harvest reported by 20 houses in 1982 was 823.

Circled data are minimums. See note in methodology section.

before people had a chance to do much crabbing. By the time they had butchered the first whale, a second whale was struck. There was an accident; a boat was overturned by the bowhead, dumping the hunters into the water. All were rescued, but the whale was lost, and the village's quota of two strikes was exhausted. Whaling was over for the year and people returned to the winter village. Two houses reported crabbing, compared to 13 in 1981. One house was unsuccessful; the other reported catching "a few." Although the data is graphed in Figure 6, it should not be considered sufficient to evaluate crabbing potential at Southwest Cape in 1982.

SUMMARY

For crabbers in Nome, Golovin and Savoonga, 1982 harvests showed an increase over 1981 levels. In Nome the average annual catch and the average daily catch per household were 50 per cent greater than in 1981, but still only about 20 per cent of the 1978 averages. In Golovin, the averages were ten times last years's (when the village reported catching only four crab), and about 50 per cent of the pre-1980 averages. In Savoonga, north side averages were equal to or greater than pre-1980 catches. Southwest Cape data were too limited to support any conclusions about fishing success there.

For crabbers in Elim, 1982 was the most discouraging year in nearly a decade. Villagers there caught only seven crab and the averages per house were extremely small. Crab virtually disappeared from the crab grounds, a phenomenon experienced by Golovin a year earlier and by Nome two and three years earlier. Other signs, such as the lack of molting and juvenile crab in shallow waters near Elim this summer, suggest that 1983 harvests may be small as well.

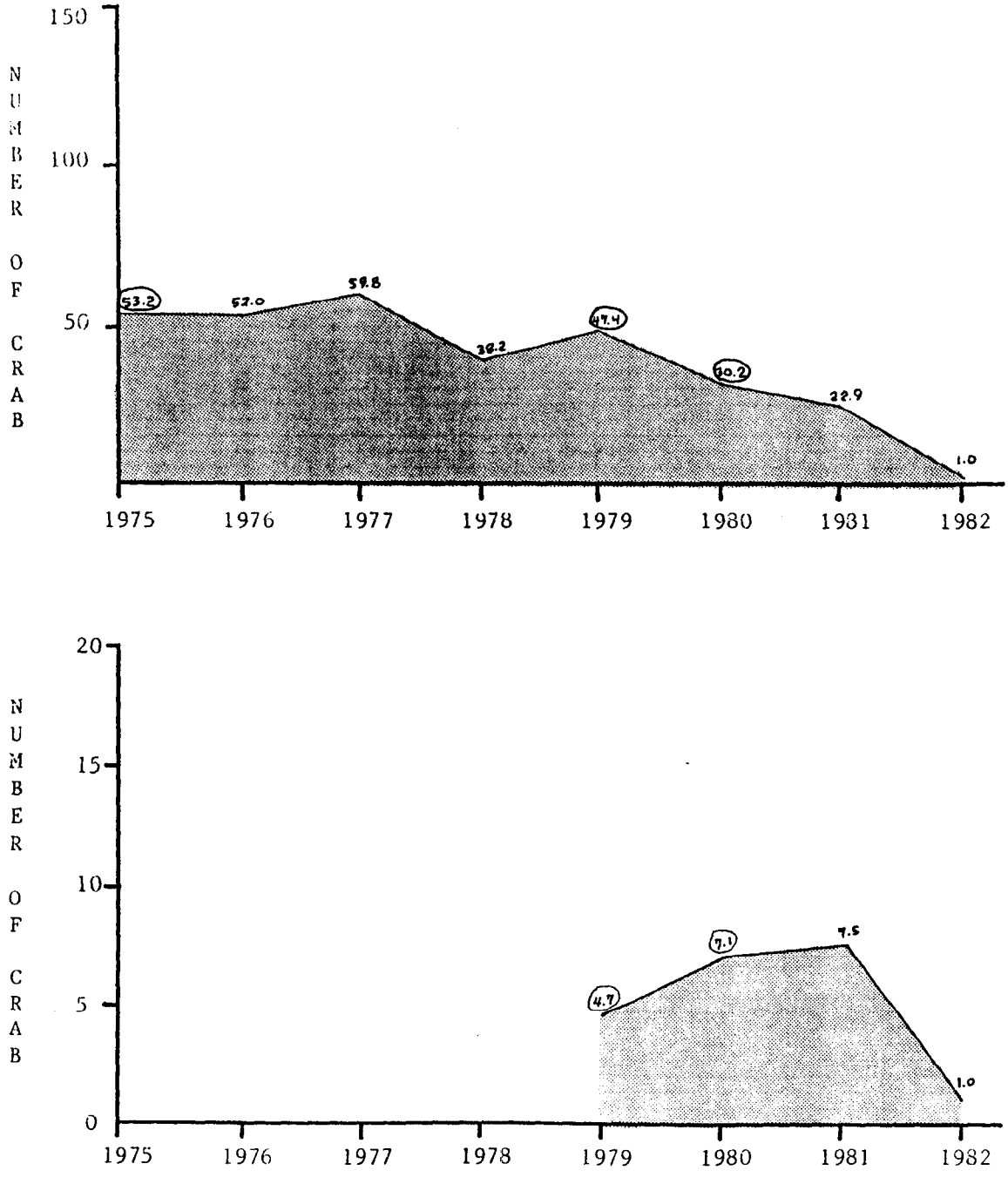

Figure 6: Average annual catch per house (top) and average daily catch per house (bottom) by Savoonga at Southwest Cape on St. Lawrence Island from 1975 to 1982. Only 2 houses reported crabbing at Southwest Cape in 1982, with a total harvest of 2 crab. See text for discussion.

Circled data are minimums. See note in methodology section.

The 1983 seasons in Nome and Savoonga appeared to be off to good starts, based on observations in Nome and informal reports from Savoonga. Nome crabbers did extremely well early in the season (20 crab per pot or per day handlining). But by early February, Nome crabbers were much less successful (2-3 crab per pot or per day handlining). Reports from Savoonga are incomplete, but apparently crabbers have had some success. Effort was reported for two crabbers in Golovin, they had no success. It is early for Golovin, since crabbing is best in March and April. Elim crabbers report catching about half a dozen crab by mid-February, so 1983 may be a better year than 1982.

A correlation between the decline in subsistence harvests and the development of the commercial fishery has been generally accepted, with the understanding that other factors also may have been involved. Crab tagged in the subsistence fishery have been returned from commercial pots. The decline in subsistence harvests directly followed the arrival of the commercial boats (see Figure 1). The magnitude of the fishery introduced by the commercial vessels had never before existed in the Norton Sound--Bering Strait area. As with the subsistence fishery, the commercial fishery has experienced a sharp decline in harvests. Commercial boats took fewer crab from Norton Sound in 1982 than in any previous year of the fishery. Although the optimum yield of 20 percent and the 15-mile closure restricted efforts, the primary reason for the low commercial take was the low population and wide distribution of legal-sized male crab (see Regnart and Schwarz 1983:2-3).

In each village surveyed for the updates, crabbers noted that crab are generally smaller now than they were four or five years ago. Norton Sound male crab stocks molt in September immediately after the commercial

fishery (Regnart and Schwarz 1983:6). Crab caught this winter by Nome crabbers tend to be recruit or pre-recruit crab that were not available to the commercial fleet during 1982. So the crab that are now supporting a modest recovery in Nome will be available to the commercial fleet during 1983. Continuing commercial efforts may reduce the number of larger, meatier, easy-to-process crab available for subsistence harvest.

Appendix 1

Protocol for Village Crab Survey

Following is the protocol of questions used in conducting the village crab surveys for the 1982 season. The questions were preceeded by a general introduction of the researcher and the project, in cases where the respondent did not know or remember the researcher.

1. "Did you go crabbing last winter?

(IF "NO", GO TO QUESTION 13)

2. "Where did you crab?

3. "What kind of gear did you use?

(ASK HANDLINE USERS)

4. "What months did you crab with handlines?

5. "How many trips did you make in (month 1, month 2, etc.)?

6. "How many crab did you catch in (month 1, month 2, etc.)?

7. "How many hours did you usually stay out when you crabbed?

(ASK POT USERS)

8. "What months did you set your pots?

9. "How many days were your pots set in (month 1, month 2, etc.)?

10. "How many crab did your pots catch in (month 1, month 2, etc.)?

(ASK ALL CRABBERS)

11. "Were your crab larger, smaller or about the same as before?

12. "Did you catch any females? Many eggs?

(ASK ALL RESPONDENTS)

13. "Do you have any comments about crabbing in general?"

Appendix 2

1982 Subsistence Harvests -- Raw Data

Nome

Nome data come from permits issued by the Division of Commercial Fisheries between December 21, 1981 and April 30, 1982. Permits included a day-by-day calendar where crabbers listed the number of crab caught, the hours fished, and the number of pots or handlines used. Permits were to be returned at the end of the crabbing season. One hundred three permits were issued; 74 were returned. Of those 74, 52 reported crabbing.

PERMIT #	HL DAYS	HL CRAB	HOURS/DAY	POT DAYS	POT CRAB	# POTS
01 did not return permit						
02	3	1				
03	2	9		32	184	
04	9	35				
05	1	0				
06 ambiguous data, see note below						
07	3	0				
08 did not return permit						
09	3	0				
10 did not crab						
11 did not return permit						
12				31	143	
13 did not return permit						
14 did not return permit						
15 did not return permit						
16 did not return permit						
17 did not return permit						
18 did not return permit						
19	2	0				
20 did not return permit						
21 did not return permit						
22 did not crab						
23				17	7	
24 did not return permit						
25 did not return permit						
26 did not return permit						
27 ambiguous data, see note below						
28				1	0	
29				8	24	
30				21	0	
31 did not crab						
32				12	59	
33	8	27		51	10	
34	4	12		5	32	

PERMIT #	HL DAYS	HL CRAB	HOURS/DAY	POT DAYS	POT CRAB	# POTS
35				10		27
36	3	19				
37 did not crab						
38				4		25
39 did not crab						
40 did not crab						
41 ambiguous data, see note below						
42 did not return permit						
43	2	12				
44	2	11				
45 did not return permit						
46	4	14				
47	1	7				
48 did not return permit						
49 did not return permit						
50 did not crab						
51 did not crab						
52	6	39				
53	2	8				
54 did not return permit						
55 did not return premit						
56 did not crab						
57 did not crab						
58	3	22				
59 did not crab						
60 did not return permit						
61	2	6				
62 did not crab						
63	1	5				
64	2	10				
65 did not crab						
66				8		13
67 did not crab						
68	1	1				
69	4	0				
70	1	0				
71 did not return permit						
72 did not return permit						
73 did not crab						
74				5		2
75 did not crab						
76				1		4
77						
78 did not return permit						
79	1	2				
80 did not return permit						
81 did not return permit						

PERMIT #	HL DAYS	HL CRAB	HOURS/DAY	POT DAYS	POT CRAB # POTS
82 did not return permit					
83	1	3			
84 did not crab					
85 did not crab					
86 lost pots					
87 did not return permit					
88 did not crab					
89 did not crab					
90				3	12
91				42	9
92	3	0			
93 ambiguous data, see note below					
94				105	196
95 did not crab					
96				7	10
97	2	1			
98	1	2			
99 did not return permit					
100	1	0			
101	3	0			
102 did not crab					
103				49	162
#?1	3	0			
#?2 ambiguous data, see note below					
TOTALS	84	246		412	919
ADJ TOT	93	274		448	1,014

The last two permits (indicated by #?) were returned without numbers. There were five permits (numbers 06, 27, 41, 93, and #?2) which had ambiguous data about the type of gear used or about the number of days crabbed. After the other permits were totalled and the average annual and daily catches per house figured, the following extrapolations were used. When the gear type was unknown, the reported catch and effort were apportioned among handlines and pots according to the following formulas. The percentages of crab caught with each type of gear and the number of days fished with each type of gear are based on the averages reported by all other 1982 permittees.

Number of Crab Caught X 21% = Number of Crab by Handline
Number of Crab Caught x 79% = Number of Crab by Pot
Number of Days Fished X 17% = Number of Days by Handline
Number of Days Fished X 83% = Number of Days by Pot

When the catch and gear were known, but the number of days was not, the catch was divided by the average daily catch reported by other crabbers. Performing these extrapolations on the five ambigious permits resulted

in the addition of 9 days to the handline effort total, 28 crab to the handline harvest total, 36 days to the pot effort total, and 95 crab to the pot harvest total.

Golovin

Golovin data were gathered during October and November, as part of a larger baseline study of Golovin subsistence resources. This researcher lived in Golovin from May through November 1982; the combined data below (houses 05 and 12, for example) represent a better understanding of subsistence production systems. In that instance, people from two houses crabbed together and shared their catch; the data under House 12 is the total of their catch. Twenty one houses were contacted, of those 14 houses reported crabbing.

HOUSE	HL DAYS	HL CRAB	HOURS/DAY	POT DAYS	POT CRAB	# POTS
01 did not crab						
02	1	2-3				
03 did not crab						
04	1	23				
05 crabbed with #12						
06	3	1				
07	2	6				
08 not available						
09 did not crab						
10 not available						
11 did not crab						
12	3	6				
13 did not crab						
14	12	30				
15 not available						
16 did not crab						
17 not available						
18 crabbed with #12						
19 crabbed with #07						
20	2	23				
21	3	10				
22 not available						
23 see note below						
24	1	2-3				
25	5	0				
TOTALS	33	103-105		no one fished pots		
ADJ TOT	36	164				

House 23 was clearly a productive crabber, but his response to the survey questions was simply that he caught about 20 each trip. Other crabbers made an average of 2.5 trips to crab during 1982. This crabber made at

least that many; he is one of Golovin's most productive subsistence hunters and fishers. The adjusted total assumes that he made three trips. His catch of about 20 per trip would make his total catch 60 crab. Midpoints of ranges were used to figure averages and adjusted totals.

Elim

Elim data come from a house-to-house survey administered between February 4 and February 9, 1983. Thomas contacted 23 houses in 1980, 24 were contacted in 1981, and 29 were contacted in 1982. The reported 1982 harvest was so low that a concerted effort was made to contact all available houses. Of the 29 houses contacted, 13 reported crabbing.

HOUSE	HL DAYS	HL CRAB	HOURS/DAY	POT DAYS	POT CRAB	# POTS
01	2	0	4-12			
02 did not crab						
03 did not crab						
04	1	0	3-4			
05 did not crab						
06	8-12	0		14	0	1
07	1	1				
08 did not crab						
09 crabbed with #11						
10	several	0	6-8			
11	8-10	0				
12 did not crab						
13 did not crab						
14	?	hardly any		90	0	1
15 did not crab						
16 did not crab						
17	?	0				
18 did not crab						
19 not available						
20 did not crab						
21 did not crab						
22 not available						
23 did not crab						
24	2-3	0	24			
25	10	1	5-6			
26	8	4				
27 not available						
28 did not crab						
29 did not crab						
30 did not crab						
31 did not crab						
32	7	0	3-4			

HOUSE	HL DAYS	HL CRAB	HOURS/DAY	POT DAYS	POT CRAB	# POTS
TOTALS	47-54	6		104	0	
ADJ TOT	64	6		104	0	

House 10 reported crabbing "several" days; the value 3 was used as explained in the methodology section. House 14 could not remember how many days they crabbed; they were assigned the village average effort of 5 days. They reported catching "hardly any" crab and were assigned the average catch of 1 crab. House 17 reported crabbing "quite a few" days; they were assigned the village average of 5 days. Midpoints of ranges were used to figure averages and adjusted totals.

Savoonga

Savoonga data come from a survey conducted between December 10 and December 15, 1982. Thirty one houses were contacted in previous surveys, an attempt was made to contact those same houses in 1982. Only two houses reported crabbing at Southwest Cape, as explained in the findings section. A total of 26 houses was contacted; 20 reported crabbing. In the table below, "NS" means the north side of St. Lawrence Island and "SW" means Southwest Cape on St. Lawrence Island.

HOUSE	NS DAYS	NS CRAB	HOURS/DAY	SW DAYS	SW CRAB
00	3	8		1	few
01	5-7	15			
02	not available				
03	2	7	4-5		
04	2	7			
05	16-18	230-324	3-4		
06	?	(50)	8		
07	8	18	4-8		
08	1	3-4	4		
09	not available				
10	not available				
11	3-4	8-10	6-10		
12	few	0			
13	not available				
14			2-3	1	0
15	4-5	7-8	6-8		
16	did not crab				
17	did not crab				
18	not available				
19	3	13	4-8		
20	7-10	5	4		
21	did not crab				
22	did not crab				

HOUSE	NS DAYS	NS CRAB	HOURS/DAY	SW DAYS	SW CRAB
23	14-20	60-80			
24	12-16	<200			
25	9	40	6-10		
26	4	6	6-8		
27	36	7-8	8		
28	4-6	8-18	4		
29	22	66	4		
30 did not crab					
TOTALS	155-176	708-837		2	0
ADJ TOT	179	823		2	2

To figure the adjusted totals, the value "2" was substituted when respondents replied "few," as did House 00 and House 12. House 06 remembered catching 50 crab, but could not remember how many days they crabbed. After the other houses were totalled and the averages figured, House 06's catch of 50 was divided by the average daily catch of other houses, for a total effort of 11 days. House 24's catch of "less than 200" was added as 200. To figure averages and adjusted totals, midpoints of the ranges were used.

Appendix 3

Notes on Figure 1

Because only sample villages were surveyed for 1981 and 1982 harvests, it is not possible to simply add the survey totals to get a total for the Norton Sound Section. Thomas' data were analyzed to determine if each village usually harvests a similar percentage of the total section harvests each year. It was discovered that these percentages were remarkably stable from year to year, with the exception of 1979. That year, Nome crabbers did poorly, while certain village crabbers did better than usual. For example, except for 1979, Nome crabbers harvested an average of 76.2 per cent of the section total, with a range of 74-79 per cent. Golovin crabbers harvested an average of 8.6 per cent, with a range of 6-11 per cent.

Therefore, to construct an approximate total subsistence harvest for 1981 and 1982, the village totals from Elim and Golovin were divided by the average percentage of the total harvest taken in Elim and Golovin. The same procedure was applied to Nome's harvest total. In 1981 these two procedures gave an extrapolated harvest of 547 (based on Elim and Golovin) and 486 (based on Nome). The 1981 harvest was assumed to be about 500 for the entire Norton Sound Section. In 1982, these two procedures gave an extrapolated harvest of 894 (based on Elim and Golovin) and 1,694 (based on Nome). Since it is known that the harvest totalled at least 1,458 (Nome + Golovin + Elim), the extrapolated harvest for the Norton Sound Section should not be less than 1,500. This is the figure that is used to construct Figure 1. The scale of the graph is so large that these extrapolations should be well within the margin of error.

Data on the commercial harvests in Figure 1 come from information published by the Divison of Commercial Fisheries, and is based on delivery records.

Savoonga, Gambell, and Little Diomede are not represented in Figure 1 because they are in the General Section. A more detailed explanation of these extrapolations can be found in the 1981 update (Appendix 2).

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